Journal of Engineering and Applied Sciences 11 (3): 644-654, 2016
ISSN: 1