THE ADOPTION OF HEALTHCARE INFORMATION SYSTEMS WITHIN PUBLIC HOSPITALS IN KURDISTAN REGION OF IRAQ

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Abstrak

Menurut laporan yang dikeluarkan oleh kerajaan Negara Iraq, penggunaan sistem Maklumat Penjagaan Kesihatan (HIS) hospital awam di Iraq adalah masih rendah dan tidak mencapai sasaran yang diharapkan oleh kerajaan walaupun telah banyak pelaburan untuk pembangunan sistem ini. Oleh yang demikian, perlu adanya kajian untuk mengenalpasti isu yang mendorong kepada penggunaan HIS dan menilai kesan dimensi yang berlainan (individu, teknologi, organisasi dan persekitaran) terhadap penerimaan HIS di Iraq. Objektif utama kajian adalah untuk meneroka faktor sebenar yang mempengaruhi penggunaan HIS dalam kalangan pengamal penjagaan kesihatan di hospital awam di Wilayah Kurdistan, Iraq (KRI). Selain dari itu, kajian ini mengkaji kesan terhadap dimensi yang berbeza ke atas sikap pengamal penjagaan kesihatan dalam penggunaan HIS demi penghasilan pengetahuan yang penting tentang penggunaan HIS. Kaedah campuran digunakan untuk kajian ini. Pengumpulan data dimulakan dengan kajian kualitatif menggunakan temubual separa struktur dengan lapan orang professional penjagaan kesihatan dan seterusnya kajian kuantitatif dijalankan melalui kaji selidik dalam kalangan 551 responden menggunakan soal selidik pentaksiran kendiri. Kajian kualitatif telah melalui temubual separa struktur telah mengcungkil 26 tema. Di samping itu, hasil daripada kajian kuantitatif mendapati bahawa penggunaan HIS dipengaruhi secara singnifikan oleh dimensi individu, teknologi, organisasi dan persekitaran secara kolektif. Melalui kaedah kualitatif di dalam konteks baru kajian ini, telah mengutarakan isu (individu, teknologi, organisasi dan persekitaran) sebenar yang mempengaruhi penggunaan HIS. Di samping itu, satu model yang lengkap dan menyeluruh berdasarkan kepada Teori Penerimaan dan Penggunaan Teknologi (UTAUT) telah dibangunkan. Kajian ini telah menghasilkan pengetahuan dan maklumat yang berharga mengenai isu penggunaan HIS untuk kegunaan literatur, pihak bertanggungjawab di sektor penjagaan kesihatan dan pengkaji di Iraq.

Kata kunci: Penerimaan sistem maklumat penjagaan kesihatan, Wilayah Kurdistan, Hospital awam.

Abstract

In Iraq, government reports stated that the adoption of Healthcare Information Systems (HIS) is still low and below the aspirations of the government despite the investments in the system development. For this reason, there was a need to explore and investigate the actual issues that influence the adoption of HIS, and to examine the effect of different dimensions (i.e. the individual, technological, organizational and environmental) on the adoption of HIS in Iraq. The main objective of the study is to explore the factors that affect the adoption of HIS among healthcare practitioners within Kurdistan Region of Iraq (KRI) public hospitals. Furthermore, another goal was to examine the influence of different dimensions on the healthcare practitioners' adoption behavior in order to produce the essential knowledge regarding HIS adoption. The study used a mixed method approach. The data collection started with a qualitative study using semi-structured interviews with eight healthcare professionals and then followed by a quantitative study that was conducted among 551 respondents using self-administered questionnaires. The qualitative study resulted in 26 themes that were elicited from the interviews. Moreover, the findings of the quantitative study indicated that the adoption of HIS was significantly influenced by different individual, technological, organizational and the environmental dimensions collectively. The study revealed the actual issues (i.e. the individual, technological, organizational and environmental) facing the adoption of HIS within the study's new context through the qualitative investigation. Moreover, a comprehensive and holistic model based on the Unified Theory of Acceptance and Use of Technology (UTAUT) was presented. The study presented the essential knowledge and information to the literature, healthcare practitioners and researchers in Iraq regarding the issue of HIS adoption.

Keywords: Healthcare Information Systems adoption, Kurdistan region, Public hospitals.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Healthcare Information Systems (HIS) are used to support and perform numerous tasks and activities regarding healthcare provision within healthcare institutions (Bhattacherjee, Hikmet, Menachemi, Kayhan, & Brooks, 2006; Goldzweig, Towfigh, Maglione, & Shekelle, 2009; Herricck, Gorman, & Goodman, 2010). These HIS systems can deliver valuable benefits through more effective healthcare services, less medical errors, integration of patients' information with better accessibility to patients' medical history, aiding decision support tasks, reducing adverse drug events and improving managerial functionalities and efficiency (Buntin, Burke, Hoaglin, & Blumenthal, 2011; Goldzweig et al., 2009; McGinn et al., 2011). Furthermore, HIS involve a wide range of technologies such as clinical, administrative and strategic systems depending on the purpose intended from those systems and the functionalities and tasks they perform (Bhattacherjee et al., 2006).

HIS can help to overcome traditional healthcare institutions' drawbacks and issues. For example, traditional (i.e. paper-based) healthcare institutions can involve issues like inability of the pharmacist to read a hand written prescription; or a doctor trying to make a medical decision based on incomplete patient-chart and lack of patient's medical history (Adler-Milstein & Bates, 2010). Kohn and his collegues (2000) reported that approximately tens of thousands of patients are deceased every year due to medical errors and it is believed that the implementation of HIS innovations would decrease such

cases by preventing or at least minimizing human produced errors in healthcare sector (Kohn et al., 2000).

However, for HIS to achieve the intended objectives it should be used and adopted by healthcare staff in the first place. This adoption of HIS by healthcare staff is an essential step and a precondition for its success (Brewster, Mountain, Wessels, Kelly, & Hawley, 2013; Chen & Hsiao, 2012; McGinn et al., 2011; Venkatesh & Zhang, 2010). In spite of their importance, the adoption of HIS is still relatively low among healthcare staff compared to the adoption of other technological innovations in other industries (Cresswell & Sheikh, 2013; Escobar-Rodríguez & Romero-Alonso, 2013; Venkatesh, Sykes, & Zhang, 2011). The challenges facing the adoption of HIS are related to numerous factors; some of these factors reflect the characteristics of the individual himself/herself, while other factors reflect the attributes of the technology itself, the organization and other external factors (i.e. it is a multidimensional process) (Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013; Jeyaraj, Rottman, & Lacity, 2006; Yusof, Kuljis, Papazafeiropoulou, & Stergioulas, 2008). Undermining the importance of these factors or neglecting some of them might lead to low adoption of the HIS, and in numerous events the implementation of HIS was faced by such situation and resulted in staff resistance, workarounds, and even failure (Bah et al., 2011; Boonstra & Broekhuis, 2010; Brewster et al., 2013; Kaplan & Harris-Salamone, 2009; Kitsiou, Manthou, Vlachopoulou, & Markos, 2010; Novak, Anders, Gadd, & Lorenzi, 2012; Trivedi et al., 2009). Moreover, the important issue that was highlighted by several researchers, is that each context and settings has its own circumstances and conditions that need to be taken into consideration when approaching that environment (Boonstra & Broekhuis, 2010;

Holden & Karsh, 2010; Novak et al., 2012). Furthermore, the size of empirical studies regarding the adoption of HIS within developing and middle east countries is scarce in comparison with western countries (Gagnon et al., 2012; McGinn et al., 2011); which highlights a gap in the literature regarding this vital domain of research. Moreover, the literature has underlined a problematic situation about the HIS adoption within Iraq public healthcare sector (Al Hilfi, Lafta, & Burnham, 2013; Ali, Abdulsalam, & Hasan, 2011); that's why the current study tried to fill this gap by providing a deeper and clearer understanding about the factors that affect the adoption of HIS in the study's new context and environment which is the public hospitals in Kurdistan Region of Iraq (KRI) by applying a mixed method approach. In the following section, the motivations for this study and the background information regarding the issue it addresses are presented in a detailed manner.

1.2 Problem Statement

Despite the importance, the advantages that Information Systems (IS) offer to its organizations within different domains and the accumulated expertise that is available in the field, the adoption of those systems is still a challenging task as declared by Laumer and his co-researchers "perfect system can still be resisted by employees" (2015, p. 11). Another report declared that about 18 percent of IT systems failed, canceled or were abandoned and more than 40 percent of the IT systems faced different challenges like delays, over budget problems and unfulfillment of required functionality (StandishGroup, 2013). This issue is also present in healthcare sector as many researchers concluded that the mere provision or existence of such systems within healthcare institutions is not sufficient to assure their adoption (Aldosari, 2014; Avgar,

Litwin, & Pronovost, 2012; Thakur, Hsu, & Fontenot, 2012). Still, as much as 40 percent of these HIS projects have either failed or were abandoned (Kaplan & Harris-Salamone, 2009). Other projects received low adoption or to some extent were rejected (Aarts & Gorman, 2007; Al Hilfi, Lafta, & Burnham, 2013; Alkadi, 2016; Bah et al., 2011; Bramson & Bramson, 2005; Escobar-Rodríguez & Romero-Alonso, 2013; Holden & Karsh, 2010; Hollis et al., 2015; Taylor, Coates, Wessels, Mountain, & Hawley, 2015). Several motivations stimulate HIS adoption studies in order to address the main barriers and avoid such unintended consequences and as follows:

Public and private sectors are investing and allocating considerable funds in order to upgrade their technological infrastructures with the aim to provide better quality healthcare services to the citizens, improve the overall healthcare outcomes and enhance the circumstances of the ergonomics for those who work in the healthcare facilities. For example, the United States Congress alone allocated 20 billion dollars for health HIS sector in the year 2009 in order to harvest the benefits and emphasize the importance of using HIS within this sector (Kaplan & Harris-Salamone, 2009). Other numerous initiatives have been established in the HIS sector and massive funds have been allocated to achieve the above goals in developed and developing countries (Bossen, Jensen, & Udsen, 2013; Dobrev et al., 2010; e-Health ERA Report, 2007; Hollis et al., 2015; Househ, Al-Tuwaijri, & Al-Dosari, 2010; Infoway, 2009; Jones & Wittie, 2015; McHugh et al., 2016; The Department of Health Australian Government, 2010). This point signifies the importance of HIS adoption within healthcare institutions because failing to do so will cause these large investments and funds to be wasted and unfruitfuly exploited; funds that might not be available twice for the organization to be spent and for the same purpose.

On the other hand, resistance of the staff is one of the main reasons behind the low adoption of new information systems within organizations as stated by (H.-W. Kim & Kankanhalli, 2009; Laumer et al., 2015); healthcare staff are also known for being reluctant to change their work routines and shifting to new procedures (Hadji, Martin, Dupuis, Campoy, & Degoulet, 2016; Taylor et al., 2015; Thakur et al., 2012; Venkatesh et al., 2011). Moreover, several researchers differentiated healthcare staff from other employees working in other organizations due to their individual attributes and their job requirements as they deal with critical patients' data, use sophisticated systems and must avoid medical errors that might result in harsh consequences (Escobar-Rodríguez & Romero-Alonso, 2013; Holden & Karsh, 2010). This attitude (i.e. resistance) of healthcare professionals is due to numerous factors, such as the complexity of the HIS systems (Avgar et al., 2012; Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013; Lluch, 2011); the pressure felt by the staff due to the severe consequences of committing medical errors and other issues (Herricck et al., 2010). Moreover, the literature has highlighted that the adoption of those HIS systems is dependent on a collection of interrelated factors that have to be accounted for collectively (Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013; Jeyaraj et al., 2006; Yusof et al., 2008), and that each context and settings has its own specific characteristics that need to be addressed separately (Holden & Karsh, 2010; Novak et al., 2012). This concept goes in parallel with the statement of Boonstra and Broekhuis (2010, p. 16) "it would be wrong to conclude that there is a one way fits all", meaning that each situation has its own specificity. In-line with this, other studies like (Prasanna & Huggins, 2016, p. 179) , have stated that "Context specific factors are not usually considered in generic technology acceptance research", which is deemed to be a shortage in those studies.

Other studies have also concluded that HIS projects could fail if the requirements of the context and the process were underestimated (Hage, Roo, van Offenbeek, & Boonstra, 2013; Hollis et al., 2015).

The bottom line is that investments in health HIS require huge budgets and the risk of these systems not to be adopted or not to be fully operationalized because of the healthcare staff being unwilling or incapable of using those systems as in many cases is still probable and this will result in a great loss and waste of valuable funds. Taking the previous points into consideration encouraged and urged the current study to further investigate the factors that contribute to the adoption of HIS as a significant prerequisite for the success of those systems in the study's new context.

Furthermore, researchers stated that the application of adoption theories in new contexts and environments will not only produce new results, it will also assert the generalizability of those models; the special characteristics and features of the new context will derive the emergence of new variables and relationships which are suitable for describing the new environment, context and society; also, the significance of the factors that influence users' adoption will not remain the same when studied within developed and developing countries or within western and eastern communities as the values, cultures and believes of those communities are quite different and it will affect their behavior regarding technology adoption (Aldosari, 2014; Baker, Al-Gahtani, & Hubona, 2010; Castillo, Martínez-García, & Pulido, 2010; Novak et al., 2012; Venkatesh et al., 2011; Venkatesh & Zhang, 2010).

Moreover, studies of real-world systems within their context can be of great importance as it will reveal the facts about that specific environment to decision makers (Goldzweig et al., 2009). It is also possible to find varying levels of adoption even within the borders of the same country. Aldosari (2014) in his study to examine the adoption of HIS within 22 hospitals in Riyadh, the capital city of Saudi Arabia, found an approximate 50 percent of adoption in those hospitals which was much higher than a 16 percent adoption concluded by another study (Bah et al., 2011), the latter study involved hospitals along the eastern province of Saudi Arabia and this emphasizes the importance of context in such studies. Studies like (Venkatesh et al., 2011; Venkatesh & Zhang, 2010) encouraged the endeavor of re-examining adoption models within new contexts in order to affirm the applicability and generalizability of those models into new horizons of the knowledge body.

Worthy of mentioning, a large portion of the user adoption studies related to healthcare sector were implemented within a small-scale or a limited scope (i.e. within the boundaries of a single hospital or with relatively local population of participants) and this was one of the main limitations in those studies which holds back the generalizability of its findings on a larger scale (Aldosari, 2012; Chen & Hsiao, 2012; Duyck et al., 2007; Pynoo et al., 2012; Venkatesh et al., 2011). According to the systematic review conducted by (McGinn et al., 2011), the researchers studied the factors affecting the adoption of HIS in western countries and found that only about 15 percent of the studies were carried out on a national level while the majority were implemented on a local limited scale which holds the generalizability of those studies' results. Similarly, Escobar-Rodríguez and Romero-Alonso (2013) stated that research

size in the area of HIS adoption compared to other industries is relatively small. Also, Gagnon and his collegues (2012) noted that the larger portion of such studies are conducted in developed countries; other researchers also found a shortage in the size of empirical studies in the area of HIS adoption in developing countries (Aldosari, 2012; Kijsanayotin, Pannarunothai, & Speedie, 2009; Najaftorkaman, Ghapanchi, Talaei-Khoei, & Ray, 2014); therefore, this limitation in the literature adds another motivation for the current study to be conducted within KRI of Iraq and further investigate this vital domain of research.

The UTAUT model (Venkatesh, Morris, Davis, & Davis, 2003) which was used as the theoretical framework for this study was found to be less robust in explaining both behavioral intention and use of information systems within healthcare settings than other domains (Bennani & Oumlil, 2013; IC Chang, Hwang, Hung, & Li, 2007; Duyck et al., 2007; Ifinedo, 2012; Venkatesh et al., 2011; Wills, El-Gayar, & Bennett, 2008). Moreover, the study of (Cresswell & Sheikh, 2013) concluded that there is a lack of empirical studies that took a comprehensive and holistic approach in covering all the important dimensions related to the adoption of HIS within the healthcare context. For those reasons, the current study extended the UTAUT model by incorporating important factors derived from the environment itself and the literature to propose a more complete and comprehensive model.

Additionally, and according to Human Development Report (UNDP, 2015), Iraq's rank was 121; this position is lagging behind many other Arabic and neighboring countries as displayed in Table 1.1.

Table 1.1

Country ranking according to UNDB

Country	Human Development Index Rank (HDI)	Country	Human Development Index Rank (HDI)
Qatar	32	Iran	69
Saudi Arabia	39	Turkey	72
United Arab Emirates	41	Jordan	80
Bahrain	45	Algeria	83
Kuwait	48	Tunisia	96
Oman	52	Egypt	108
Malaysia	62	Iraq	121

Al Hilfi and his collegues (2013) stated that the current HIS are not being used effectively in Iraqi hospitals. The same report declared that the number of academic work published in healthcare domain is low compared to other countries which presents a gap in the field of healthcare provision in general and in the field of HIS adoption in particular, especially regarding to the factors and variables that actually stand behind the lagging adoption of HIS and the issues related to this stumbling situation. Another governmental report issued by the Iraqi Ministry of Health in cooperation with the World Health Organization (Ali et al., 2011) declared that large funds have been employed throughout the previous years in HIS projects, but the assessment of those systems in regard to its management, usage and adoption resulted in weak and poor. Efforts and research are required to enhance the current situation and to improve the usage and adoption of HIS in the public hospitals of Iraq. The current study was carried

out in Kurdistan Region of Iraq which is the northern part of the country because KRI is considered to be the most secure, safe and developed part of Iraq (Khayyat & Heshmati, 2013), which enabled the study to evaluate the most modern healthcare institutions in the country and to assess the most up-to-date developments in the field of healthcare. To the best of our knowledge, this study is one of the first empirical studies that have been carried out to examine the issue of HIS adoption in KRI of Iraq public hospitals.

Taking the above motivations into account, the **problem statement** is going to be:

There is a need to investigate the problematic issue of HIS adoption within the public hospitals in Kurdistan Region of Iraq in order to form an insightful understanding about the challenges and factors surrounding the adoption behavior of the healthcare professionals. And for this purpose, a mix of both qualitative and quantitative methods was employed to produce a clear and thorough comprehension about this issue.

1.3 Theoretical Framework

The current study used the underpinning theory of UTAUT (Venkatesh et al., 2003) as the theoretical framework for examining the adoption of HIS among healthcare staff within the public hospitals of Kurdistan Region of Iraq. The UTAUT model proved to be a robust model in studying individuals' adoption of new technologies within different domains (Alshehri, Drew, Alhussain, & Alghamdi, 2012; Rodrigues, Sarabdeen, & Balasubramanian, 2016; Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012; Venkatesh & Zhang, 2010; Yu, 2012). In the original UTAUT model, the study was able to explain about 70% and 50% of the variance in regard to both behavioral intention and use of technology, respectively. However, within healthcare context the UTAUT model

did not show the same robustness in regard to explaining healthcare staff's behavior towards HIS adoption and the results from several studies were much less than the variance explained within the original UTAUT model which highlights a shortage of the UTAUT model within healthcare context (Bennani & Oumlil, 2013; IC Chang et al., 2007; Duyck et al., 2007; Ifinedo, 2012; Venkatesh et al., 2011; Wills et al., 2008).

Furthermore, the empirical studies that were conducted within healthcare context and used the UTAUT model produced fluctuating results regarding the significance of the UTAUT model's constructs (Duyck et al., 2007; Ifinedo, 2012; Liu et al., 2014; Schaper & Pervan, 2007; Venkatesh et al., 2011), which emphasizes the impact of the environment and the respondents on the results of technology adoption studies. Venkatesh and his collegues in their study (2011) also suggested that the UTAUT model needs further testing within different healthcare settings in order to provide a better understanding about the adoption of different HIS innovations among healthcare staff in new environments. Such findings from the literature encouraged this study to use the UTAUT model to further examine its robustness within the study's new context which is the public hospitals in KRI of Iraq. Moreover, in order to give the UTAUT model a more holistic view about the HIS adoption and to improve its power of predicting users' behavior, this study integrated other important factors into the UTAUT model; those factors were selected depending on the results of a preliminary qualitative study in combination with a thorough review of the literature. Those added factors were intended to cover different aspects of the adoption behavior that were mentioned in the literature (Jeyaraj et al., 2006; Yusof et al., 2008) in order to complement the shortage of the UTAUT model within healthcare context. By extending the UTAUT model and

covering all the important aspects that are related to the adoption behavior, the study fills the gap in the literature and contributes to this important area of research.

1.4 Research Questions

The following are the current study's research questions:

1. What are the current issues and factors that are influencing healthcare professionals in regard to the adoption of HIS in public hospitals in Kurdistan Region of Iraq?
2. To what extent individual, technological, organizational and environmental characteristics affect the adoption of HIS in public hospitals in Kurdistan Region of Iraq?
3. To what extent moderator factors affect the adoption of HIS in public hospitals in Kurdistan Region of Iraq?

1.5 Research Objectives

1. To identify the current issues and factors that are influencing healthcare professionals in regard to the adoption of HIS in public hospitals in Kurdistan Region of Iraq.
2. To examine the effect of individual, technological, organizational and environmental characteristics on the adoption of HIS in public hospitals in Kurdistan Region of Iraq.
3. To examine the effect of moderator factors on the adoption of HIS in public hospitals in Kurdistan Region of Iraq.

1.6 Scope of the Study

The healthcare sector is one of the important sectors in any community since it is concerned with people's most valuable possession, which is their health. So, examining the factors that affect HIS usage and adoption among healthcare staff in healthcare settings is a vital and a worthwhile issue, as it will eventually lead to successful implementation of those systems and improve healthcare provision to citizens.

The Iraqi Ministry of Health report (Ali et al., 2011) stated that the assessment of HIS systems within Iraqi public hospitals in regard to its usage, adoption, and management resulted in poor and disappointing. Another study (Al Hilfi et al., 2013) also stated that HIS innovations are inefficiently used among healthcare staff within Iraqi hospitals; the thing that encouraged the current study to thoroughly investigate this issue to understand the reasons behind this problematic situation within the public healthcare sector. The current study conducted its empirical investigation within the public hospitals in Kurdistan Region of Iraq (KRI), because it is considered to be the most secure, safe and developed part of the country (Khayyat & Heshmati, 2013), which enables the study to evaluate the most modern healthcare institutions in the country and to assess the most up-to-date developments in the field of healthcare. Furthermore, the current study focused on the perceptions of healthcare professionals regarding their usage of clinical and administrative information systems within the public hospitals of KRI as the scope for this study.

1.7 Research Design

Research design represents the roadmap for carrying out the research in a detailed manner; it specifies the data collection methods, the appropriate analysis tools and any other important practical steps needed to address the research questions (Creswell, 2009). The current study started by reviewing the literature for the purpose of identifying the problem statement and selecting the appropriate theoretical framework. Since this study embraced a mixed methods approach, a preliminary qualitative study was conducted using semi-structured interviews with open-ended questions for the aim of exploring the field of public healthcare in Kurdistan Region of Iraq and to underline the issues and challenges that face the healthcare professionals regarding the use and adoption of healthcare information systems.

Depending on the results of the semi-structured interviews and the review of the related literature, a set of potential factors was identified that could contribute to the issue of HIS adoption in KRI public healthcare sector and a set of hypotheses was conceptualized in order to produce the study's proposed model. Then, a quantitative method (i.e. survey) was performed to investigate the opinions and perceptions of healthcare professionals working in the public hospitals of Kurdistan region to test the proposed hypotheses and to come up with generalized conclusions. Structural Equation Modeling (SEM) and specifically the partial least squares (PLS) technique was used to analyze the survey observations and to test the study hypotheses. Figure 1.1 portrays the research design in a summarized way.

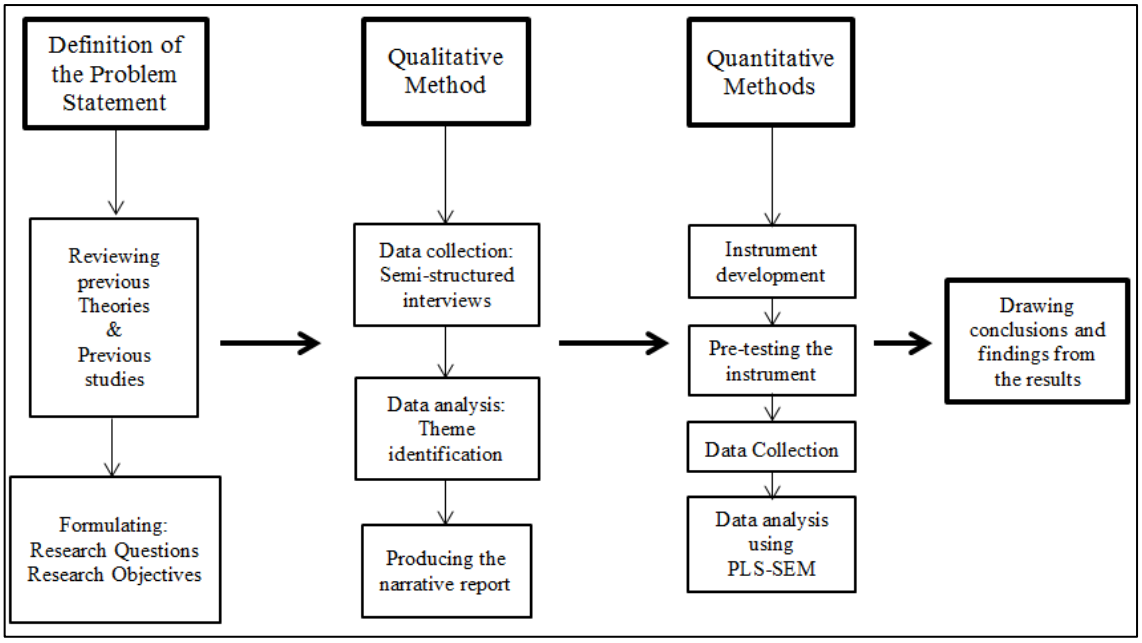


Figure 1.1. Research Design

1.8 Structure of the Thesis

Chapter one introduces an entrance to the topic of the study which is examining the adoption of HIS among healthcare staff within public hospitals in KRI of Iraq. It also presents the background of the problem statement and the motivations to conduct the current study. Moreover, the chapter introduces the research questions, objectives and scope. It also explains the theoretical framework for this study and concludes by presenting the research design.

Chapter two presents a thorough description of HIS, its types, benefits and the barriers that face the adoption of these technologies. The chapter also presents a review of the literature regarding the previous studies that examined HIS adoption within different contexts with the findings resulted from those studies. Moreover, the chapter reviews a number of the important technology adoption theories with a description of each theory

and the factors covered by the theory. Finally, the chapter concludes by explaining the hypothesized relationships for the current study and how they were theoretically conceptualized.

Chapter three starts by introducing the research design of the study, followed by a detailed presentation of both the qualitative and the quantitative methodology that were carried out for this study. Furthermore, it provides complete information about the practical steps that were performed such as the sampling techniques, the data collection and the analysis procedures for the study.

Chapter four presents the empirical results obtained from the current study. Since this study followed a mixed method approach, the first section of the chapter exhibits the results of the qualitative part of the study after performing the interpretative analysis technique. The next section presents the quantitative results after performing the Structural Equation Model (SEM) technique for the data analysis; all the details regarding the measurement and the structural model assessment are introduced in this chapter.

Chapter five highlights the findings of the current study regarding the study's phenomenon (i.e. the adoption of HIS within KRI of Iraq public hospitals) and the main issues and factors that contribute to this phenomenon from both a qualitative and a quantitative point of view. The chapter also explains those results in light of the related literature.

Finally, chapter six presents the main conclusions, theoretical and practical contributions, the limitations of the current study and the possible directions for future studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of the Chapter

This chapter begins with an introduction about the study's context and environment (i.e. Kurdistan Region of Iraq). Another objective of this chapter is to build an understanding regarding Healthcare Information Systems (HIS), its types, benefits, its nexus to the research area of technology adoption and the barriers facing the adoption of these technologies. Furthermore, this chapter discusses the technology adoption theories that were developed by researchers to examine the adoption behavior within different domains. Moreover, this chapter presents a review of the literature regarding the adoption of HIS and what has been done in this area of research. Finally, an explanation about the study's proposed model is presented describing the factors that are included into the UTAUT model, the theoretical justification behind each factor and the related hypothesis. Then, the chapter concludes with a summary section.

2.2 Facts about Iraq and Kurdistan Region (KRI)

Iraq is situated at the south western part of Asia, neighbored by Turkey from the north, Syria and Jordan from the west, Kingdom of Saudi Arabia and Kuwait from the south and Iran from the east. The area of Iraq is about 438,317 km^2 ("About Iraq," n.d.), Iraq has a population of about 33 million and Iraq Gross Domestic Product (GDP) is estimated around $223 billion as reported by (Worldbank, 2016). The expenditure on healthcare as a percentage of the GDP is about 5.2 percent according to (WHO, 2013).

Arabic and Kurdish are the official languages of the country and Islam is the official religion.

The modern history of Iraq suffered from harsh events, starting with eight years of war with the neighboring country Iran from 1980-1988. The first gulf war took place in 1991. Additionally, Iraq endured severe economic sanctions which lasted for almost thirteen years from 1990 until 2003. And last but not least, in 2003 Iraq was invaded by the collision forces causing wide destruction and looting actions for its facilities which deeply affected the country's infrastructure and created political gap which resulted in sectarian violence and unstable atmosphere that is unfortunately still present until now.

Kurdistan Region of Iraq (KRI) is situated at the north of Iraq and it is represented by three governorates; Erbil, the capital city of KRI, Sulaimani and Dhok. The approximate population is about 5.2 million ("The Kurdistan Region in Brief," 2016). The Kurdistan Region has its own local government and parliament. It has the autonomy to manage its own financial resources and budget which stands for about 17% of Iraq's total budget (Al Hilfi et al., 2013). However, KRI must follow the Iraqi federal law and constitution.

The recent human development index reported that Iraq's current rank was 121, stating that it is lagging behind countries like Iran, Turkey and many other Arab countries (UNDP, 2015). The number of academic work published in the area of healthcare in general is low compared to other countries (Al Hilfi et al., 2013), which highlights the need for empirical healthcare related studies in order to provide better understanding about healthcare related topics and improve the healthcare situation in general. The same study stated that HIS in Iraqi hospitals are still not efficient used by healthcare

staff (Al Hilfi et al., 2013). Another governmental report by the Iraqi Ministry of Health evaluated the status of the HIS systems in the public hospitals and the usage of these systems were considered weak despite the funds that were allocated for such systems (Ali et al., 2011). Taking the previous facts into consideration, this study focuses on one aspect, that is examining the adoption of health information systems among healthcare staff within the Iraqi context, specifically in KRI public hospitals in order to provide more understanding about the important factors that promote the adoption of HIS among healthcare staff in Iraqi hospitals and draw future insights regarding that matter.

2.3 Healthcare Information Systems (HIS)

Healthcare information systems (HIS) refer to "computerized systems designed to facilitate the management and operation of all technical (biomedical) and administrative data for the entire healthcare system" (Rodrigues, Gattini, Almeida, & Gamboa, 1999, p. 2). Other definitions have also been used within the literature to describe HIS, such as the one presented by Hersh (2009) who defines HIS as the collection of different technologies and computer-based systems within healthcare institutions. Another definition for HIS was presented by Thompson and Brailer (2004, p. 38) as "the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data and knowledge for communication and decision-making" and the purpose for those systems as stated by Haux and his collegues (2013, p. 30), is to "sufficiently enable the adequate execution of hospital functions for patient care". The current study defines HIS as the collection of both hardware and software systems that exist within healthcare

institutions and perform numerous medical tasks and support other organizational activities.

HIS provides an umbrella that describes a large range of different and comprehensive systems used to collect, store, communicate, display and integrate patients' data across digitized systems in secure channels among healthcare institutions (Chaudhry et al., 2006); but in order to provide a taxonomy of HIS technologies, Bhattacherjee and his collegues (2006) classified different HIS innovations into three main types, clinical, administrative and strategic, according to the purpose and the function of those systems.

Clinical information systems (CIS) include systems that relate directly to healthcare provision to patients, such as computerized physician order entry (CPOE), pharmacy information systems, picture archiving and communication systems (PACS), electronic health records (EHR) which sometimes are referred to as electronic medical records (EMR), intensive care-unit systems and lab information systems (LIS) (Bhattacherjee et al., 2006; Herricck et al., 2010). The second type (i.e. the administrative information systems) includes applications that are not directly associated with patients' health condition rather it support managerial and accounting tasks within the hospital such as patient registration, salary systems, inventory control systems, scheduling systems and billing systems (Bhattacherjee et al., 2006; Herricck et al., 2010). The last type (i.e. strategic information systems) includes applications designed to enhance decision making functionalities such as business intelligence systems and executive information systems (Bhattacherjee et al., 2006).

Each one of those HIS systems serve a certain purpose, but collectively, HIS hold major benefits to the hospitals implementing them. The main expected benefits are more effective healthcare services, reduced costs, better sickness management, less medical errors, improved managerial functionalities, reduced adverse drug events, better accessibility to patients' information and the ability to integrate patient's data from different departments within the hospital into a single digital record without the need for piles of papers scattered around the hospital departments (Aldosari, 2014; Avgar et al., 2012; Buntin et al., 2011; Goldzweig et al., 2009; McGinn et al., 2011). In fact, a study by (Kohn et al., 2000) estimated that the number of deaths due to medical errors in the United States alone is approximately between 44,000 and 98,000 deaths annually. The report stated that half of these incidents is avoidable; and this is one the reasons that catalyzes the implementation and use of HIS innovations; in other words, to reduce medical errors and its consequences (Kohn et al., 2000). Another reason for encouraging the implementation of HIS is to reduce the medical errors within hospitals which can be a result of handwritten prescriptions, conflicting effects of different drugs and accidental overdoses (Adler-Milstein & Bates, 2010).

The implementation of HIS within hospitals has a significant role that could be summarized into three main points: automate, inform and transform (Dehning, Richardson, & Zmud, 2003). Automate means substituting the processes that require human or manual intervention with machine or computerized one. For example, lab results can be viewed remotely and immediately by the physician immediately when it is ready, without the need to manually deliver it by-hand. On the other hand, inform means providing the necessary information about the activities and processes to ordinary users

as well as to managers in real-time fashion to improve job performance and decision making. For example, scheduling tasks can be done more efficiently using HIS to avoid inconsistency events. While transform means redefining and upgrading the organizations processes and relationships (Dehning et al., 2003). The last point was also asserted by Avgar et al. (2012) that implementing HIS will not merely automate the healthcare services, rather it will transform the whole healthcare organization.

"Digital hospital is the future" stated Chang and his collegues (2006, p. 1050); and therefore, many countries started to put a roadmap to reach the goal of digitizing their healthcare institutions through initiatives and allocation of funds for this objective. For example, the United States Congress alone allocated 20 billion dollars for HIS sector in the year 2009 in order to harvest the benefits and emphasize the importance of using HIS within this sector (Kaplan & Harris-Salamone, 2009). Also, Denmark has invested approximately 45 million Euros for implementing EHR systems in the central Denmark region; the project serves 1.2 million patients and is used by more than 10,000 healthcare staff (Bossen et al., 2013). Moreover, Australia dedicated more than 466 million dollars to establish a national Personally Controlled Electronic Health Record (PCEHR) system for all Australian citizens (The Department of Health Australian Government, 2010). Other similar projects and plans were established in Canada (Infoway, 2009), Europe (Dobrev et al., 2010; e-Health ERA Report, 2007; Hollis et al., 2015) and in developing countries (Househ et al., 2010; Singh & Lillrank, 2015).

2.4 HIS Adoption

The investment in HIS holds promising benefits for the healthcare institutions. However, the complexity of HIS innovations and its implementation (Avgar et al., 2012; Cresswell & Sheikh, 2013; Lluch, 2011; Thakur et al., 2012; Venkatesh et al., 2011) and the high cost of investing in those systems (Adler-Milstein & Bates, 2010; Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013; Kaplan & Harris-Salamone, 2009) require careful planning and consideration of many aspects in order to assure the adoption of those innovations and avoiding undesired results and failures (Cresswell & Sheikh, 2013; Thakur et al., 2012).

Unfortunately, many IT projects faced costly failures due to underutilization or low adoption. For example, one of the high-profile IT implementations that failed and resulted in substantial financial loss was with Hewlett-Packard (HP) in the year 2004 and it did cost the company around 160 million dollars (Koch, 2004b). Another high-profile company which faced unsuccessful IT project was Nike in the year 2000; the project did cost the company around 100 million dollars and 20% decrease in stock value (Koch, 2004a).

Similarly, several HIS projects faced challenges, low adoption or failure and the literature has documented many cases. For example, one study stated that about 40 percent of these HIS projects have either failed or were abandoned (Kaplan & Harris-Salamone, 2009). Other projects received unintended results, low adoption or to some extent were rejected (Aarts & Gorman, 2007; Ammenwerth et al., 2006; Bah et al., 2011; Bramson & Bramson, 2005; Escobar-Rodríguez & Romero-Alonso, 2013; Holden & Karsh, 2010; Hollis et al., 2015; Novak et al., 2012).

Other examples from the literature have reported that staff resistance was identified as the cause for low adoption of new technologies (H.-W. Kim & Kankanhalli, 2009; Laumer et al., 2015). Another study in the United States (Trivedi et al., 2009) concluded that the lack of computer skills and unfamiliarity with the system led to failure implementation of a clinical decision support system. In another case (Spetz & Keane, 2008), the hospital implemented a new system but the implementation process was associated with delays from the vendor, lack of leadership and medication errors from the system which led the staff to be skeptical about the usage of the new system. In the study conducted by Heeks (2006), the researcher found that the majority of HIS projects faced challenges in one aspect or another. According to McManus and Wood-Harper (2007), the study covered 214 information system projects in different sectors including 18 projects in healthcare industry, the study concluded that management ill-processes accounted for 65% of the factors that contributed to the failure of the projects while technical factors, technical support and poor design accounted for the remaining 35% of the factors that were associated with projects' failure.

In a study that was carried out in a Dutch academic medical center (Niazkhani, Pirnejad, de Bont, & Aarts, 2008), the healthcare staff revealed some inefficiency issues regarding the implemented HIS and the incapability of the system to account for all the required tasks of the staff within different departments of the hospital. Eventually, the healthcare staff abandoned the system and returned to the previous traditional method of communication to overcome the system shortages. Another study found that a barcode medication administration system (BCMA) faced workarounds and low adoption by the healthcare staff due to errors and inaccurate documentation of the system (Novak et al.,

2012). Kitsiou and his collegues (2010) evaluated the adoption of different clinical information systems within Greek public hospitals and found that around 70% of those institutions failed to exploit the potentials of various clinical information systems that served and supported many healthcare activities. Another recent study within healthcare context (Hollis et al., 2015), reported the dissatisfaction of information system's users; and highlighted that such HIS should assert the users' main requirements throughout the development process, the efficiency of the HIS, the privacy of the patients' data and that a standardized evaluation framework should be available for assessment purposes.

As demonstrated earlier, a number of HIS projects which faced low adoption, rejection and failure were presented to emphasize the fact that despite the technological advancement and the high expertise in this domain, still numerous projects in healthcare settings experience challenges and those challenges need to be further studied within different contexts and with different respondents in order to avoid such unintended results in the future, provide a better understanding about the situation and increase the adoption among healthcare staff regarding these complex innovations.

On the other hand, the implementation of modern HIS in today's hospitals is not error-free (Herricck et al., 2010). In fact, HIS systems produced new types of errors and the following section presents examples of this issue. For example, the Therac-25, is a radiology system that was involved in death incidences and sever injuries to patients; the Therac 25 produced massive overdoses of radiation to patients due to programming glitches and unverified software control which led to sever human casualties (Leveson & Turner, 1993).

Another type of errors is staff's over-dependence on technology (Herricck et al., 2010). The healthcare staff reliance on the information presented by the system without any further verification led them to wrong diagnoses and caused adverse drug event; after reviewing the incident, weak integration of the system, data fragmentation and poor work processes were identified as the main causes (Herricck et al., 2010). Additionally, over-reliance on technology and dependence on default selections suggested by the system for drug doses and course of action might lead to medical errors (Weiner, Kfuri, Chan, & Fowles, 2007). Another undesired situation is the lack of accessibility to critical healthcare data by staff in time of system failure (Reckmann, Westbrook, Koh, Lo, & Day, 2009), frequent warnings that might interrupt current workflow (Weiner et al., 2007).

The previous section presented a number of negative outcomes associated with the implementation of HIS. Such problematic HIS examples from the literature, encouraged researchers to empirically study the factors that foster the adoption of those complex HIS within different contexts in order provide a deeper understanding about the adoption process and eliminate or at least reduce unsuccessful HIS implementations. Assuring that these HIS innovations are adopted by healthcare staff depends not only on the attributes of the HIS itself but on other individual, organizational and environmental factors that must be taken into account in order to achieve the adoption of those complex system (Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013; Yusof et al., 2008). The following lines shed some light on the previous work from the literature in that regard. A study by Jeyaraj and collegues (2006) conducted a review of the literature regarding the adoption of IT innovations in general and within different industries. The

researchers summarized the published work regarding the IT adoption and extracted the independent and dependent variables that were examined. Those variables were then categorized and grouped under four generic categories to provide a clearer top-view about the aspects that affect IT adoption; the four categories are individual, technological, organizational and the environmental (Jeyaraj et al., 2006).

Individual category refers to the factors that relate to the users' attributes and merits. Technological category refers to the factors that relate to the attributes of the innovation itself. The organizational category refers to the factors that relate to the organization that is implementing the innovation while environmental category involves factors that reside outside the organization control but still affect the adoption process (Jeyaraj et al., 2006). Another study by Boonstra and Broekhuis (2010), found that despite the benefits associated with using the different types of electronic medical records (EMR) in healthcare institutions, the adoption of those systems is still facing challenges for a number of reasons. The researchers in their study reviewed the literature and summarized the barriers facing the EMR adoption and classified them into eight categories: financial, technical, time, psychological, social, legal, organizational and change process factors (Boonstra & Broekhuis, 2010). An important point concluded by the researchers is that each situation has its own conditions and has its own suitable set of interventions in order to overcome those barriers and ensure a smooth adoption process (Boonstra & Broekhuis, 2010).

The study by Cresswell and Sheikh (2013) concluded that HIS adoption is influenced by different dimensions. The study also emphasized on the relatedness of those dimensions and the need to fit between them when examining the adoption of complex HIS systems.

The researchers also noted that there is a lack of empirical studies that took a comprehensive and integrated approach in covering all the dimensions presented by the study especially within healthcare context (Cresswell & Sheikh, 2013). In another related study by (Yusof et al., 2008), the researchers developed the human organizational technological-fit model (HOT-fit) as an evaluation model for HIS success. The model was constructed by combining two previous models which are the IS success model (Delone & Mclean, 2003) and the IT-Organization fit model (Morton, 1991). The new developed HOT-fit model has three components (i.e. human, organization and technology) and these components collectively have eight interrelated dimensions related to HIS success; each one of those dimensions can be measured using numerous factors. Even though this model was developed to evaluate HIS success but it can also be approached by technology adoption studies if the success definition stated by (Kaplan & Harris-Salamone, 2009, p. 294) as "simply getting the application or system turned on, getting people to use it" is considered. In addition to what have been mentioned, table 2.1 lists some the previous studies that examined the adoption of technology within healthcare context along with its results.

Table 2.1

Related Studies

Study	Constructs	Study Results
(Hadji et al., 2016)	Perceived usefulness, confirmation of expectations, clinical information system quality, system use and satisfaction.	This longitudinal study was conducted within a single hospital in France to evaluate the adoption of a clinical information system (CIS) among healthcare staff. The three constructs (i.e. Perceived usefulness, confirmation of expectations, clinical information system quality), contributed to the satisfaction with the CIS within the study context.
(Prasanna & Huggins, 2016)	Performance expectancy, effort expectancy, social influence, facilitating conditions, information quality and adoption.	This study used a modified version of the UTAUT model to examine the factors that influence the adoption of HIS within four emergency information centers. All the study hypotheses were confirmed and the performance expectancy was found to have a mediating effect within the study.
(Ifinedo, 2016)	Perceived usefulness, perceived ease of use, attitude, behavioral intention and use.	This study employed the TAM model to examine the effect of moderators (i.e. education level, computer knowledge, age and experience) on nurses' attitude to adopt HIS technologies. The study found that education level and computer knowledge had a significant moderating effect while the effect of age and experience as moderators was insignificant.
(Cimperman, Brenčič, & Trkman, 2016)	Performance expectancy, effort expectancy, social influence, doctor opinion, computer anxiety, perceived security and behavioral intention.	The study used the UTAUT model to investigate the adoption of Tele-health services among 400 users. The proposed relationships were found to be significant predictors of BI except for the construct social influence.

Table 2.1 continued

(Jang, Kim, & Lee, 2016)	Performance expectancy, effort expectancy, social influence, compatibility, connectivity, complexity, perceived benefit, perceived trust and use intention.	The study examined the acceptance of U-Healthcare services among 142 healthcare staff. It also proposed five antecedents for the construct performance expectancy. All hypothesized relationships were found to be significant within the study's model.
(Sherer, Meyerhoefer, & Peng, 2016)	Mimetic, normative, coercive pressure and IT adoption.	This study used secondary data to examine the effect of mimetic, normative and coercive pressure on IT adoption within healthcare context. The study found that institutional effect, government policies and industry norms have influence on technology adoption.
(Li, Wu, Gao, & Shi, 2016)	Perceived privacy risk, perceived benefit, information sensitivity, personal innovativeness, legislative protection, perceived prestige, perceived informativeness, functional congruence, adoption intention and actual adoption.	The study used the privacy calculus theory as the theoretical foundation. This study examined the adoption of health wearable devices among 333 actual users and found that all hypothesized relationships were significant.
(Moon & Hwang, 2016)	Performance expectancy, effort expectancy, social influence, facilitating conditions, perceived enjoyment and behavioral intention.	The study examined the factors that influence smart healthcare services and used UTAUT as its theoretical basis. Perceived enjoyment and other factors were found to have significant effect on users' intention.
(Bozan, Parker, & Davey, 2016)	Performance expectancy, effort expectancy, facilitating conditions, coercive, normative, mimetic pressure and behavioral intention.	The study focused on the social effects and its influence on older patients' adoption of patient portal services. 117 individuals participated in the study using convenient sampling. All social effects significantly affected the individuals' adoption behavior.

Table 2.1 continued

(Gajanayake, Iannella, & Sahama, 2016)	Performance expectancy, effort expectancy, information control, information governance, information accountability, computer anxiety, computer self-efficacy, computer attitude and behavioral intention.	The study used a modified version of the UTAUT model to examine the adoption of accountable E-Health system among 334 healthcare students. The study also presented several variables as moderators within its model.
(Kim, Lee, Hwang, & Yoo, 2016)	Performance expectancy, effort expectancy, facilitating conditions, attitude and behavior intention.	The study examined the factors affecting the adoption of mobile EMR among 449 healthcare professionals. All hypothesized relationships were found to be significant.
(Lazuras & Dokou, 2016)	Perceived usefulness, perceived ease of use, job relevance, subjective norms, descriptive norms, computer anxiety, attitude and use intention.	The study utilized the TAM model to examine the adoption of online counseling technology among 63 healthcare professionals. PEOU, attitude and computer anxiety were found to be insignificant predictors of usage intention while PU was the most salient predictor of use intention.
(Hadji & Degoulet, 2016)	Perceived usefulness, system quality, facilitating conditions, confirmation of expectations, satisfaction, system use and continuance intention.	The study proposed several models to examine the adoption of clinical information systems among 571 healthcare staff. All relationships were found to be significant, and system quality was an important determinant of user satisfaction and continuance intention. However, facilitating conditions had no significant effect on satisfaction during late adoption phases.
(Dwivedi, Shareef, Simintiras, Lal, & Weerakkody, 2016)	Performance expectancy, effort expectancy, social influence, facilitating conditions, waiting time, hedonic motivation, price value, self-concept	The study used the UTAUT2 as the theoretical foundation to examine the adoption of mobile-health applications among citizens within three countries and compared the results from the three environments.

Table 2.1 continued

	and behavioral intention.	
(Hsieh, 2016)	Performance expectancy, effort expectancy, social influence, facilitating conditions, sunk costs, regret avoidance, uncertainty, perceived value, transition costs, intention to use and resistance.	The study examined the opinions of 692 patients regarding their adoption behavior of health cloud technologies and the driving factors for their use intention and the barriers that increase their resistance.
(Maillet, Mathieu, & Sicotte, 2015)	Performance expectancy, effort expectancy, facilitating conditions, compatibility, self-efficacy, actual use and satisfaction.	The study examined nurses' satisfaction regarding the use of electronic patient records and UTAUT was used as the foundation for the study. Compatibility, effort expectancy and facilitating conditions did not affect the nurses' actual use; on the other hand, social influence and self-efficacy did not affect their satisfaction with the system.
(Taylor et al., 2015)	Qualitative study	The study used focus groups to explore the opinions healthcare staff regarding the adoption of Tele-health technologies. The findings revealed issues, such as insufficient training, technical barriers and the lack of a standardized evaluation framework.
(Esmaeilzadeh, Sambasivan, Kumar, & Nezakati, 2015)	Performance expectancy, effort expectancy, social network, social trust, shared goals, attitude, interactivity perception, autonomy, involvement, self-efficacy and intention to use.	The study investigated the adoption of clinical decision support systems among 355 doctors. It used a modified version of the UTAUT model with focus on social factors. The study found a positive influence of the level of involvement and a negative influence of doctors' perceived autonomy on behavioral intention.
(Steininger & Stiglbauer, 2015)	Perceived usefulness, attitude, cost saving, stakeholder benefit, improvement, privacy concerns, social influence, experience and intention to use.	The study examined the adoption of EHR among 204 physicians using a modified version of TAM. The proposed relationships were found to be significant and behavioral intention was affected by attitude, PU, social influence and experience.

Table 2.1 continued

(Ahmadi, Nilashi, & Ibrahim, 2015)	Compatibility, complexity, relative advantage, perceived technical competence, organization size, formalization and centralization and other factors.	The study used the TOE framework to combine 13 variables for the purpose of examining the adoption of hospital information system among twelve experts. The variables were found to be significant predictors of healthcare technologies.
(Chong, Liu, Luo, & Keng-Boon, 2015)	Performance expectancy, effort expectancy, social influence, facilitating conditions, behavior intention and personality attributes.	The study extended the UTAUT model to examine the acceptance of RFID among 252 physicians and nurses. The researchers concluded that personality differences are important predictors to technology acceptances and that different groups of users have different perceptions.
(Tintorer et al., 2015)	Perceived usefulness, perceived ease of use, user profile, security, improved quality, reduced cost and intention to use.	The study used the TAM model to investigate the opinions of healthcare staff about the factors that affect their use of Web 2.0 platforms for collaboration purposes. Information security did not predict the use of such platforms while the remaining factors significantly predicted it.
(Sezgin & Yıldırım, 2015)	Perceived usefulness, perceived ease of use, system factors, perceived behavioral control and behavioral intention.	The study used the TAM model to investigate the adoption of pharmaceutical services system among 1420 pharmacists in Turkey. All the proposed factors were found to be important except for perceived behavioral control which had no significant effect on behavioral intention.
(Chang et al., 2015)	Perceived usefulness, perceived ease of use, web-site quality, service quality, user experience and intention to use.	The study used the TAM model as the theoretical foundation and examined the adoption of an e-health system among 140 respondents and found that PEOU did not influence behavioral intention. Service quality effect on both PU and PEOU was insignificant.
(Kowitlawakul, Chan, Pulcini, & Wang, 2015)	Perceived usefulness, perceived ease of use, attitude, self-efficacy and intention to use.	The study used the TAM model to examine nursing students' acceptance of EHR system within an educational setting. All study hypotheses were confirmed and attitude was the most significant driver of the students' acceptance behavior.

Table 2.1 continued

(Gagnon et al., 2014)	Perceived usefulness, perceived ease of use, social norm, personal identity, professional norm, computer self-efficacy and behavioral intention.	The study investigated the factors that affect the acceptance of electronic health records among 150 doctors. All proposed relationships were found to be significant with PEOU having the strongest effect.
(Nieboer, van Hoof, van Hout, Aarts, & Wouters, 2014)	Qualitative study	This study followed a qualitative approach and interviewed several healthcare professionals. The participants highlighted some points like the importance of training and support, the availability of helpdesk and concerns about HIS reliability. The participants also asserted the importance of their professional values like their relationship with the patients and how implemented HIS should preserve these values rather than interrupting them.
(Elske Ammenwerth et al., 2014)	Mixed method approach	The study evaluated a computerized patient medication history that was deployed as a pilot project. Healthcare staff were dissatisfied with several aspects of the system including the software quality and organizational issues. The study suggested a full redesign of the project due to the negative feedback from the respondents.
(Alaiad & Zhou, 2014)	Mixed method approach	The study examined the factors that affect the adoption of home healthcare robots. 108 patients and physicians participated in the study and UTAUT was used as the theoretical framework. Social influence was found to be the most significant factor while effort expectancy and legal concerns had no significant effect on usage intention.
(Aldosari, 2014)	Hospital size, level of care, ownership and development team composition.	The study was carried out within several public and private hospitals in the city of Riyadh. The number of participants was 280 healthcare staff. The results showed that the level of EHR adoption is about 50%. The adoption was higher within urban areas than rural areas; higher within public-

Table 2.1 continued

		nonprofit and bigger size hospitals.
(Smith & Buzi, 2014)	Degree of usefulness, personal knowledge, personal skills, personal confidence and privacy.	The study examined the factors that influence the adoption of new web-based technologies promoting for healthcare awareness, family planning and other healthcare related issues. The study found that individual and organizational factors affect the adoption process among healthcare professionals.
(Hung, Tsai, & Chuang, 2014)	Perceived trust, compatibility, perceived usefulness, attitude, co-workers viewpoints and intention to use.	The study was conducted among 768 nurses to examine their adoption of primary health information system. TRA was used as the theoretical framework for the study. All study's hypothesized relationships were found to be significant.
(Kohnke, Cole, & Bush, 2014)	Performance expectancy, effort expectancy, social influence, facilitating conditions and behavior intention.	This study investigated the factors affecting the adoption of Telemedicine among 126 participants. The study also included attitude, anxiety, role and self-efficacy as moderators. All relationships were confirmed.
(Lin, 2014)	Perceived usefulness, perceived ease of use, subjective norm, perceived information security, culture and behavioral intention.	The study utilized the TAM theory to examine the opinions of 361 doctors from USA and Taiwan regarding adoption of knowledge management system. The results revealed that cultural differences do affect the adoption behavior.
(Lee, Lin, Yang, Tsou, & Chang, 2013)	Performance expectancy, effort expectancy, social influence, organizational learning capability, experimentation, risk taking, interaction with the external environment, dialog, participative decision making and behavior intention.	The study used a modified version of the UTAUT model to investigate the adoption of HIS among 215 nurses. All relationships within the proposed model were confirmed except for perceived OLC with BI which was insignificant.

Table 2.1 continued

(Garcia-Smith & Effken, 2013)	Information quality, system performance, social influence, facilitating conditions, net benefits, satisfaction and CIS use dependency.	The study used the success model as its theoretical foundation to evaluate clinical information systems among 234 nurses. All study hypotheses were supported except for social influence effect on nurses' satisfaction.
(Phichitchaisopa & Naenna, 2013)	Performance expectancy, effort expectancy, social influence, facilitating conditions, behavior intention and use behavior.	The study used the UTAUT model to examine the adoption of HIS among 400 healthcare staff members. All proposed hypotheses were found to be significant except for social influence which had no significant effect on BI.
(Jianbin & Jiaojiao, 2013)	Performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, perceived cost and behavioral intention.	This study examined the adoption of healthcare web-sites. Participants of the study were students and educators. The study used the UTAUT model and added perceived risk and cost as new predictors. All relationships were found to be significant except for the SI which had no influence on BI.
(Slade, Williams, & Dwivedi, 2013)	Qualitative Study	The researchers used a qualitative approach represented by semi-structured interviews with three different age groups to study the factors that affect the acceptance of mobile technology in healthcare context.
(Jackson, Mun, & Park, 2013)	Perceived ease of use, perceived usefulness, image, innovativeness, subjective norm, compatibility, result demonstrability, perceived behavioral control and behavioral intention.	The study presented three mediation models to examine the acceptance of an e-commerce purchase system among 251 hospital administrators. The study focused on personality traits and found that the relationship between innovativeness and behavioral intention was mediated by the other constructs.
(Bossen et al., 2013)	Mixed method approach	The study took place in one hospital. All relationships within the success model which was used for this study were confirmed. The qualitative part of the study revealed the challenges faced by the staff and produced a clearer image about the situation to decision makers. Experience, organizational support and staff involvement in the

Table 2.1 continued

		process helped to implement the HIS.
(Bennani & Oumlil, 2013)	Performance expectancy, effort expectancy, social influence, facilitating conditions, trust and behavioral intention.	The study was carried out among 200 nurses to examine their adoption of healthcare technologies. UTAUT was used as the theoretical framework for the study. Trust, performance expectancy and facilitating conditions were found to be significant predictors of behavioral intention. While effort expectancy and social influence were found to be insignificant within the study.
(Cohen, Bancilhon, & Jones, 2013)	Performance expectancy, effort expectancy, social influence, facilitating conditions, trust, price value and adoption.	The study surveyed the opinions of 72 physicians and used the UTAUT model as the foundation for the study. Performance expectancy and facilitating conditions were found to be salient predictors to the adoption of HIS. On the other hand, trust, effort expectancy, price value and social influence did not have a significant effect on the adoption process.
(Ifinedo, 2012)	Performance expectancy, effort expectancy, social influence, facilitating conditions, compatibility, behavioral intention and use behavioral.	The study was carried out among 227 healthcare staff and UTAUT was used as the basis for the study's model. All relationships were proven to be significant. Interestingly, performance expectancy was found to be insignificant in this study.
(Xue et al., 2012)	Perceived usefulness, perceived ease of use, subjective norm, compatibility, perceived user resource, technology anxiety, Perceived Physical Condition and intention to use.	The study used the TAM model to investigate the perceptions of 700 female users regarding the usage of a mobile-based information system. The use intention was predicted by its antecedents except for technology anxiety and perceived physical condition which had no effect on the intention to use.
(Dünnebeil, Sunyaev, Blohm, Leimeister, & Krcmar, 2012)	Perceived usefulness, perceived ease of use, intensity of IT utilization, importance of data security, importance of	The study used an extended version of the TAM model to examine the acceptance of E-Health services in ambulatory care unit among 117 physicians. The added variables were found to be significant predictors of

Table 2.1 continued

	documentation, E-Health knowledge, importance of standardization, process orientation and behavioral intention.	both PU and PEOU.
(Novak et al., 2012)	Qualitative Study	The research concluded that the employment of experienced staff, providing the sufficient IT training, developing a positive interaction between system developers and organizational authorities and understanding the relationships within the work environment, all are important factors that can improve the adoption and usage of new implemented systems and minimize undesired results.
(Chen & Hsiao, 2012)	Self-efficacy, compatibility, project team competency, system quality, information quality, perceived usefulness and perceived ease of use.	The study was carried out within one private hospital and the number of participants was 124 doctors to study their acceptance of HIS. The study employed the TAM as a basis for the study's model. The effect of the construct perceived ease of use was more salient than perceived usefulness. The effect of Self-efficacy, compatibility and information quality on PU and PEOU was insignificant. While system quality significantly affected PEUO.
(Hung, Ku, & Chien, 2012)	Perceived usefulness, perceived ease of use, attitude, personal innovativeness, subjective norm, perceived behavioral control, self-efficacy, facilitating conditions and usage intention.	The study used a modified version of the Theory Planned Behavior to examine the opinions of 224 physicians regarding the acceptance of HIS. Attitude, subjective norm and perceived behavioral control were found to be significant contributors to use intention.

Table 2.1 continued

(Aldosari, 2012)	Perceived usefulness, perceived ease of use, change and behavior acceptance.	This study was conducted within one hospital and the number of participants was 89 healthcare staff. TAM was used as the theoretical framework to study the adoption of PACS. All constructs, Perceived usefulness, perceived ease of use and change had significant influence on the acceptance of PACS. Age, gender and experience had no effect on the relationships.
(Ketikidis, Dimitrovski, Lazuras, & Bath, 2012)	Perceived usefulness, perceived ease of use, subjective norm, image, job relevance, output quality, result demonstrability, behavioral intention and actual use.	The study used the TAM model as the theoretical framework; the sample size for the study was 133 doctors and nurses. The effect of PEOU had a salient effect on behavioral intention, while PU was insignificant in this study. Job relevance and subjective norms were also salient in the study.
(Maass & Varshney, 2012)	Perceived usefulness, perceived ease of use, perceived enjoyment and intention to use.	The researchers studied the adoption of ubiquitous health information system and found that perceived ease of use, perceived usefulness and perceived enjoyment all affected the intention to use the system.
(Venkatesh et al., 2011)	Performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention and use behavior.	The study was conducted within one private hospital and the number of participants was 202 doctors. The UTAUT model was used to study the adoption of EMR. The results were consistent with the original UTAUT. The effort expectancy was found to be significant at all three stages of measurement and only age was found to be significant as a moderator.
(Egea & González, 2011)	Perceived usefulness, perceived ease of use, attitude, trust, information integrity, perceived risk and intention to use.	The study used the TAM and extended it to examine the adoption of EHR among 254 physicians. All proposed relationships were confirmed within the study.

Table 2.1 continued

(Melas, Zampetakis, Dimopoulou, & Moustakis, 2011)	Perceived usefulness, perceived ease of use, attitude, ICT knowledge, ICT features demand, physician specialty and behavioral intention.	The study examined the opinions of 604 healthcare staff regarding the acceptance of clinical information systems. The TAM model was used by the study; PU, PEOU and attitude significantly affected the BI; and the specialty of the healthcare staff had a significant moderation effect.
(AL-nassar, Abdullah, & Osman, 2011)	Perceived usefulness, perceived ease of use, attitude, behavioral intention, organizational leadership, cost, training programs, resistance.	The study used the TAM model as its theoretical foundation. It examined the factors influencing the usage of EMR in seven Jordanian hospitals (both private and public). All factors found to have a significant effect within the study.
(Pai & Huang, 2011)	Perceived usefulness perceived ease of use, system quality, information quality, service quality and intention to use.	The study examined the adoption of HIS among 366 healthcare staff and used the TAM model as the foundation for this study. All hypothesized relationships were found significant within the study.
(Hu, Al-Gahtani, & Hu, 2010)	Perceived ease of use, perceived usefulness, attitude, subjective norm, perceived behavioral control and behavioral intention.	The study surveyed 1088 respondents from different organizations including healthcare institutions. TAM and TPB models were used as a foundation for the study's proposed model. Perceived usefulness, perceived ease of use, subjective norm and perceived behavioral control all significantly affected the behavioral intention and perceived usefulness was the most significant.
(Kijsanayotin et al., 2009)	Performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, use behavior, voluntariness, experience and IT knowledge.	The study was conducted among 1323 healthcare officers and UTAUT was used as the theoretical framework for the study. All relationships were supported. Voluntariness and experience were treated as independent variables not moderators; voluntariness, experience and IT knowledge significantly affected behavioral intention and use behavior.

Table 2.1 continued

(DesRoches et al., 2008)	Mixed methods study	The study found that hospital size, type of the implemented EHR and incentives affect the adoption of HIS.
(Tung, Chang, & Chou, 2008)	Perceived usefulness, perceived ease of use, trust, compatibility, perceived financial cost and behavioral intention.	The study was conducted within several hospitals and the sample size was 252 nurses. TAM, innovation diffusion theory (IDT) were used in this study. All independent variables were found significant predictors to the intention to use HIS.
(Al-Gahtani, 2008)	Perceived ease of use, perceived usefulness, attitude, behavioral intention and use.	The study covered 56 organizations including healthcare institutions and it used the TAM model as the basis for it. All the relationships have been proven valid by the study.
(Duyck et al., 2007)	Performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, attitude, self-efficacy, anxiety and use behavior.	The study was conducted within one hospital with 56 participants to study the adoption of PACS. The UTAUT was used as the theoretical framework. Performance expectancy influenced behavioral intention but facilitating conditions was the strongest predictor.
(Wu, Wang, & Lin, 2007)	Perceived usefulness, perceived ease of use, compatibility, self-efficacy, technical support and training and behavioral intention.	This study was carried out within several hospitals and the number of respondents was 123 healthcare staff. TAM was used as the theoretical framework to study the adoption of mobile healthcare system. All relationships were supported except for the technical support and training which had no effect on PU or PEOU.
(Schaper & Pervan, 2007)	Mixed methods study	This study surveyed 600 occupational therapists regarding their adoption of IT technologies. The study used the UTAUT model as its theoretical framework. Performance expectancy, social influence, computer attitude and computer self-efficacy did not have significant influence on behavioral intention.
(Chang et al., 2006)	Centralization, Formalization, High-Level Manager Support, Business Competition,	The study analyzed the responses of 35 radiology department directors regarding their adoption of PACS. The study found that government policies and managers' support significantly

Table 2.1 continued

	Governmental Policies, Cost of PACS, Compatibility and Benefits of PACS.	affected the adoption of PACS while compatibility's effect was insignificant.
(Chau & Hu, 2002)	Perceived usefulness, perceived ease of use, peer influence, compatibility, attitude perceived technology control and behavioral intention.	TAM and TPB models were used as the foundation for the study that surveyed 400 doctors. The study aimed to examine the factors that affect the adoption of telemedicine technology. All the relationships resulted in significant except for the peer influence which had no effect on both attitude and BI. The perceived ease of use effect was also limited on BI.

After presenting the previous table from the literature regarding previous studies conducted in the domain of HIS adoption, it is appropriate to extract more information from this table in a more summarized manner in order to provide a better understanding about this issue. Several studies covered only one hospital within their scope (Aldosari, 2012; Bossen et al., 2013; Chen & Hsiao, 2012; Duyck et al., 2007; Hadji & Degoulet, 2016; Hadji et al., 2016; Kim et al., 2016; Venkatesh et al., 2011); other studies included a limited number of respondents for their samples (Ahmadi et al., 2015; Alaiad & Zhou, 2014; Bozan et al., 2016; Chang et al., 2015; Cohen et al., 2013; Jang et al., 2016; Jianbin & Jiaojiao, 2013; Ketikidis et al., 2012; Lazuras & Dokou, 2016; Maass & Varshney, 2012; Nieboer et al., 2014) which limits the results' generalizability obtained from those studies. It is also observed from the studies presented in Table 2.1 that the majority of studies were conducted within western and developed countries. Only few studies examined the issues related to HIS adoption within Arabic context (Aldosari, 2012, 2014; AL-nassar et al., 2011; Bennani & Oumlil, 2013; Hu et al., 2010), which highlights the scarcity of empirical studies that were conducted within Arabic context. Some of those studies that were conducted within Arabic context included both private

and public healthcare institutions within the same study (Aldosari, 2014; AL-nassar et al., 2011; Bennani & Oumlil, 2013); profitable and non-profitable organizations differ in their characteristics, goals and policies, the thing that might has a different effect on both the staff members and the adoption process itself. Some of the studies included only one hospital as their sample (Aldosari, 2012), which asserts that there is a limited number of studies that covered a sufficient number of healthcare institutions or a sufficient number of participants within their scope in order to present a clear image about the issues related to HIS adoption and to present a generalization of the studies' findings within Arabic healthcare context.

Furthermore, from Table 1.2 it can be concluded that the number of studies that followed a qualitative or a mixed method approach is very small compared to the majority of studies that employed a quantitative approach in their methodology which underlines the need for studies that combine both qualitative and quantitative techniques in addressing the issue of HIS especially in new environments; the results of such studies would reveal actual, in-depth and comprehensive findings that that would not be obtained if only one method was used. Also, this will shed more light on the current issue, produce practical solutions and provide a deeper insight about the phenomenon being studied; those explorative approaches permit the healthcare respondents (i.e. healthcare staff) to express their unique and actual needs (Creswell, 2012a; Maxwell, 2012); it also enables the researcher to reflect the actual problems of the environment itself (Goldzweig et al., 2009).

Moreover, the majority of studies presented in Table 2.1 have focused on individual factors or a combination of both individual and technological factors which emphasizes

the scarceness of using holistic and integrated models in the previous studies that covers all the important aspects of the adoption behavior. The latter point asserts the importance of the current study's endeavor which is incorporating all the essential dimensions (i.e. the individual, technological, organizational and environmental) in a single overarching model as one of the main objectives of this study.

2.5 Adoption Theories

Several theories and models exist in the literature trying to explain the users' adoption of different technological systems and the factors that influence and predict this behavior like the theory of reasoned action (TRA), theory of planned behavior (TPB), technology acceptance model (TAM), the extended technology acceptance model (TAM2), and TAM third version (TAM3), diffusion of innovation theory (DIT), motivational model (MM), social cognitive theory (SCT), model of PC utilization (MPCU), unified theory of acceptance and use of technology (UTAUT) and the extended version of UTAUT, referred to as (UTAUT2). In the following sections those theories are presented in a more detail.

2.5.1 Theory of Reasoned Action (TRA)

Theory of reasoned action (TRA) was developed by Fishbein and Ajzen (1975). TRA focuses on the person's psychological attributes that affect his/her behavioral intention to perform a task. TRA stated that a person's behavior regarding a certain task is influenced by the person's behavior intention (BI) and that intention is determined by both, the person's attitude and subjective norm regarding the task being performed. Attitude refers to the person's perceptions or feelings towards a certain behavior that is

being practiced (Fishbein & Ajzen, 1975) while subjective norm refers to the extent to which the opinions of the important others have an effect on the individual's behavior regarding the use of the new technology (Fishbein & Ajzen, 1975). Figure 2.1 displays the TRA model and its constructs.

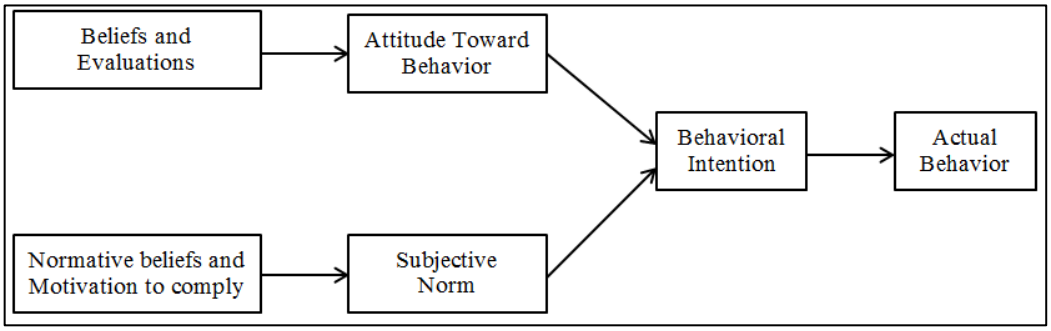


Figure 2.1. TRA Model

TRA has its limitations because it only considers attitude and subjective norm as predictors to behavior intention. An individual BI can be determined and influenced by other factors like performance expectancy, effort expectancy and facilitating conditions (Venkatesh et al., 2003).

2.5.2 Technology Acceptance Model (TAM)

Technology acceptance model (TAM) was developed by (Davis, Bagozzi, & Warshaw, 1989) and proved to be one of the important theories used to measure the users' acceptance and usage of information systems. TAM was originally derived from the TRA (Fishbein & Ajzen, 1975). TAM had the following constructs, perceived usefulness (PU), perceived ease of use (PEOU), attitude (AT), behavioral intention (BI) and actual usage. The purpose of TAM was to predict the usage of information systems

by users using the two constructs PU and PEOU. External variables were also present in the TAM model to denote that other variables could also contribute to predicting users' behavior regarding the usage of a certain system by influencing both PU and PEOU. Figure 2.2 displays the TAM model along with its components.

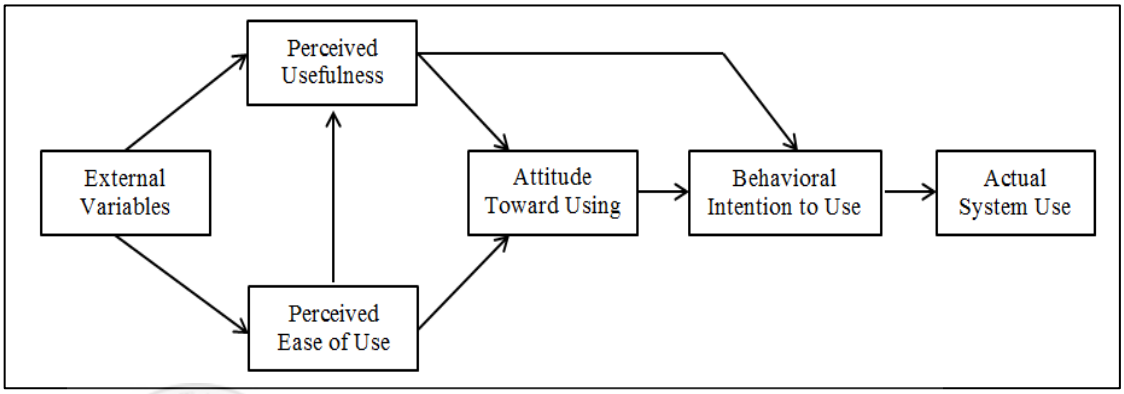


Figure 2.2. TAM Model

Perceived usefulness refers to the extent to which an individual believes that using a certain system will be more advantageous for him/her and will improve the task's performance (Davis et al., 1989). Perceived ease of use refers to the degree of ease and simplicity experienced by individuals when they use a certain information system (Davis et al., 1989).

Some of the empirical studies that used TAM later on, discarded the attitude construct in order to provide a more parsimonious model (Simon & Paper, 2007). The limitation of this model is that it only used PU and PEOU constructs to explain the adoption behavior and it did not consider other factors as predictors of users' perceptions regarding the use of a certain technology (Davis, 1989; Yarbrough & Smith, 2007); this opened the door for other researchers to restudy the TAM model and add other factors to the model in

order to enhance the TAM performance and to examine other aspects of the adoption process (Venkatesh & Davis, 2000; Venkatesh et al., 2003).

2.5.3 The Extended Technology Acceptance Model (TAM2)

Developed by Venkatesh and Davis (2000). It is the newer version of the original TAM and it was developed to explain perceived usefulness and behavioral intention in the light of cognitive instrumental processes and social influence process. Figure 2.3 displays the components of TAM2.

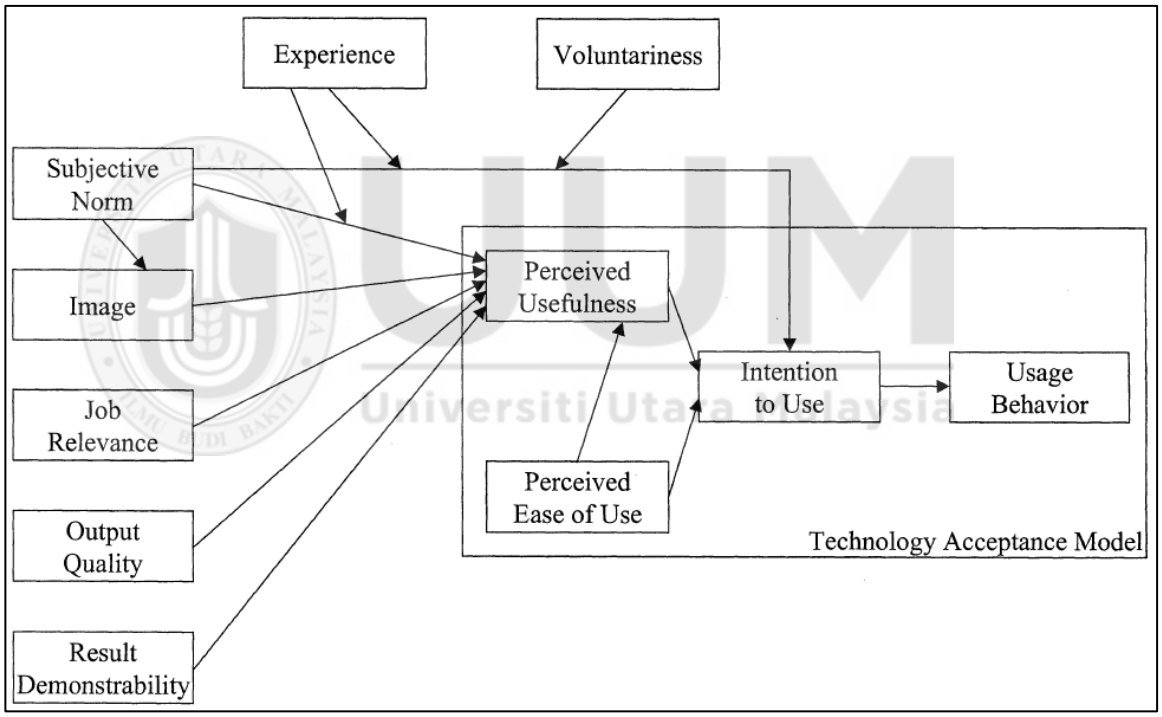


Figure 2.3. TAM2 Model

The social influence process encapsulates three factors that affect technology usage behavior, and they are: subjective norm, image and voluntariness. Image refers to the extent to which an individual perceives that using a certain technology will improve his/her social status within his/her society (Moore & Benbasat, 1991). Voluntariness

refers to the degree to which an individual perceives that the use of a certain system is volitional (Moore & Benbasat, 1991).

On the other hand, cognitive instrumental process encapsulates two factors which are job relevance and output quality. Job relevance refers to the degree to which an individual believes that a certain technology is applicable and related to the individual's job (Venkatesh & Davis, 2000). Output quality refers to the degree to which the user perceives the system to be functioning and performing the intended tasks efficiently (Venkatesh & Davis, 2000).

Result demonstrability was also added to the model and it refers to the degree to which the users perceive the outcomes from using the technology as being tangible and useful (G. C. Moore & Benbasat, 1991) and it was found to be a significant predictor to perceived usefulness. Those factors were added to this model to overcome the shortages of the original TAM and to improve its power of explaining the users' behavior towards the acceptance of technology.

2.5.4 TAM3

This model was developed by Venkatesh and Bala (2008). The researchers merged the model TAM2 (Venkatesh & Davis, 2000) with the work of (Venkatesh, 2000) to produce this model for technology acceptance. TAM3 had three main goals: first, to present a model for understanding the adoption of new systems by determining two sets of factors for predicting both perceived usefulness and perceived ease of use. Secondly, to empirically test the hypothesized model using four longitudinal studies and the last goal was to present an agenda for future work directions by suggesting a set of factors

that could influence the users' adoption of new technologies. The Figure 2.4 displays the TAM3 model along with its constructs.

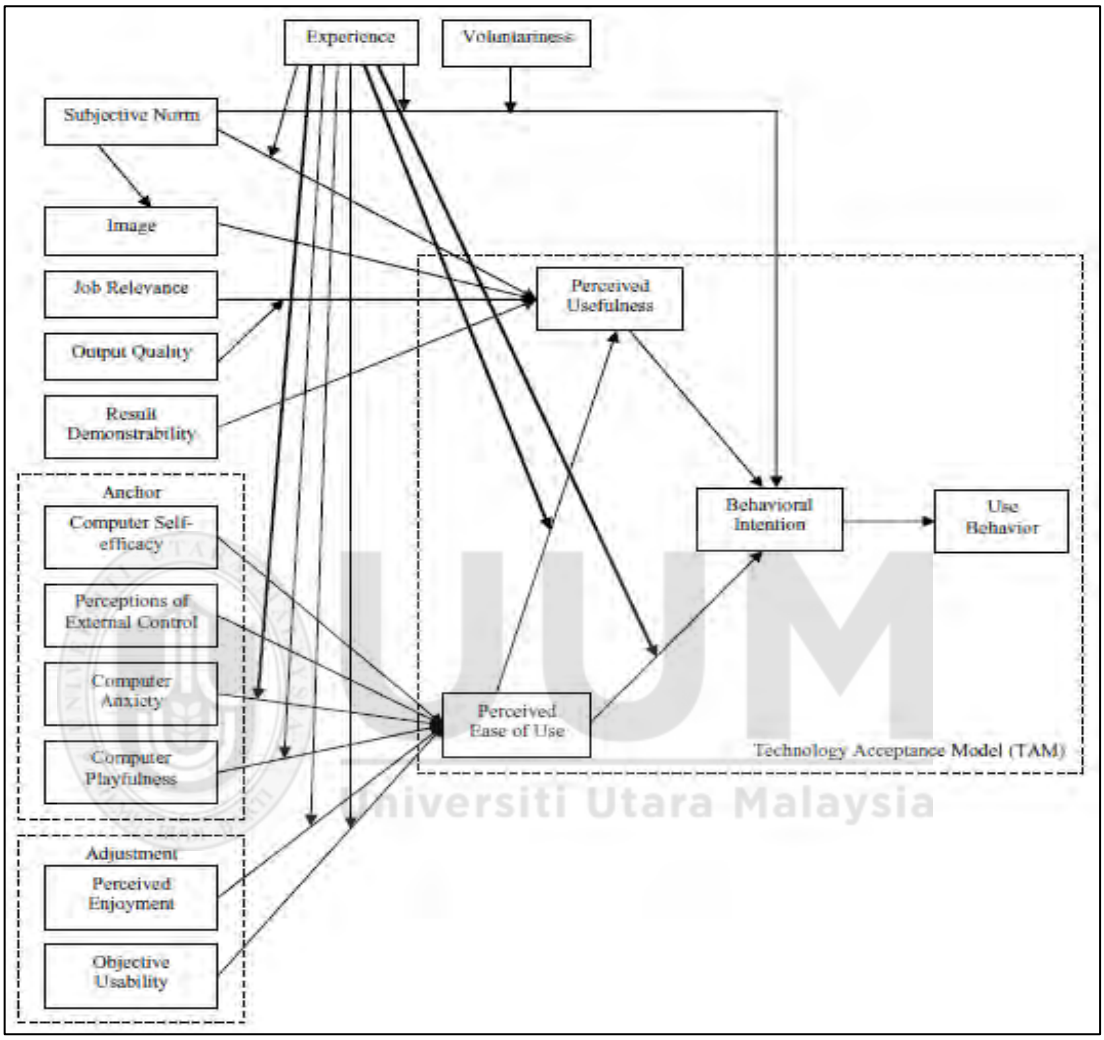


Figure 2.4. TAM3 Model

2.5.5 Diffusion of Innovation Theory (DOI)

The diffusion of innovation theory (DOI) was developed by Rogers (1995). It is also referred to as Innovation Diffusion Theory (IDT). Within this theory, innovation is defined as a task, an object, or a concept that an individual perceives as new and novel to him/her; while diffusion is defined as the operation of communicating innovations to a

particular group of respondents through specific channels and over a period of time (Rogers, 1995). According to the same researcher, users of a certain innovation have different levels of willingness and desire to adopt the innovation and therefore, the diffusion process within this population of users is approximately normally distributed over a period of time as shown in Figure 2.5.

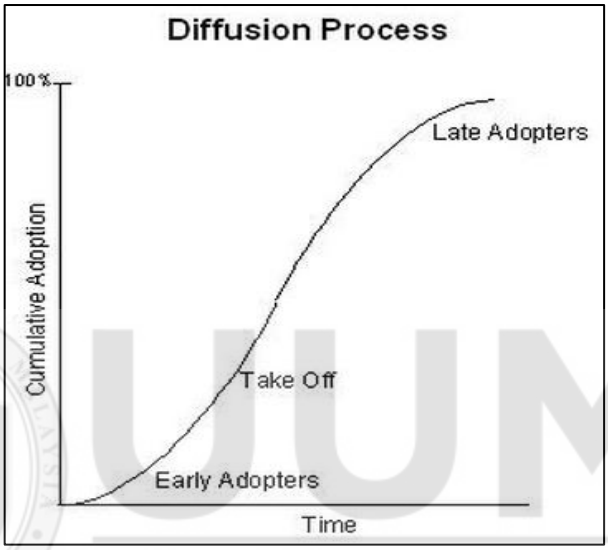


Figure 2.5. Diffusion Process

Accordingly, this population of users is segmented according to their innovativeness into five categories ordered from most innovative down to least innovative, and they are: innovators, early adopters, early majority, late majority and laggards (Rogers, 1995). The rate of adoption is influenced by five factors which are relative advantage, compatibility, trialability, observability and complexity (Rogers, 1995). Relative advantage is defined as the degree to which a new system is considered to be more advantageous than its predecessor (Moore & Benbasat, 1991). Compatibility is defined as the degree to which a technological innovation is considered to be consistent with

individual's previous values, experiences, requirements and work style (Rogers, 1995). Trialability refers to the degree to which a new system can be tested and experimented sufficiently. Observability is defined as the degree to which the outcomes of using a certain system can be recognized and seen by others. Complexity refers to the users' expectations regarding the degree of ease or effort associated with the system usage (Rogers, 1995).

2.5.6 Motivational Model (MM)

The motivational model was developed by (Davis, Bagozzi, & Warshaw, 1992). The researchers used motivational theories from the literature and employed them to study the acceptance of technology among users within work environment. The researchers stated that the motivations that could influence the users' intentions to use technological systems can be classified in broad sense into extrinsic and intrinsic. Extrinsic motivations refer to the degree to which an individual or a user perceives that performing a certain activity or a task would be beneficial and associated with external rewarding outcomes that are separate from the activity per se, such as promotions, salary raise, or improved task performance (Davis et al., 1992). On the other hand, intrinsic motivations refer to the tendency to execute a task or an activity for the sake of the activity itself and without anticipation of any other external performance outcomes (Davis et al., 1992).

The motivational model included four constructs which represented the independent variables and they are: perceived usefulness, perceived ease of use, perceived output quality and enjoyment. In addition to that the model included two dependent variables, behavioral intention (BI) and usage, plus one moderator which is task importance.

Both perceived usefulness and enjoyment had a significant influence on behavioral intention with the two empirical studies conducted within the work of (Davis et al., 1992). The motivational model focused on the system characteristics and did not cover organizational or environmental factors; and enjoyment was the only individual factor that was examined in this theory. For that reason, Davis et al. (1992) suggested that additional potential factors could be included and tested within the boundaries of this theory in order to improve it.

2.5.7 Model of PC Utilization (MPCU)

This theory was developed by (Thompson, Higgins, & Howell, 1991). The MPCU included six factors that determined the actual utilization of computers instead of behavioral intention. The factors are: social factors, affect towards system usage, long term consequences, facilitating conditions, complexity and job fit. Social factors refer to the person's perceptions regarding the opinions of referents of whether he/she should or should not perform a certain behavior (Thompson et al., 1991). Affect towards system usage refers to the individual's positive or negative believes and feelings regarding the usage of a particular system (Thompson et al., 1991). Long term consequences refer to the individual's believes about the anticipated future outcomes that are associated with the usage of a certain system (Thompson et al., 1991). Facilitating conditions refers to the availability of needed resources, infrastructure and training that makes the performance of an activity possible and easier (Thompson et al., 1991). Complexity refers to the user's expectations regarding the degree of ease or effort associated with the system usage (Thompson et al., 1991). Job fit refers to the degree to which an individual

believes that the usage of a system will improve his/her job performance (Thompson et al., 1991). The Figure 2.6 displays the MPCU model along with its factors.

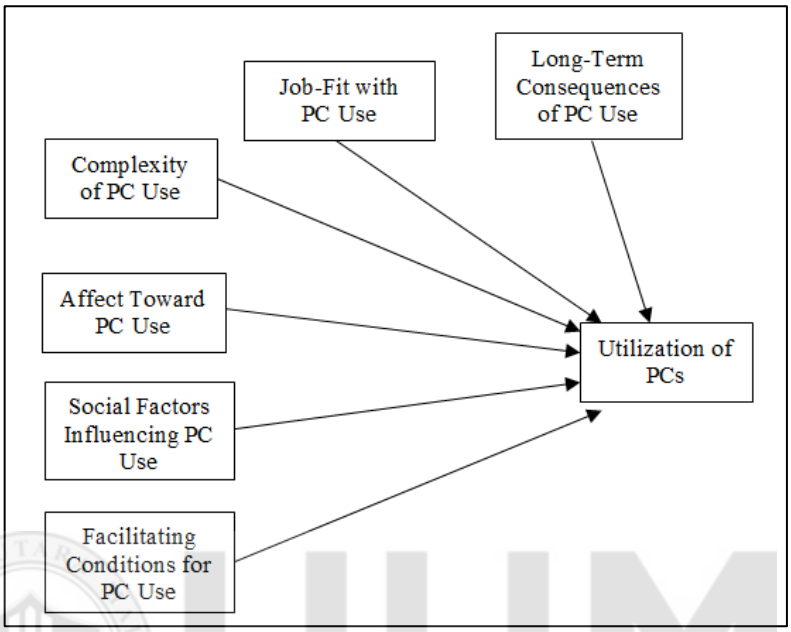


Figure 2.6. MPCU Model

2.5.8 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh and his collegues in (2003) presented the model of Unified Theory of Acceptance and Use of Technology (UTAUT) by combining and integrating eight previous prominent models. The UTAUT model was able to explain 70% and 50% of the variance in technology acceptance and use, respectively, which outperformed previous models. The model identified three constructs (i.e. Performance expectancy, Effort Expectancy and Social Influence) that have direct influence on Behavioral Intention (BI) and two other constructs (i.e. Behavioral Intention and Facilitating Conditions) that have direct influence on technology use. Those relationships were

moderated by Age, Gender, Experience and Voluntariness as displayed in Figure 2.7.

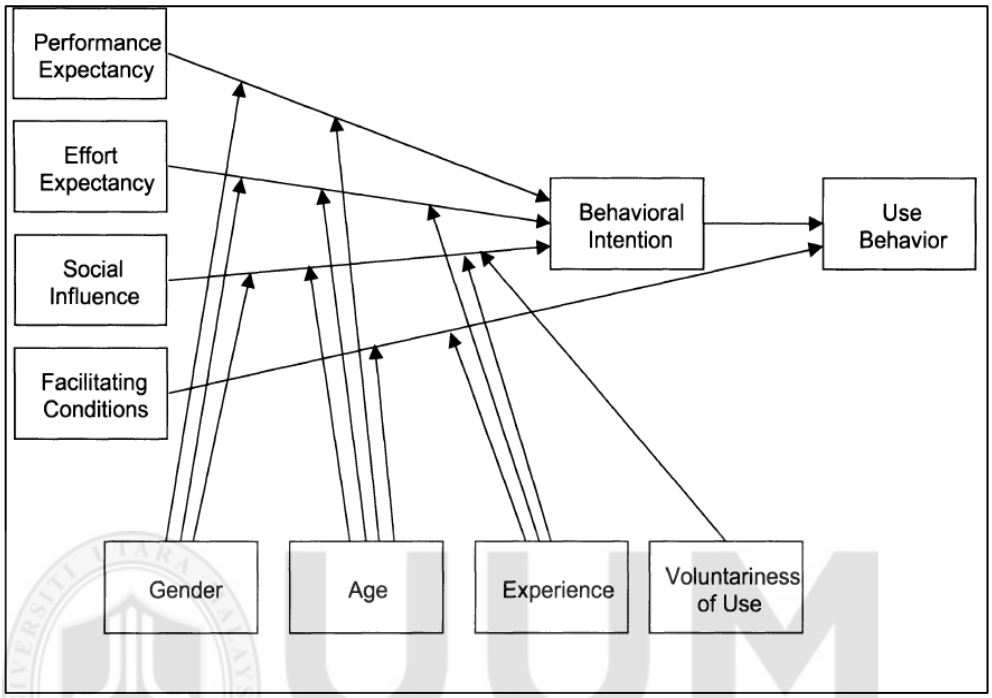


Figure 2.7. UTAUT Model

2.5.9 The Extended Unified Theory of Acceptance and Use of Technology (UTAUT2)

Developed by Venkatesh, Thong, and Xu (2012) and it is the newer version of the original UTAUT (Venkatesh et al., 2003). UTAUT2 was developed to study the technology acceptance within a voluntary consumer context. In addition to the original UTAUT constructs, three more constructs were added to understand the acceptance behavior of mobile internet and they are: hedonic motivation, price value and habit. Hedonic motivation refers to the degree of pleasure associated with performing a behavior and in this case it is the use of mobile internet. Price value refers to users'

perceptions regarding the expected benefits from using the technology compared to the financial cost that users should bare. Habit refers to the degree to which users will continue using a certain technology based on the accumulated experiences they acquired from previous interaction with that technology. Figure 2.8 displays the model UTAUT2 along with its constructs.

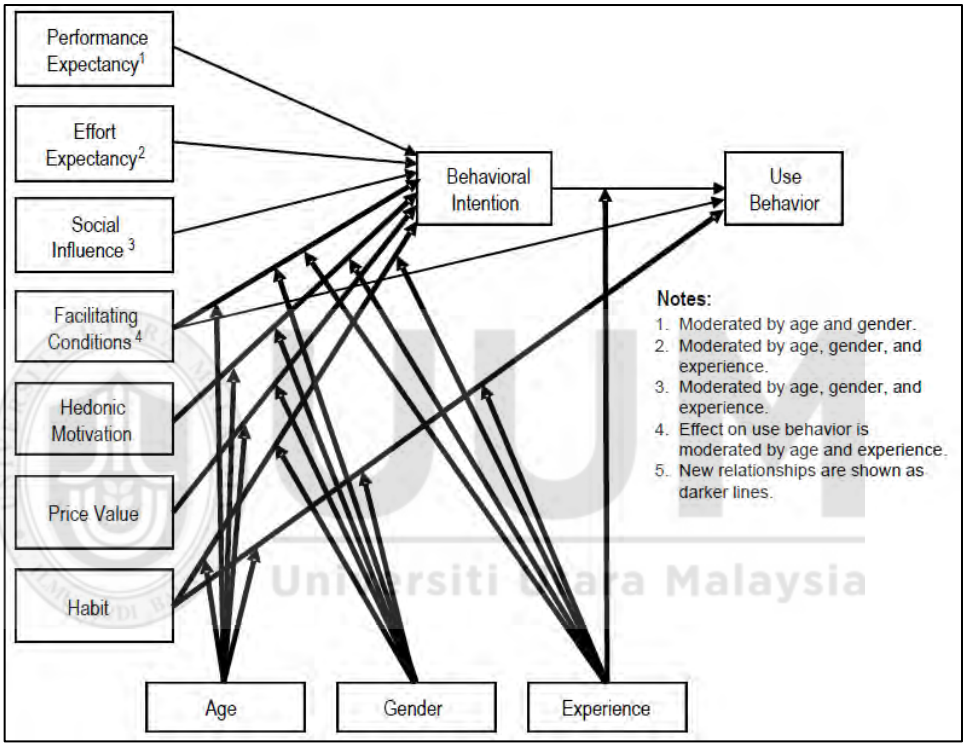


Figure 2.8. UTAUT2 Model

The UTAUT2 empirical results confirmed and supported the results from the original UTAUT in regard to the significance of its constructs. The additional three constructs were also proven to have a significant influence on behavioral intention to use the technology. The relationship between behavioral intention and technology use was moderated by experience and this was the difference from the original UTAUT (Venkatesh et al., 2012).

The UTAUT2 was conducted to examine a certain type of technology within a voluntary context which could have influenced the final results of the study; therefore, the researchers suggested that further examining for this model within different contexts, technologies and respondents would present a wider understanding about the acceptance of technological systems (Venkatesh et al., 2012).

2.6 Research Hypothesis

In the following sections the constructs that formulated the study's model are presented along with their theoretical justification and hypotheses. As stated earlier, the UTAUT model was used as the theoretical backbone for this study. The dependent variables are presented first followed by the independent variables within the next sub-sections.

2.6.1 Behavioral Intention

Behavioral Intention (BI) is one of the dependent variables for the UTAUT model (Venkatesh et al., 2003) and for this study. BI refers to the degree to which a person is willing to use a technological system (Davis, 1989; Venkatesh et al., 2003). Behavioral intention is also a significant predictor to the actual use of information systems (Davis, 1989; Venkatesh et al., 2003, 2011, 2012). According to Venkatesh et al. (2003), behavioral intention was predicted by performance expectancy, effort expectancy and social influence. For this study, the hypothesis for this construct (i.e. BI) is like the following:

H1: Behavioral Intention will have a significant influence on HIS usage.

2.6.2 Use Behavior

Use behavior is defined as the recurrence of using a certain system as reported by the user or the individual himself/herself (Davis, 1989). This construct is the second dependent variable for the UTAUT model (Venkatesh et al., 2003) and for this study.

2.6.3 Performance Expectancy

Performance Expectancy (PE) refers to the extent to which an individual believes that using a certain system will be more advantageous for him/her and will improve the task's performance (Venkatesh et al., 2003). This construct was formulated for the UTAUT model but it was based on constructs from five previous theories, technology Acceptance Model (TAM), TAM2, Combined TAM and Theory of Planned Behavior (C-TAM-TPB), Motivational Model (MM), Model of Personal Computer Utilization (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT).

Performance expectancy was found to be the strongest predictor to the intention to use technological systems (Venkatesh et al., 2003, 2012) and its effect was moderated by age and gender. In the context of healthcare settings and HIS adoption, a study by (Venkatesh et al., 2011) used the UTAUT model to examine the adoption of EMR system among doctors; performance expectancy was again found to be the strongest predictor to the intention to use EMR. In the same study only age found to have a moderating effect (Venkatesh et al., 2011). However, the study has its limitations as stated by the researchers; it was conducted within one hospital and only doctors were considered as participants. The study of Venkatesh et al. (2011) suggested that to overcome this limitation, other settings and other healthcare professionals should be considered in future studies to get a better understanding of HIS adoption.

Aldosari (2012) conducted a study in a single hospital in Saudi Arabia to examine the acceptance of PACS among different healthcare staff and concluded that perceived usefulness (PU) which is similar to performance expectancy is the most significant predictor to PACS acceptance. Other studies also found performance expectancy to have a significant effect on behavioral intention to use technological innovations within healthcare context and other domains (Al-Gahtani, Hubona, & Wang, 2007; De Veer et al., 2015; Kijsanayotin et al., 2009; Prasanna & Huggins, 2016; Venkatesh & Zhang, 2010).

Another study (Duyck et al., 2007), also examined the acceptance of PACS in a hospital in Belgium and found that performance expectancy was a significant predictor to the intention to use PACS but not the strongest one; facilitating conditions was the most significant. This finding was a contradiction with the findings of (Venkatesh et al., 2003, 2011) and the reason for that could be the different context of the study, type of respondents or the type of HIS being studied.

Schaper and Pervan (2007) in their study about the acceptance of HIS among healthcare practitioners, found that the relationship between performance expectancy and behavioral intention was not significant which was not in-line with results from the literature that asserted the significance of this relationship (Venkatesh et al., 2003, 2011). This insignificant effect of PE was also found by another study within healthcare context (Ifinedo, 2012). Such inconsistency underlines the importance of the environment, participants, the type of technology being studied and its effect on the results of these studies regarding the users' adoption of HIS.

Considering the importance of this construct and the different findings from the literature regarding its salience, this study examined the performance expectancy effect on the behavioral intention of using HIS among healthcare staff within public hospitals of KRI of Iraq and the hypothesis for this relationship is:

H2: Performance Expectancy will have a significant influence on behavioral intention to use HIS.

2.6.4 Effort Expectancy

Effort Expectancy (EE) refers to the degree of ease and simplicity experienced by individuals when they use a certain information system (Venkatesh et al., 2003). This construct was formulated for UTAUT, but it has origins from constructs from three previous models, TAM, MPCU and IDT.

In the original UTAUT model (Venkatesh et al., 2003), effort expectancy was found to be a significant predictor to the intention to use technology systems, but this significance was only salint at early phases of usage (i.e. with limited experience); as users became more experienced with the system, the significance of effort expectancy decreased. In the same study, effort expectancy was moderated by age and gender.

According to (Venkatesh et al., 2011), a logtudinal study was conducted to examine the applicability of UTAUT in a healthcare context. A questionair was submitted to participants three times over the period of seven months. The notable thing is that effort expectancy was a significant predictor to the intention to use EMR at all three points of measurement and this contradicts the findings of the original UTAUT model in which effort expectancy significance was only proved at the beginning of system usage. The

explanation for this finding might be the special characteristics of the participants themselves or due to the special characteristics of the EMR as those information systems are known for being complex (Cresswell & Sheikh, 2013; Lluch, 2011; Venkatesh et al., 2011) and that's why healthcare practitioners asserted on the issue of HIS simplicity as a driver for its adoption.

The significant role of effort expectancy in predicting behavioral intention to use HIS within healthcare settings was confirmed by other studies (De Veer et al., 2015; Kijsanayotin et al., 2009; Schaper & Pervan, 2007). Within Arabic environment, Aldosari (2012) found that perceived ease of use (PEOU); which is a similar construct to effort expectancy, was a salient predictor to healthcare professionals' behavior to accept PACS in Saudi Arabia. The significance of PEOU as a predictor to behavioral intention was also confirmed by another study within the Arabic context (Hu et al., 2010).

Another study (Ketikidis et al., 2012), concluded that healthcare staff behavioral intention to use a comprehensive EHR system was most significantly influenced by perceived ease of use more than perceived usefulness. A similar finding was reached by (Chen & Hsiao, 2012), where perceived ease of use for doctors was more salient than perceived usefulness in HIS adoption.

On the other hand, a contradiction was found in another study by Duyck et al. (2007), where effort expectancy was not significant in predicting the behavioral intention of using the PACS by healthcare staff and the explanation for that by the same study was that the special attributes of the participants and the study context might be the reason for such adoption behavior. Al-Gahtani et al. (2007) in their study of knowledge workers

from different organizations in Saudi Arabia, found that effort expectancy was not significant as a predictor of behavioral intention to use information systems.

These different findings from the literature about the significance or non-significance of effort expectancy prediction power of behavioral intention could be due to different contexts, participants and different systems examined (Venkatesh et al., 2011; Venkatesh & Zhang, 2010). Hence, this study's hypothesis about the effect of effort expectancy on behavioral intention among healthcare staff working in public hospitals of KRI of Iraq is:

H3: Effort Expectancy will have a significant influence on behavioral intention to use HIS.

2.6.5 Social Influence

Social influence (SI) refers to the extent to which the opinions of the important others have an effect on the individual's behavior regarding the use of new technology (Venkatesh et al., 2003). This construct was adapted from similar constructs from previous models like TRA, TAM2, TPB, MPCU and IDT. In the UTAUT model, this construct had a significant effect on users' behavioral intention to use technology and was moderated by age, gender and experience. Its significance was salience at early stages of use and as individuals became more experienced with the system, the effect of social influence diminished (Venkatesh et al., 2003).

Prasanna and Huggins (2016) found that social influence had a significant influence on the adoption emergency information systems. In another study (Hung et al., 2014), the opinions of healthcare professionals were surveyed in regard to their adoption of

primary healthcare information system (PHIS). The study found that co-workers' viewpoint which is a similar construct to social influence had a significant impact on the intention to use PHIS. Social influence was also salient in Venkatesh and Zhang study (2010). According to (Hu et al., 2010), acceptance of information systems was studied among workers of 56 organizations in Saudi Arabia from different sectors; the study found that subjective norm which is similar to social influence, had a significant effect on behavioral intention to use information systems and the effect was moderated by gender. Similar findings were obtained by (Al-Gahtani et al., 2007). In healthcare context, other studies also concluded that social influence predicts behavioral intention significantly (Chang, Hwang, Hung, & Li, 2007; Duyck et al., 2010; Kijsanayotin et al., 2009).

On the other hand, other studies found that social influence had no influence on behavioral intention to use HIS within healthcare institutions (Chau & Hu, 2002; Duyck et al., 2007; Jianbin & Jiaojiao, 2013; Schaper & Pervan, 2007) due to the effect of the context, characteristics of the participants and the technology being studied. This disagreement within the literature about the significance of social influence and its effect on behavioral intention to use HIS encourages this study to further examine the salience of this construct among healthcare staff in public hospitals in Kurdistan Region of Iraq. The hypothesis for this construct is:

H4: Social Influence will have a significant influence on behavioral intention to use HIS.

2.6.6 Facilitating Conditions

According to Venkatesh et al. (2003), facilitating conditions (FC) refers to the extent to which an employee or an individual perceives that tools, technical infrastructure and support from the organization are existed to encourage the use of information systems. This construct was derived from three constructs from previous models which are TPB/DTPB, C-TAM-TPB and IDT. Facilitating conditions had a significant influence on usage of information systems but not on behavioral intention and it was moderated by age and experience (Venkatesh et al., 2003).

Facilitating conditions was found to be a significant predictor of HIS usage among 1607 healthcare center officers (Kijsanayotin et al., 2009). Also in healthcare context, other studies concluded that technical support and training provided by the hospital has a salient effect on the adoption of HIS (Castillo et al., 2010; Escobar-Rodríguez & Romero-Alonso, 2013; Jha et al., 2009). Jones and Wittie (2015) in their study findings, emphasized the importance of technical assistance (i.e. a similar factor to facilitating conditions) as an accelerator for the adoption of EHR systems within healthcare centers. Facilitating conditions significance as a predictor to the usage of information systems was also proved by other studies within other domains (Gogus, Nistor, Riley, & Lerche, 2012; Venkatesh et al., 2012).

Some contradictions exist in the literature, according to (Duyck et al., 2007) which conducted their work to study the adoption of PACS in a hospital in Belgium; in that study, Facilitating conditions had the most significant influence on behavioral intention but not on PACS usage; and its effect was even more than the effect of performance expectancy, which was not in-line with previous literature. This result asserts the impact

of context, type of participants and the type of technology being studied. Another study (Al-Gahtani et al., 2007), found that facilitating conditions had no influence on the usage behavior among knowledge workers in Saudi Arabia.

Based on the literature shown above, this study examined the effect of facilitating conditions on the usage of HIS among healthcare staff working in the public hospitals of KRI of Iraq and the hypothesis for this construct is:

H5: Facilitating Conditions will have a significant influence on HIS usage.

2.6.7 Personal Innovativeness

Personal Innovativeness (PI) can be defined as the individual's propensity and willingness to explore and examine new things such as new technologies and innovations (Agarwal & Prasad, 1998). This personal attribute is related to the person himself/herself, the common norms and the cultural characteristics within a certain society (Daghfous, Petrof, & Pons, 1999); that's why it should be considered separately from one environment to the other.

Several studies have investigated the effect of this factor on the person's behavior regarding the adoption of new technologies. For example, the researchers in the empirical study of (Wells, Campbell, Valacich, & Featherman, 2010) concluded that innovative attributes of the users played a fundamental role in the adoption process of new technologies. Eckhardt and his collegues (2014) found that personal traits can contribute significantly to job-related attitudes within organizations. Another study examined the perceptions of individuals using an online banking services and the factors affecting their adoption behavior (Yousafzai & Yani-de-Soriano, 2012); the study found

that a fraction of the respondents were considered to be pioneers (i.e. having more intention to use the new technology in daily life) while other respondents were less innovative in this regard. However, in another study (Behrend, Wiebe, London, & Johnson, 2011), the researchers aimed at examining the factors influencing the adoption of new technologies (i.e. cloud computing) within higher education context, the study conceptualized the relationship between personal innovativeness and the adoption behavior to be mediated by perceived usefulness (PU) and perceived ease of use (PEOU); however, the personal innovativeness did not have salient influence on either one (i.e. on PU and PEOU).

Within healthcare domain, a qualitative study interviewed several respondents regarding the implementation of an HIS project (Yusof et al., 2008); the interviewees reported that despite the simple IT skills of the staff, it was the staff's cooperation, enthusiasm and willingness (i.e. their innovativeness) that effectively helped to start operating the HIS project. Moreover, within our qualitative field study, several interviewees stated that one of the barriers facing the usage and adoption of HIS by some healthcare staff was the lack of innovativeness and the lack of will to learn new techniques and new skills.

As a result to the findings extracted from the literature and the importance of this factor, the current study examined the effect of personal innovativeness on behavioral intention to use HIS among healthcare staff working in the public hospitals of KRI of Iraq and the hypothesis for this construct is:

H6: personal innovativeness will have a significant influence on behavioral intention to use HIS.

2.6.8 Compatibility

Compatibility refers to the degree to which a technological innovation is considered to be consistent with individual's previous values, experiences, requirements and work style (Rogers, 1995). Healthcare staff have maintained a certain style of work through their years of practice (Boonstra & Broekhuis, 2010). The implementation of new healthcare information systems will impose new procedures and work routines which might be inconsistent with prior ones, and this is considered to be one of the barriers to the adoption of HIS (Boonstra & Broekhuis, 2010).

According to (Buntin et al., 2011; Gagnon et al., 2009), the implementation of HIS has presented compatibility challenges to healthcare staff, represented by work-flow changes and responsibilities alteration which was perceived as a barrier by healthcare staff. The lack of compatibility was found to be an obstacle facing the adoption of HIS (Gagnon et al., 2012) and the transfer of a certain HIS from one healthcare setting to another without paying attention to the requirements and work style of the new context could represent a potential threat to HIS adoption in regard to its compatibility; meaning that each situation and each settings has its own needs and requirements (Boonstra & Broekhuis, 2010; Prasanna & Huggins, 2016). The healthcare staff would be reluctant to adopt new HIS if those systems reallocated their tasks and did not fit with previous routines (Escobar-Rodríguez & Romero-Alonso, 2013; Taylor et al., 2015).

Several studies have investigated the compatibility effect among healthcare staff; for example, Alkadi (2016) found that compatibility was one of the main challenges that faced the use of electronic patient records. Moreover, Hung, Tsai and Chuang (2014) examined nurses intention to use primary healthcare information system and found that

compatibility significantly influenced the nurses' perceived usefulness and perceived trust. In another study, the adoption of mobile healthcare system by healthcare staff within nine hospitals in Taiwan found that compatibility was a significant predictor to behavioral intention, perceived usefulness and perceived ease of use (Wu et al., 2007). In another study (Rahimi, Timpka, Vimarlund, Uppugunduri, & Svensson, 2009), the participants represented by doctors and nurses reflected their concerns about COPE compatibility as the system had not been adapted into their daily routine. Chau and Hu (2002) in their study came to a conclusion that compatibility had a significant effect on perceived usefulness but not on perceived ease of use in regard to physicians acceptance of telemedicine technology.

In the study of Chen and Hsiao (2012), the findings showed that physicians did not perceive compatibility as a significant predictor to perceived usefulness and perceived ease of use, which contradicts the results from previous literature. Another study (Chang et al., 2006) examined the adoption of PACS among radiology department directors and found insignificant relationship between compatibility and the adoption of PACS. The context, participants and the type of technology being studied could have affected the results for these studies.

Taking into consideration the importance of the compatibility construct within healthcare settings, the contradiction about its significance in the literature, the new context for this study which is the public hospitals of Kurdistan Region of Iraq and the suggestion of (Pynoo et al., 2013) to incorporate the compatibility construct into the UTAUT model when studying the adoption of HIS; this study included the

compatibility into the UTAUT model and the hypothesis for this construct is like the following:

H7: Compatibility will have a significant influence on behavioral intention to use HIS.

2.6.9 System Quality

System Quality (SQ) refers to the degree to which the system under question provides the required technical features and functionalities to support the employees or individuals in performing the job and achieving the intended tasks; these technical features and characteristics can be referred to in terms of system availability, reliability, response time, usability and accessibility (Delone & Mclean, 1992, 2003).

Boonstra and Broekhuis (2010) stated that dependability of EMR is one of the barriers that negatively influences the adoption of such HIS systems. Healthcare professionals are worried about the loss of patients' information and inability to access these important data due to hardware crash, computer viruses, technical glitches or electricity failure (Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013; McGinn et al., 2011; Menachemi, Langley, & Brooks, 2007).

System quality was studied within other domains and the following examples from the literature present its influence in those domains. For example, a study regarding the adoption of E-Learning systems was conducted in public universities (Ramayah, Ahmad, & Lo, 2010); the study surveyed the opinions of more than 1600 undergraduate and postgraduate students, the study concluded that system quality is a salient predictor to the intention to use E-Learning systems in public universities. Another study (Dai, Kao, Harn, Yuan, & Chen, 2011) was conducted to examine the factors that affect high

school teachers' attitude regarding a knowledge platform designed for teachers. The study found that system quality had a salient significance on both perceived ease of use and perceived usefulness. Within healthcare context, Pai and Huang (2011) studied the adoption of HIS among nurses; the study covered 100 district hospitals and found that system quality significantly affected the intention to use HIS but through the mediation of perceived ease of use. A study conducted within a single hospital about the adoption of e-hospital services (Chang, Pang, Tarn, Liu, & Yen, 2015) used a construct named web-site-quality which is similar to system quality, the study found that this construct had more significant influence on perceived ease of use than perceived usefulness. Furthermore, according to (Chen & Hsiao, 2012), their study investigated the adoption of HIS among physicians within the boundaries of one private hospital; the study found that system quality had a significant effect on perceived ease of use but had no effect on perceived usefulness which contradicts the results from the literature. In Netherlands, a qualitative study (Nieboer et al., 2014) interviewed healthcare professionals from multiple healthcare institutions; the participants in the study declared their concerns about the reliability of the HIS and whether these technological systems will perform their tasks properly and in an error-free manner.

The previous literature showed concerns from healthcare professionals regarding the quality of different HIS systems (Boonstra & Broekhuis, 2010; Nieboer et al., 2014). System quality was originally developed by Delone and Mclean (1992) to measure the information system success within organizations. However, the current study and as a part of its contribution integrated system quality into the UTAUT model to examine HIS adoption rather than success within healthcare context and specifically within new

environment which is the public hospitals in KRI of Iraq; the study included system quality into the proposed model and the hypothesis is:

H8: System quality will have a significant influence on behavioral intention to use HIS.

2.6.10 Top Management Commitment

Top Management Commitment (TMC) refers to the level of support, commitment and active engagement the top management shows in regard to the planning and the implementation of new technological systems in order to achieve the organization's goals and vision (Thong, Yap, & Raman, 1996).

Top management has the power and the authority to influence and persuade the members of the organization about the potentials of the technological innovations being implemented by engaging the staff and employing a bottom-up approach; it also has the financial resources that can be allocated to overcome any obstacles slowing down the implementation process by providing the required support and training to ensure the adoption of those systems by the targeted individuals to reach the ultimate goal which is fulfilling the promised effectiveness intended from the investment in these technical innovations (Avgar et al., 2012; Cresswell & Sheikh, 2013; Kim & Kankanhalli, 2009; Thakur et al., 2012; Thong, Yap, & Raman, 1994).

Boonstra and Broekhuis (2010) stated that the management belief in the potentials of HIS and the level of support it shows will certainly influence the adoption of those systems by healthcare staff. Without the management's important role to motivate, encourage and convince the individuals within the organization about the benefits of

HIS, the adoption and use of those systems might become a challenging issue (Terry et al., 2008; Thakur et al., 2012).

The HIS have proven to be complex systems to implement (Anderson, 2007; Bossen et al., 2013; Cresswell & Sheikh, 2013). The inadequate support of management in certain cases for such systems is considered a barrier, for example; lack of planning and using inappropriate techniques by the management was considered a barrier in EHR implementation (Scott, Rundall, Vogt, & Hsu, 2005), other studies reported that management is not providing sufficient resources for the implementation process (Goddard, Alty, & Gillies, 2001; Greenhalgh et al., 2008), other researchers reported that the management being disoriented and lacking a full strategic plan can cause the selection on of inappropriate HIS for their organizations and consequently unfulfilling the realistic needs and requirements for their staff and the job-tasks (Davidson & Heslinga, 2006; Ludwick & Doucette, 2009).

Studies such as (Bossen et al., 2013; Escobar-Rodríguez & Romero-Alonso, 2013), have found that support provided by the top management positively influenced the adoption of HIS by health care staff and reduced their resistance. In a study about the adoption of PACS, top management played a salient role to support the adoption of those innovations (Chang et al., 2006). Another study (Chen & Hsiao, 2012), concluded that management support had a salient effect on physicians' perceived usefulness but its effect on the respondents perceived ease of use was insignificant.

According to a study (Zhu, Kraemer, & Xu, 2006), the researchers concluded that organizations in developing countries face managerial challenges and barriers more than

those in developed countries .other studies like (Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013) have noticed the special characteristics, diversity and complexity of different HIS systems and the issues regarding their implementation and adoption within healthcare settings and found that management related factors have received limited attention by researchers compared to its importance and encouraged that future studies should give more focus to this aspect of the adoption process.

Considering the importance of the top management commitment role, the recommendations from the literature and not to forget the new context for this study which is the public healthcare hospitals in KRI of Iraq; the construct top management commitment will be included into the study to examine its influence. The hypothesis for this construct is:

H9: Top management commitment will have a significant influence on behavioral intention to use HIS.

2.6.11 Top Management Innovativeness

Top Management Innovativeness (TMV) refers to top management's degree of willingness and tendency to embrace innovative ideas and approaches to solve the organization's problems and to improve its performance (Thong & Yap, 1995).

This factor was found to have a significant effect on the adoption of technological solutions within organizations (Thong, 1999; Thong & Yap, 1995). The role of top management innovativeness is important to organizations as top managers are responsible for keeping the organization's competitive edge, enhancing the organization performance and stimulating business through taking fundamental steps like the decision

to adopt new technology innovations (Thong, 1999; Thong & Yap, 1995). The healthcare institutions are lagging behind other industries in regard to the adoption of technology innovations (Al Hilfi et al., 2013; Aldosari, 2014; Ali et al., 2011; Buntin et al., 2011; McGinn et al., 2011). The top management role can be significant in encouraging the adoption of new technologies within healthcare institutions (Cresswell & Sheikh, 2013; Escobar-Rodríguez & Romero-Alonso, 2013; Yusof et al., 2008). Top managers' knowledge and familiarity about the technological innovations can minimize the uncertainty about the new innovations and as a result prompting its implementation by the organization and its adoption by the staff (Abdul Hameed & Counsell, 2012; Thong, 1999; Thong & Yap, 1995).

Taking into account that the study of organizational issues had received inadequate attention in regard to its effect on HIS adoption (Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013) , the effect of the individual's personality on his/her job attitude (Eckhardt et al., 2014) and the new context for the current study, this study covered this aspect in order to bridge the gap in the literature by including the construct top management innovativeness into the UTAUT model as part of this study's contribution. The hypothesis for this construct is:

H10: top management innovativeness will have a significant influence on behavioral intention to use HIS.

2.6.12 Vendor Support

Vendor Support (VS) refers to the degree to which the vendor of a technological product provides support and assistance to the product users during and after the implementation

phase (Thong et al., 1996). This support will help to minimize the uncertainty about the technological product and overcome any potential problems.

Boonstra and Broekhuis (2010) in their work found that the lack of belief in the vendor is one of the barriers that affect the adoption of EMR among healthcare practitioners. The same study stated that healthcare practitioners are concerned about the trustworthiness of the vendor to provide the adequate support, training during and after implementation due to several reasons like vendor immaturity or going out of business. Therefore, the confidence about the vendor can contribute positively to the adoption of its products (Boonstra & Broekhuis, 2010; Bramson & Bramson, 2005). Other studies also highlighted the users' concerns about the vendor and the inadequacy of its support (Ludwick & Doucette, 2009) and fears about vendor's continuance in the market (Davidson & Heslinga, 2006). The importance of the vendor's role was also asserted by (Keshavjee et al., 2006) in aspects like providing staff at the cite, providing assistance and having a good relationship with the organization.

In a study conducted in Denmark (Bossen et al., 2013), healthcare staff found that vendor responsiveness and support was a significant factor during and after the deployment of a comprehensive EHR system in the hospital. The vendor provided staff members whom were available at the hospital for the first two months following the implementation of the system. This level of support helped the hospital staff to overcome obstacles and problems and created a positive climate for the staff to adopt and use the new system. The work of Thong, Yap, and Raman (1994) stated that the role of the vendor is significant because it represents the external expertise that is responsible for implementing the system. Thong et al. (1996) mentioned that it is possible for

vendor's role to diminish after the deployment stage which will affect the users' adoption of the system. Lluch (2011) stated that one of the reasons for healthcare professionals' low adoption is that vendors are delivering products that are unreliable or with low customizability. Aldosari (2012) in his study about the acceptance of PACS within healthcare institution in Saudi Arabia suggested that vendor support could influence the acceptance of such technologies since there are multiple suppliers for those HIS systems with each supplier having its own policy; the researcher also suggested to include this factor in future studies.

However, some studies found no influence of vendor support on IS adoption (Al-Qirim, 2008) nor with users attitude to use IS (Alia, Rahman, & Ismail, 2012). In a study conducted in South Africa (Cohen et al., 2013) to examine the acceptance of e-prescribing system among doctors, the comments (i.e. qualitative findings) from doctors declared that vendor slow responsiveness and lack of support was perceived as a barrier in some practices. Moreover, within the qualitative study in the current research, the respondents declared some dissatisfaction with the support provided with some HIS systems.

The previous lines have demonstrated the importance of vendor support in many industries, it also showed that there is an inconsistency about the influence of this construct. For those reasons this study aimed at integrating this construct into the UTAUT model to examine its effect on healthcare staff within the study's new context which is the public hospitals of Kurdistan region of Iraq. The hypothesis for this construct is:

H11: Vendor Support will have a significant influence on the usage of HIS.

2.6.13 Government Support

Government Support (GVS) is one of the environmental factors (i.e. the external factors) that exist outside the organization control; it refers to the role of the government in promoting and encouraging the implementation and usage of technology within organizations (Tornatzky, Fleischer, & Chakrabarti, 1990). This role can be translated into several aspects like providing guidelines, setting policies, allocating funds for training programs, starting initiatives, offering low-cost infrastructure for organizations and providing financial incentives for both organizations and individuals within public and private sectors (Quaddus & Hofmeyer, 2007; Tornatzky et al., 1990).

Government regulations and policies varies from one country to another and from one industry to another (Tornatzky et al., 1990). These regulations can be a constraining factor within a certain industry which discourages the adoption of innovations within that industry while in another industry, those regulations and guidelines can stimulate the organization to adopt technological innovations (Tornatzky et al., 1990).

A study conducted among academicians working in higher education sector in Pakistan (Abbasi, Chandio, Soomro, & Shah, 2011) to examine the factors that affect their adoption and usage of technology, the study found that the relationship between government support and perceived usefulness was empirically confirmed. However, in the same study, the relationship between government support and usage behavior was insignificant. El-Gohary (2012) studied the factors that affect the adoption of E-Marketing by small tourism companies in Egypt. The study included the government influence construct which is similar to the government support and found that government influence had a significant effect on the adoption of e-marketing but this

construct had no salient effect on perceived ease of use and relative advantage (i.e. perceived usefulness). Abdul Hameed and Counsell (2012) carried out a study regarding the factors that have an impact on technology adoption; the results from the study showed a weak effect of government support on technology adoption within organizations. In another empirical study about the adoption behavior of a trading portal (i.e. online marketplace) among small businesses in Australia, the study did not find statistical significance for governmental support as an external factor (Quaddus & Hofmeyer, 2007). In healthcare setting, (Chang et al., 2006) studied the adoption of PACS among radiology department directors and found that government policies (i.e. a similar construct to government support) is a significant predictor to the adoption of PACS.

Considering the complexity of HIS technologies, the importance of environmental dimension and the construct government support in previous studies from one hand and its fluctuating significance from the other hand; and the new context of this study which is public hospitals in KRI of Iraq, the study included the construct government support into the proposed model and the hypothesis for this construct is:

H12: Government support will have a significant influence on the usage of HIS.

2.6.14 Work Overload

Work Overload (WOL) refers to the employees' perceptions regarding the work environment being compacted with many tasks, close deadlines and having exhausting working hours (Moore, 2000). Work overload was found to be one of the job-stressors that leads an employee to develop negative feelings towards his/her job and it might cause undesired outcomes in some cases (Firth, Mellor, Moore, & Loquet, 2004).

In regard to the field of technology adoption, Kale and Goh (2014) examined the opinions of several schools' teachers in the United States regarding the adoption of emerging technologies in their daily practice; the results showed that the teachers' full schedule and workload was perceived as a barrier to the adoption of emerging technologies like the Web 2.0. In healthcare context, Boonstra and Broekhuis (2010) found that the lack of time (i.e. workload) is one of the factors that stands as a barrier facing the adoption of HIS within healthcare institutions as those new technologies will impose additional obligations on the staff, not to forget the time required to learn and master these systems and the time required afterwards for data entry purposes. Additionally, McGinn and his collegues (2011) in their study, concluded that time-insufficiency and heavy workload in the healthcare sector were considered important factors negatively affecting the implementation of HIS programs and its subsequent adoption by healthcare staff. Likewise, some healthcare staff thought that using HIS would not save them time in performing their daily tasks (Koivunen, Välimäki, Koskinen, Staggers, & Katajisto, 2009). In our preliminary qualitative study, several respondents denoted the workload inside the hospital as one of the factors affecting the use and adoption behavior of the staff, as those staff being already busy providing services for large number of patients and performing daily scheduled tasks.

However, Calisir, Gumussoy and Iskin (2011) in their study among technology professionals in Turkey, the researchers did not find a significant effect of workload as a job stressor which contradicts the findings of previous studies; and the researchers explained the results by describing the IT professionals as being used to stressful work environments and managers' demanding requests (Calisir et al., 2011). A similar

finding was also reached by (Dagnone et al., 2006) in their qualitative study within healthcare context; the study's respondents stated that the use of new technologies inside the hospital did not increase the staff workload; on the contrary, it decreased the workload and improved the job efficiency.

Considering the specificity of each work environment (Boonstra & Broekhuis, 2010; Prasanna & Huggins, 2016), the different findings from the literature and the new context of this study which is public hospitals in KRI of Iraq, the study included the construct work overload into the proposed model as part of the environmental dimension. The hypothesis for this construct is:

H13: Work overload will have a significant negative influence on the usage of HIS.

2.7 Moderators

Normally, individuals have diverse opinions regarding a certain phenomenon (i.e. they perceive the phenomenon and interact with it differently depending on their special and distinctive characteristics, values and experiences) (Joseph Hair, Hult, Ringle, & Sarstedt, 2014). If a study respondents are accounted for as a single set without recognizing the specific attributes of different groups, that might drive the study findings to be biased or misleading (Joseph Hair et al., 2014). For this reason, the current study has included four attributes to be examined as moderators. A moderator can be defined as a variable that modifies the strength or the direction of a relationship between two constructs (Baron & Kenny, 1986). Within the study's new context four moderators were examined, gender, age, experience and job-position.

2.7.1 Gender

Gender is an important sociocultural factor that can influence the individual's behavior regarding a certain issue (Gefen & Straub, 1997). From a general point of view, men are usually more assertive and competitive than women; on the other hand, women are more collaborative and nurturing (Gefen & Straub, 1997). Within Arabic and Middle-Eastern communities, tradition and gender segregation impose social impact on individuals where women are expected to comply with social norms; this social impact can leave its influence on workers' attitude within work environments and affect their behavior such as their adoption behavior of new technologies (Hu et al., 2010). Some studies have concluded that male individuals have more propensity than females to try new technologies and web based services (Bae & Lee, 2011; Fan & Miao, 2012). Other studies have examined the effect of gender on technology adoption and the results were inconsistent throughout different environments, respondents and settings as highlighted within the next section.

The original UTAUT model investigated the effect of gender as a moderator and showed that its effect was significant on the determinants of adoption (i.e. PE, EE and SI). In regard to performance expectancy, the UTAUT found that the effect of gender was stronger for men than women which means that male individuals are more likely to make their adoption decisions depending on performance gains or outcomes (Venkatesh et al., 2003). Other studies also showed that women are less keen and have less intention to use e-health technologies (De Veer et al., 2015). Similar findings were concluded by (Hu et al., 2010), in a sense that male workers considered the usefulness of new technologies as a more significant driver than their female peers in forming their

opinions and attitudes towards technology adoption. However, in another study, (Venkatesh et al., 2011), the researchers did not find a moderating effect of gender on PE within that study. Aldosari (2012), also did not find a significant moderation effect of gender on perceived usefulness within healthcare context.

In regard to effort expectancy, the findings from the literature contained inconsistent results. For example, within the original UTAUT the effect of gender was significant on the relationship between EE and the intention to use technology and it was more important for females than males, which means that women preferred simply designed technologies in order to make their adoption decision (Venkatesh et al., 2003). However, other studies did not find a significant effect of gender on EE (i.e. perceived ease of use) and its relationship with technology adoption (Aldosari, 2012; Hu et al., 2010; Venkatesh et al., 2011).

Also, the moderation effect of gender on the relationship between the variable social influence and BI showed different results throughout different studies. For example, in the original UTAUT model, women were more influenced by social pressure than men regarding the use of new systems within work environment (Venkatesh et al., 2003). On the other hand, Hu and his collegues (2010) conducted a study within Arabic context and their results were different; they found that men were more influenced by society pressure and others' opinions than women which implies that they were more concerned about their image within work environment than female workers. In another study (Venkatesh et al., 2011) within healthcare context, the effect of gender on social influence was absent, which implies that healthcare staff feel more independent in making their work decisions. Hence, such fluctuating results about the significance of a

certain variable highlight the effect of the environment and the study context on the findings.

Furthermore, some scholars suggested that gender differences and its effect on job-related issues such as innovativeness should be investigated as there is a shortage of research in this area (Marinova, Plantenga, & Remery, 2015). Moreover, another study declared that there is a shortage of assessing the innovativeness of females as entrepreneurs within business and organizations in certain contexts (Pantić, 2014).

Taking all the previous points into account and the inconsistent findings from the literature, demonstrates the significance and the influence of the context on the final results, which encouraged the current study to re-examine the effect of gender as a moderator on the study's proposed relationships and the hypothesis is:

Gender will moderate the effect of PE, EE, SI and PI on the intention to use HIS.

2.7.2 Age

Age was considered as a moderator in previous technology adoption studies. However, the effect of this variable was context-dependent; in other words, its effect was not uniformed through different settings and studies. Within the original UTAUT (Venkatesh et al., 2003), the age had a significant moderating effect on the relationship between PE, EE and SI with behavioral intention. Similar findings were reached within healthcare context (Venkatesh et al., 2011), where age was the only factor that had a moderation effect on the study relationships. However, within another technology adoption study regarding the acceptance of PACS, the age factor did not show any effect on the constructs perceived usefulness and perceived ease of use (Aldosari, 2012). In

another study within healthcare context (Ifinedo, 2016), age did not have a significant moderation effect on healthcare staff's PU and PEOU towards their attitude to adopt HIS. These results highlight the impact of the context and the type of respondents on the obtained results. In regard to the effect of age on personal innovativeness and within the preliminary qualitative study of the current work, the respondents denoted that some of the older staff members are being reluctant to change their work routines (i.e. to include and use HIS in their daily practice). Furthermore, another study concluded that older individuals have less intention and willingness to use e-health technologies (De Veer et al., 2015). Taking the previous findings from the literature into consideration, the current study hypothesized the effect of age as the following:

Age will moderate the effect of PE, EE, SI and PI on the intention to use HIS.

Age will moderate the effect of FC on the use of HIS.

2.7.3 Experience

Experience refers to a person's involvement or exercise of a certain action over a period of time (Venkatesh & Davis, 2000). The original UTAUT theory found that the effect of experience (i.e. as a moderator) was significant on the independent variables EE, SI and FC (Venkatesh et al., 2003). However, when applying the UTAUT within healthcare setting (Venkatesh et al., 2011), the moderation effect was insignificant. In another study within educational work environment (Abbasi et al., 2011), the researchers found a negative moderating effect of experience on both PU and PEOU towards the usage of new information systems; which means that as individuals gained more experience, they became less dependent on PU and PEOU as determinants of their technology use behavior and enjoyment became the main driver for this usage behavior as declared by

the study (Abbasi et al., 2011). The current study included this factor as a moderator to examine its effect within the study's new context which is public hospitals in KRI and the hypothesis for it is:

Experience will moderate the effect of EE and SI on the intention to use HIS.

Experience will moderate the effect of FC on the use of HIS.

2.7.4 Job-Position

Job-position can have an influence on the individual's perceptions and behavior inside the workplace as different individuals have different responsibilities and work in different settings depending on the position they occupy (Wynekoop & Walz, 1998). Eckhardt and his collegues (2014) found that different information technology (IT) personals (i.e. such as programmers, system engineers and system administrators) have different job attitudes inside the organization; the reason for such behavior is that those different groups of IT employees have diverse personal attributes and professional characteristics which have an impact on their perceptions.

Within healthcare context, some scholars stated that different healthcare professionals have different opinions regarding the factors that influence their job-satisfaction (Lambrou, Kontodimopoulos, & Niakas, 2010). That's why the current study aims at examining the effect of job-position on the perceptions of healthcare staff (i.e. medical and non-medical staff) regarding the issue of HIS adoption in KRI public hospitals and the hypothesis is:

Job-position will moderate the effect of PE, EE, SI and PI on the intention to use HIS.

2.8 Study Hypotheses

Table 2.2 presents a summary of the current study's hypotheses in a tabular format.

Table 2.2

The Constructs and Their Hypothesis

	Construct	Hypothesis
1	Behavioral Intention	**H1:** Behavioral Intention will have a significant influence on HIS usage.
2	Performance Expectance	**H2:** Performance Expectancy will have a significant influence on behavioral intention to use HIS.
3	Effort Expectancy	**H3:** Effort Expectancy will have a significant influence on behavioral intention to use HIS.
4	Social Influence	**H4:** Social Influence will have a significant influence on behavioral intention to use HIS.
5	Facilitating Conditions	**H5:** Facilitating Conditions will have a significant influence on HIS usage.
6	Personal Innovativeness	**H6:** personal innovativeness will have a significant influence on behavioral intention to use HIS.
7	Compatibility	**H6:** Compatibility will have a significant influence on behavioral intention to use HIS.
8	System Quality	**H7:** System quality will have a significant influence on behavioral intention to use HIS.
9	Top Management Commitment	**H8:** Top management Commitment will have a significant influence on behavioral intention to use HIS.
10	Top management innovativeness	**H9:** top management innovativeness will have a significant influence on behavioral intention to use HIS.
11	Vendor Support	**H10:** Vendor Support will have a significant influence on the usage of HIS.
12	Government Support	**H11:** Government support will have a significant influence on the usage of HIS.
13	Work Overload	**H13:** Work overload will have a significant negative influence on the usage of HIS.
	Moderators	Gender will moderate the effect of PE, EE, SI and PI on the intention to use HIS. Age will moderate the effect of PE, EE, SI and PI on the intention to use HIS. Age will moderate the effect of FC on the use of HIS.

Table 2.2 continued

	Experience will moderate the effect of EE and SI on the intention to use HIS.
	Experience will moderate the effect of FC on the use of HIS.
	Job-position will moderate the effect of PE, EE, SI and PI on the intention to use HIS.
	Job-position will moderate the effect of FC on the use of HIS.

2.9 Proposed Research Model

Figure 2.9 will portray the study's proposed model. The UTAUT model forms the backbone theoretical framework for this study. Additional factors representing other important dimensions have been added to the original UTAUT model to improve its performance in regard to explaining the users' behavior towards using HIS. Compatibility and system quality represented the technological dimension and they were hypothesized to have significant effect on behavioral intention. Top management support and top management innovativeness represented the organizational dimension and they were hypothesized to have significant effect on behavioral intention. Vendor support and government support represented the environmental dimension and they were hypothesized to have significant effect on use behavior.

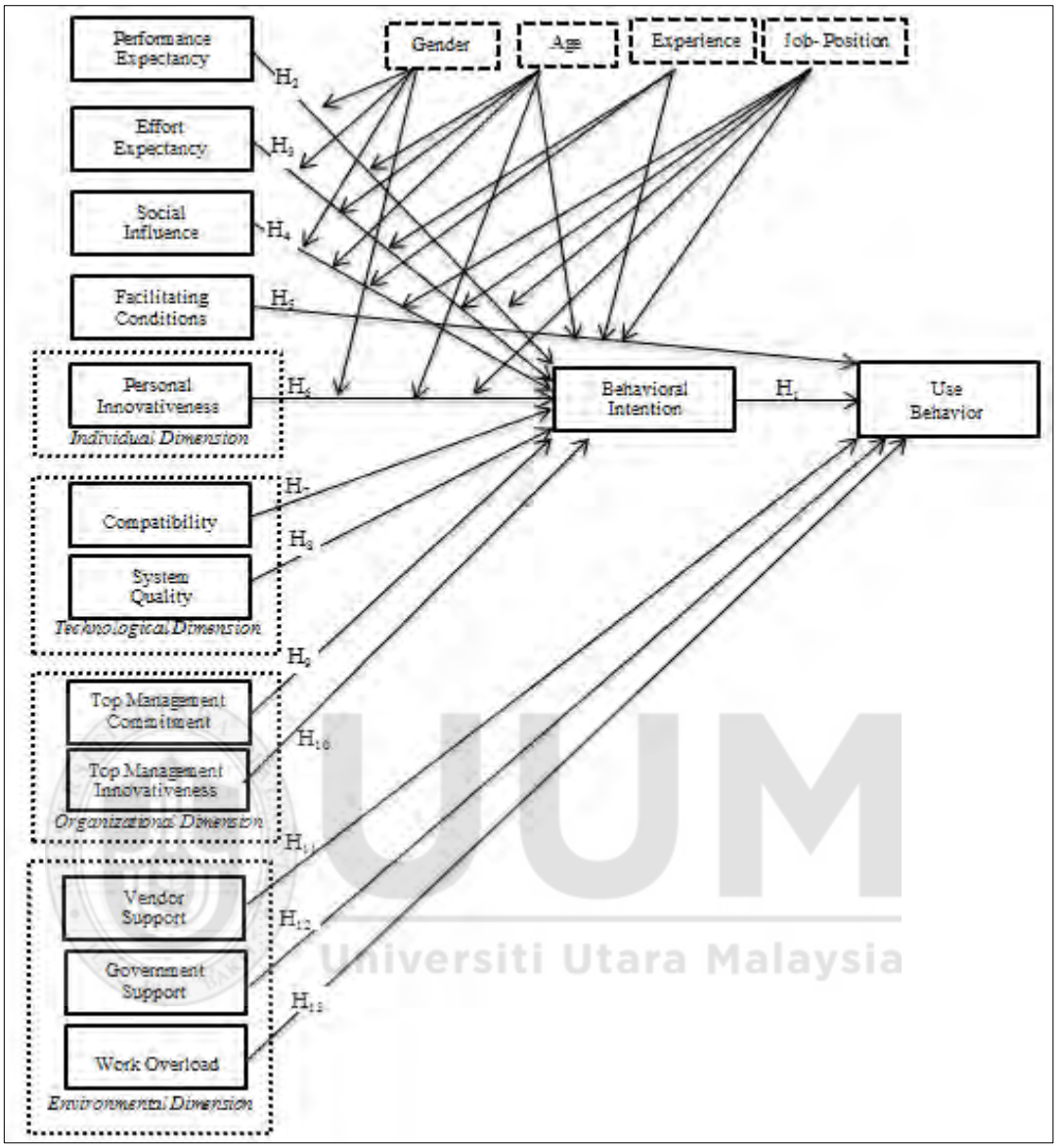


Figure 2.9. Proposed Model for the Study

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview of the Chapter

This chapter begins by presenting a description about the research paradigm and the methodology that was followed for this study. Afterwards, the research design for the study is elaborated. Since this study used a mixed method approach, the following sections presented detailed information about the two phases of data collection (i.e. the qualitative and the quantitative) that were carried out. Furthermore, this chapter includes a description regarding the appropriate data collection method, sampling technique and the analysis methods that were used for both the qualitative and the quantitative part of the study. Finally, a summary about the chapter contents concludes this chapter.

3.2 Research Paradigm

A paradigm is the worldview as perceived by the researcher; it will help and guide the researcher to select the proper method of investigation of the phenomenon under question; the paradigm provides the logical orientation for the researcher to embrace a certain methodology (i.e. qualitative, quantitative or a mixed method) in order to establish a better understanding about the research problem (Creswell, 2009; Saunders, Lewis, & Thornhill, 2012). Several types of paradigms are available within the literature such as postpositivism, constructivism, advocacy and pragmatism; the selection of a certain paradigm is determined by how the researcher views the world and the objectives

of the study; subsequently, this will decide the suitable methodology that should be followed for that study (Creswell, 2009; Saunders et al., 2012).

Postpositivism is usually pared with quantitative research methods. Normally, studies following this paradigm start from a theory and researchers proposes new hypotheses about a certain phenomenon, collect data from the real world and then depend on scientific and systematic analysis of those data to support or refute the proposed hypotheses (Creswell, 2009; Saunders et al., 2012). The purpose behind this process is to provide better understanding about the phenomenon or the issue under question using rigor scientific tools. The researcher must preserve objectivity in this approach; meaning that the researcher must not let his/her beliefs, values and own perspectives influence the study conclusions or outcomes; in other words, interpretations of the collected data cannot endure personal opinions rather, it must depend on systematic analysis to avoid bias (Creswell, 2009; Saunders et al., 2012).

The constructivism paradigm is usually associated with qualitative research methods (Creswell, 2009). In this paradigm, instead of beginning with a theory and trying to retest it, the researcher starts with a phenomenon that holds a certain degree of ambiguity, a limitation in the knowledge about it or the number of studies related to this phenomenon. That's why the purpose behind this kind of research is formulating a theory about a certain phenomenon rather than testing an existing one (Creswell, 2009). In this paradigm, qualitative methods such as interviews with open-ended questions and observations are used to study the phenomenon (Creswell, 2009). The researcher uses his/her beliefs, own skills and experiences in interpreting the collected data in order to draw conclusions; therefore, this kind of research involves a certain degree of

subjectivity due to the researcher's direct involvement with the data analysis and the interpretation process (Creswell, 2009).

With advocacy paradigm, also referred to as participatory paradigm, both qualitative and quantitative methods can be used (Creswell, 2009). The aim of these studies is to establish a political dispute regarding important issues that matter to the society like inequality, suppression and women empowerment in order to improve people's conditions who suffer from such problems, create an action agenda and bring change to the world (Creswell, 2009). In this type of research, the participants can play a bigger role by helping in collecting the data, designing the questions and gaining benefits or rewards for their role in the research; and that's why this paradigm is also referred to as participatory (Creswell, 2009).

In the pragmatic worldview, the researcher uses different approaches and methods with the aim to reach a better understanding about the problem (Creswell, 2009; Saunders et al., 2012). Mixed methods can be used for this kind of research; however, the researcher has the freedom to choose the suitable method for conducting the study depending on the nature of the study, its requirements and objectives (Creswell, 2009; Saunders et al., 2012).

The current study embraced a pragmatic paradigm in order to reach a better understanding about the issue of HIS use and adoption in public healthcare sector in Kurdistan Region of Iraq. As a result, a mixed methodology approach was utilized in order to comprehend the research problem from a wider perspective and the following sections explain this methodology in a more elaborated manner.

3.3 Research Methodology

The selection of a certain research methodology (i.e. quantitative, qualitative or mixed methods) depends on the purpose and the objectives of the research (Christensen, Johnson, & Turner, 2014; Creswell, 2009; Saunders et al., 2012). The approach that is chosen for a certain study will determine the practical steps that are carried out in order to answer the research questions for that study; therefore the selection of the appropriate methodology is significant for any study as it will influence the research results and its quality (Christensen et al., 2014; Creswell, 2009; Saunders et al., 2012).

Quantitative research can use approaches like surveys and experiments for conducting the study; the researcher keeps a neutral role, maintains objectivity and uses mathematical and statistical methods to analyze the study's numeric data in order to prove or disprove the proposed hypotheses; the researcher will not depend on his/her own personal interpretation of the data regarding the issue being studied (Saunders et al., 2012; Sekaran & Bougie, 2010). For example, if a survey method was used for a certain study, then the researcher's role is summarized by developing the instrument that will be used to measure the participants' responses, will formulate a specific and close-ended questions which require the participants to give a short and a specific answer which is going to be a numeric value; afterwards, the researcher will utilize mathematical and statistical tools to analyze the data in order to explain the relationships or the influence between the independent variables and the dependent variables (Saunders et al., 2012; Sekaran & Bougie, 2010).

On the other hand, qualitative research can use methods such as observations, focus groups and one-on-one interviews with open-ended questions; the researcher's aim is to

discover and probe the underlying meaning in order to build an in-depth understanding about the phenomenon or the issue being studied through interpreting the observations or the respondents' answers in interviews using the researcher's own interpretation and analysis skills. The qualitative methods involves a degree of subjectivity because the researcher uses his/her own experiences and values in the interpretation and the analysis of the qualitative data (Creswell, 2012a; Maxwell, 2012; Saunders et al., 2012). In qualitative research the researcher provides broad questions and then attempts to summarize the respondents' answers to find themes within the answers in order to produce an understanding regarding the issue being studied. The data collected from qualitative research is normally a non-numeric data (Maxwell, 2012; Saunders et al., 2012).

Another approach is the mixed methodology approach. The basic idea of this approach is that it uses a combination of both qualitative and quantitative methods within the same study, the thing that will bring a better understanding of the issue being studied than if only one method was utilized (Creswell, 2012a; Saunders et al., 2012). Using mixed methods approach will combine the strengths of the qualitative and the quantitative methods together; or in other words, the strength of one method will compensate the weakness of the other method. Furthermore, when using a single method (i.e. qualitative or quantitative) is not sufficient to tackle the research problem, mix methods can help to address the different research questions within the same study (Creswell, 2012a; Saunders et al., 2012).

Since the current study followed a pragmatic paradigm, using a mixed methods approach was the appropriate choice in order to answer the different research questions and to provide a deeper and more thorough understanding of the issue under question, which is the usage and adoption of HIS within public hospitals in KRG of Iraq and the factors that influence this usage among healthcare staff.

The current study embraced the embedded sequential design which is one of the mixed methods designs that are presented by (Creswell, 2012a). Within the embedded design, both qualitative and quantitative data are collected sequentially for the study, one of them will play a "supportive role" (Creswell, 2012a, p. 544) and the other method will be depended upon as the major source of data. In the current study, qualitative method represented by semi-structured interviews with open-ended questions was the supportive method and was carried out at first (i.e. before the quantitative method). The purpose of the qualitative method was to explore the domain of public healthcare in KRI of Iraq to investigate the issues that are currently facing the adoption of HIS among healthcare professionals. This in-depth investigation supported by the review of the related literature helped to identify a set of potential factors that might affect the issue of HIS adoption and to conceptualize a set of hypotheses that were tested later in the next part of the study (i.e. the quantitative part). Thereafter, a quantitative study was carried out and a questionnaire was developed for the purpose of examining the study's proposed model. The following sections explain and shed more light on these steps in a more detailed manner.

3.4 Research Design

Research design represents the roadmap for carrying out the research in a detailed manner; it specifies the data collection methods, the appropriate analysis tools and any other important practical steps needed to address the research questions (Creswell, 2009).

The current study started by reviewing the literature for the purpose of identifying the problem statement and selecting the appropriate theoretical framework. Since this study embraced a mixed methods approach, a preliminary qualitative study was conducted using semi-structured interviews with open-ended questions for the aim of exploring the field of public healthcare in Kurdistan Region of Iraq and to underline the issues and challenges that face the healthcare professionals regarding the use and adoption of healthcare information systems.

Depending on the results of the semi-structured interviews and the review of the related literature, a set of potential factors was identified that could contribute to the issue of HIS adoption in KRI public healthcare sector and a set of hypotheses was conceptualized in order to produce the study's proposed model. Then, a quantitative method (i.e. survey) was performed to investigate the opinions and perceptions of healthcare professionals working in the public hospitals of Kurdistan region to test the proposed hypotheses and to come up with generalized conclusions. Structural Equation Modeling (SEM) and specifically the partial least squares (PLS) technique was used to analyze the survey observations and to test the study hypotheses. Figure 3.1 portrays the research design in a summarized way and further detailed description of each step is presented in the following sections of this chapter.

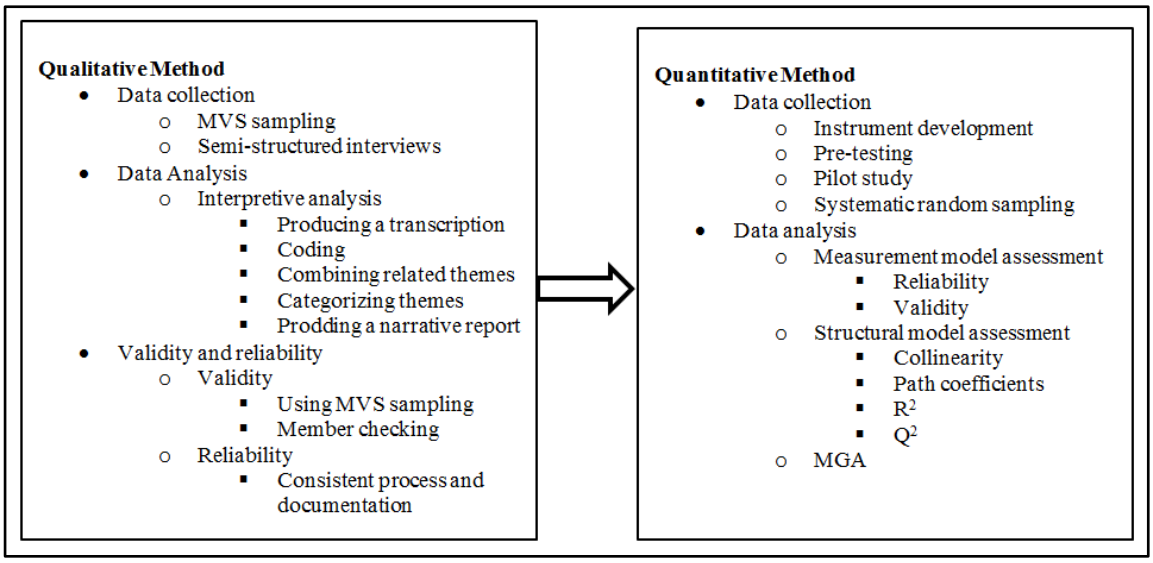


Figure 3.1. Research Design

3.5 Qualitative Methods

Qualitative research methods provide a deeper insight into the phenomenon under question, explore the circumstances involved within that phenomenon, provide a wider understanding about a certain situation and reveal potential issues that would not be observed or noted if other methods were employed; this can be done through the investigation of the phenomenon within its own environment and the interaction with the individuals experiencing it (Creswell, 2012b; Maxwell, 2012).

Creswell (2012a) provided several steps to be considered when conducting qualitative research; these steps include 1) choosing the suitable sampling technique that will help the researcher to identify the appropriate sites and individuals in order to obtain the answers the researcher is seeking for; 2) acquiring the formal and official permissions to conduct the study at the specified sites and submitting the informed consent forms to the participants; 3) deciding on the most suitable kind of qualitative data that will best

address the research questions; 4) selecting the techniques for recording and documenting the qualitative data; 5) addressing the ethical issues like the respondents' confidentiality and finally validating the elicited results (Creswell, 2012a). The next sections elaborate these points with more detail.

3.5.1 Qualitative Sampling

In qualitative studies, the sampling technique that is used is referred to as purposeful sampling (Creswell, 2012a; Sekaran & Bougie, 2010). Purposeful sampling is not used to generate generalizability of the findings as in quantitative studies (Creswell, 2012a; Maxwell, 2012); instead, it is used to select sites and participants whom acquire condense information about the phenomenon being studied which will help the researcher to understand the phenomena in a better way and develop a clear comprehension about it (Creswell, 2012a, 2012b). However, several strategies exist in the literature regarding the sampling techniques that could be followed to identify the potential participants for the study; the choice of a certain sampling technique depends on its suitability to the research questions and the research objectives (Creswell, 2012a; Maxwell, 2012).

For the current study, maximal variation sampling (MVS) was used (Creswell, 2012a). MVS aims at identifying different individuals working in different sites in order to collect different opinions and perspectives regarding the phenomenon being studied which will help the researcher to develop a better understanding about the problem at hand and look at that issue from different angles (Creswell, 2012a). The diversity of participants and sites will enable the researcher to see the big picture (Creswell, 2012a).

Furthermore, Kvale (1996) suggested that a number of respondents (i.e. interviewees) ranging from five to twenty five is considered sufficient as a general rule of thumb for conducting qualitative interviews. Also relating to this topic, several researchers stated that the sample size within qualitative interviews depends on the subjective assessment of the researcher; when he/she realizes that the point of saturation was reached, meaning that the information is becoming more redundant and no more new themes are being identified; at that time the researcher can decide to end the process (Creswell, 2012a; Lincoln & Guba, 1985).

Accordingly, the researcher identified two sites, the first one is a large size public hospital and the second one is a college of nursing with a total number of eight participants from the two sites; both sites are located within Kurdistan Region of Iraq (KRI). Within the first site, several healthcare professionals were approached for conducting the semi-structured interviews. Eventually, six individuals agreed to participate in the study; four doctors working in different departments, one nurse and one senior administrative staff.

The second site that was selected is one of the nursing colleges in Kurdistan Region. Two professors from this college were asked to participate in the study. The two professors work as senior lecturers and they teach classes for both undergraduate and postgraduate students; furthermore, as part of their duties, the two professors conduct practical classes inside the teaching hospital which make them very familiar and in continuous contact with the hospital practical environment and in touch with the issues that healthcare staff face on daily bases, which make them appropriate candidates to give their opinions and perspectives regarding the study's issue. Choosing two site and

different participants for the qualitative study was to increase the validity and the objectivity of the findings and to make use of different opinions in order to reach a better understanding about the situation (Creswell, 2012a).

3.5.2 Ethical Issues

Getting the necessary official approvals from healthcare institutions is an important issue in academic research (Creswell, 2012a; Maxwell, 2012). Approval requests were submitted and it included a description about the study, its topic, aims, the procedure for the data collection and how this study can aid these institutions and improve its ergonomics. All formal documents and approvals were obtained from the healthcare institutions in order to conduct the current study. The researcher assured that conducting the study will not interrupt the work procedures inside the healthcare institution nor distract the healthcare staff from performing their primary duties.

Furthermore, informed consent forms were submitted to the participants prior to conducting the qualitative study as part of the ethical code; the informed consent form included a brief description about the study, its aims and the role of the participant; it also assured that the privacy, the confidentiality and the anonymity of the participant's identity will be preserved throughout the study (Christensen et al., 2014; Creswell, 2012a). For the sake of documentation, a copy of the informed consent form can be found in Appendix A.

3.5.3 The Qualitative Instrument

Several methods can be utilized to collect data for qualitative studies like interviews and observations (Christensen et al., 2014; Creswell, 2012b). The current study employed

semi-structured interviews with open-ended questions for the purpose of data collection. Some of the advantages of using semi-structured interviews as declared by Barriball and While (1994) is that it has the ability to overcome the problem of low response rate that exist in studies which use questionnaires for collecting the data; it can be utilized to explore the values, attitudes and the opinions of the respondents in a direct and interactive way; the researcher can assure that every question is answered by the respondents, while in quantitative studies, respondents may tend to answer the questionnaire incompletely due to several reasons (Barriball & While, 1994). Creswell (2012a) also stated that semi-structured interviews permit the respondents to express their ideas and opinions in a free and an unconstrained fashion, describe personal experiences in detail and that their opinions can be probed by the researcher for more clarification. Even though semi-structured interviews are time consuming and costly compared to other qualitative methods (Creswell, 2012a), but it is more rewarding in terms of information richness and it provide more flexibility in regard to specifying the timing and the location for conducting the interviews in order to make the respondents feel more comfortable during the process (Creswell, 2012a).

Furthermore, the semi-structured interviews approach gives the researcher another advantage. It gives the researcher the flexibility of using probes (Barriball & While, 1994; Creswell, 2012a). Probing enables the researcher to clarify additional issues raised by the interviewee; elicit more explanations regarding important points and assists the respondent to recall other related and valuable information about the phenomenon being studied through the interactivity and the dialog between the researcher and the

respondent which helps to reveal more information and themes about the research topic (Barriball & While, 1994; Creswell, 2012a).

3.5.4 Qualitative Analysis and Interpretation

The current study followed the steps presented by (Creswell, 2012a) on how to analyze qualitative data produced by semi structured interviews. The first step was producing a textual version of the interview dialog which is called the transcription. After producing the transcription, the researcher read the entire text in order to get a general sense of the text and to obtain a general understanding regarding the interviewee's answers (Creswell, 2012a; Sayre, 2001). Afterwards, this transcription was used to locate themes within the text in a process called coding (Creswell, 2012a).

Coding is the process of organizing the interview text into segments and pieces of text and assigning a label to each segment for the purpose of extracting a meaning from the interview dialog (Christensen et al., 2014; Creswell, 2012a). These segments of text are labeled with terms (i.e. each sentence will stand for a single concept and this concept will be referred to with a term); the terms that are used for labeling the statements should be meaningful and it is also advised to use the participants' own words for this process of coding (Creswell, 2012a). Then, the related statements (i.e. coded statements with similar meaning) in the text were grouped under categories in order to produce a more abstract comprehension about the interviewee's responses and to present a more condensed version of the information (Creswell, 2012a, 2012b). The point is that the researcher wants to present a more structured and abstracted version of the transcription and summarize the interview dialog into a small number of themes (Creswell, 2012a, 2012b; Maxwell, 2012).

3.5.5 Qualitative Validity and Reliability

Validity refers to the accuracy of the study's findings and whether it was correctly interpreted by the researcher (Creswell, 2012a; Maxwell, 2012). For this study, two validation strategies were employed for the qualitative study, triangulation and member checking (Creswell, 2012a; Maxwell, 2012). Triangulation means that the researcher seeks multiple evidences from different individuals, processes or sites to provide multiple support for themes extracted from the qualitative data (Creswell, 2012a; Maxwell, 2012); this would confirm the validity of the study findings because the same issue has been referred to by several sites and individuals. In the current study, this objective has been accomplished by selecting two different sites and selecting different respondents from those sites. The second validation strategy was member checking (Creswell, 2012a; Maxwell, 2012). In member checking, the researcher asked the interviewees to check both the transcription of the interview and the interpretation of that transcription whether it was accurate, credible and whether the researcher properly understood the participants' intents.

On the other hand, reliability means that the researcher has followed a consistent approach throughout different stages of conducting the study and the data collection mechanism was also consistent with all participants (Creswell, 2012a; Maxwell, 2012). Moreover, the consistency of the data analysis process was maintained in order to produce credible and dependable findings (Creswell, 2012a; Maxwell, 2012). The previous points were maintained by following the same procedure with each respondent (i.e. in terms of audio recording the interview, taking field notes and the later analysis

step) in order to ensure that the transcription did not contain errors and the coding process was consistent.

3.6 Quantitative Methods

The current study used a mixed methods approach to combine the advantages of both qualitative and quantitative methods. After completing the qualitative part which aimed at exploring the phenomenon (i.e. the usage and adoption of HIS) in an in-depth manner and probing the participants' (i.e. healthcare professionals) perceptions and opinions, quantitative method was employed to fulfill the remaining objectives of the study which is investigating the significance of the hypothesized relationships, examining the proposed model's prediction of HIS usage by healthcare professionals and providing generalizability of the study findings. A questionnaire was developed for this purpose; however, several important points needed to be considered prior to the actual data collection such as selecting the participants of the study, getting the formal approvals, pretesting the measurement instrument (Creswell, 2012a; Sekaran & Bougie, 2010), and other issues that will be discussed in detail in the following sections.

3.6.1 Quantitative Sampling

Before distributing the study's questionnaire which was developed based on the findings from the preliminary qualitative study and the review of the previously published work, the researcher must decide the proper population for the study in order to produce generalizability of the study findings (Sekaran & Bougie, 2010).

Population can be defined as the group of individuals or objects with common attributes that will be investigated by the study (Lunsford & Lunsford, 1995; Sekaran & Bougie,

2010). Each member within the population is referred to as an element and the collection of all elements represents the population being studied (Sekaran & Bougie, 2010). Another term is population frame, which defines the perimeter of the population or the border line which includes particular elements and excludes others (i.e. only the elements which represent the population) depending on a criteria or a condition set in advance (Sekaran & Bougie, 2010).

Normally, population elements have certain features or characteristics in common according to a certain criteria set by the researcher or according to the problem definition which the study is investigating or focusing on. The population for this study includes all healthcare professionals (i.e. both medical and administrative staff) working in public hospitals of Kurdistan Region of Iraq. Those staff members have been selected because they are the current users of the HIS systems which is the focus point of this study. According to the numbers of the Kurdistan Region Ministry of Health, those healthcare staff includes about 28,000 healthcare professionals.

On the other hand, sample is defined as a subgroup of the original population that can be utilized by the study as a representative of the original population (Lunsford & Lunsford, 1995; Sekaran & Bougie, 2010). The sample members constitute a portion of the original population and those members are chosen using a certain technique called the sampling technique (Sekaran & Bougie, 2010). Examining the sample members or subjects will enable the researcher to extract conclusions about the problem or the issue being studied and then generalizing those findings to the target population. Several reasons cause the researcher to conduct the study on a sample of subjects instead of the whole population elements such as the population large size which makes it very

difficult to reach each and every element in the population, time and cost constraints, shortage of human resources required to investigate large populations and the disperse distribution of the population elements over a wide geographical area (Lunsford & Lunsford, 1995; Sekaran & Bougie, 2010).

Sampling is defined as the procedure of choosing sufficient number of subjects or elements for the sample of the study from the original population (Lunsford & Lunsford, 1995; Sekaran & Bougie, 2010). The sample should be an adequate representative of the original population in a sense that the sample characteristics should be as close as possible to those of the original population in order to generalize the study findings. Moreover, determining the right sample size is another important issue that has to be taken into account in order to achieve generalizability (Lunsford & Lunsford, 1995; Sekaran & Bougie, 2010). Depending on the table provided by Sekaran and Bougie (2010) about population sizes and the adequate sample sizes for them, the appropriate sample size for this study was 379 subjects since the population size is about 28,000 members.

Sampling in general can be divided into two types: probability and non-probability sampling (Creswell, 2012a; Sekaran & Bougie, 2010). In probability sampling all elements within the population have a previously known chance of being chosen as a member of the sample; while in non-probability sampling, the elements don't have a previously known chance of being selected as part of the sample (Creswell, 2012a; Sekaran & Bougie, 2010). When generalizability is one of the study objectives, then probability sampling should be used. However, many techniques are referred to as probability sampling techniques such as simple random sampling, systematic sampling,

proportionate stratified random sampling, disproportionate stratified random sampling, cluster sampling, area sampling and double sampling (Creswell, 2012a; Sekaran & Bougie, 2010). Non-probability sampling also involves several techniques such as convenience sampling, purposive sampling, judgment sampling and quota sampling (Creswell, 2012a; Sekaran & Bougie, 2010). The selection of a certain technique depends on the objectives, time and cost constraints of the study.

The current study used systematic sampling design for specifying the sample members (Saunders et al., 2012; Sekaran & Bougie, 2010). Systematic sampling is carried out by selecting every Nth member from the population and the starting point is a random number selected between 1 and N (Saunders et al., 2012; Sekaran & Bougie, 2010). However, before the actual data collection, the questionnaire must be verified for its validity and reliability before its actual usage. The following section covers these points.

3.6.2 Instrument Development

The instrument represents the questionnaire items that were used to measure each construct within the study's model (Sekaran & Bougie, 2010). The questionnaire's items were adapted from previously published studies in order to fit the healthcare context of the current study. Table 3.1 presents each construct included within the study's proposed model along with its items and the resource they were derived from. Seven-point Likert Scale was used with all questions to measure the respondents' answers, ranging from 1 (i.e. I strongly disagree) to 7 (i.e. I strongly agree).

Table 3.1

The Constructs and their Items

	Construct	Items	Source
1	Behavioral Intention	• I intend to use the HIS system in the coming months. • I predict I would use the HIS system in the coming months. • I plan to use the HIS system in the coming months.	(Venkatesh et al., 2003)
2	Use Behavior	• I frequently use HIS to understand a health problem or an illness. • I often use HIS to serve patients. • I frequently use HIS to find information about a health problem. • I very often use HIS to do my job.	(Ifinedo, 2012)
3	Performance Expectance	• I find using HIS useful in my job. • Using HIS enables me to accomplish tasks more quickly. • Using HIS increases my productivity. • If I use HIS, I will increase my chances of getting a raise.	(Venkatesh et al., 2003)
4	Effort Expectancy	• My interaction with HIS is clear and understandable. • It is easy for me to become skillful at using HIS. • I find HIS easy to use. • Learning to operate the HIS is easy for me.	(Venkatesh et al., 2003)
5	Social Influence	• People who influence my behavior think that I should use the HIS. • People who are important to me think that I should use the HIS. • The senior management of this business has been helpful in the use of the HIS. • In general, the organization has supported the use of the HIS.	(Venkatesh et al., 2003)

Table 3.1 continued

6	Facilitating Conditions	• I have the resources necessary to use the HIS. • I have the knowledge necessary to use the HIS. • The HIS is not compatible with other systems I use. • A specific person (or group) is available for assistance with HIS difficulties.	(Venkatesh et al., 2003)
	Personal Innovativeness	• People come to me for advice on new technologies. • I learn more than others about the new technologies. • I am first among friends to acquire new technologies. • I usually work out new high-tech products without help from others. • I keep up with the latest technological developments in my area of interest. • I enjoy the challenge of figuring out high-tech gadgets. • I have few problems in making technology work for me.	(Yousafzai & Yani-de-Soriano, 2012)
7	Compatibility	• Using HIS system is compatible with all aspects of my work. • Using HIS system is completely compatible with my current situation. • I think that using HIS system fits well with the way I like to work. • Using HIS system fits into my work style.	(Moore & Benbasat, 1991)
8	System Quality	• HIS has an appropriate style and design. • HIS has easy navigation to information. • HIS has fast response and quick performance. • HIS keeps personal information secure from exposure. • HIS is available and can be used at any time. • HIS has good functionality relevant to my job. • HIS is error-free. • HIS creates an audio and visual experience.	(Ahn, Ryu, & Han, 2007)
9	Top Management	• The hospital is committed to a vision of using HIS in healthcare provision.	(Lewis, Agarwal, &

Table 3.1 continued

	Commitment	• The hospital is committed to supporting my efforts in using HIS for healthcare provision. • The hospital strongly encourages the use of HIS for healthcare provision. • The hospital will recognize my efforts in using HIS for healthcare provision. • The use of HIS for healthcare provision is important to the hospital.	Sambamurthy, 2003)
10	Top Management Innovativeness	• Top Managers have original ideas. • Top Managers would sooner create something new than improve something existing. • Top Managers often risk doing things differently.	(Thong & Yap, 1995)
11	Vendor Support	• HIS vendor provides support services if difficulties in using the HIS are encountered. • HIS vendor provides training in using the HIS systems. • HIS vendor is concerned with potential problems in using AIS.	(Alia et al., 2012)
12	Government Support	• The government is committed to a vision of using HIS in public hospitals. • The government is committed to support healthcare staff's effort in using HIS. • The government strongly encourages the use of HIS for healthcare provision. • The government will recognize healthcare staff's efforts in using HIS for healthcare provision. • The use of HIS for healthcare provision purposes is important for government.	(Abbasi et al., 2011)
13	Work Overload	• I feel that the number of requests or problems I deal with due to HIS system is more than expected. • I feel that the amount of work I do interferes with how well it is done. • I feel busy or rushed due to using HIS system. • I feel pressured due to using HIS system.	(Moore, 2000)

Moreover, the questionnaire was designed in three sections; the first section included the study's title, a brief introduction describing the main purpose of the study and its importance. Also in this section, the researcher assured the confidentiality and the anonymity of the participants. Then, the first section was concluded with the researcher's contact information. The second section of the questionnaire was dedicated to capture the participants' demographic information. The third section of the questionnaire included 62 questions (i.e. items) that represented the study's constructs; those items were intended to record the healthcare professionals' opinions about the factors that influence their usage and adoption behavior of healthcare information systems. A seven likert-scale was used for all the items in the questionnaire. A copy of the questionnaire can be found in Appendix B.

3.6.2.1 Content Validity

Before using the instrument for the actual data collection, it is recommended to assess the instrument for its suitability (Sekaran & Bougie, 2010; Straub, 1989). Content validity test was used to make sure that the items used to measure the constructs are considered appropriate, adequate and correspond to the concept they intend to measure; content validity can also be referred to as face-validity (Sekaran & Bougie, 2010; Straub, 1989). This type of validity can be carried out using a panel of experts who read and review the instrument and check whether the used items adequately represent the intended constructs and whether the items' wording is clear, understandable and free of ambiguity (Sekaran & Bougie, 2010; Straub, 1989).

Since the study was carried out in Kurdistan Region of Iraq, another issue needed to be addressed which is the local language used within the society; for that reason another

version of the questionnaire was introduced (i.e. in Kurdish language); therefore, the questionnaire was translated into the Kurdish language using two different and independent licensed translators (i.e. two Kurdish copies were produced). Afterwards, one of the Kurdish questionnaires was sent to a third licensed translator to be translated this time from Kurdish back to English to check its similarity with the original questionnaire; this process is referred to as back translation (Sekaran & Bougie, 2010). Then, three senior lecturers from the University of Sulaimani in Kurdistan Region of Iraq were approached to assess the questionnaire and to get their opinions and feedback about enhancing the questionnaire in regard to its wording, comprehensibility and its overall design. Feedback and suggestions from the experts were considered to improve the overall look of the instrument. This step concludes the content validity phase. A copy of the Kurdish questionnaire can be found at the Appendix C.

3.6.2.2 Pilot Study

Conducting a pilot study on a small number of respondents is a necessary step that precedes the actual data collection in order to validate the study's measurement instrument, to further enhance the instrument and to support its reliability (Sekaran & Bougie, 2010; Straub, 1989). Regarding the sufficient number of participants within a pilot study, some researchers like Hill (1998) suggested that an appropriate number would be no less than 30 individuals. Julious (2005) suggested that 12 respondents is the minimum number that should be considered for conducting pilot studies within healthcare context. On the other hand, Hertzog (2008) recommended that 10 percent of the planned sample size is a good rule of a thumb for determining the size of a pilot study. To achieve a high degree of academic quality and for getting better results, the

current study conducted the pilot study in one of the healthcare institutions in KRI of Iraq and 78 healthcare professionals participated in it. The members who participated in the pilot study were excluded from the final and actual data collection.

The software Smart PLS 2.0 (Ringle, Wende, & Will, 2005) was used to analyze the participants' responses as it is capable of analyzing small sample sizes (Hair, Hult, Ringle, & Sarstedt, 2014). The pilot data were tested for its reliability and validity. The reliability of the measurement instrument is an important issue as it refers to the accuracy and the consistency of the measurement instrument (Sekaran & Bougie, 2010). Fruthermore, the validity of the measurement instrument was tested; the idea behind validity testing was to make sure that the used instrument truly measured the intended constructs (Sekaran & Bougie, 2010; Straub, 1989).

The criterions: internal consistency reliability, Cronbach's Alpha and discriminant validity of the measurement model assessment were tested (Chin, 2010; Hair et al., 2011; Hair, Hult, et al., 2014); the results were satisfactory for those criterions; for example, the minimum value for Cronbach's Alpha was 0.7119 within the constructs and for internal consistency reliability, the minimum value for composite reliability was 0.8201 which are all above the recommended threshold of 0.7. The detailed results from the pilot study observations were satisfactory and the detailed reliability and validity tests can be found in Appendix D and E.

3.7 Questionnaire Administration and Data Collection

Kurdistan Region of Iraq is comprised of three governorates (i.e. Erbil, Sulaimani and Dhok); nine public hospitals were selected randomly to carry out the empirical study

(i.e. three hospitals within each governorate); from the nine public hospitals, three were specialized and the remaining six were general hospitals, Table 3.2 presents the hospitals names along with their corresponding governorate and staff numbers.

Table 3.2

Hospitals that represented the study sample

	Hospital Name	Governorate	Staff No.
1	Rizgari Hospital	Erbil	1155
2	Hewler Ferkari	Erbil	1085
3	Cardiology Hospital	Erbil	286
4	Shar Hospital	Sulaimani	912
5	Ferkari Hospital	Sulaimani	554
6	Hewa-Cancer Hospital	Sulaimani	242
7	Azadi Educational	Dhok	1043
8	The Emergency Hospital	Dhok	404
9	The Eye specialized Hospital	Dhok	122

In total, 1250 questionnaires were distributed on healthcare professionals using systematic random sampling. Eventually, 596 filled questionnaires were returned with a response rate 47.68%.

3.8 Structural Equation Modeling (SEM)

Structural equation modeling (SEM) represents the second generation of multivariate analysis techniques that are capable of analyzing numerous latent variables and relationships simultaneously (Chin, 1998). SEM offers several advantages over first

generation techniques such as cluster analysis, multidimensional scaling, logistic regression and multiple regression (Chin, 1998); for example, SEM provides more flexibility for the researcher enabling the incorporation of numerous unobservable variables (i.e. latent variables) through the measurement of the indicator variables. SEM is also able to account for error measurement in observable variables (Chin, 1998).

SEM includes two main approaches, the first one is covariance-based approach (CB-SEM) which is used by tools such as EQS, AMOS and SEPATH. CB-SEM depends on maximum likelihood (ML) function which aims at decreasing the difference between the sample covariance and those predicted by the theoretical model (Chin, 1998; Hair, Ringle, & Sarstedt, 2011). The second one is partial least squares approach (PLS-SEM) which is used by tools such as SmartPLS. PLS-SEM is considered a variance-based approach; this technique depends on least squares functions and it attempts to maximize the explained variance of the dependent variables (Hair et al., 2011; Hair, Hult, Ringle, & Sarstedt, 2014). The two approaches differ from each other in regard to their statistical assumptions and the type of statistical fitness they produce. However, the two approaches are considered complementary to each other and the choice to use one technique over the other depends on a number of factors related to the objectives of the study, the data characteristics, the sample size, the structural model complexity and the model supplementary evaluation requirements (Chin, 2010; Hair et al., 2011; Hair et al., 2014).

3.8.1 Partial Least Squares (PLS)

Partial least squares is one of the structural equation modeling techniques; it is also referred to as PLS Path Modeling (Hair et al., 2014). The choice for selecting PLS-SEM

technique over CB-SEM depends on a number of criteria (Chin, 2010; Hair et al., 2011; Hair et al., 2014). For example, the PLS-SEM can be used when: 1) the objective of the study is the prediction of target variables (i.e. dependent variables) or the identification of main driver variables (i.e. independent variables); 2) the study is explorative in nature or extending an existing theory; 3) the proposed model is complex (i.e. the model is composed of numerous constructs and indicators); 4) the assumptions regarding the data distribution is not preserved (i.e. the study data is not normally distributed); 5) the sample size is small; 6) further subsequent analysis of the model is needed (i.e. when latent variables' scores are needed for further analysis); for those reasons, PLS-SEM is considered more suitable and is recommended as the analysis technique (Chin, 2010; Hair et al., 2011; Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014).

Regarding the current study, one of the objectives was to predict the key contributors to the usage and adoption of HIS among healthcare professionals. Furthermore, the data for the current study showed non-normal distribution as can be seen in the next chapter; and taking into consideration that PLS-SEM was used as the statistical tool for the original UTAUT model (Venkatesh et al., 2003, 2011, 2012) which is the theoretical framework for the current study, the partial least squares and specifically the software SmartPLS 2.0 was used for analyzing the data and examining the current study's proposed hypotheses (Ringle et al., 2005). PLS-SEM provides a systematic evaluation process of the proposed model and it involves a two-step process. The first step is the assessment of the measurement model followed by the assessment of the structural model (Hair et al., 2011; Hair et al., 2014), as discussed in the following sections.

The assessment of the measurement model concentrates on the reliability and the validity of the constructs and the indicators (i.e. the items) that are used to measure the constructs (i.e. a latent variables). Reliability refers to the accuracy and the consistency of the measurement instrument; while validity refers to whether the measurement instrument truly represented the constructs they were intended to measure originally (Hair, Hult, et al., 2014). Measurement model assessment was done by employing four evaluation tests: internal consistency reliability, individual indicator reliability, convergent validity and discriminant validity (Chin, 2010; Hair et al., 2011; Hair, Hult, et al., 2014). Reliability of the measurement model was evaluated using internal consistency reliability and individual indicator reliability while validity was evaluated using the tests of convergent validity and discriminant validity. The assessment of the measurement model through those four criterions is an important step to ensure the model's quality and eligibility for the next step of assessment which is the structural model assessment. The explanation about each criterion and how it was calculated will be introduced in the next chapter in combination with the results of the current study.

Once the measurement model assessment has been established, the next step was assessing the structural model by calculating several criterions such as path coefficients, empirical t-values, coefficient of determination and the predictive relevance of the proposed model (Hair et al., 2011; Hair et al., 2014).

3.8.2 Evaluating the Moderation Effect

Since this study included four moderators (i.e. gender, age, experience and job-position), it was important to analyze and assess the moderators' effect on the proposed relationships within the study's model. Different groups of respondents might have

heterogeneous (i.e. diverse) believes and perceptions regarding the phenomenon being studied; the heterogeneity of those respondents' opinions is due to their different personal characteristics, educational and social backgrounds and the diverse ergonomics settings (Hair et al., 2014; Hu et al., 2010; Venkatesh et al., 2003, 2011). Studying the effect of moderators can be useful as it could disclose hidden patterns and reveal important aspects of the adoption behavior between different groups; neglecting such examination of distinctive groups of respondents might result in misleading conclusions and findings (Hair et al., 2014). Consequently, the Multi-Group Analysis (MGA) was employed for the goal to uncover the effect of moderators on the study's proposed relationships (Hair et al., 2014). In MGA, instead of assessing (analyzing) the aggregated dataset as a single homogenous pool of observations, the dataset is divided into several separate groups of observations depending on a certain criteria (i.e. divide the observations to distinct categories with common and shared characteristics for each category) in order to reveal the influence of the categorical moderator variables (Hair et al., 2014; Henseler & Fassott, 2010).

3.9 Summary

This chapter presented the methodology followed by this study in a detailed manner. It explained the paradigm adopted by the study, the rationale behind the study's research design and the mixed method that was approached. It also elaborated how the two empirical sections of the study (i.e. the qualitative and the quantitative) were carried out in regard to the preparation of the instrument, conducting the data collection and the final analysis procedures.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

The current chapter presents the empirical results of this study after carrying out the data analysis procedures for both the qualitative and the quantitative data. In regard to the qualitative data, interpretive analysis was used to extract themes form the interviewees' responses (Creswell, 2012a; Sayre, 2001). On the other, hand SmartPLS version 2.0 (Ringle et al., 2005) was used to produce the results of the quantitative data. This chapter also presents the hypothesis testing, the effect of the moderators on the proposed relationships in order to establish the basis for the study's findings and conclusions.

4.2 Qualitative Results

The current study embraced a mixed method approach in order to address the different research questions of the study and to reach a better understanding about the issue of HIS use and adoption in public hospitals in Kurdistan Region of Iraq. The qualitative part of the study was carried out at first and semi-structured interviews with open ended question were used for this purpose. This section presents the results of the qualitative study.

As mentioned in chapter three, eight healthcare professionals from two different sites were interviewed during the process, and the reason for that was to draw a clear image about the situation and to gather multiple opinions and perspectives about the problem at hand which will help the researcher to better understand the situation (Creswell, 2012a,

2012b; Maxwell, 2012). The eight respondents were denoted P1, P2 through P8 in order to preserve the anonymity of their identities.

The qualitative investigation confirmed the problem statement of the study through the responses of the interviewees who affirmed that the usage of HIS within KRI public hospitals is still enduring challenges and is still below the desired level:

> P1: “in governmental hospitals, we have low usage of computers”
>
> P2: “they have shortness in using the information technology in the health system”
>
> P6: “in regard to the use of HIS, it is still low”
>
> P8: “the system is operational but it is not used, the doctor is afraid to write the diagnoses and save it to the system”.

Furthermore, the use of probing technique with the interviewees helped to extract more information from them and to get more explanations about the research issue (Creswell, 2012a; Maxwell, 2012). The interviewees reported several topics that influence the usage and adoption of HIS among healthcare staff such as culture:

> P1: “some of the nurses, within their cultural background they are not exposed to computers at home”.
>
> P2: “I think we need to develop our culture”.
>
> P6: “patients don’t want to spend 10 minutes answering questions for data entry”.

Another issue that has been brought up by the interviewees was the lack of a good English language proficiency which stands as an obstacle and makes the use of advanced HIS an intimidating and a complex task for some staff members:

P5: “the English language is a major defect”.

P7: “the first problem is language”.

P8: “the staff is committed to one language, which is the Kurdish”.

Some of the respondents blamed the educational system for not properly qualifying new graduates in this regard, specifically for some specializations like nursing:

P1: “education level of the nurse affects the usage of healthcare information system”.

P5: “the sub-staff have low education”.

Some respondents expressed that job-position inside the hospital might be an influencing factor as some respondents claimed that doctors have the priority and are more eligible in regard to training and providing the resources; on the other hand, other staff members such as nurses were not getting the same attention:

P1: “we have low training for nurses, priority for doctors”.

P5: “hierarchy between staff and the doctors”.

Age was also mentioned by the interviewees as a factor affecting the adoption of new healthcare technologies as some elderly staff are being reluctant to use those technologies and unwilling to switch their work routines to newer ones:

P1: “old nurses are not using the computer”.

P4: “old doctors refuse to use the new technology”.

Moreover, the interviews stated that some personality attributes such as low innovativeness of some individuals might restrict him/her form trying new things and adopting new technologies as it will require him/her to participate in tiring training courses, change usual work routines and the risk of committing medical errors due to the implementation of those new systems:

P2: “they are not motivated”.

P4: “they like to do things the traditional way, the way they are used to”.

Other issues such as low experience about HIS systems might also be considered one of the barriers, because of the anxiety of using such complex systems:

P1: “low knowledge regarding this issue, and this leads them to what? leads them to no self-confidence”.

P4: “lack of experience and lack of knowledge about the new systems”.

Also related to the issue of using new HIS systems, job-insecurity might raise fears and concerns to healthcare staff because of the digital documentation of every task that could be used against the staff members in case medical errors were committed or a law-suit was filed against the hospital:

P8: “the system is operational but it is not used, the doctor is afraid to write the diagnoses and save it to the system”.

The interviewees declared that HIS systems should provide full connectivity across different institutions in order to make access to patients’ information immediate and easier from any healthcare institution:

P2: “no cooperation between this healthcare center and other healthcare centers”

P4: “no intranet connection between hospitals”

P5: “I can still see the patient investigation if we had the intranet”

P6: “the system is not connected with other hospitals”

P8: “no connectivity with other health institutions”.

Some interviewees raised some concerns about the quality of the HIS systems as a barrier to adopt those systems because unscheduled malfunctioning incidences affect the staff’s trust in those systems and as a result might discourage them to adopt it:

P4: “delays in operating a medical device”

P5: “we have a system but without its supporting parts”

P6: “the system stopped temporarily because of operational problems”

P8: “we have problems in the hospital warehouse system”.

Furthermore, the respondents mentioned another issue related to HIS systems, which is the lack of a unified patient identity system which gives each patient (i.e. a citizen) a unique number that can be recognized by the healthcare institutions which is an essential requirement needed to connect and integrate HIS systems. This unified and standardized platform can organize the patients’ data, simplify the remote access to those data, minimize the administrative and the data entry tasks and improve the overall efficiency:

P5: “we have no personal ID for the patients”

P8: “we need unified patient ID system”.

Another contributor to the phenomenon being studied as expressed within the interviews was the worry and the concern about the security and the privacy of the patients’ data

being compromised and the need to set appropriate procedures to prohibit any unauthorized access or misuse of the patient's vital data:

P2: "they feel the information is not protected, there is no security".

Compatibility with such new systems has also been expressed by the interviewees as an important issue that should be considered as HIS projects should be developed in a way that take into consideration the current work style and attempts not to make major changes or disrupts the daily routine substantially to the degree to become discouraging to staff members to adopt these new technologies:

P2: "they are not used on the usage of information system".

One of the most mentioned issues by the interviewees was the lack of adequate and sufficient training programs which was perceived as a barrier to the adoption of HIS systems by the healthcare staff:

P1: "low training for nurses"

P2: "we have shortness of training courses"

P3: "we should be provided with training courses"

P4: "we wish to have training courses"

P6: "the staff is not trained properly"

P7: "we don't have training staff"

P8: "the staff needs training".

Taking into consideration that HIS systems are advanced and complex systems (Boonstra & Broekhuis, 2010; Bossen et al., 2013), this requires appropriate training courses to be provided by the hospital management to the healthcare staff in order to

reduce any anxiety or uncertainty and to promote the use of HIS among the staff members. Another important matter that was brought up by the interviewees was the shortage of skillful maintenance teams. Some routine problems, stoppage of the systems and maintenance staff being unable to solve it in some cases can cause the system to halt temporarily which interrupts the daily work and affects the system's trustworthiness and dependability and as a result negatively affects its adoption by the staff members:

P1: "have no maintenance person in case the system faced problems"

P3: "inexperienced maintenance team"

P4: "lack of IT staff"

P7: "we don't have good maintenance teams".

Additionally, the participants declared that assigning the wrong person in the wrong position could cause a hospital department to be incapable of fulfilling the vision of employing new technologies in healthcare provision. The lack of a managerial leading role, the intellectual skills, the professional qualities and the necessary innovativeness could be a hurdle against the adoption of new healthcare technologies as those managers don't realize the actual needs and requirements for implementing those advanced technologies and would consider it as a source of intimidation:

P2: "this manager is not educated about information technology, for this reason he doesn't like other ones to use it"

P5: "we don't have the right person in the right place"

P7: "the administration doesn't realize the importance of HIS".

Furthermore, lacking a motivational or a rewarding environment was mentioned by the participants as one of the factors that could contribute to the HIS low adoption; because

these systems impose additional tasks to the staff and demands enrolling in training courses to master them which adds time burdens to the staff's heavy schedule and if there was no promotional or rewarding system from the management to acknowledge the staff's effort in this regard, this situation might be interpreted negatively by the staff members and could affect their attitude towards HIS systems:

> P5: "there is no promotion, that's why there is no will of getting better", "no one to tell him that you did a good job".

The long routine and the prolonged official approvals to perform tasks or to provide certain supplies needed by the healthcare professionals were also mentioned as one of the issues that might affect the adoption behavior:

> P4: "we don't have a committee that represents all departments of the hospital to help face all the hospital issues"
>
> P5: "it is a long sequence and at the end you will not get anything".

Some issues were mentioned by the interviewees but were not related to the hospital management such as workload. Heavy workload inside public hospitals was the most mentioned theme to affect the use of HIS, as limited number of healthcare staff needs to cope and handle large numbers of patients on daily basis without adding further duties to their busy schedule:

> P1: "it is time consuming for nurses to use these systems"
>
> P2: "shortness of staff"
>
> P3: "number of doctors is low"
>
> P5: "here in ICU they work for 24 hours"
>
> P6: "the number of patients coming to the hospital is high"

P8: “we have work load”.

Furthermore, the shortage of financial support was also highlighted as an additional factor by several interviewees, as this factor affects the quality of the HIS systems purchased for hospitals; financial support also influences the availability of training courses needed to master those systems and the availability of maintenance and follow-up programs. Financial support can also be interpreted as government support as it is the responsible side of providing the required funds for implementing different projects in the country:

P2: “there is shortness of budget in the healthcare system in our governorate”

P3: “management without financial support can’t do a lot”

P4: “the governmental support now is less because of the financial crises”

P5: “the economy is the first”

P6: “for financial reasons the internet service has stopped”.

Moreover, the low commitment of some vendor companies or the vendor’s low experience in the field of HIS was also considered by the interviewees as one of the barriers that discourages the use of these systems:

P4: “low maintenance of the company”

P5: “they should come here and give lectures to our staff how this system is working”

P6: “the company brought trainers, but they weren’t efficient”

P7: “we are not comfortable with the company’s policy”.

Another important issue that was brought up by the participants was the defect in curriculums in the educational system which does not take into consideration improving the important skills required by healthcare staff to acquire; which causes new graduates to be lacking the knowledge and self-efficacy to use advanced HIS within the hospital's practical environment:

P1: "college graduate nurses use the computer better than institute graduates"

P2: "some of them are not educated about using the computers"

P5: "teaching is affecting all the system".

Staff members also declared that frequent electricity blackouts is an important and annoying matter that cause to repeatedly interrupting the functioning of these HIS, which negatively affects staff's perception about those systems and its usage. That's why, providing the necessary supportive infrastructure is an important issue that should not be neglected by healthcare officials:

P1: "the electricity"

P2: "we have a problem of electricity in Iraq".

Also, participants stated that the availability of effective healthcare insurance system might be a solution, since such insurance system could provide the fundamental funds and resources required to remove some of the obstacles, elevate the healthcare crew capabilities and improve the healthcare infrastructure:

P2: "we have no insurance system in our country"

P5: "I think that insurance is the best way".

Additionally, participants in the study gave notice to the difference between the public and the private sector in regard to the use and adoption of HIS and asserted that the private sector is more advanced in terms of HIS implementation and adoption:

P1: “private hospitals are better”

P5: “private hospitals, they are much better”.

The previous section presented the results obtained from the qualitative study which used semi-structured interviews with open-ended questions with eight healthcare professionals. Interpretive analysis (Creswell, 2012a; Sayre, 2001) was used to analyze the qualitative data and several themes were extracted from the interviewees’ responses. In order to ensure the validity and the reliability of the study findings, member checking and triangulation techniques were used with all the participants for this purpose (Creswell, 2012a; Maxwell, 2012). The results obtained from the interviews highlighted the important issues and challenges that healthcare professionals face in regard to the use and adoption of HIS within healthcare environment. Furthermore, the themes that were extracted from this qualitative study helped to identify the potential factors that were included in the study’s proposed model and to conceptualize the set of hypotheses for the quantitative study. The next section presents the systematics steps that were followed to carry out the quantitative part of the study along with its results.

4.3 Quantitative Results

Quantitative methods represented the second part of this study which embraced a mixed method approach. For this purpose, a questionnaire was developed and distributed on healthcare professionals working in KRI public hospitals. The following sections present

in detail the steps that were followed to carry out the data analysis, the measurement model assessment, the structural model assessment, the multi-group analysis in order to produce the final results.

4.3.1 Demographic Statistics

Prior to the assessment of the measurement model and the structural model, it is logical and important to start by explaining the current study's context and presenting sufficient information about the study's respondents and their profile in order to draw a clear picture about the study's environment and to provide a better understanding about the phenomenon under question (Chin, 2010).

In total, 1250 questionnaires were distributed among the healthcare staff of the nine public hospitals in KRI that represented the sample for this study. After the distribution of the questionnaires at each location, a period of few days was given to the respondents to complete the questionnaire; each location was visited at least three times in order to collect as many filled questionnaires as possible and to encourage those whom did not finish their questionnaires to complete it by giving them additional time. Out of the 1250 distributed questionnaires, 596 questionnaires were filled up by the respondents. The response rate for this study was 47.68%.

Following the rule of thumb by (Hair et al., 2014), any observation with more than 15% of missing data (i.e. unanswered questions) should be deleted from the dataset. Reflecting that rule within the current study, any observation with nine missing values and above (i.e. nine unanswered questions) should be deleted from the dataset (Hair et

al., 2014); as a result, 45 observations (i.e. questionnaires) were omitted from the dataset and 551 observations were considered as valid and were used for statistical analysis.

Based on the demographic analysis, the respondents of this study were composed of 50.3% females and 49.7% of males. About 49.9% of the respondents aged between 21 to 30 years old; 31.9% aged between 31 to 40; 13.4% aged between 41 to 50; 3.8% aged between 51 to 60 and 0.9% of the respondents were above 60.

In regard to their academic level, 45.7% have a college degree, 37.7% have an institute degree, 9.3% have a master's degree, 5.3% have a high school degree and 2.0% have a PhD degree. In regard to working experience, 43.0% of the respondents had an experience between 3 to 6 years, 17.4% had an experience of 15 years and above, 16.5% had an experience between 7 to 10 years, 12.2% of the respondents had less than two years of experience and 10.9% had an experience between 11 to 14 years. In terms of respondents' job position, 14.9% of the respondents were doctors, 21.8% were nurses, 4.5% were pharmacists, 34.1% were lab-personnel and 24.7% were administrative staff. Accumulatively, 75.3% of the study respondents were medical staff while the remaining (24.7%) were administrative staff. Table 4.1 presents the demographic statistics of the respondents for this study.

Table 4.1

Demographic Data

	Category	Frequency	Percent	Cumulative Percent
Gender	Male	274	49.7	49.7
	Female	277	50.3	100.0
Age	21-30	275	49.9	49.9
	31-40	176	31.9	81.9
	41-50	74	13.4	95.3
	51-60	21	3.8	99.1
	Above 60	5	.9	100.0
Education	High School	29	5.3	5.3
	Institute	208	37.7	43.0
	College Degree	252	45.7	88.7
	Master's Degree	51	9.3	98.0
	PhD Degree	11	2.0	100.0
Work	Less than 2 years	67	12.2	12.2
Experience	3-6 years	237	43.0	55.2
	7-10 years	91	16.5	71.7
	11-14 years	60	10.9	82.6
	More than 14	96	17.4	100.0
Job Position	Doctor	82	14.9	14.9
	Nurse	120	21.8	36.7
	Pharmacist	25	4.5	41.2
	Lab personnel	188	34.1	75.3
	Administrative staff	136	24.7	100.0

4.3.2 Normality

Another important issue that needs to be checked is the distribution of the data and whether it is normally or abnormally distributed as it is one of the reasons and the requirements for using SEM-PLS; because SEM-PLS is capable of dealing with abnormally distributed data as one of the technique's strength points (Hair et al., 2014). For this purpose, two statistical tests were employed: the first one is Shapiro-Wilk test and the second one is skewness and kurtosis test. In regard to Shapiro-Wilk test (Razali & Wah, 2011; Shapiro & Wilk, 1965), the null hypothesis for the Shapiro-Wilk test is that the data is normally distributed. In order accept or reject the null hypothesis, the W-value is calculated for the Shapiro-Wilk test which ranges between zero and one; if the W-value was close to one, this means the data is normally distributed and the null hypothesis is accepted; otherwise, small values of the W-value indicates the non-normality of the data and leads to the rejection of the null hypothesis. After running the Shapiro-Wilk test using the statistical software SPSS version 19, all the W-values (i.e. that can be found under the column named Sig in Table 4.2) were equal to 0.00; which means that the null hypothesis was rejected and the data was not normally distributed.

Table 4.2

Shapiro-Wilk test of Normality

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
PE1	.208	551	.000	.892	551	.000
PE2	.211	551	.000	.884	551	.000
PE3	.214	551	.000	.892	551	.000
PE4	.150	551	.000	.926	551	.000
EE1	.159	551	.000	.938	551	.000

Table 4.2 continued

EE2	.208	551	.000	.892	551	.000
EE3	.183	551	.000	.915	551	.000
EE4	.171	551	.000	.915	551	.000
SI1	.141	551	.000	.939	551	.000
SI2	.156	551	.000	.927	551	.000
SI3	.137	551	.000	.929	551	.000
SI4	.149	551	.000	.927	551	.000
FC1	.134	551	.000	.939	551	.000
FC2	.137	551	.000	.944	551	.000
FC3	.131	551	.000	.950	551	.000
FC4	.117	551	.000	.940	551	.000
PI1	.127	551	.000	.932	551	.000
PI2	.173	551	.000	.943	551	.000
PI3	.159	551	.000	.949	551	.000
PI4	.138	551	.000	.943	551	.000
PI5	.148	551	.000	.931	551	.000
PI6	.141	551	.000	.926	551	.000
PI7	.167	551	.000	.946	551	.000
CMP1	.138	551	.000	.934	551	.000
CMP2	.151	551	.000	.938	551	.000
CMP3	.164	551	.000	.922	551	.000
CMP4	.192	551	.000	.904	551	.000
SQ1	.143	551	.000	.939	551	.000
SQ2	.157	551	.000	.937	551	.000
SQ3	.161	551	.000	.921	551	.000
SQ4	.183	551	.000	.923	551	.000
SQ5	.154	551	.000	.933	551	.000
SQ6	.153	551	.000	.930	551	.000
SQ7	.148	551	.000	.947	551	.000
SQ8	.145	551	.000	.939	551	.000
TMC1	.139	551	.000	.951	551	.000
TMC2	.133	551	.000	.951	551	.000
TMC3	.132	551	.000	.950	551	.000
TMC4	.133	551	.000	.945	551	.000
TMC5	.160	551	.000	.923	551	.000
TMV1	.128	551	.000	.944	551	.000
TMV2	.113	551	.000	.944	551	.000
TMV3	.128	551	.000	.947	551	.000
VS1	.124	551	.000	.946	551	.000
VS2	.124	551	.000	.946	551	.000

Table 4.2 continued

VS3	.131	551	.000	.951	551	.000
GVS1	.142	551	.000	.940	551	.000
GVS2	.128	551	.000	.946	551	.000
GVS3	.112	551	.000	.947	551	.000
GVS4	.133	551	.000	.945	551	.000
GVS5	.149	551	.000	.930	551	.000
WOL1	.176	551	.000	.942	551	.000
WOL2	.156	551	.000	.943	551	.000
WOL3	.136	551	.000	.950	551	.000
WOL4	.142	551	.000	.949	551	.000
BI1	.145	551	.000	.931	551	.000
BI2	.138	551	.000	.940	551	.000
BI3	.143	551	.000	.932	551	.000
USB1	.130	551	.000	.942	551	.000
USB2	.141	551	.000	.931	551	.000
USB3	.137	551	.000	.936	551	.000
USB4	.142	551	.000	.932	551	.000

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USB= Use Behavior).

The second normality test was conducted by calculating the skewness and kurtosis values (Cramer & Howitt, 2004). The z-scores were calculated by dividing the skewness and kurtosis values by their associated standard errors; the rule of thumb states that when the z-score is above +1.96 or below -1.96 thresholds, this indicates a violation of the normality distribution (Cramer, 1998; Cramer & Howitt, 2004). The results displayed in Table 4.3 confirm the abnormality of the data. As a result, the findings obtained from the Shapiro-Wilk test, the skewness and the kurtosis tests added further justification for using the PLS-SEM technique for analyzing the data for the current

study, as it requires no prior assumptions regarding the distribution of the data (Chin, 2010; Hair et al., 2014), which is the case in the current study.

Table 4.3

Skewness and Kurtosis tests

	Skewness	Std. Error of Skewness	z-value		Kurtosis	Std. Error of Kurtosis	z-value	
PE1	-.738	.104	-7.088	Not Normal	-.211	.208	-1.015	Normal
PE2	-.833	.104	-8.002	Not Normal	.031	.208	0.148	Normal
PE3	-.829	.104	-7.967	Not Normal	.125	.208	0.601	Normal
PE4	-.464	.104	-4.458	Not Normal	-.453	.208	-2.181	Not Normal
EE1	-.440	.104	-4.226	Not Normal	-.234	.208	-1.124	Normal
EE2	-.893	.104	-8.582	Not Normal	.386	.208	1.859	Normal
EE3	-.671	.104	-6.445	Not Normal	-.106	.208	-0.509	Normal
EE4	-.645	.104	-6.199	Not Normal	-.126	.208	-0.607	Normal
SI1	-.367	.104	-3.524	Not Normal	-.408	.208	-1.966	Not Normal
SI2	-.541	.104	-5.202	Not Normal	-.283	.208	-1.363	Normal
SI3	-.273	.104	-2.623	Not Normal	-.884	.208	-4.253	Not Normal
SI4	-.361	.104	-3.467	Not Normal	-.858	.208	-4.130	Not Normal
FC1	.091	.104	.870	Normal	-.938	.208	-4.515	Not Normal
FC2	-.105	.104	-1.010	Normal	-.867	.208	-4.174	Not Normal
FC3	.044	.104	.425	Normal	-.665	.208	-3.202	Not Normal
FC4	-.069	.104	-.660	Normal	-.901	.208	-4.338	Not Normal
PI1	-.037	.104	-.356	Normal	-1.035	.208	-4.980	Not Normal
PI2	-.231	.104	-2.222	Not Normal	-.242	.208	-1.165	Normal
PI3	-.105	.104	-1.010	Normal	-.564	.208	-2.715	Not Normal
PI4	-.077	.104	-.743	Normal	-.845	.208	-4.066	Not Normal
PI5	-.452	.104	-4.339	Not Normal	-.414	.208	-1.991	Not Normal
PI6	-.476	.104	-4.573	Not Normal	-.247	.208	-1.189	Normal
PI7	-.229	.104	-2.201	Not Normal	-.438	.208	-2.108	Not Normal
CMP1	-.382	.104	-3.673	Not Normal	-.460	.208	-2.215	Not Normal
CMP2	-.279	.104	-2.677	Not Normal	-.436	.208	-2.101	Not Normal
CMP3	-.573	.104	-5.507	Not Normal	-.213	.208	-1.023	Normal
CMP4	-.696	.104	-6.684	Not Normal	-.075	.208	-0.360	Normal
SQ1	-.341	.104	-3.279	Not Normal	-.458	.208	-2.202	Not Normal
SQ2	-.374	.104	-3.592	Not Normal	-.484	.208	-2.332	Not Normal
SQ3	-.503	.104	-4.829	Not Normal	-.276	.208	-1.326	Normal

Table 4.3 continued

SQ4	-.501	.104	-4.817	Not Normal	-.354	.208	-1.703	Normal
SQ5	-.451	.104	-4.331	Not Normal	-.415	.208	-1.996	Not Normal
SQ6	-.526	.104	-5.055	Not Normal	-.111	.208	-0.535	Normal
SQ7	.096	.104	.918	Normal	-.597	.208	-2.872	Not Normal
SQ8	-.350	.104	-3.367	Not Normal	.014	.208	0.067	Normal
TMC1	-.011	.104	-.105	Normal	-.639	.208	-3.077	Not Normal
TMC2	-.083	.104	-.800	Normal	-.673	.208	-3.239	Not Normal
TMC3	-.123	.104	-1.178	Normal	-.685	.208	-3.295	Not Normal
TMC4	-.052	.104	-.499	Normal	-.791	.208	-3.805	Not Normal
TMC5	-.475	.104	-4.560	Not Normal	-.547	.208	-2.634	Not Normal
TMV1	.078	.104	.751	Normal	-.736	.208	-3.542	Not Normal
TMV2	.014	.104	.133	Normal	-.898	.208	-4.323	Not Normal
TMV3	.037	.104	.354	Normal	-.766	.208	-3.689	Not Normal
VS1	-.066	.104	-.632	Normal	-.825	.208	-3.970	Not Normal
VS2	-.058	.104	-.557	Normal	-.846	.208	-4.071	Not Normal
VS3	.003	.104	.033	Normal	-.675	.208	-3.247	Not Normal
GVS1	.029	.104	.282	Normal	-.899	.208	-4.325	Not Normal
GVS2	-.029	.104	-.279	Normal	-.829	.208	-3.990	Not Normal
GVS3	.004	.104	.040	Normal	-.720	.208	-3.467	Not Normal
GVS4	-.056	.104	-.538	Normal	-.858	.208	-4.131	Not Normal
GVS5	-.274	.104	-2.629	Not Normal	-.956	.208	-4.603	Not Normal
WOL1	.157	.104	1.506	Normal	-.258	.208	-1.241	Normal
WOL2	.264	.104	2.538	Not Normal	-.062	.208	-0.297	Normal
WOL3	.123	.104	1.186	Normal	-.663	.208	-3.192	Not Normal
WOL4	.018	.104	.174	Normal	-.683	.208	-3.289	Not Normal
BI1	-.370	.104	-3.559	Not Normal	-.735	.208	-3.539	Not Normal
BI2	-.347	.104	-3.339	Not Normal	-.561	.208	-2.698	Not Normal
BI3	-.377	.104	-3.619	Not Normal	-.593	.208	-2.853	Not Normal
USB1	-.199	.104	-1.914	Normal	-.754	.208	-3.629	Not Normal
USB2	-.385	.104	-3.702	Not Normal	-.686	.208	-3.304	Not Normal
USB3	-.350	.104	-3.365	Not Normal	-.660	.208	-3.178	Not Normal
USB4	-.434	.104	-4.172	Not Normal	-.553	.208	-2.661	Not Normal

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USB= Use Behavior).

4.3.3 Measurement Model Assessment

Chin (2010) and Hair et al. (2011) have asserted on the issue of clear and detailed reporting of the data analysis procedure in order to ensure the high quality and the eligibility of the results. The PLS-SEM reporting technique involves two main steps: assessing the measurement model (i.e. the outer model) followed by assessing the structural model (i.e. the inner model) (Chin, 2010; Hair et al., 2011).

The assessment of the measurement model concentrates on the reliability and the validity of the constructs and the indicators (i.e. the items) that are used to measure a certain construct (i.e. a latent variable). Reliability refers to the accuracy and the consistency of the measurement instrument; while validity refers to whether the measurement instrument truly represented the constructs it was intended to measure originally (Hair et al., 2014). Measurement model assessment can be done by employing four evaluation tests: internal consistency reliability, individual indicator reliability, convergent validity and discriminant validity (Chin, 2010; Hair et al., 2011; Hair et al., 2014).

4.3.3.1 Internal Consistency Reliability

The internal consistency reliability is an important criterion and it must be evaluated for each construct within the proposed model; this test can be accomplished by examining the value of Composite Reliability (CR) for each latent variable (Hair et al., 2014). This calculated value (i.e. composite reliability), ranges from zero to one and it is considered to be acceptable if it exceeds the threshold of 0.7 (Hair et al., 2014). In the current study, the CR values for the model's constructs ranged from (0.839) to (0.946), which is

considered a satisfactory criterion for the constructs. Table 4.4 presents the CR values for all the constructs within the current study's model.

Table 4.4

Measurement Model Analysis

Construct	CR	AVE	Cronbach's Alpha	R^2	Q^2
BI	0.926	0.806	0.879	0.357	0.2796
CMP	0.920	0.742	0.884		
EE	0.915	0.730	0.877		
FC	0.859	0.605	0.781		
GS	0.942	0.766	0.923		
PE	0.877	0.641	0.814		
PI	0.876	0.543	0.830		
SI	0.839	0.565	0.744		
SQ	0.912	0.566	0.890		
TMC	0.923	0.708	0.894		
TMV	0.917	0.787	0.865		
USE	0.946	0.815	0.924	0.456	0.3687
VS	0.931	0.817	0.888		
WOL	0.840	0.570	0.758		

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior, AVE= Average Variance Extracted, CR=Composite reliability).

4.3.3.2 Indicator Reliability

When assessing the measurement model, the reliability of each indicator (i.e. the items) must be examined; the indicator's reliability is considered acceptable if the outer loading for that indicator is above the value of 0.7 (Chin, 2010; Hair et al., 2011). After analyzing the data, the loadings of the items within the current study's model ranged from (0.626) to (0.925). However, indicators with loadings of 0.5 and 0.6 can still be retained if the construct's CR value was above the accepted threshold (i.e. 0.7) and if there exist other indicators within the same construct with values (i.e. loadings) above 0.7 for comparison purposes (Chin, 2010; Hair et al., 2011); therefore, the indicators with loadings below 0.7 in the study's model were preserved.

4.3.3.3 Convergent Validity

The validity of the measurement model can be assessed depending on the convergent validity and the discriminant validity tests. Convergent validity refers to the amount of variance a certain construct shares with its own indicators, or in other words, the extent to which the indicators of the same construct correlate positively with each other (Chin, 2010; Hair et al., 2011, 2014). The value of the Average Variance Extracted (AVE) is used to assess the convergent validity of a measurement model where the AVE value is considered acceptable when it is equal or above the threshold value of 0.5 for a certain construct (Chin, 2010; Hair et al., 2014). For this study, all the constructs' AVE values within the measurement model were above 0.5 which indicated that it have satisfied the criterion of convergent validity. Table 4.4 displays the AVE values for all the constructs within the measurement model.

4.3.3.4 Discriminant Validity

Discriminant validity can be defined as the degree to which a certain construct can be differentiated from other constructs within the same model; in other words, to what extent the study's participants recognized a certain variable (i.e. a construct) distinctively and did not confuse it with other variables of the same study (Chin, 2010; Hair et al., 2014).

The discriminant validity can be evaluated using two methods: 1) the Fornell-Larcker criterion (Fornell & Larcker, 1981) and 2) the cross-loadings of the measurement indicators (Chin, 2010; Hair et al., 2014). The rule of thumb for the Fornell- Larcker criterion is that each construct's square root of the AVE value must be greater than the construct's correlations with other latent variables (i.e. constructs) within the same model (Chin, 2010; Hair et al., 2014).

Another method for assessing discriminant validity is by examining the outer loading of each individual indicator; the rule of thumb is that each indicator's outer loading on its original construct must be greater than the same indicator's cross-loadings on other constructs (Chin, 2010; Hair et al., 2014). The current study employed both methods for assessing discriminant validity and the data analysis results showed that all the constructs within the model have fulfilled the discriminant validity criterion; Table 4.5 presents the results of the Fornell-Larcker method with more detail; the diagonal cells on the table represent the square root of the AVE values for all the constructs; the diagonal cells were found to be greater than all the off-diagonal cells which represent the construct's correlations with the other constructs in the model.

On the other hand, Table 4.6 presents the results of the second method (i.e. the indicator cross-loading), the bold font cells represent the indicators' loadings on their original constructs; those values were found to be greater than the indicators' cross-loadings on other constructs of the model. The results obtained from the two methods affirmed that all constructs in the model were distinctively recognized in this study and that discriminant validity for the measurement model was achieved.

This step concluded the measurement model assessment after examining all the required criteria for the model's reliability and validity, which both were found to be adequate and sufficient. Hence, the next section discusses the structural model assessment procedure.

Table 4.5

Discriminant validity (Fornell-Larcker method)

	BI	CMP	EE	FC	GS	PE	PI	SI	SQ	TMC	TMV	USE	VS	WOL
BI	**0.8977**													
CMP	0.4546	**0.8616**												
EE	0.4559	0.5393	**0.8546**											
FC	0.4243	0.4749	0.4601	**0.7780**										
GS	0.3888	0.3260	0.2726	0.4788	**0.8754**									
PE	0.3639	0.5436	0.6097	0.3223	0.1848	**0.8007**								
PI	0.4310	0.4926	0.5163	0.5069	0.3449	0.3668	**0.7368**							
SI	0.4600	0.4857	0.6104	0.4970	0.4238	0.5069	0.4415	**0.7518**						
SQ	0.4241	0.6630	0.5659	0.4848	0.4161	0.5340	0.4615	0.5025	**0.7523**					
TMC	0.4472	0.4260	0.3765	0.5259	0.6222	0.3424	0.4035	0.5067	0.5628	**0.8412**				
TMV	0.3846	0.3143	0.2642	0.4776	0.5730	0.2525	0.3606	0.3782	0.4326	0.6279	**0.8873**			
USE	0.5902	0.4278	0.4000	0.4780	0.4319	0.3429	0.4622	0.4583	0.4691	0.4924	0.3879	**0.9026**		
VS	0.3721	0.3783	0.3415	0.4417	0.5361	0.3721	0.3492	0.3895	0.4926	0.4904	0.5354	0.4289	**0.9039**	
WOL	-0.2281	-0.2187	-0.2354	-0.3071	-0.3950	-0.2159	-0.2810	-0.3111	-0.2791	-0.3454	-0.3057	-0.3435	-0.2863	**0.7547**

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior).

Table 4.6

Discriminant validity (indicator cross-loading method)

	BI	CMP	EE	FC	GS	PE	PI	SI	SQ	TMC	TMV	USE	VS	WOL
BI1	**0.8908**	0.4178	0.4343	0.4055	0.3554	0.3829	0.3891	0.4327	0.4108	0.3908	0.3352	0.5247	0.3567	-0.2223
BI2	**0.9122**	0.3685	0.4082	0.3675	0.3417	0.3154	0.38	0.4203	0.3752	0.3764	0.348	0.5218	0.3471	-0.1998
BI3	**0.8898**	0.4362	0.3851	0.3691	0.3495	0.2819	0.3911	0.386	0.3561	0.4356	0.3523	0.5422	0.299	-0.1920
CMP1	0.3864	**0.8606**	0.4631	0.4218	0.254	0.4718	0.4346	0.4601	0.5206	0.3551	0.2631	0.3553	0.3046	-0.1957
CMP2	0.4021	**0.8643**	0.4569	0.4188	0.2871	0.4808	0.4487	0.4302	0.5556	0.3998	0.3301	0.3647	0.3336	-0.1720
CMP3	0.4037	**0.8686**	0.491	0.4274	0.3219	0.4548	0.4194	0.3958	0.6086	0.3938	0.2863	0.4181	0.3567	-0.2196
CMP4	0.3732	**0.8529**	0.4465	0.3662	0.258	0.4665	0.3935	0.3877	0.6006	0.3155	0.1984	0.3333	0.3067	-0.1649
EE1	0.3751	0.4811	**0.8354**	0.409	0.228	0.5777	0.445	0.5051	0.4724	0.3283	0.2554	0.3225	0.3401	-0.1842
EE2	0.377	0.4965	**0.8431**	0.3641	0.2502	0.5512	0.4504	0.5318	0.4989	0.322	0.2331	0.3148	0.2976	-0.2183
EE3	0.4096	0.4446	**0.8759**	0.3851	0.2123	0.4945	0.4097	0.5254	0.5001	0.3159	0.2007	0.3367	0.2761	-0.2039
EE4	0.3953	0.4256	**0.8633**	0.4152	0.2431	0.4671	0.4624	0.5248	0.4633	0.3219	0.2173	0.3917	0.2575	-0.1985
FC1	0.3683	0.3681	0.3965	**0.8293**	0.3917	0.3101	0.3977	0.4145	0.4214	0.4446	0.4082	0.3794	0.331	-0.2496
FC2	0.3838	0.4447	0.4415	**0.8463**	0.3951	0.32	0.4721	0.438	0.4033	0.4345	0.4011	0.444	0.3553	-0.2762
FC3	0.1997	0.2744	0.2715	**0.6495**	0.2831	0.1401	0.3696	0.3353	0.2684	0.3338	0.2674	0.2788	0.2788	-0.2033
FC4	0.3383	0.367	0.2966	**0.7716**	0.4088	0.1993	0.3312	0.3502	0.3981	0.416	0.3927	0.3626	0.4065	-0.2195
GVS1	0.3485	0.301	0.2762	0.4305	**0.8849**	0.1686	0.3532	0.3922	0.3764	0.546	0.5331	0.3929	0.4795	-0.3774
GVS2	0.3489	0.2789	0.2175	0.3912	**0.9015**	0.1459	0.3109	0.3591	0.3774	0.5695	0.5078	0.3571	0.4925	-0.3433
GVS3	0.3361	0.301	0.2326	0.4198	**0.9029**	0.1604	0.3098	0.3746	0.3706	0.5675	0.5068	0.3936	0.4639	-0.3375
GVS4	0.3263	0.2545	0.1967	0.4207	**0.8863**	0.1132	0.272	0.3543	0.3173	0.5275	0.5021	0.3716	0.4746	-0.3413
GVS5	0.3409	0.2885	0.2668	0.43	**0.7968**	0.2194	0.2598	0.3717	0.3775	0.5105	0.4544	0.3712	0.435	-0.3267
PE1	0.2488	0.4534	0.4551	0.1962	0.099	**0.7673**	0.2606	0.3482	0.4299	0.2522	0.1344	0.2335	0.2917	-0.1728
PE2	0.2617	0.4837	0.4936	0.3001	0.1456	**0.8397**	0.2926	0.4174	0.4712	0.2728	0.1882	0.3142	0.3173	-0.1692
PE3	0.2989	0.4366	0.5273	0.2632	0.1508	**0.8533**	0.3122	0.4238	0.4339	0.2392	0.1933	0.2634	0.2817	-0.1835

Table 4.6 continued

PE4	0.3352	0.3765	0.4665	0.2628	0.1815	**0.7365**	0.2983	0.4177	0.3801	0.3187	0.2683	0.2802	0.2975	-0.1639
PI1	0.3172	0.2571	0.2887	0.4318	0.354	0.2235	**0.6455**	0.3476	0.2395	0.3146	0.3077	0.345	0.2593	-0.269
PI2	0.3547	0.41	0.4422	0.421	0.2638	0.3236	**0.8006**	0.3555	0.3739	0.3014	0.2479	0.3467	0.2609	-0.2211
PI3	0.2936	0.3495	0.346	0.3562	0.2568	0.2402	**0.7871**	0.3156	0.3508	0.318	0.2787	0.333	0.2735	-0.1767
PI4	0.302	0.2745	0.3557	0.4076	0.2236	0.2313	**0.7497**	0.2617	0.2796	0.2814	0.3281	0.2905	0.2401	-0.2077
PI5	0.3245	0.4503	0.4222	0.3271	0.24	0.3045	**0.7332**	0.3539	0.413	0.2859	0.2234	0.366	0.2557	-0.1938
PI6	0.303	0.4228	0.4138	0.2859	0.179	0.2856	**0.6933**	0.3059	0.374	0.2797	0.2103	0.3555	0.252	-0.1668
SI1	0.3331	0.347	0.4845	0.2476	0.237	0.4237	0.3337	**0.748**	0.3709	0.2857	0.2065	0.2421	0.2804	-0.1987
SI2	0.3847	0.3997	0.5612	0.2694	0.1817	0.4736	0.3391	**0.7862**	0.4108	0.3039	0.1736	0.3397	0.2492	-0.1976
SI3	0.3537	0.3665	0.3863	0.4881	0.4575	0.2911	0.3471	**0.7656**	0.3521	0.4897	0.4043	0.4283	0.352	-0.2689
SI4	0.3054	0.3441	0.3914	0.5142	0.4229	0.3265	0.3072	**0.705**	0.3777	0.4601	0.3727	0.3693	0.2959	-0.2799
SQ1	0.3383	0.5521	0.4552	0.3744	0.295	0.4629	0.3442	0.3975	**0.7769**	0.4592	0.3237	0.3736	0.4215	-0.2474
SQ2	0.3178	0.5244	0.4826	0.4191	0.3291	0.4193	0.4253	0.3743	**0.7744**	0.479	0.3696	0.3602	0.384	-0.1988
SQ3	0.2778	0.5596	0.4548	0.3611	0.2613	0.4642	0.3598	0.3992	**0.7839**	0.4205	0.2903	0.3038	0.3723	-0.1927
SQ4	0.3419	0.4735	0.4265	0.3326	0.3223	0.4153	0.3234	0.404	**0.7896**	0.4416	0.326	0.3463	0.3844	-0.2674
SQ5	0.3643	0.5195	0.4368	0.4085	0.3273	0.3947	0.3667	0.4064	**0.7909**	0.4301	0.3374	0.3278	0.3618	-0.1318
SQ6	0.372	0.6024	0.4868	0.413	0.3282	0.4404	0.3867	0.3932	**0.7855**	0.4487	0.3188	0.4381	0.3556	-0.2331
SQ7	0.2747	0.3132	0.2871	0.2776	0.3377	0.2622	0.3073	0.3084	**0.6262**	0.3675	0.3743	0.3291	0.3498	-0.2062
SQ8	0.2198	0.3977	0.3399	0.3046	0.3093	0.3296	0.2336	0.3259	**0.6718**	0.3073	0.26	0.3331	0.3395	-0.21
TMC1	0.3552	0.3418	0.2982	0.4582	0.516	0.2858	0.3248	0.441	0.4732	**0.8614**	0.54	0.4131	0.4473	-0.2702
TMC2	0.3956	0.3715	0.3499	0.5069	0.5691	0.2561	0.3629	0.4331	0.4965	**0.897**	0.5741	0.4192	0.4102	-0.2911
TMC3	0.3744	0.3453	0.3108	0.4902	0.5636	0.264	0.3734	0.4444	0.4681	**0.8883**	0.5854	0.4374	0.4131	-0.2671
TMC4	0.3804	0.3175	0.2795	0.4164	0.5341	0.2742	0.3618	0.4073	0.3999	**0.8429**	0.5607	0.42	0.4244	-0.3181
TMC5	0.3684	0.4112	0.3394	0.3309	0.4232	0.3595	0.2665	0.4004	0.5243	**0.7017**	0.3693	0.3752	0.3635	-0.3013
TMV1	0.3557	0.2926	0.2723	0.4364	0.5185	0.2338	0.3458	0.3589	0.4087	0.6139	**0.8963**	0.3685	0.5066	-0.2165
TMV2	0.3605	0.2825	0.2028	0.4397	0.5499	0.2188	0.3279	0.3614	0.361	0.5711	**0.9218**	0.3525	0.5006	-0.2914
TMV3	0.304	0.2606	0.2294	0.393	0.4509	0.2203	0.2824	0.2797	0.3845	0.478	**0.8419**	0.3082	0.4111	-0.3132
USB1	0.5386	0.372	0.3363	0.4325	0.3849	0.3308	0.4053	0.4285	0.4324	0.4616	0.3908	**0.8799**	0.3913	-0.2993

Table 4.6 continued

USB2	0.5474	0.4126	0.3902	0.4443	0.4161	0.3117	0.4174	0.4345	0.4256	0.445	0.3246	**0.9248**	0.392	-0.3346
USB3	0.5133	0.397	0.3522	0.4152	0.3677	0.3017	0.4028	0.3929	0.4294	0.4368	0.3358	**0.9106**	0.3975	-0.3004
USB4	0.5302	0.3619	0.364	0.4326	0.3889	0.2934	0.4428	0.3971	0.4058	0.4338	0.3495	**0.8943**	0.3676	-0.3045
VS1	0.3654	0.3818	0.3285	0.4321	0.4684	0.3592	0.3455	0.4027	0.4869	0.4877	0.4819	0.4194	**0.9101**	-0.227
VS2	0.3023	0.324	0.307	0.4085	0.5136	0.3225	0.3105	0.3284	0.4364	0.4229	0.503	0.3705	**0.9054**	-0.2622
VS3	0.3379	0.3149	0.2882	0.3528	0.4743	0.3244	0.2873	0.3185	0.4073	0.4136	0.4675	0.3693	**0.8961**	-0.2917
WOL1	-0.2346	-0.2913	-0.2888	-0.2809	-0.3621	-0.2235	-0.2704	-0.3684	-0.2861	-0.3135	-0.2501	-0.3254	-0.2656	**0.8119**
WOL2	-0.212	-0.2193	-0.1826	-0.2997	-0.3401	-0.2117	-0.201	-0.2381	-0.2796	-0.3728	-0.291	-0.283	-0.2707	**0.7838**
WOL3	-0.1414	-0.0538	-0.1261	-0.1946	-0.2467	-0.1231	-0.2093	-0.1654	-0.1475	-0.1639	-0.1876	-0.2204	-0.1576	**0.7482**
WOL4	-0.034	0.0179	-0.0316	-0.0859	-0.1934	-0.0247	-0.1373	-0.0758	-0.0428	-0.1134	-0.166	-0.1611	-0.1201	**0.6671**

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior).

4.3.4 Collinearity

Before starting to assess the structural model, it is important to examine the model for collinearity issues (Hair et al., 2014). Collinearity happens when two constructs (i.e. latent variables) within the model are highly correlated; and when several constructs are involved in such situation, it is referred to as multi-collinearity (Hair et al., 2014). When collinearity exists, it affects the results obtained from the data analysis process because it (i.e. collinearity) increases the standard errors which will alter the model estimates and subsequently affects the final results (Hair et al., 2014).

To detect collinearity, a criterion called Variance Inflation Factor (VIF) need to be calculated for all the exogenous variables within the model. A VIF value below five, means that the model does not show critical levels of collinearity and as a result it is considered acceptable and adequate for the next stage of assessment. The current model's collinearity values were below the mentioned threshold as displayed in Table 4.7 and Table 4.8 for the two sets of exogenous constructs and their associated endogenous constructs (i.e. BI and USE), as collinearity test requires that each endogenous construct and its associated set of predictors (i.e. exogenous constructs) needs to be examined separately from the complete structural model (Hair et al., 2014).

Table 4.7

Collinearity Test for BI predictors

Constant	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
	9.222E-7	.034		.000	1.000		
PE	.008	.047	.008	.181	.857	.539	1.856
EE	.152	.052	.152	2.905	.004	.435	2.297
SI	.123	.048	.123	2.556	.011	.513	1.951
PI	.125	.044	.125	2.874	.004	.627	1.595
CMP	.168	.050	.168	3.341	.001	.472	2.118
SQ	-.030	.053	-.030	-.566	.572	.415	2.410
TMC	.144	.050	.144	2.867	.004	.468	2.137
TMV	.121	.045	.121	2.674	.008	.583	1.716

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, BI=Behavioral Intention, VIF = Variance Inflation Factor).

Table 4.8

Collinearity Test for USE predictors

Constant	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
	-1.017E-5	.032		.000	1.000		
BI	.413	.036	.413	11.376	.000	.757	1.321
FC	.174	.039	.174	4.503	.000	.667	1.499
GS	.069	.041	.069	1.681	.093	.588	1.702
VS	.123	.039	.123	3.140	.002	.652	1.535
WOL	-.133	.035	-.133	-3.817	.000	.821	1.217

Note: (FC=Facilitating Condition, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior, VIF = Variance Inflation Factor).

4.3.5 Structural Model Assessment

The measurement model assessment for the current study satisfied all the four criterions (i.e. internal consistency reliability, indicator's reliability, convergent validity and discriminant validity), which means that the model is eligible to proceed with the next step of analysis which is assessing the structural model (i.e. the inner model) (Chin, 2010; Hair et al., 2011, 2014). Several tests need to be carried out in order to assess the significance of hypothesized relationships and the predictive power of the proposed model such as: Path Coefficients, coefficient of determination (R^2) and predictive relevance (Q^2) (Chin, 2010; Hair et al., 2011, 2014). These steps will be discussed thoroughly in the following sections.

4.3.5.1 Path Coefficients

Each relationship between two latent variables (i.e. constructs) within the structural model represents a single hypothesis. The SmartPLS analysis tools helps to determine which one of those hypotheses (i.e. relationships) is significant or non-significant (Chin, 2010; Hair et al., 2014). Whether a relationship is significant or not depends on the results obtained from running the SmartPLS bootstrapping function; this function calculates the empirical t-value for each relationship as a measure for the relationship significance. The empirical t-value is computed by dividing the relationship's path coefficient by its associated standard error (Hair et al., 2014). A relationship (i.e. a hypothesis) is considered salient (i.e. significant) if the empirical t-value exceeds the critical value at a certain level of significance (Chin, 2010; Hair et al., 2011, 2014). All the relationships in the study's model, their path coefficients and their empirical t-values are presented in Table 4.9.

Table 4.9

Structural model assessment

Paths	Path Coefficients	t-value	Hypothesis Supported/not
BI → USE	0.413	9.8040***	Supported
CMP → BI	0.168	3.1611***	Supported
EE → BI	0.152	2.5648***	Supported
FC → USE	0.174	4.5376***	Supported
GS → USE	0.069	1.5006	Not supported
PE → BI	0.009	0.1560	Not supported
PI → BI	0.125	2.6177***	Supported
SI → BI	0.123	2.3894**	Supported
SQ → BI	-0.0302	0.5403	Not supported
TMC → BI	0.1444	2.3994**	Supported
TMV → BI	0.1206	2.3354**	Supported
VS → USE	0.1229	2.7541***	Supported
WOL → USE	-0.1331	3.2701***	Supported

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior).
** p<0.05; *** p<0.01;

4.3.5.2 Coefficient of Determination (R^2)

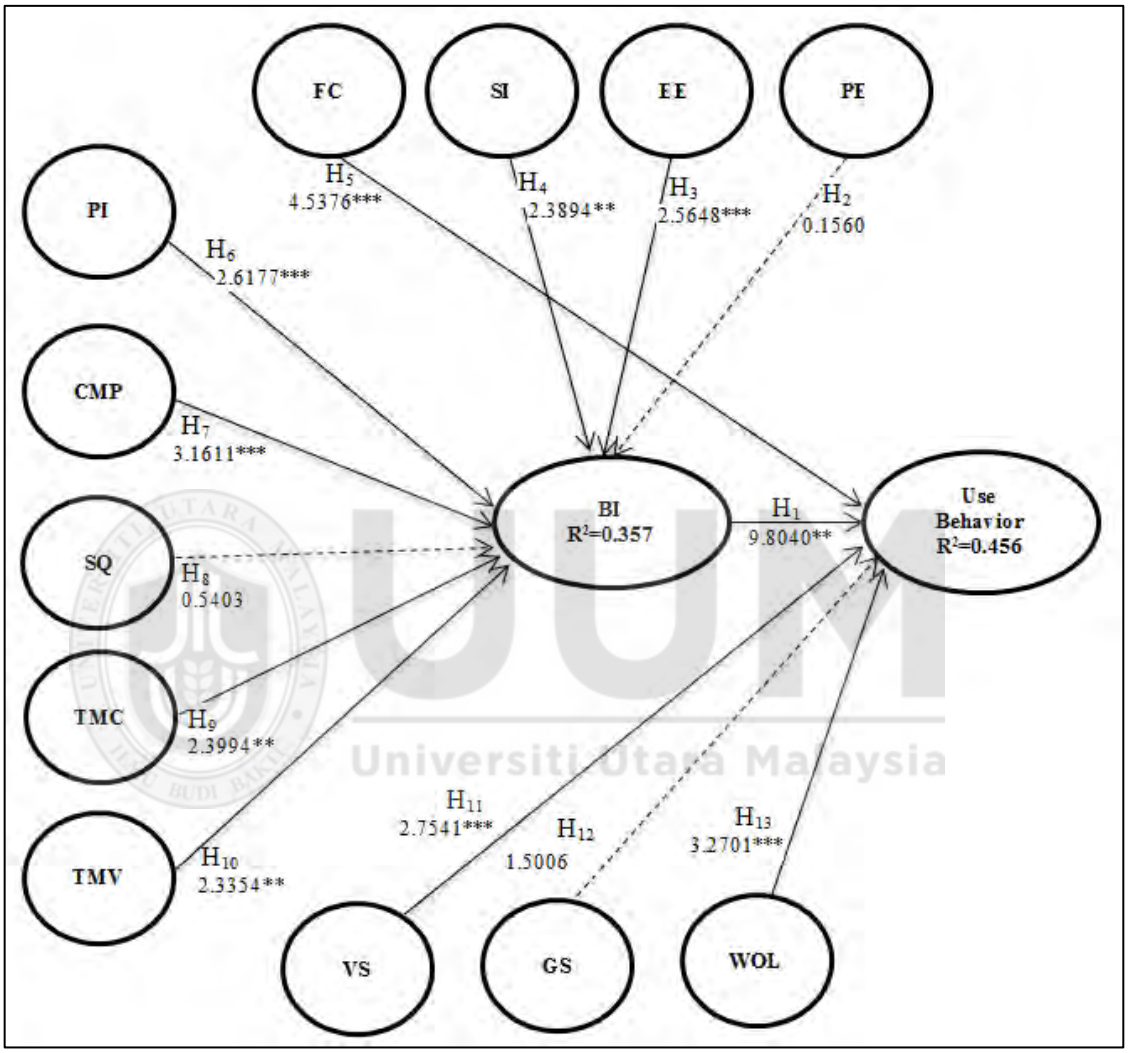
Coefficient of determination (R^2) is a measure of the model's predictive power; it can also be defined as the exogenous variables' combined effect on the endogenous variable (Chin, 2010; Hair et al., 2014). In other words, the R^2 refers to how much variance in the endogenous construct (i.e. the dependent variable) is explained by its associated exogenous constructs (i.e. the independent variables). The value of R^2 ranges from zero

to one; a higher value of R^2 means that the model has more predictive power (Hair et al., 2014). SmartPLS algorithm was used to calculate the R^2 value for the model's two endogenous constructs which are behavioral intention (BI) and behavioral usage (USE) and the R^2 values were (0.357) and (0.456) respectively. The two values are considered adequate and satisfactory (Chin, 2010; Hair et al., 2014).

4.3.5.3 Predictive Relevance (Q^2)

Q^2 is used to measure the predictive relevance of the study's model; in other words, the Q^2 criterion attempts to measure the model's predictive capability (i.e. how well an endogenous construct's data points can be reconstructed depending on the model and its estimates) (Chin, 2010; Hair et al., 2014; Henseler, Ringle, & Sinkovics, 2009). This measure was originally developed by Geisser (1974) and Stone (1974). The main principle of this measure suggests that a model should be able to predict the data points of the indicators of the endogenous latent variable. SmartPLS employs the blindfolding tool to calculate the Q^2 measure; this tool uses a sample reuse technique that omits certain data points in the endogenous construct's indicators and then the procedure attempts to predict the omitted data points (Chin, 2010; Hair et al., 2014). The current study used the cross-validated redundancy approach to calculate the Q^2 measure as recommended by (Hair et al., 2011, 2014), because this method depends on estimates from both the measurement model and the structural model for the prediction process. When the Q^2 measure for an endogenous construct is larger than zero, this means that the model demonstrates a satisfactory predictive relevance (Chin, 2010; Hair et al., 2011, 2014). The Q^2 values for the two endogenous constructs in this study (i.e. BI and USE) are (0.2796) and (0.3687), respectively; both of them demonstrated to have

adequate predictive relevance as displayed in Table 4.2. Furthermore, Figure 4.1 presents the current study's proposed model with the structural model assessment.



Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior).
** p<0.05; *** p<0.01;
The value on the arrow represents the t-value;
Dashed line indicates that the hypothesis was not supported;

Figure 4.1. Structural model assessment

4.3.6 Assessment of the Moderation Effect

An important part of the analysis process is to assess the moderators' effect on the proposed relationships within the study's model. Different groups of respondents might have heterogeneous (i.e. diverse) believes and perceptions regarding a phenomenon being studied; the heterogeneity of those respondents' opinions is due to their different personal characteristics, educational, social backgrounds and the diverse ergonomics settings (Hair et al., 2014; Hu et al., 2010; Venkatesh et al., 2003; 2011). Studying the effect of moderators can be useful as it could disclose hidden patterns and reveal important aspects of the adoption behavior; neglecting such examination of distinctive groups of respondents might result in misleading conclusions and findings (Hair et al., 2014). Consequently, the multi-group analysis main goal is to uncover the effect of moderators on the study proposed relationships (Hair et al., 2014).

The current study incorporated four moderators: gender, age, experience and job position of the healthcare staff members; those moderators were conceptualized to influence five relationships within the current study's model, more specifically between the independent variables: performance expectancy, effort expectancy, social influence, facilitating conditions, personal innovativeness and the dependent variables: behavioral intention and use behavior. The following sections present the results obtained after carrying out the multi-group analysis.

4.3.6.1 The moderating Role of Gender

The study sample included 274 males with a percentage of (49.72%) and 277 females with a percentage of (50.27%); multi-group analysis was carried out to investigate whether there is a significant difference between the two groups in regard to the issue of

HIS adoption. The relationships between performance expectancy, effort expectancy, social influence, personal innovativeness and behavioral intention were consistent between male and female staff members and the results does not show a significant moderating effect for gender as presented in Table 4.10.

Table 4.10

Multi-group analysis results for gender

Relation	Male n=274			Female n=277			T-value of difference
	Path Coefficient	Std. Error	t-value	Path Coefficient	Std. Error	t-value	
PE → BI	-0.0447	0.0797	0.561	0.0608	0.0819	0.7414	0.925
EE → BI	0.1667	0.0894	1.8659*	0.1393	0.0817	1.7048*	0.227
SI → BI	0.1305	0.0711	1.8337*	0.1227	0.0765	1.6055	0.075
PI → BI	0.1763	0.0736	2.3943**	0.0954	0.0609	1.5652	0.848

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, PI=Personal Innovativeness, BI=Behavioral Intention, USE= Use Behavior).

* p<0.1; ** p<0.05; *** p<0.01

4.3.6.2 The Moderating Role of Age

Morris and Venkatesh (2000) suggested that individuals within their twenties and thirties are considered young and individuals within their forties and above are considered old. Accordingly, the current study participants were divided into two groups: young staff members (i.e. 451 members) with a percentage of 81.85% and old staff members (i.e. 100 members) with a percentage of 18.14%.

After conducting the multi-group analysis to examine the effect of age as a moderator, the relationship between facilitating conditions and use behavior was moderated by age and the t-value of difference was (2.372). The effect of age was stronger for young staff members (β = 0.2254, t-value = 5.619) than for older staff (β = -0.0306, t-value = 0.304).

However, the other path coefficients did not differ significantly between young and old staff members as shown in Table 4.11 and as a result, age did not moderate those relationships.

Table 4.11

Multi-group analysis results for age

Relation	Young n =451			Old n =100			T-value of difference
	Path Coefficient	**Std. Error**	**t-value**	**Path Coefficient**	**Std. Error**	**t-value**	
PE → BI	0.0261	0.0619	0.4215	-0.1004	0.1153	0.8708	0.891
EE → BI	0.1342	0.0646	2.0771**	0.2018	0.1418	1.4237	0.444
SI → BI	0.0933	0.056	1.6667*	0.2367	0.1204	1.9658**	1.090
PI → BI	0.1362	0.0524	2.6001**	0.1115	0.1153	0.9673	0.200
FC → USE	0.2254	0.0401	5.619***	-0.0306	0.1007	0.304	2.372**

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, BI=Behavioral Intention, USE= Use Behavior).

* p<0.1; ** p<0.05; *** p<0.01

4.3.6.3 The Moderating Role of Experience

Multi-group analysis was performed to assess the effect of experience on the relationships between the latent variables. The staff members with job experience with one to six years form about (55.17%) of the respondents, while more experienced staff with more than six years on the job form (44.82%) of the respondents. The relationship between facilitating conditions and use behavior was moderated by experience and the t-value of difference was (2.098). Moreover, the effect of facilitating conditions on technology use was stronger for staff members with low experience (β = 0.2433, t-value = 4.7688) than for staff members with higher experience (β = 0.0834, t = 1.4651). However, experience did not have a significant moderating effect on the remaining proposed relationships as shown in the Table 4.12

Table 4.12

Multi-group analysis results for experience

Relation	Lower experience n= 304			Higher experience n= 247			T-value of difference
	Path Coefficient	Std. Error	t-value	Path Coefficient	Std. Error	t-value	
EE → BI	0.0588	0.0823	0.7141	0.2401	0.0845	2.841***	1.528
SI → BI	0.0912	0.075	1.2164	0.1695	0.0733	2.3134**	0.748
FC→USE	0.2433	0.051	4.7688***	0.0834	0.0569	1.4651	2.098**

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, BI=Behavioral Intention, USE= Use Behavior).

* p<0.1; ** p<0.05; *** p<0.01

4.3.6.4 The Moderating Role of Position

The medical staff formed (75.31%) of the respondents while administrative staff formed (24.68%). The last moderator (i.e. job position) did not have any moderating effect on the proposed relationships of the current study and there was no significant difference between medical and non-medical (i.e. administrative) staff members as the results obtained from multi-group analysis shows in Table 4.13

Table 4.13

Multi-group analysis results for job-position

Relation	medical staff n=415			non-medical staff n=136			T-value of difference
	Path Coefficient	Std. Error	t-value	Path Coefficient	Std. Error	t-value	
PE → BI	0.025	0.0643	0.389	-0.0432	0.1005	0.4299	0.541
EE → BI	0.1483	0.0703	2.1085**	0.1362	0.1363	0.9995	0.083
SI → BI	0.1538	0.0586	2.6249**	-0.0046	0.1136	0.0407	1.309
PI → BI	0.1292	0.0548	2.3589**	0.1124	0.0956	1.1751	0.153
FC→USE	0.1827	0.0473	3.8619***	0.1793	0.0609	2.9465***	0.038

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, BI=Behavioral Intention, USE= Use Behavior).

* p<0.1; ** p<0.05; *** p<0.01

4.4 Summary of Chapter 4

The current study followed a mixed method approach. As a result, the first part of this chapter presented the results of the qualitative study (i.e. the themes extracted from the interview process) which used semi-structured interviews with open-ended questions. On the other hand, SmartPLS was employed for the data analysis process of the 551 observations which represented the responses of the healthcare staff that were surveyed in the quantitative part of this study. Both the measurement model and the structural model were assessed using the recommended criteria in the literature. The measurement model assessment procedure involved evaluating the internal consistency reliability, individual indicator reliability, convergent validity and discriminant validity. The results obtained from carrying out the previous tests were adequate and satisfactory.

The next step was assessing the structural model by performing the collinearity test followed by calculating the important values of path coefficients, empirical t-values, coefficient of determination R^2 and the predictive relevance of the proposed model (i.e. Q^2) in order to estimate the significance of the relationships and subsequently to see whether the proposed hypotheses were supported or not. The final stage of the analysis included executing the multi-group analysis in order to check heterogeneity issues among the respondents and to check the moderation effect.

The next chapter discusses the findings of the current study in a more detailed manner, interprets those findings in-light of the literature and previous studies and explains how those findings addressed the research questions and objectives.

CHAPTER FIVE

DISCUSSIONS OF THE RESULTS

5.1 Introduction

This chapter discusses the results obtained from the data analysis stage for both the qualitative and the quantitative methods; it also presents the current study's research questions one by one, how each question was addressed within the study. Furthermore, the effect of the moderating variables is presented in this chapter. All these findings are explained in-light with the related studies from the literature. Finally, this chapter concludes with a summary sub-section.

5.2 Study Findings

The current study included five research questions to address the study's problem statement which is the issue of HIS adoption by healthcare professionals within the public hospitals of Kurdistan Region of Iraq. In order to answer these research questions, a combination of both qualitative and quantitative methods were used to provide a coherent and comprehensive approach for answering those questions.

The implementation of mixed methods provide several advantages for the study such as: rather than depending on a single method, the combination of both qualitative and quantitative methods will provide a better understanding of the problem as the strength of one method will compensate the weakness of the other method (Creswell, 2012a; Saunders et al., 2012); in other words, investigating the phenomenon qualitatively helped to explore the issue, the context and the settings from within, helped to identify

the factors that contribute to the phenomenon within its own environment and helped in developing the instrument for the quantitative study based on the actual needs and requirements of the individuals who are experiencing the phenomenon in real life rather than merely depending on previously published studies. The developed instrument then was tested using quantitative methods to achieve the required generalizability (Creswell, 2012a; Tashakkori & Teddlie, 2010). Furthermore, mixed methods approach enabled the study to properly answer the different research questions that are needed to address the phenomenon under question which is in this case the use and adoption of HIS within Kurdistan Region public healthcare sector.

5.2.1 Discussion on the Current Issues that are Influencing HIS Adoption

This section addresses the first research question in this study and highlights the main challenges and issues regarding the adoption of HIS. The current study utilized a qualitative approach using semi-structured interviews with open-ended questions to explore the perceptions and opinions of healthcare professionals in regard to the issue of HIS adoption in public hospitals in KRI of Iraq. From a general point of view, the factors that affect the usage and adoption of new technologies can fall under four general categories (i.e. individual, technological, organizational and environmental) according to (Jeyaraj et al., 2006). However, it is pivotal to specify which factors that actually influence the phenomenon under question as each context, domain and settings has its own special characteristics and circumstances that requires a customized and a specific approach (Boonstra & Broekhuis, 2010; Holden & Karsh, 2010; Novak et al., 2012). For this reason, qualitative in-depth interviews were employed to highlight the main issues that actually affect the HIS adoption among healthcare professionals and 26 themes were

extracted from the interviews. Those themes were grouped under four categories (i.e. individual, technological, organizational and environmental) in order to put them into perspective and to provide a more oriented and top view sight of the problem at hand. Those themes were used later for developing the quantitative measurement instrument.

The interviewees reported several individual topics that influenced the usage and adoption of HIS among healthcare staff within their responses; the individual issues encapsulate the personal characteristics of the person himself/herself which influences his/her behavior regarding the phenomenon under question. From the issues that were mentioned, culture. The respondents declared that the society merits such as cultural background and norms might influence the adoption of new technologies in work environments. This finding came aligned with previous studies which found that membership to a certain group or society has its impact on the individuals' values and beliefs and consequently on the individuals' behavior. For example, Srite and Karahanna (2006) stated that cultural discrepancies between countries have an effect on the adoption of new technologies depending on the characteristics of a given society. Other studies also indicated that even carefully designed information systems can face high resistance from its users not because of the system's characteristics but due to the users' personal traits and the local context (Laumer et al., 2015). Moreover, other studies concluded that certain relationships could result in differently (i.e. could be significant in one environment and insignificant in another) depending on the society attributes and the values which shape the individuals' perceptions regarding the issue under question (Venkatesh & Zhang, 2010).

Another issue that has been brought up by the interviewees was the lack of a good English language proficiency which stands as an obstacle facing the adoption of HIS. The HIS technologies are complex systems with advanced features and interfaces (Avgar et al., 2012; Boonstra & Broekhuis, 2010; Cresswell & Sheikh, 2013), which require the individuals who use it to acquire some intellectual characteristics such as a high level of English language. Lacking such a skill might create some fears and increase the anxiety when using those technologies. Other studies also found that language anxiety can significantly contribute to the behavioral intention to use new technologies (Yang, Tsao, Lay, Chen, & Liou, 2008).

Some respondents mentioned that the level of education might influence the adoption of HIS technologies, specifically for some specializations like nursing. The explanation for this is that the graduates of some schools and medical institutes might be lacking the required skills and training needed to handle advanced HIS systems compared to their counter parts like doctors, which stands as an obstacle to adopting these technologies by some healthcare individuals. This point comes in-line with another issue that was indicated by the respondents, which is the low experience of some healthcare staff; which results in low self-confidence, more anxiety and resistance when using those HIS systems. Similarly, Al-Gahtani (2008) found that education level had a moderating effect on the attitude of individuals to adopt new technologies within Arabic context. Another study (Hage et al., 2013), also concluded that educational status of individuals facilitates the adoption of new technologies in healthcare context.

Furthermore, the interviewees indicated that job-position represented an issue within the hospital, as more focus and attention is dedicated for part of the healthcare staff (i.e.

such as doctors) more than the others. This could be explained as the hospital might perceive the doctors role in the hospital as the most essential to healthcare provision, and therefore, they deserve the major part of resources (i.e. such as training programs). The latter issue (i.e. job-position) might also be interpreted as organizational inequality by allocating resources and attention for one part of the healthcare staff and assigning less for the remaining staff. For this reason, job-position was conceptualized as one of the moderators for the current study and it was hypothesized to affect certain relationships, which was examined in the quantitative part of this study.

Also, the qualitative interviews revealed that age was one of the barriers to adopt new HIS technologies, as older staff members being more reluctant to adopt HIS and being more used to old routines and procedures. This could be explained as younger generations being more exposed to new technologies within their daily lives than their older collegues, which makes them more capable and more willing to use HIS technologies as they perceive its value and impact more than older staff members who might perceive the HIS system as difficult or unnecessary in some cases. Some studies found that age moderated the proposed relationships within those studies in a way that technology adoption was more prevalent among young healthcare professionals (Al-Gahtani, 2008; Venkatesh et al., 2011).

Another issue that was brought up by the respondents is the low innovativeness of some staff members. This can be explained as some healthcare staff being used to do tasks within the hospital in a certain way; on the other hand, using HIS would produce new procedures or at least change old ones. Some of the staff members are not willing to change their work routines even if that would bring more benefits and better

performance on the long run. The reason for such behavior might be the time and effort that has to be spent to master those systems or the uncertainty about the technology itself. In this regard, the management can play an important role to endorse the use of HIS systems and encourage its adoption by the healthcare staff. In line with this, several studies concluded that personality characteristics can be an important predictor to technology adoption behavior in different settings (Laumer et al., 2015; Wells et al., 2010).

Another issue that was highlighted is job-insecurity. Taking into consideration that healthcare practice has a busy environment inside the hospital with hard consequences when medical errors are committed (Herricck et al., 2010), these circumstances increase the staff's resistance to use HIS as each and every task they perform is digitally recorded in the system which can be used as a proof against any staff member when medical mistakes are committed even if they were unintentional.

As a result, the individual themes that were extracted from the interviews are: culture, English language proficiency, job-position, educational level, age, innovativeness, low experience, low self-confidence, and job-insecurity; Table 5.1 presents those themes in a tabular format.

Table 5.1

Themes extracted from the interviews

Category	Theme
Individual	Culture
	English language proficiency
	Job-position
	Educational level
	Age
	Innovativeness
	Low experience
	Low self-confidence
	Job-insecurity
Technological	Lack of integration
	System quality
	Lack of standardization
	Compatibility
	Security issues
Organizational	Low training
	Management support
	Shortage of skillful maintenance staff
	Management innovativeness
	Motivational system
	long administrative routine
Environmental	Workload
	Financial support or Governmental support
	Vendor support
	Educational system
	Infrastructure
	Insurance system

In another direction, the interviewees highlighted other themes that represented characteristics of the technology itself (i.e. themes that are related to the technological dimension). The respondents revealed within their answers that the lack of integration between different HIS systems operating in different healthcare institutions is an important issue influencing the adoption of HIS. Such integration between the hospitals'

systems would provide valuable benefits, achieve those systems' full functionality, provide immediate access to patients' medical history anywhere they go, reduce the paper work required for patients, eliminate the need to enter patients' information at each hospital and enable the doctors to collaborate more actively in real-time mode. The lack of HIS integration limits its capability to a narrow scope, influences the staff's perceptions regarding its potentials and as a result negatively affects its adoption. Related to the previous point, the respondents declared that the lack of a unified patient identity system is one of the points that is affecting the adoption of HIS within the KRI public hospitals; the availability of such unified identity system for each patient (i.e. citizen) is a necessary requirement for integrating the whole healthcare system. It will remove the redundancy of information and make access to the patients' data easier and immediate. However, the lack of such system holds back the harvest of HIS benefits, reduces the staffs' belief in HIS and the purpose behind it. Related to this point, Boonstra and Broekhuis (2010) also stated that different HIS systems are not necessarily compatible with each other and the task of integrating them is not an easy one, which might become a barrier to its adoption.

The respondents also stated that the quality of the current HIS systems operating in the hospitals is one of the issues facing its adoption. The unscheduled stoppages of a system interrupt the work flow, enforces the staff to revert temporarily to old work routines until the problem is solved; moreover, this down time of the system impacts the staffs' satisfaction and trust about the systems' quality. Similar concerns regarding the systems' being dependable were also declared within other qualitative studies (Nieboer et al., 2014).

Security and privacy of healthcare data was another concern that was raised by the interviewees. The loss of vital patients' data due to hardware failure, computer viruses of even misuse of those data is a serious matter that should be accounted for within healthcare sector in order to increase the trustworthiness of the system and consequently to increase the users' adoption of those technologies. This issue was similarly highlighted in the literature as a barrier to HIS adoption (Boonstra & Broekhuis, 2010; McGinn et al., 2011).

Compatibility was also one of the topics that were reported during the interviews. This issue should be considered by both the healthcare officials and the HIS developers. Healthcare officials should pay attention to the actual needs of their institutions, their staff and the job requirements in order to achieve the vision of implementing healthcare technologies and improving the healthcare provision. Similarly, the developers should consider the characteristics of the HIS users, the tasks' descriptions and not to underestimate this important issue as there is no single suitable solution for all situations (Boonstra & Broekhuis, 2010; Holden & Karsh, 2010); in other words, certain customizations should be presented to fit a certain context. Preserving the current work style or at least trying not to make significant changes can positively fosters the adoption of HIS systems within healthcare institutions. Likewise, other researchers concluded that the inability to customize HIS to fit a certain context and it needs might become a barrier to its adoption (Nieboer et al., 2014).

The technological themes that were mentioned throughout the semi-structured interviews are: the lack of integration, HIS system quality, the lack of standardization, security and compatibility of the HIS systems. Those themes are presented in Table 5.1.

Additionally, the interviewees mentioned other non-technical issues that influenced their perceptions of HIS and its adoption (i.e. issues that are related to the organizational dimension), such as the lack of adequate training programs. Providing the sufficient training is an essential issue that helps novice an experienced healthcare staff to master HIS systems, reduce their anxiety and excel their skills not only to use the different functions of those technologies but to avoid unnecessary potential problems. Being unable to provide these necessary training courses increases staff's anxiety and limits their capabilities to handle the system properly. Other scholars also linked the issue of inadequate training to the resistance of staff in healthcare context (Hage et al., 2013; Nieboer et al., 2014).

The shortage of skillful maintenance teams was one of the topics that were frequently mentioned by the interviewees. The presence of experienced support teams is an important aspect within any organization as those maintenance teams can handle any urgent problems with the systems and fix it without disrupting the work routines. On the other hand, if such skillful teams were unavailable or incapable to provide the needed help regarding the HIS systems, this situation would damage the systems' dependability by its users and would require external maintenance teams each time a problem occurs. This scenario would negatively affect the healthcare staffs' perception about the HIS. The lack of this logistic support can decreases the staff's adoption behavior as declared by the literature (Hage et al., 2013; Lluch, 2011).

The interviewees also stated that the top manager characteristics and attributes is an important contributor to the issue of HIS adoption within public hospitals. The managers leading role, innovativeness and support are key facilitators as the manager can lead the

transformation process from paper based systems to computerized systems. The managers can help to spread the awareness about the benefits and the potentials of the HIS technologies, minimize the uncertainty and the resistance of the staff and provide the needed technical and logistic support. When the managers lack such qualities, they can slow down the adoption process and might become a barrier to the adoption process. Other studies have also mentioned that organizations' leadership contributes to technology adoption (Boonstra & Broekhuis, 2010; Thakur et al., 2012).

Moreover, the lack of a rewarding and a motivational system within the hospital can play an important role to discourage the healthcare staff to adopt HIS in their daily work as declared by the respondents. Providing financial or sentimental incentives (i.e. such as recommendation and appreciation letters) can positively motivate the staff members, shows them that their hard work is appreciated and minimizes the impact of the additional tasks and time burden imposed by the HIS systems. On the other hand, lacking such acknowledging environment can increase the staff's resistance as they will perceive the use of these systems as merely extra work that is not properly appreciated. Similarly, McGinn and his collegues (2011) reported that providing incentives can facilitate the adoption of healthcare technologies. Moreover, other researchers concluded that both financial and non-financial incentives can elevate the healthcare staff's attitude and behavior regarding their job (Lambrou et al., 2010).

Furthermore, the execution of administrative tasks and the long routines needed to get things done was mentioned by the interviewees as an issue affecting their adoption behavior. According to the staff's prior experience regarding the administrative cycle within the hospital, they considered it delaying and disruptive; as each task or request

needs to go through multiple formal approvals to be performed. This might discourage the staff to adopt the HIS knowing that these systems need training, updating and customization that would be delayed and stalled due to bureaucracy.

Therefore, themes such as: low training, shortage of skillful maintenance staff, managers' innovativeness and being supportive, the need for motivational environment, and the long administrative routine, all these can fall under the organizational category as abbreviated from the interview process and presented in Table 5.1.

The interviewees also expressed the effect of some external factors and issues on their HIS adoption behavior (i.e. environmental factors). Issues such as insufficiency of staff members were among the themes that were extracted from the interviewees' responses. Large numbers of patients who come to public hospitals on daily bases and the limited number of doctors and nurses in Iraq hospitals compared to other neighboring countries (Al Hilfi et al., 2013) could become a barrier to adopting HIS; as those healthcare staff must handle long queue of patients without the need to add further duties related to HIS systems; not to mention the time and effort required to master those systems, this situation would increase the workload and consequently increase their resistance. Within the literature, other studies also found that workload was an inhibitor and a barrier to adopt new web technologies within public work settings (Kale & Goh, 2014).

Some interviewees declared that the governmental support and the financial support to the healthcare sector in this regard was below their aspirations. Such lack of resources would certainly affect many aspects within the hospital, such as inability to provide the necessary training courses, the continuous upgrading of the HIS systems or the essential

infrastructure. For example, sudden electricity blackout not only interrupts the functioning of the HIS, it jeopardizes the patients' data to loss. Such situations could drive healthcare staff to depend less on HIS systems to do the hospital tasks and depend more on old and traditional procedures. The current economic situation in Iraq because of the drop of the crude oil prices and the war expenses against terrorism no doubt have influenced the government expenditure in all public areas and the healthcare is no exception to that. That's why the financial situation is one of the factors that affect the healthcare staff perceptions regarding the government support. However, a possible solution for this issue could be accomplished by embracing a thorough and complete insurance system that can provide the needed budgets, elevate the healthcare provision situation and foster the vision of digitizing the healthcare system in Iraq as stated by some of the interviewees. Financial and governmental support were referred to by previous studies as contributors to the implementation and adoption of new technologies (Boonstra & Broekhuis, 2010; El-Gohary, 2012).

The respondents also revealed that some of the vendor companies that are providing the HIS systems were lacking the required commitment. The vendors' immaturity, low responsiveness and inability to provide the adequate training or troubleshooting could seriously damage the HIS image and the users' trust in the system. The reason for that is that the vendors and after deploying the HIS systems, hold the first responsibility to make the staff familiar with the new system and help them to resolve any technical glitches that might appear in the first weeks of operation. This finding comes in-line with other studies who concluded that vendors' role can be a barrier is some situations

and its worth investigating in different contexts and settings (Aldosari, 2012; Lluch, 2011).

Moreover, the respondents mentioned that the current educational system is one of the factors affecting the adoption of HIS. This could be explained as the current educational system not concentrating sufficiently on the technologies employed in healthcare practice as part of the curriculum. The medical schools should focus more on training the students how to use the HIS properly in addition to the other theoretical and medical topics; that's why more attention should be paid to improve the current curriculums and trying to involve the students more in the hospital's practical work environment in order to break this barrier. Similarly, Nieboer and his collegues (2014) in their qualitative study indicated a gap between the use of technology and the educational curriculums in healthcare practice and suggested that the current educational curriculums require some improvements in that regard (i.e. familiarizing healthcare students about the possibilities and the use of technologies in a practical context). As a result, several environmental themes emerged through the interviews and they are: workload, financial support or governmental support, vendor support, the educational system, the infrastructure and the absence of insurance system. Those themes are displayed in Table 5.1.

After performing the qualitative part of the study and reviewing the related literature regarding the issue of HIS adoption, a number of factors were conceptualized to form the study's model. The next step was to produce an instrument that could be quantitatively used to investigate the opinions of healthcare professionals regarding the study's issue which is the adoption of HIS in Kurdistan Region of Iraq public hospitals in order to produce generalized findings. The proposed model covered all the important

aspects of the HIS adoption behavior. The literature has indicated that the technology adoption behavior is a multi-dimensional process (Jeyaraj et al., 2006; Yusof et al., 2008); however, it should be noticed that each environment and settings requires a customized instrument specifically designed to address that context and its circumstances and it would be misleading to conclude that there is one solution that is suitable for all scenarios (Boonstra & Broekhuis, 2010; Holden & Karsh, 2010). The effect of the context on the technology adoption phenomenon and the different results obtained from different studies is documented in the literature (Aldosari, 2014; Hu et al., 2010; Venkatesh et al., 2011; Venkatesh & Zhang, 2010). For those reasons, the developed model and the selected factors was chosen carefully to address the situation on the ground in order to present a practical solution and recommendations. The current study employed the UTAUT model (Venkatesh et al., 2003) and extended it by adding other factors that cover the four dimensions (i.e. the individual, technological, organizational and the environmental) that was indicated in the literature (Jeyaraj et al., 2006).

5.2.2 Discussion about the Effect of Individual Characteristics on HIS Adoption

This section addresses the second research question for this study, which is examining the effect individual and personal attributes on the healthcare staff's adoption behavior of HIS innovations. A quantitative study was carried out and involved 551 healthcare respondents working in the public hospitals of Kurdistan Region of Iraq to examine the research proposed model, its constructs and hypotheses and whether they were supported or not. Before presenting the findings regarding the individual dimension, the

next section exhibits the findings of the original constructs that formed the UTAUT model.

The study has two dependent variables which are behavioral intention (BI) and HIS usage (USE); the variance for those two DVs was (0.357) and (0.456), respectively. The relationship between BI and USE was found to be salient in this study ($\beta = 0.413$, t-value = 9.8040***, $P < 0.01$) and it was the strongest among all the relationships; as a result, H1 was supported in this study.

The first four independent variables in the study's model (i.e. performance expectancy, effort expectancy, social influence and facilitating conditions) were present in the original UTAUT model; the empirical findings of the current study shows that the relationship between PE and BI was insignificant ($\beta = 0.009$, t-value = 0.1560). This finding was not in-line with the study's hypothesis nor with previous studies. As a result H2 was not supported in the current study. Furthermore, other empirical studies also found that PE is not a significant predictor to the adoption of HIS technologies within healthcare context (Ifinedo, 2012; Schaper & Pervan, 2007). The explanation for this finding might be that healthcare professionals are more concerned with the HIS being easy to use and simply designed rather than depending on the HIS performance and its impact on the job to make the decision whether to use or not. Another explanation for that might be the influence of the context, participants and the type of technology that was investigated.

According to the findings of the current study, the construct effort expectancy was found to be an important determinant to the HIS adoption behavior and the relationship

between EE and behavioral intention was found to be significant (β = 0.152, t-value = 2.5648***, P < 0.01). As a result, H3 was supported in this study. This means that simple and straightforward design of HIS systems is an important issue for the users of those systems (i.e. the healthcare staff), and therefore, the issue of simplicity and ease of use should be considered by the developers without compromising the efficiency or the functionality of those technologies and healthcare officials whom are responsible for the purchase of those technologies. The significant relationship between EE and BI was also supported in previous studies (Aldosari, 2012; Ifinedo, 2012; Venkatesh et al., 2011).

The empirical findings of the current study shows that social influence is a salient predictor to the adoption of HIS among healthcare professionals in Kurdistan Region of Iraq and the relationship between SI and BI was significant (β = 0.123, t-value = 2.3894**, P < 0.05); therefore, the hypothesis H4 was supported by the empirical results of this study. This implies that healthcare professionals are affected by their collegues' and superiors' opinions regarding the issue of HIS adoption and that society influence does have an impact on the perceptions of healthcare staff members. Other studies have also found this factor to be an important contributor to the adoption behavior of new technologies (Hung et al., 2014; Kijsanayotin et al., 2009; Venkatesh et al., 2011).

In regard to facilitating conditions and its effect on the usage of HIS, the findings show that this relationship was significant in the current study (β = 0.174, t-value = 4.5376***, P < 0.01) and the hypothesis H5 was supported. This finding emphasizes the important role of providing training courses, skillful maintenance teams and any other resources that could facilitate the use of these complex HIS technologies and foster the attitude of the staff and their adoption behavior. This relationship was also found to be

significant by other researchers (Bennani & Oumlil, 2013; Cohen et al., 2013; Ifinedo, 2012; Venkatesh et al., 2011).

The individual dimension in this study was represented by one latent variable (i.e. personal innovativeness). This factor had a salient effect on BI (β = 0.125, t-value = 2.6177***, p < 0.01) and the hypothesis H6 was supported in this study. This implies that PI is an important predictor of the HIS adoption behavior and thus should be fostered by healthcare officials by providing sufficient training and a motivational environment in order to increase this personal positive merit and subsequently excel the usage and adoption of healthcare technologies among healthcare staff. Previous studies produced similar results regarding the importance of PI as a predictor to technology adoption (Behrend et al., 2011; Lewis et al., 2003; Wells et al., 2010) which comes in-line with the findings of the current study. Additionally, other studies also concluded that personality attributes are important determinants to job related attitudes and adoption behavior of new technologies (Laumer et al., 2015).

5.2.3 Discussion about the Effect of Technological Factors on HIS Adoption

This section addresses the second research question for this study, which is examining the effect technological features on the healthcare staff's adoption behavior of HIS innovations. The technological dimension within the current study was represented by two constructs (i.e. compatibility and system quality). The current study found that system compatibility has a salient relationship with BI (β = 0.168, t-value = 3.1611***, P < 0.01). Thus, hypothesis H7 was supported in this study. This significant influence of compatibility on technology adoption was also present in the literature (Hung et al., 2014; Ifinedo, 2012; Schaper & Pervan, 2007). This implies that the design of the HIS

system should be accounted for as a serious matter and must not be underestimated; in other words, the HIS systems should be designed in a way that maintain the current work procedure and avoid making substantial modifications that might be perceived confusing or disrupting by the healthcare staff. This issue should be realized by healthcare officials and managers, as implementing off-the-shelf systems and technologies might not be the best solution even if it was the fastest or the cheapest one. Since the hospitals goal from implementing such technologies is to be used by their staff, it makes sense that the current environment and setting's attributes should be considered and certain customizations should also be incorporated into the delivered systems in order to achieve high levels of adoption.

Moreover, the results show that the relationship between system quality and BI was not significant according to the respondents' answers (β = -0.0302, t-value = 0.5403) and as a result, H8 was not supported. This finding was not in-line with the study's hypothesis. However, other researchers found that this relationship was also not supported within their study and that system quality did not affect the acceptance of an e-learning system as stated by (Lin & Wang, 2012). Moreover, within the current study, the healthcare staff revealed in their responses that PE was not an important determinant of the adoption behavior; this result is similar to their perception about SQ and its effect on BI in the current study. Another explanation is that the respondents found these HIS systems to be below their expectation and not providing all the needed functionalities that are necessary to perform the hospital tasks and therefore it's (i.e. HIS systems) quality was not considered a contributor to their adoption behavior; similar findings about the quality of an HIS system were reported by another study (Ammenwerth et al.,

2014); the researchers in that study evaluated a computerized patient medication history system and the respondents (i.e. doctors and pharmacists) were dissatisfied with the technological aspects of the system; the system was unsuccessful project from their point of view and the study recommended an overall system redesign as the software quality was dissatisfying and was perceived as a barrier by the study participants (Ammenwerth et al., 2014).

5.2.4 Discussion about the Effect of Organizational Factors on HIS Adoption

This section addresses the second research question for this study, which is examining the effect organizational factors on the healthcare staff's adoption behavior of HIS innovations. The organizational dimension within the current study was represented by two constructs (i.e. top management commitment and top management innovativeness). Based on the data analysis stage, the findings demonstrated that the relationship between top management commitment and BI was significant ($\beta = 0.1444$, t-value = 2.3994**, $P < 0.05$) and as a result H9 was supported in the current study. This finding was consistent with results obtained from previous studies (Lewis et al., 2003; Smith & Buzi, 2014). That's why it is important for healthcare officials to pay attention to the pivotal role of management in fostering the adoption of HIS by embracing a reasonable strategy and following a clear vision to implement HIS projects, encourage the staff to use it, recognize and acknowledge the members' distinct efforts in this regard.

Also, the current findings showed that top management innovativeness has a significant effect on the BI to use the HIS technologies ($\beta = 0.1206$, t-value = 2.3354**, $P < 0.05$) and therefore hypothesis H10 was supported in the current study. For this reason, it is important for healthcare officials to pay attention for this issue and assign only qualified

people and appropriate personnel with vision for high ranking positions inside the hospital as those managers would play an exceptional role in promoting the use of HIS among healthcare staff, encouraging them, spreading the awareness about the importance of such new technologies and providing the necessary resources to overcome any possible obstacles that might face the implementation and use of such systems.

5.2.5 Discussion about the Effect of Environmental Factors on HIS Adoption

This section addresses the second research question for this study, which is examining the effect of environmental factors on the healthcare staff's adoption behavior of HIS innovations. The environmental dimension within the current study was represented by three constructs (i.e. vendor support, government support and work overload). The finding of the current study revealed that vendor support has a significant effect on the use of HIS technologies inside the hospital ($\beta = 0.1229$, t-value = 2.7541***, $P < 0.01$) and therefore H11 was supported in the study. The salient role of vendor support was also found in other studies (Bossen et al., 2013). The HIS technologies are considered complex systems and its implementation is not as easy as installing a simple hardware/software package (Avgar et al., 2012; Boonstra & Broekhuis, 2010); therefore, the important and supportive role of vendors during and after the implementation is essential for the sustenance of those systems. This continuance support from the vendors represented by on-site presence and after installation services such as troubleshooting, updating the software, upgrading the HIS components and providing the technical training that is essential to improve the staff's confidence in the HIS at hand and subsequently to increase their adoption behavior. That's why the healthcare officials are

encouraged to choose and collaborate only with qualified and reputable HIS vendors to implement such projects.

On the other hand, the relationship between government support and the use of HIS was found to be not significant in the current study (β = 0.069, t-value = 1.5006), and therefore H12 was not supported. This finding was not consistent with previous studies' which found that government role was an important predictor of technology adoption (I Chang et al., 2006; El-Gohary, 2012). However, other empirical studies found that the effect of government support was not salient regarding the adoption of new technologies (Abbasi et al., 2011; Quaddus & Hofmeyer, 2007). The explanation for such finding in the current study might be because of the financial crises the country (i.e. Iraq) is facing recently because of the drop in the crude oil prices which directly affected the national revenues for the government; adding to that the war against terrorism which added another financial burden to the already shortened budget. Such harsh circumstances has left its shadow on other branches of the government responsibilities and caused shortages in other areas such as healthcare. In other words, the funds allocated for healthcare projects might have suffered from cuts or suspension in order to compensate for the financial deficiency in the national budget which might have affected the execution, the expenditure and the support for HIS projects. This situation could have been perceived by healthcare staff as a lack of support in regard to HIS projects and as a result was not considered a significant determinant on their adoption behavior.

The current study also hypothesized work overload to negatively affect the use of HIS. The finding of the current study has proven this relationship to be significant (β = -0.1331, t-value = 3.2701***, P < 0.01) and as a result H13 was supported. This factor

was also found to be salient in technology adoption studies within other domains; for example, the study of (Kale & Goh, 2014) concluded that workload is affecting the adoption of new web technologies within educational settings. Hence, healthcare officials should consider this variable and attempt to reduce its effect on the staff by either hiring more healthcare staff or by dividing the workload more evenly among them. Heavy workload and long queues of patients need immediate attention by healthcare professionals, adding additional tasks that are related to HIS tasks to those busy healthcare personnel might become an obstacle discouraging the staff to adopt such technologies. Moreover, the possible medical errors involved in the use of HIS in these overloaded settings might become an extra factor intimidating the staff and driving them not to adopt such systems in their daily practice in order to avoid undesired organizational and legal consequences. Table 5.2 summarizes all the main hypotheses for the current study.

Table 5.2

Main Hypotheses of the study

	Construct	Hypothesis	Findings
1	Behavioral Intention	**H1:** Behavioral Intention will have a significant influence on HIS usage.	Supported
2	Performance Expectance	**H2:** Performance Expectancy will have a significant influence on behavioral intention to use HIS.	Not Supported
3	Effort Expectancy	**H3:** Effort Expectancy will have a significant influence on behavioral intention to use HIS.	Supported
4	Social Influence	**H4:** Social Influence will have a significant influence on behavioral intention to use HIS.	Supported

Table 5.2 continued

5	Facilitating Conditions	**H5:** Facilitating Conditions will have a significant influence on HIS usage.	Supported
6	Personal Innovativeness	**H6:** Personal Innovativeness will have a significant influence on behavioral intention to use HIS.	Supported
7	Compatibility	**H7:** Compatibility will have a significant influence on behavioral intention to use HIS.	Supported
8	System Quality	**H8:** System Quality will have a significant influence on behavioral intention to use HIS.	Not Supported
9	Top Management Commitment	**H9:** Top Management Commitment will have a significant influence on behavioral intention to use HIS.	Supported
10	Top management innovativeness	**H10:** Top Management Innovativeness will have a significant influence on behavioral intention to use HIS.	Supported
11	Vendor Support	**H11:** Vendor Support will have a significant influence on the usage of HIS.	Supported
12	Government Support	**H12:** Government Support will have a significant influence on the usage of HIS.	Not Supported
13	Work Overload	**H13:** Work Overload will have a significant negative influence on the usage of HIS.	Supported

5.3 Discussion of the Moderation Effects

5.3.1 The Moderating Effect of Gender

This section addresses the third research question of the study, which is examining the moderator factors' effect on the adoption behavior. The current study hypothesized gender to moderate the relationships between the independent variables performance expectancy, effort expectancy, social influence and personal innovativeness with the dependent variable behavioral intension.

The relationships were not moderated by gender as the t-values of difference between males and females were insignificant. However, male participants were more influenced by their peers' opinions (i.e. social influence) and were more concerned about their personal image than female counterparts as shown in the results in Table 5.3. In regard to the relationship between personal innovativeness and BI, this relationship was significant for male healthcare professionals ($\beta = 0.1763$, t-value = 2.3943^{**}, $P < 0.05$) and insignificant for females (t-value = 1.5652); which can be interpreted as males having more confidence in themselves and more willing to try new work techniques than their female colleagues.

The literature has presented inconsistent results regarding the role of this moderator (i.e. gender); for example, in the original UTAUT theory (Venkatesh et al., 2003), the study relationships were moderated by gender and its effect was significant. While in the study of (Venkatesh et al., 2011) within healthcare context, the results showed that gender did not have a moderating effect and its impact was similar between male and female healthcare professionals. Another study (Hu et al., 2010) that was conducted within Arabic context and examined the effect of gender as a moderator found that gender had a salient moderating effect in regard to perceived usefulness and subjective norms and that effect was stronger for male participants than for females; in other words, the male participants considered technology usefulness to be more important in making their technology adoption decisions than their female counterparts (Hu et al., 2010). In another study (Aldosari, 2012), the researcher did not find a significant difference between male and female healthcare workers in regard to the adoption of PACS. In the study of (Al-Gahtani, 2008), the findings stated that gender effect on the relationship

between perceived usefulness and technology adoption was insignificant. As a result, these inconsistent results from the literature highlight the important effect of the context and the type of participants on the final results.

Table 5.3

Moderation effect results

	Relation	Male n=274		Female n=277		T-value of difference
		Path Coefficient	t-value	Path Coefficient	t-value	
Gender	PE → BI	-0.0447	0.561	0.0608	0.7414	0.925
	EE → BI	0.1667	1.8659*	0.1393	1.7048*	0.227
	SI → BI	0.1305	1.8337*	0.1227	1.6055	0.075
	PI → BI	0.1763	2.3943**	0.0954	1.5652	0.848
		Young n =451		Old n =100		
Age	PE → BI	0.0261	0.4215	-0.1004	0.8708	0.891
	EE → BI	0.1342	2.0771**	0.2018	1.4237	0.444
	SI → BI	0.0933	1.6667*	0.2367	1.9658**	1.090
	PI → BI	0.1362	2.6001**	0.1115	0.9673	0.200
	FC→ USE	0.2254	5.619***	-0.0306	0.304	2.372**
		Lower experience n= 304		Higher experience n= 247		
Experience	EE → BI	0.0588	0.7141	0.2401	2.841***	1.528
	SI → BI	0.0912	1.2164	0.1695	2.3134**	0.748
	FC→ USE	0.2433	4.7688***	0.0834	1.4651	2.098**
		medical staff n=415		non-medical staff n=136		
Job position	PE → BI	0.025	0.389	-0.0432	0.4299	0.541
	EE → BI	0.1483	2.1085**	0.1362	0.9995	0.083
	SI → BI	0.1538	2.6249***	-0.0046	0.0407	1.309
	PI → BI	0.1292	2.3589**	0.1124	1.1751	0.153
	FC→ USE	0.1827	3.8619***	0.1793	2.9465***	0.038

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior).

5.3.2 The Moderating Effect of Age

The current study hypothesized age to moderate the relationships between the independent variables performance expectancy, effort expectancy, social influence and personal innovativeness with the dependent variable behavioral intension; and between the independent variable facilitating conditions and the dependent variable HIS usage behavior. However, the multi-group data analysis shows that only one relationship (i.e. between FC and USE) was moderated by age and the t-value of difference was (t-value = 2.372**, P < 0.05). The relationship between FC and USE was significant for young healthcare staff members (i.e. staff in their twenties and thirties) whom represent approximately 81.85% of the study's 551 respondents (β = 0.2254, t-value = 5.619***, P < 0.01); this finding highlights the important role of facilitating conditions for young healthcare staff as an important contributor to increase their HIS adoption behavior. On the other hand, the same relationship was insignificant for the older respondents (i.e. staff members in their forties and above) whom represented about 18.14% of the study's participants (t-value = 0.304). This could be interpreted as those older staff members are being more reluctant to adopt such technologies or perhaps because of their longer experience in the field, they put less emphasis on the facilitating conditions.

The remaining relationships were not moderated by age as can be observed from the t-values of difference of the other relationships in Table 5.3 However, even though the t-values of difference were not significant, but still there was some variation between the groups of respondents in regard to the proposed relationships. For example, the relationship between effort expectancy and behavioral intention was salient for young healthcare professionals (β = 0.1342, t-value = 2.0771**, P < 0.05) and insignificant for

older staff (t-value = 1.4237). This finding highlights the importance of implementing simple and well-designed HIS technologies even for younger generation. In regard to the relationship between social influence and BI, its effect was stronger for older staff members ($\beta = 0.2367$, t-value = 1.9658^{**}, $P < 0.05$) than for younger staff ($\beta = 0.0933$, t-value = 1.6667^{*}, $P < 0.1$) which can be explained as the older staff being more affected by others opinions and being more concerned about their personal image within the society and work ergonomics while younger staff are being less affected by society impact and being more independent regarding job decisions.

In regard to the relationship between personal innovativeness and BI, the multi-group analysis revealed that the relationship was found to be significant for young staff members ($\beta = 0.1362$, t-value = 2.6001^{**}, $P < 0.05$) while the relationship between PI and BI was insignificant for older staff members (t-value = 0.9673) which shows that young people are more willing to try new things like new technology in their daily work more than their elder collegues.

Regarding the role of age as a moderator and its effect according to the literature, Venkatesh et al. (2003) and within the original UTAUT model found that age had a significant moderating effect on the proposed relationships in that study. Within healthcare context, the study results of (Venkatesh et al., 2011) stated that age was the only moderator that had a significant moderating effect on the study respondents. However, in another study within healthcare settings (Aldosari, 2012), the research findings did not support any salient effect of age as a moderator among healthcare professionals and their adoption behavior of modern healthcare technologies. On the other hand, Al-Gahtani (2008) in his work within Arabic context found that age

significantly moderated the participants' perceived usefulness and perceived ease of use towards technology adoption. These inconsistent results from the literature regarding the effect of age underline the important impact of the society, context and participants on the results of such studies and the specificity of each environment.

5.3.3 The Moderating Effect of Experience

The current study hypothesized experience to moderate the relationships between effort expectancy and social influence with behavioral intention and facilitating condition with HIS use behavior. The MGA demonstrated that only one relationship was moderated by experience which is the one between FC and USE and the t-value of difference was (t-value = 2.098**, P < 0.05) and the effect was significant for staff members with low experience (β = 0.2433, t-value = 4.7688***, P < 0.01) and insignificant for staff members with longer experience (t-value = 1.4651). The explanation for this finding is that healthcare professionals who own less experience in the domain need more support and training (i.e. they need more facilitating conditions) in order to master these complex technologies, while more experienced staff depend less on such facilitating conditions.

In regard to the relationship between effort expectancy and behavioral intention the t-value of difference between the two groups was not significant (t-value = 1.528); however, the relationship was only salient for more experienced staff members (β = 0.2401, t-value = 2.841***, P < 0.01) which asserts the importance of simple HIS design for healthcare professionals even if they have several years of expertise in the field.

The relationship between social influence and behavioral intention was not moderated by experience as the t-value of difference between the two groups was insignificant (t-value = 0.748) but this relationship was significant for staff members with more experience ($\beta = 0.1695$, t-value = 2.3134^{**}, $P < 0.05$) and not significant for staff members with low experience ($\beta = 0.0912$, t-value = 1.2164). The explanation for that might be that healthcare professionals with high experience are more concerned with their own professional image and collegues' perceptions about them and they value the opinions of the society more than peers with low experience whom are normally of younger age.

In the original UTAUT (Venkatesh et al., 2003), the experience found to have a significant moderating effect in the study. However, within healthcare context, Venkatesh et al. (2011) and through the study findings demonstrated that experience did not show a moderating effect and its impact was insignificant. In another study (Abbasi et al., 2011), the researchers studied the effect of experience as a moderator on the relationships between perceived usefulness and perceived ease of use on the adoption of internet; the study found a negative significant influence of experience on the adoption behavior, and their explanation for that finding was that the usage of internet for more experienced individuals brought them more enjoyment and pleasure which minimized the effect PU and PEOU as drivers for technology adoption (Abbasi et al., 2011). Within another study (Aldosari, 2012), the findings showed that staff experience had no salient effect on the adoption of PACS within a healthcare setting. All those different findings from the literature underline the impact of the context on the study results.

5.3.4 The Moderating Effect of Job-position

The last moderator (i.e. job-position) was conceptualized to moderate the relationships between performance expectancy, effort expectancy, social influence and personal innovativeness with behavioral intention and facilitating conditions with HIS use behavior. According to the MGA results, none of these relationships were moderated by the job-position; both medical and administrative staff members did not show a significant difference regarding their HIS adoption behavior as can be seen in the Table 5.3.

More detailed results exhibits that the relationship between PE and BI for both medical and administrative staff members were found to be insignificant. However, the relationships between EE with BI ($\beta = 0.1483$, t-value = 2.1085^{**}, $P < 0.05$), SI with BI ($\beta = 0.1538$, t-value = 2.6249^{***}, $P < 0.01$) and PI with BI ($\beta = 0.1292$, t-value = 2.3589^{**}, $P < 0.05$) were all significant for medical staff members as shown by the previous t-values for those relationships. On the other hand, those same relationships were insignificant for administrative staff members. The explanation for that might be that since medical staff is in direct interaction with HIS systems from one side and with patients from the other side, this would make them directly responsible for the patients' wellbeing and responsible for their medical decisions; which make HIS technologies more important and necessary for them than for the administrative staff members. That's why they are more influenced by the HIS being simple and easy to use. Furthermore, being a member of the medical staff makes an individual more prone to social pressure and peers' critique because he/she should be versed in their profession and should keep

updated information all the time, and that's why the social pressure is a salient contributor to the medical staff's adoption behavior.

Moreover, taking into consideration that medical staff have higher academic status and higher intellectual level, this makes them more innovative and willing to learn new things like new technologies, especially if those technologies were related to their medical practice in order to be up-to-date with the latest developments and to excel their performance inside the hospital. The last relationship between facilitating condition and HIS use behavior was significant for both medical staff ($\beta = 0.1827$, t-value = 3.8619^{***}, $P < 0.01$) and administrative staff ($\beta = 0.1793$, t-value = 2.9465^{***}, $P < 0.01$) even though the t-value of difference was not significant (t-value = 0.038). This means that the perceptions of both medical and administrative staff members were convergent regarding the importance of providing the necessary facilitating condition and its effect on their decisions to use and adopt new HIS technologies.

5.4 Summary of the Chapter

This chapter discussed the findings of the current study. All the research questions were answered and the proposed hypotheses were discussed and explained. The use and adoption of healthcare information systems were predicted by effort expectancy, social influence, facilitating conditions, personal innovativeness, compatibility, top management commitment, top management innovativeness, vendor support, work overload and behavioral intention. Furthermore, performance expectancy, system quality and government support's influence on the adoption behavior of healthcare staff were insignificant. In regard to the moderation effect of gender, age, experience and job-

position and after carrying out the multi-group analysis, only one relationship (i.e. between facilitating conditions and HIS usage) was moderated by age and experience; the moderators did not show a significant moderating effect on the remaining proposed relationships.

CHAPTER SIX

CONCLUSION OF THE STUDY

6.1 Introduction

This chapter presents a summary of each of the previous chapters. It also discusses both the theoretical and the practical contributions of the study. This followed by a section that explains the limitations of this study and the dimensions for future work. Finally, the thesis ends with a concluding remark.

6.2 Summary of this Study

The first chapter of this study presents the foundation of the study; it aimed at explaining the motivations and the importance of conducting this study and highlighting the study's main endeavor which is investigating the factors that influence the phenomenon of HIS adoption within the public hospitals in Kurdistan region of Iraq. The study was stimulated by the low adoption of HIS among healthcare professionals as reported by governmental reports and the lack of empirical studies in Iraq regarding this issue. Starting from this point, the current study was able articulate the main research questions and objectives that eventually led the study to examine the study's issue, fill the theoretical gap in the literature and provide the practical suggestions to policy makers in the domain of public healthcare. The first research question was logically set to explore the issue of HIS adoption within its own actual environment (i.e. the Iraqi public healthcare sector); furthermore, as the topic of HIS is very context dependent, this requires an empirical investigation of the real barriers the individuals are experiencing

on daily basis and for this purpose a preliminary qualitative study was carried out to grasp the perceptions of the healthcare professionals in order to encapsulate the factors that affect their adoption behavior.

On the other hand, taking into consideration that the technology adoption issue is a multidimensional one, this helped to formalize the proposed model for the current study which covered all the important dimensions (i.e. individual, technological, organizational and environmental) of the adoption behavior. The remaining research questions were developed to examine the extent to which each one of the dimensions that are mentioned above do affect the adoption of HIS among healthcare staff; and to achieve this goal a quantitative study was carried out to survey the opinions of 551 healthcare professionals working in the public healthcare sector in order to draw generalized conclusions about the importance of each dimension and the influence of each factor on the adoption behavior.

The second chapter in this study presented a systematic review of the literature regarding the empirical studies that were conducted in the domain of HIS adoption and the theories that were utilized in those studies. This review of the literature helped in identifying the proper theory for the current study (i.e. the UTAUT model) and helped in conceptualizing and developing the set of hypotheses for this study in a way that would improve the UTAUT model in the domain of healthcare, cover the UTAUT model shortages, address the actual needs of the study's new context and fill the gap in the literature.

In chapter three, the research design for the current study was presented which embraced an embedded sequential mixed method design. The study started its investigation by employing a qualitative method represented by semi-structured interviews; then the results of the qualitative study in combination with the systematic literature review helped to develop the instrument that was used to conduct the latter quantitative study. A detailed information were presented in chapter three about the both the qualitative and the quantitative parts of this study including the sampling, the data collection, the data analysis techniques and finally the validity and the reliability procedures that were used with both methods.

Chapter four presented the empirical results of both the qualitative and the quantitative parts of the study. In regard to the qualitative part, the themes that were extracted from the interviewees' responses were presented in this chapter; afterwards, the quantitative results were presented in terms of both the measurement and the structural model assessments using SmartPLS version 2.0. Finally the moderation effects were exhibited at the end of this chapter after conducting the multiple group analysis.

Chapter five presented the findings of the current study, explained their implications and discussed them in-light with the related literature. The qualitative findings (i.e. themes) were discussed according to their characteristics and then were grouped under categories to give them a hierarchical view. A summary of the study hypotheses were presented in accordance with the research questions, Overall, from 13 main hypotheses proposed for the current study, ten were supported and three were rejected (i.e. H2, H8, H12); theoretical justifications were given for both the supported and the non-supported hypotheses in order to put them into logical perspective .

6.3 Theoretical Contribution

The current study implemented the UTAUT model (Venkatesh et al., 2003) into the new context of public healthcare in Kurdistan Region of Iraq to investigate the adoption of healthcare information systems among healthcare professionals. This study demonstrated the applicability and the generalizability of this underpinning theory into the study's new contexts. The previous studies shows that the UTAUT was less robust in explaining the variance for both the behavioral intention and the use behavior within the context of HIS adoption; the reason for such findings might be due the complexity of the HIS (Avgar et al., 2012; Cresswell & Sheikh, 2013; Herricck et al., 2010) and the special characteristics of the healthcare professionals compared to other employees working in other public service sectors (Escobar-Rodríguez & Romero-Alonso, 2013; Holden & Karsh, 2010). This requires a special and a customizable approach in order to understand the healthcare staffs' adoption behavior as each context requires its own solution that addresses that context's circumstances (Boonstra & Broekhuis, 2010; Holden & Karsh, 2010; Novak et al., 2012).

As a result, to improve the performance of the UTAUT model and to increase its ability to explain the variance of the HIS adoption behavior, the current study extended the UTAUT model by incorporating a number of constructs that were added according to two criteria: first, conceptualizing variables that reflect the actual needs and challenges that are facing the healthcare staff regarding the issue of HIS adoption in KRI public hospitals; and for that purpose, a preliminary qualitative study was conducted in combination with a thorough review of the literature; the qualitative study was carried out to explore the opinions and the perceptions of healthcare professionals and to

identify the factors that affect their adoption behavior within their work environment. The second criteria was to produce a comprehensive and a holistic model that addresses all the aspects of the adoption behavior in order to provide a better understanding of the phenomenon and to provide practical solutions and recommendations to healthcare officials. The constructs that were integrated into the UTAUT model represented all the dimensions that affect the technology adoption behavior (i.e. the individual, technological, organizational and the environmental) that are stated in the literature (Jeyaraj et al., 2006) and to the best of our knowledge, this study is one of the first empirical studies that addressed the issue of HIS adoption in public hospitals in KRI of Iraq.

Moreover, eight additional constructs were conceptualized into the UTAUT model representing several dimensions related to the technology adoption behavior. The individual dimension was represented by the construct personal innovativeness; while the technological dimension was represented by two constructs (i.e. compatibility and system quality); on the other hand, the organizational dimension was represented by two constructs (i.e. top management commitment and top management innovativeness) and finally, the environmental dimension was represented by vendor support, government support and work overload.

Furthermore, the current study included four moderators (i.e. gender, age, experience and job-position). The last moderator (i.e. job-position) was not present in the original UTAUT model, but it was highlighted in the preliminary qualitative study by the respondents as one of the themes; as a result, it was conceptualized into the study's model as a moderator. Although its effect was statistically insignificant on the proposed

relationships, but the empirical findings showed that the medical staff were more influenced by the HIS simple design, peers' opinions and personal innovativeness than their administrative (i.e. non-medical) collegues.

From a methodological point of view and to the best of our knowledge, this study was the first to utilize a mixed methods approach to investigate the topic of HIS adoption within public hospitals in KRI of Iraq which provided wider and better understanding about this phenomenon and presented valuable information to healthcare officials on how to overcome the obstacles in this domain as discussed in the next section.

6.4 Practical Contribution

The findings of the current study presented valuable benefits and information for policy makers working in the healthcare sector in KRI of Iraq as this study enlighten them by providing a better understanding about the actual issues and challenges that are facing the adoption of HIS by healthcare staff. The qualitative part of this study and the in-depth investigation using semi-structured interviews uncovered the actual problems and the issues that are affecting the healthcare professionals in regard to their adoption of HIS; depending merely on the results published in previous studies about this phenomenon would not necessarily reflect the actual situation under question or the actual obstacles affecting the staff within their ergonomics, as each context has its own circumstances and attributes. The qualitative exploration gave the opportunity to draw a realistic image about the problem at hand from the lenses of the individuals who are experiencing the phenomenon themselves. 26 themes were extracted from the interviewees' responses and those themes were grouped under four general categories

(i.e. individual, technological, organizational and environmental) in order to provide a top-view and oriented guidelines on how to tackle this phenomenon in a practical and structured way.

The quantitative part of this study underlined the necessary information about the factors that contribute to the adoption behavior. The healthcare officials should pay more attention to creating a more positive and a motivational work environment in order to foster the staff's innovativeness and to improve their personal attitude towards the HIS. Also, from a technological point of view, the implemented HIS should preserve the compatibility of the current work style as much as possible without making drastic changes that would increase the staff's resistance.

Furthermore, the managers within the healthcare institutions should be qualified personnel as those individuals would lead their departments and institutions, prompt their staff members to embrace new technologies in their work and allocate the necessary resources that would facilitate the implementation and adoption process. Without innovative, supportive and persistent top managers, executing any plan could face several barriers such as delays and resistance. Moreover, healthcare officials should assign the responsibility of implementing advanced HIS systems to only experienced and capable vendors in order to assure the best support and after deploy services from those vendors. Also, improving the ergonomics (i.e. the work environment) and decreasing the workload or at least dividing it more evenly among staff members can encourage the staff to adopt these HIS systems to harvest its benefits instead of just perceiving it as mere additional burden. In addition to that, the deployed HIS should preserve simplicity in regard to its technical design without compromising its efficiency

and functionality. Similarly, providing the adequate training programs and the professional technical support can increase the adoption of the HIS systems; on the other hand, neglecting any of the previous points can slow down the adoption process and undermine these projects.

6.5 Limitation of the Study

The current study attempted to follow the highest academic standards in conducting the study not only to obtain the best results but to achieve the authenticity for the current study. However, the limitations of the current study can be described as the following: first, this study took a general perspective in regard to the type of healthcare technologies being studied (i.e. the study did not examine the adoption of a specific HIS per se); however, this general approach was also followed by several studies within the literature (Aldosari, 2014; Chen & Hsiao, 2012; Ifinedo, 2012; Steininger & Stiglbauer, 2015). Focusing on a specific type of HIS can confirm the results of the current study and might reveal further findings about the adoption behavior regarding specific HIS technologies. Moreover, the participants of the current study included both medical and administrative staff members; such general scope was also present in the literature (Aldosari, 2012; Bossen et al., 2013; Kim et al., 2016; Tintorer et al., 2015). However, concentrating on a particular group of the medical staff could provide more information about the needs and requirements of each specialty in the domain of healthcare.

Secondly, the qualitative part of this study revealed 26 themes (i.e. factors) that are affecting the healthcare professionals' adoption behavior; not all those themes were included in the quantitative study because that would increase the questionnaire's size

enormously; the increase in the number of items would affect the responsiveness of the participants. For this reason only part of these themes was selected to be included in the questionnaire based on the justification from the literature to provide an instrument that covers all the aspects of the adoption behavior.

6.6 Future Work

The current study opens the door and provides several opportunities for future researchers to conduct more oriented studies in this vital discipline that is related to healthcare provision in KRI of Iraq.

Taking into consideration that the qualitative study within this research included only eight participants, future studies can conduct other qualitative studies with larger number of participants to collect a larger set of data that could reveal other important information that was absent from the current study due the relatively limited number of participants. Additionally, the qualitative studies can focus on a specific category of healthcare staff to get more focused and condensed information about the needs and the perceptions of a certain group of the healthcare professionals. Other qualitative methods can be utilized for the data collection other than the semi-structured interviews that were used for the current study as each technique has its own strength points and advantages. On the other hand, quantitative studies are essential to address other factors or contributors to the phenomenon of HIS adoption, as one study is incapable of covering all the issues that face the problem at hand. One suggestion for future studies is to concentrate on a certain type of HIS technology or a certain type of healthcare professionals in order to provide the important knowledge regarding such specific scenarios. Moreover, future studies could include other variables as moderators since

there is scarceness in such empirical studies as demonstrated by the systematic review in chapter two. Future studies can also examine the issue of HIS adoption within the private sector and investigate the opinions and the perspectives of healthcare professionals from both a qualitative and a quantitative point of view in order to highlight the issues and the challenges in the private healthcare sector and compare their findings with the current study. Such future direction can help to draw a better image about the healthcare ergonomics and subsequently improve the healthcare provision in general.

6.7 Concluding Remarks

The current study explored and evaluated the factors that influence the issue of HIS adoption within the context of public hospitals in Kurdistan Region of Iraq and for this purpose a mixed methods approach was utilized to provide a thorough and concrete standard for this study and to present the essential recommendations and contributions for both the theoretical discipline and the practical healthcare work environment.

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Appendix A

Informed Consent Form

Dear participant

My name is Waleed Khalid Mohamed; I am a PhD candidate at the University Utara Malaysia.
You are invited to participate in this research study which aims at identifying the issues and factors influencing the usage of Healthcare Information Systems within public hospitals in Kurdistan Region of Iraq.
The following points will highlight the role of the participant and other important issues.

1- You will be kindly asked to participate in an interview with the researcher. Your participation in this study is absolutely voluntary. At the interview you (i.e. the participant) will have the freedom to express your opinions, prior experiences and perceptions regarding the use of Healthcare Information Systems in Kurdistan public hospitals.
2- The participant has the right to withdraw from the study at any time without worrying about any penalties or consequences.
3- The interview location and timing will be decided by the participant to assure his/her convenience. The interview will last for approximately 60 minutes.
4- The participant's identity will be kept confidential, will not be disclosed to any third party and will not be mentioned within the study's body or the final report. A coding procedure will be used to replace the participant's name in order to ensure his/her identity confidentiality. However, the results of the study can be published but without declaring the names of the participants.
5- The interview will be digitally recorded in order to be transcribed later for the purpose of analysis and information extraction. The interview material will be stored securely for a period of two years, after that it will be destroyed.

After clarifying all the important points regarding this study and the participants' role and rights, if you have any further inquiries you may contact the researcher on the following contact information; the researcher's e-mail (waleedhadban@yahoo.com) and mobile No. (07705077146).
Thanks for your participation, your time and efforts are truly appreciated.

Signature of the interviewee ----------, Date----------

Appendix B

The English Version of the Questionnaire

Questionnaire No.

Questionnaire

PhD Research Title:
The Factors Influencing The Usage of Healthcare Information Systems (HIS) Within Public Hospitals in Kurdistan Region of Iraq.

Dear Sir/Madam

This questionnaire is designed to investigate the opinions of healthcare staff (both medical and administrative staff) regarding the **factors influencing the usage of healthcare information systems (HIS) within Kurdistan public hospitals.** The term healthcare information systems **(HIS)** means all types of information systems, new technological and electronic systems implemented within Kurdistan public hospitals whether they are used for medical or administrative purposes. This study will be in partial fulfillment of the requirements for attaining the doctoral degree at the University Utara Malaysia (UUM), Malaysia. Your responses are important for this study and will be kept confidential.

Thanks a lot. Your time and effort are highly appreciated.

PhD Candidate : Waleed Khalid Al-Hadban.
Place of work: University of Sulaimani - Sulaimani.
Place of study: University Utara Malaysia (UUM) - Malaysia.
E-Mail address: waleedhadban@yahoo.com

This section will include Demographic Information about the respondent. **Kindly mark the suitable answer.**	
Gender	Male ☐ Female ☐
Age	
	21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ Above 60 ☐
Education Level	
	High School ☐ Institute ☐ College Degree ☐ Master's Degree ☐ PhD Degree ☐
Working Experience?	
	Less than 2 years ☐ 3-6 years ☐ 7-10 years ☐ 11-14 years ☐ More than 14 years ☐
Current Position	
	Doctor ☐ Nurse ☐ Pharmacist ☐ Lab personal ☐ Or Administrative staff ☐ Others ☐

The following statements will refer to your opinions about the usage of **Healthcare Information System (HIS), in general** within your hospital.
Please select your response by **drawing a circle** O around the number that represents your answer for each of the statements using the scale from 1 to 7, where
" **1 indicates Strongly Disagree**" and " **7 indicates Strongly Agree**".

Strongly Disagree	Disagree	Slightly Disagree	Neither agree or disagree	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Performance Expectancy الاداء المتوقع							
1. I find using HIS useful in my job.	1	2	3	4	5	6	7
2. Using HIS enables me to accomplish tasks more quickly.	1	2	3	4	5	6	7
3. Using HIS increases my productivity.	1	2	3	4	5	6	7
4. If I use HIS, I will increase my chances of getting a raise.	1	2	3	4	5	6	7

Effort Expectancy الجهد المتوقع							
5. My interaction with HIS is clear and understandable.	1	2	3	4	5	6	7
6. It is easy for me to become skillful at using HIS.	1	2	3	4	5	6	7
7. I find HIS easy to use.	1	2	3	4	5	6	7
8. Learning to operate HIS is easy for me.	1	2	3	4	5	6	7

Social Influence التأثيرات الاجتماعيه							
9. People who influence my behavior think that I should use HIS.	1	2	3	4	5	6	7
10. People who are important to me think that I should use HIS.	1	2	3	4	5	6	7
11. The senior management of this hospital has been helpful in the use of HIS.	1	2	3	4	5	6	7
12. In general, the hospital has supported the use of HIS.	1	2	3	4	5	6	7

Strongly Disagree	Disagree	Slightly Disagree	Neither agree or disagree	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Facilitating Conditions العوامل المساعدة							
13. I have the resources necessary to use HIS.	1	2	3	4	5	6	7
14. I have the knowledge necessary to use HIS.	1	2	3	4	5	6	7
15. HIS is not compatible with other systems I use.	1	2	3	4	5	6	7
16. A specific person (or group) is available for assistance with HIS difficulties.	1	2	3	4	5	6	7

Personal Innovativeness الابداع والابتكار الشخصي							
17. People come to me for advice on new technologies.	1	2	3	4	5	6	7
18. I learn more than others about the new technologies.	1	2	3	4	5	6	7
19. I am first among friends to acquire new technologies.	1	2	3	4	5	6	7
20. I usually use new high-tech products without help from others.	1	2	3	4	5	6	7
21. I keep up with the latest technological developments in my area of interest.	1	2	3	4	5	6	7
22. I enjoy the challenge of figuring out high-tech gadgets.	1	2	3	4	5	6	7
23. I have few problems in making technology work for me.	1	2	3	4	5	6	7

Compatibility التوافقيه							
24. Using HIS system is compatible with all aspects of my work.	1	2	3	4	5	6	7
25. Using HIS system is completely compatible with my current situation.	1	2	3	4	5	6	7
26. I think that using HIS system fits well with the way I like to work.	1	2	3	4	5	6	7
27. Using HIS system fits into my work style.	1	2	3	4	5	6	7

Strongly Disagree	Disagree	Slightly Disagree	Neither agree or disagree	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

System Quality جودة النظام							
28. HIS has an appropriate style and design.	1	2	3	4	5	6	7
29. HIS has easy navigation to information.	1	2	3	4	5	6	7
30. HIS has fast response and quick performance.	1	2	3	4	5	6	7
31. HIS keeps personal information secure from exposure.	1	2	3	4	5	6	7
32. HIS is available and can be used at any time.	1	2	3	4	5	6	7
33. HIS has good functionality relevant to my job.	1	2	3	4	5	6	7
34. HIS is error-free.	1	2	3	4	5	6	7
35. HIS creates an audio and visual experience.	1	2	3	4	5	6	7

Top Management Commitment إلتزام الادارة العليا							
36. Top Management is committed to a vision of using HIS in healthcare provision.	1	2	3	4	5	6	7
37. Top Management is committed to supporting my efforts in using HIS for healthcare provision.	1	2	3	4	5	6	7
38. Top Management strongly encourages the use of HIS for healthcare provision.	1	2	3	4	5	6	7
39. Top Management will recognize my efforts in using HIS for healthcare provision.	1	2	3	4	5	6	7
40. The use of HIS for healthcare provision is important to Top Management.	1	2	3	4	5	6	7

Top Management Innovativeness درجة الابتكار والابداع لدى الادارة العليا							
41. Top Managers have original ideas.	1	2	3	4	5	6	7
42. Top Managers would sooner create something new than improve something existing.	1	2	3	4	5	6	7
43. Top Managers often risk doing things differently.	1	2	3	4	5	6	7

Strongly Disagree	Disagree	Slightly Disagree	Neither agree or disagree	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Vendor Support دعم الشركات المجهزة							
44. HIS vendor provides support services if difficulties in using HIS are encountered.	1	2	3	4	5	6	7
45. HIS vendor provides training in using HIS systems.	1	2	3	4	5	6	7
46. HIS vendor is concerned with potential problems in using HIS.	1	2	3	4	5	6	7

Government Support الدعم الحكومي							
47. The government is committed to a vision of using HIS in public hospitals.	1	2	3	4	5	6	7
48. The government is committed to support healthcare staff's effort in using HIS.	1	2	3	4	5	6	7
49. The government strongly encourages the use of HIS for healthcare provision.	1	2	3	4	5	6	7
50. The government will recognize healthcare staff's efforts in using HIS for healthcare provision.	1	2	3	4	5	6	7
51. The use of HIS for healthcare provision purposes is important for the government.	1	2	3	4	5	6	7

Work Overload ضغط العمل							
52. I feel that the number of requests or problems I deal with due to HIS system is more than expected.	1	2	3	4	5	6	7
53. I feel that the amount of work I do interferes with how well it is done.	1	2	3	4	5	6	7
54. I feel busy or rushed due to using HIS system.	1	2	3	4	5	6	7
55. I feel pressured due to using HIS system.	1	2	3	4	5	6	7

Behavioral Intention النية في استخدام النظام							
56. I intend to use HIS system in the coming months.	1	2	3	4	5	6	7
57. I predict I would use HIS system in the coming months.	1	2	3	4	5	6	7
58. I plan to use HIS system in the coming months.	1	2	3	4	5	6	7

Use Behavior سلوك الاستخدام							
59. I frequently use HIS to understand a health problem or an illness.	1	2	3	4	5	6	7
60. I often use HIS to serve patients.	1	2	3	4	5	6	7
61. I frequently use HIS to find information about a health problem.	1	2	3	4	5	6	7
62. I very often use HIS to do my job.	1	2	3	4	5	6	7

Appendix C

The Kurdish Version of the Questionnaire

ژمارەی پاپرسی

پاپرسی

ناونیشانی توێژینەوەی دکتۆرا لە فەلسەفە PhD:

The Factors Influencing The Usage of Healthcare Information Systems (HIS) Within Public Hospitals in Kurdistan Region of Iraq.

فاکتەرە کاریگەرەکانی لە بەکارهێنانی سیستەمەکانی زانیاری چاودێری تەندروستی HIS لە ناو نەخۆشخانە گشتیەکانی لە هەرێمی کوردستانی عیراق.

ئازیزان،

ئەم پاپرسییە بۆ لێکۆڵینەوە لە زانکۆی کارمەندانی چاودێری تەندروستی (هەریەك لە کارمەندانی پزیشکی و کارگێڕی) دانراوە دەربارەی ئەو فاکتەرانەی کاردەکەنەسەر بەکارهێنانی سیستەمەکانی زانیاری چاودێری تەندروستی ئاسراو بە (HIS) لە ناو نەخۆشخانە گشتیەکان لە هەرێمی کوردستان. ووشەی سیستەمەکانی زانیاری چاودێری تەندروستی ئاسراو بە (Healthcare Information Systems -HIS) بەمەبەستی لێکدانەوەی هەموو جۆرە سیستەمەکانی زانیاری، تەکنۆلۆجیای نوێ و سیستەمەکانی ئەلیکترۆنی دادەنرێت ئاخۆ بۆ مەبەستەکانی پزیشکی یان لە بواری کارگێڕی و لە ناو نەخۆشخانە گشتیەکانی کوردستاندا کەئکیان لە جێبەجێکردنیان وەرگرتبێت. ئەم لێکۆڵینەوەیە بەشێکە لە پرکردنەوەی داواکاریەکان بۆ بەدەستهێنانی بڕوانامەی دکتۆرا لە زانکۆی ئوتارا مالیزیا لە مالیزیا ئاسراو بە (University Utara Malaysia (UUM. بەخشندەیی وەلامەکانتان سودی بۆ لێکۆڵینەوەکەوە دەبێت و دواتریش زانستێکی پێویستییە بۆ کارمەندانی چاودێری تەندروستی و یاسادانەران بۆ زاڵبون بەسەر ئەو کێشانەی ئێستا و لە ئایندەدا ڕوبەڕوی کەرتی چاودێری تەندروستی لە هەرێمی کوردستانی عیراق دەبێتەوە. وەلامەکانتان بە نهێنی دەمێننەوە.

زۆر سوپاس بۆ تەرخانکردنی کاتی خۆتان و تێکۆشانتان بە بەرزی ستایش دەکەین.

پالێوراوی بڕوانامەی دکتۆرا لە فەلسەفە PhD: **ولید خالد الهدبان**
شوێنی پیشە: **زانکۆی سلێمانی – سلێمانی**
شوێنی لێکۆڵینەوە: **زانکۆی ئوتارا مالیزیا (UUM) – مالیزیا**
ئیمەیڵ: waleedhadban@yahoo.com

ئەم بەشە بریتیە لە زانیاری تویژینەوەی سەرژمێریی دەربارەی تاکی وەڵامدەرەوە.
تکایە وەڵامی گونجاو دیاربیکە.

ڕەگەز	نێر مێ	☐ ☐
تەمەن	30-21 40-31 50-41 60-51 زۆرتر لە 60	☐ ☐ ☐ ☐ ☐
ئاستی خوێندن	ئامادەیی پەیمانگا کۆلیژ ماجستێر دکتۆرا	☐ ☐ ☐ ☐ ☐
ئەزموونی کار	کەمتر لە 2 ساڵ 6-3 ساڵ 10-7 ساڵ 14-11 ساڵ زۆرتر لە 14 ساڵ	☐ ☐ ☐ ☐ ☐
پیشەی ئێستات (پۆستەکەت)	پزیشک پەرستار دەرمانساز کارمەندی تاقیگە یان کارمەندی کارگێڕی کاری تر	☐ ☐ ☐ ☐ ☐ ☐

1

دەربڕینەکانی خوارەوە ئاماژەن لە ڕاوبۆچوونەکانی ئێوە دەربارەی بەکارهێنانی **سیستەمی زانیاری چاودێری تەندروستی (HIS)، بەگشتی** لە ناو نەخۆشخانەکانی ئێوەدا. سیستەمی زانیاری چاودێری تەندروستی (Healthcare Information Systems-HIS) بە لێکدانەوەی هەموو جۆرەکانی سیستەمی زانیاری، تەنکۆلۆجیای نوێ و سیستەمەکانی ئەلیکترۆنی جێبەجێکراو لە نەخۆشخانە گشتیەکانی کوردستان دێت ئاخۆ بۆ مەبەستەکانی پزیشکی یان کارگێڕی بەکارهێنراین.

تکایە **بازنەیەک بکێشە** بە دەوری ئەو ژمارەیەی بە وەڵامی تۆ دادەنرێت لە پێوەری دەستپێدەکات لە **(1 – زۆر ناڕازیم)** بۆ **(7 – زۆر ڕازیم)**

زۆر ناڕازیم	ناڕازیم	تاڕادەیەک ناڕازیم	مامناوەند	تاڕادەیەک ڕازیم	ڕازیم	زۆر ڕازیم
1	2	3	4	5	6	7

ئەنجامی پێشبینکراو (Performance Expectancy)							
1. من لە ئیشەکەمدا، بەکارهێنانی سیستەمی زانیاری چاودێری تەندروستی HIS بەلامەوە سودبەخشە.	1	2	3	4	5	6	7
2. بەکارهێنانی سیستەمی HIS یارمەتیم دەدات زۆر خێراتر ئەرکەکانم ئەنجام بدەم.	1	2	3	4	5	6	7
3. بەکارهێنانی سیستەمی HIS ئاستی بەرهەمی من بەرز دەکاتەوە.	1	2	3	4	5	6	7
4. ئەگەر سیستەمی HIS بەکاربێنم، ئەوا چانسی زیاترم ئەبێت بۆ زیاتر سودمەندبوونم لەڕووی ماددیەوە.	1	2	3	4	5	6	7

هەوڵی پێشبینیکراو (Effort Expectancy)							
5. کارلێکبونی من لەگەڵ سیستەمی HIS ڕوون و ئاسانە بۆ تێگەیشتن.	1	2	3	4	5	6	7
6. بەکارهێنانی سیستەمی HIS ئاسانە بۆ من ببمە کەسێکی شارەزا.	1	2	3	4	5	6	7
7. من سیستەمی HIS ئاسان دەبینم بۆ بەکارهێنان.	1	2	3	4	5	6	7
8. فێربون بۆ کارپێکردنی سیستەمی HIS بەلای منەوە ئاسانە.	1	2	3	4	5	6	7

کاریگەریەکانی کۆمەڵایەتی (Social Influence)							
9. ئەو خەڵکانەی کاریگەرن بە ڕەفتاری من پێیاوانوایە کە پێویستە لەسەر من سیستەمی HIS بەکاربێنم.	1	2	3	4	5	6	7
10. ئەو خەڵکانەی گرنگن بەلای منەوە پێیانوایە کە پێویستە لەسەر من سیستەمی HIS بەکاربێنم.	1	2	3	4	5	6	7
11. کارگێڕی باڵای ئەم نەخۆشخانەیە یارمەتیدەربون بۆمان لە بەکارهێنانی سیستەمی HIS.	1	2	3	4	5	6	7
12. بەگشتی، نەخۆشخانە کە پشتگیری لە بەکارهێنانی سیستەمی HIS دەکرد.	1	2	3	4	5	6	7

زۆر ناڕازیم	ناڕازیم	تاڕادەیەك ناڕازیم	مامناوەند	تاڕادەیەك ڕازیم	ڕازیم	زۆر ڕازیم
1	2	3	4	5	6	7

هۆکارەکانی یارمەتی (Facilitating Conditions)							
13. من سەرچاوە پێویستەکانم لەبەردەستە بۆ بەکارهێنانی سیستەمی HIS.	1	2	3	4	5	6	7
14. من زانیاری پێویستم هەیە بۆ بەکارهێنانی سیستەمی HIS.	1	2	3	4	5	6	7
15. سیستەمی HIS هاوتانیە لەگەڵ ئەو سیستەمانەی تر کە من بەکاریان دێنم.	1	2	3	4	5	6	7
16. کەسێك (یان گرووپێك)ی دیاریکراو بۆ پێشکەشکردنی هاوکاری لە چارەسەرکردنی کێشەکانی بەکارهێنانی سیستەمی HIS هەیە.	1	2	3	4	5	6	7

داهێنانی کەسێتی (Personal Innovativeness)							
17. خەڵك دێ داوای ڕێنمایی لەسەر تەکنۆلۆجیای نوێ لە من دەکەن.	1	2	3	4	5	6	7
18. من لە چاو خەڵکی تردا زۆر دەربارەی تەکنۆلۆجیای نوێ دەزانم.	1	2	3	4	5	6	7
19. من یەکەمی ناو هاوڕێکانی خۆمم بۆ دەستکەوتنی تەکنۆلۆجیای نوێ.	1	2	3	4	5	6	7
20. من هەمیشە ئامێری تەکنۆلۆجیای-بەرزی نوێ بەبێ یارمەتی خەڵکی تر بەکاردەهێنم.	1	2	3	4	5	6	7
21. من بەردەوام هەوڵ دەدەم بۆ دەستکەوتنی دواین پێشکەوتنەکانی تەکنۆلۆجیا لە بوارەکەی خۆمدا.	1	2	3	4	5	6	7
22. من چێژ لە هەوڵەکانی دۆزینەوەی کێشەکانی ئامێری تەکنەلۆجیای بەرز دەبینم.	1	2	3	4	5	6	7
23. من هەندێك کێشەم هەیە لە بەکارهێنانی تەکنۆلۆجیا بۆ ڕاییکردنی ئیشی خۆم.	1	2	3	4	5	6	7

هاوتابون (Compatibility)							
24. بەکارهێنانی سیستەمی HIS لە هەموو ڕوویەکەوە لەگەڵ ئیشەکەی من هاوتایە.	1	2	3	4	5	6	7
25. بەکارهێنانی سیستەمی HIS لەگەڵ بارودۆخی ئێستامدا تەواو هاوتایە.	1	2	3	4	5	6	7
26. من پێموایە کە بەکارهێنانی سیستەمی HIS بەباشی گونجاوە لەگەڵ ئەو شێوازەی کە من حەزی پێدەکەم بۆ ئیش.	1	2	3	4	5	6	7
27. بەکارهێنانی سیستەمی HIS گونجاوە بۆ کارەکەی من.	1	2	3	4	5	6	7

زۆر ناڕازیم	ناڕازیم	تاڕادەیەك ناڕازیم	مامناوەند	تاڕادەیەك ڕازیم	ڕازیم	زۆر ڕازیم
1	2	3	4	5	6	7

کوالیتی سیستەمەکە (System Quality)							
28. سیستەمی HIS شێواز و دیزاینی لەباری هەیە.	1	2	3	4	5	6	7
29. گەڕان بۆ زانیاری لە ناو سیستەمی HIS ئاسانە.	1	2	3	4	5	6	7
30. سیستەمی HIS بە دەنگەوەهاتنی خێرا و جێبەجێکردنی بە پەلەیە.	1	2	3	4	5	6	7
31. سیستەمی HIS زانیاری کەسێتی بە مسۆگەری دەپارێزێت بۆ ئاشکرانەبون.	1	2	3	4	5	6	7
32. سیستەمی HIS دەستدەکەوێت و هەر کاتێك بتوانرێت کەڵکی لێوەردەگیرێت.	1	2	3	4	5	6	7
33. سیستەمی HIS کرداری باشی تێدایە کە پەیوەندی بە نیشەکەی منەوە هەیە.	1	2	3	4	5	6	7
34. سیستەمی HIS بێ هەڵەیە.	1	2	3	4	5	6	7
35. سیستەمی HIS ئەزمونی بیستڕا و بینراو دێنێتەکایەوە.	1	2	3	4	5	6	7

پابەندبونی بەڕێوبەرانی باڵا (Top Management Commitment)							
36. بەڕێوبەرانی باڵا پابەندە بە تێڕوانین لە بەکارهێنانی سیستەمی HIS لە دابینکردنی چاودێری تەندروستی.	1	2	3	4	5	6	7
37. بەڕێوبەرانی باڵا پابەندە بە پشتگیریکردنی هەوڵەکانی من لە بەکارهێنانی سیستەمی HIS بۆ دابینکردنی چاودێری تەندروستی.	1	2	3	4	5	6	7
38. بەڕێوبەرانی باڵا بە شێوەیەکی باش هانی بەکارهێنانی سیستەمی HIS دەدات بۆ دابینکردنی چاودێری تەندروستی.	1	2	3	4	5	6	7
39. بەڕێوبەرانی باڵا دان بە هەوڵەکانی منـدا دەنێت لە بەکارهێنانی سیستەمی HIS بۆ دابینکردنی چاودێری تەندروستی.	1	2	3	4	5	6	7
40. بەکارهێنانی سیستەمی HIS بۆ دابینکردنی چاودێری تەندروستی گرنگە بۆ بەڕێوبەرانی باڵا.	1	2	3	4	5	6	7

داهێنانی بەڕێوبەرانی باڵا (Top Management Innovativeness)							
41. بەڕێوبەرانی باڵا بیرۆکەی ڕەسەنیان هەیە.	1	2	3	4	5	6	7
42. بەڕێوبەرانی باڵا هەر زووهەندێك شتی تری نوێ دەهێنن لەبری ئەوەی کە هەیە.	1	2	3	4	5	6	7
43. بەڕێوبەرانی باڵا زۆرجار سەرکێشی دەکەن لە کردنی هەندێك کار بە شێوەیەکی نوێ و جیاواز.	1	2	3	4	5	6	7

زۆر ناڕازیم	ناڕازیم	تاڕادەیەك ناڕازیم	مامناوەند	تاڕادەیەك ڕازیم	ڕازیم	زۆر ڕازیم
1	2	3	4	5	6	7

پشتیگری کۆمپانیای دابینەکری سیستەم (Vendor Support)							
44. کۆمپانیای فرۆشیاری سیستەمی HIS خزمەتگوزاری پشکەش دەکات بۆ ڕوەبەرووبەنەوەی هەرکێشەیەك لە بەکارهێنانی سیستەمی HIS.	1	2	3	4	5	6	7
45. کۆمپانیای فرۆشیاری سیستەمی HIS مەشق و ڕاهێنان لە بەکارهێنانی سیستەمەکانی HIS دابیندەکات.	1	2	3	4	5	6	7
46. کۆمپانیای فرۆشیاری سیستەمی HIS ڕۆڵی لایەنی پەیوەندیدار دەبینێت لە سەرهەڵدانی کێشەکانی بەکارهێنانی سیستەمی HIS.	1	2	3	4	5	6	7

پشتگیری حکومەت (Government Support)							
47. حکومەت پابەندە بە تێڕوانین لە بەکارهێنانی سیستەمی HIS لە نەخۆشخانەکانی گشتیدا.	1	2	3	4	5	6	7
48. حکومەت پابەندە بە پشتگیریکردنی هەوڵی کارمەندانی چاودێری تەندروستی لە بەکارهێنانی سیستەمی HIS.	1	2	3	4	5	6	7
49. حکومەت بە شێوەیەکی باش هانی بەکارهێنانی سیستەمی HIS دەدات بۆ دابینکردنی چاودێری تەندروستی.	1	2	3	4	5	6	7
50. حکومەت دان بە هەوڵەکانی کارمەندانی چاودێری تەندروستیدا دەنێت لە بەکارهێنانی سیستەمی HIS بۆ دابینکردنی چاودێری تەندروستی.	1	2	3	4	5	6	7
51. بەکارهێنانی سیستەمی HIS بۆ مەبەستەکانی چاودێری تەندروستی بەلای حکومەتەوە گرنگە.	1	2	3	4	5	6	7

فشاری کار (Work Overload)							
52. من هەستدەکەم کە ژمارەی نەو داواکاریانەی یان کێشانەی من مامەڵەیان لەگەڵدا دەکەم سەبارەت بە سیستەمی HIS زۆرترە لەوەی پێشبینیکراوە.	1	2	3	4	5	6	7
53. من هەستدەکەم کە بڕی نەو نیشەی من دەیکەم تێکەڵدەبێت لەگەڵ نەوەی چۆن بە باشی کراوە.	1	2	3	4	5	6	7
54. من هەستدەکەم بەهۆی بەکارهێنانی سیستەمی HISەوە سەرقاڵم یان پەلە پەل دەکەم.	1	2	3	4	5	6	7
55. من هەستدەکەم بەهۆی بەکارهێنانی سیستەمی HISەوە فشارم لەسەرە.	1	2	3	4	5	6	7

زۆر ناڕازیم	ناڕازیم	تاڕادەیەک ناڕازیم	مامناوەند	تاڕادەیەک ڕازیم	ڕازیم	زۆر ڕازیم
1	2	3	4	5	6	7

هەڵسوکەوت لەگەڵ سیستەمەکە (Behavioral Intention)							
56. من لە مانگەکانی ئایندەدا بە نیازم سیستەمی HIS بەکاربێنم.	1	2	3	4	5	6	7
57. من پێموایە لە مانگەکانی ئایندەدا سیستەمی HIS بەکاردەهێنم.	1	2	3	4	5	6	7
58. من بەرنامەم داناوە لە مانگەکانی ئایندەدا سیستەمی HIS بەکاربێنم.	1	2	3	4	5	6	7

شێوازی بەکارهێنان (Use Behavior)							
59. من بەردەوام سیستەمی HIS بەکاردەهێنم بۆ تێگەیشتن لە کێشەی تەندروستی یان نەخۆشی.	1	2	3	4	5	6	7
60. من زۆرجار سیستەمی HIS بەکاردەهێنم بۆ خزمەتی نەخۆشەکان.	1	2	3	4	5	6	7
61. من زۆرجار سیستەمی HIS بەکاردەهێنم بۆ دۆزینەوەی زانیاری دەربارەی کێشەیەکی تەندروستی.	1	2	3	4	5	6	7
62. من زۆرجار سیستەمی HIS بەکاردەهێنم بۆ ئەنجامدانی کارەکەم.	1	2	3	4	5	6	7

6

Appendix D

Pilot Study Reliability

Constructs	AVE	Composite Reliability	Cronbach's Alpha
BI	0.8105	0.9276	0.8832
CMP	0.7087	0.9065	0.8646
EE	0.7174	0.9098	0.867
FC	0.5345	0.8201	0.7119
GS	0.6871	0.9161	0.9148
PE	0.5422	0.8254	0.7437
PI	0.4329	0.8207	0.7467
SI	0.5802	0.8457	0.7656
SQ	0.5129	0.8918	0.8638
TMC	0.7235	0.9288	0.9039
TMV	0.772	0.91	0.8586
USE	0.7769	0.933	0.9043
VS	0.6974	0.8717	0.883
WOL	0.5518	0.8299	0.7276

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior, AVE= Average Variance Extracted, CR=Composite reliability).

Appendix E

Pilot Study Discriminant Validity

	BI	CMP	EE	FC	GS	PE	PI	SI	SQ	TMC	TMV	USE	VS	WOL
BI	0.9003													
CMP	0.3708	0.8418												
EE	0.4942	0.4023	0.8470											
FC	0.5196	0.4074	0.4092	0.7311										
GS	0.2477	0.2743	0.3562	0.3448	0.8289									
PE	0.4407	0.4078	0.6289	0.4332	0.1486	0.7363								
PI	0.5334	0.3882	0.4953	0.5013	0.2601	0.4341	0.6580							
SI	0.4906	0.3648	0.4779	0.2627	0.3093	0.4747	0.2979	0.7617						
SQ	0.3231	0.6905	0.4179	0.5042	0.3915	0.4714	0.3799	0.2348	0.7162					
TMC	0.4863	0.4751	0.5157	0.4173	0.4673	0.4531	0.3934	0.5521	0.5866	0.8506				
TMV	0.2301	0.2491	0.1995	0.2042	0.3628	0.2540	0.2331	0.3568	0.3659	0.4983	0.8786			
USE	0.5996	0.3348	0.4024	0.4244	0.1507	0.4998	0.4122	0.2872	0.4127	0.4305	0.2339	0.8814		
VS	0.3304	0.2682	0.2726	0.3988	0.3456	0.3054	0.1448	0.3559	0.2913	0.2861	0.2502	0.0670	0.8351	
WOL	-0.1181	-0.2627	-0.2894	-0.3176	-0.1987	-0.3847	-0.2306	-0.0900	-0.4450	-0.3568	-0.2242	-0.4627	0.0167	0.7428

Note: (PE=Performance Expectancy, EE=Effort Expectancy, SI=Social Influence, FC=Facilitating Condition, PI=Personal Innovativeness, CMP=Compatibility, SQ=System Quality, TMC=Top Management Commitment, TMV=Top Management Innovativeness, GS=Government Support, VS=Vendor Support, WOL=Work Overload, BI=Behavioral Intention, USE= Use Behavior).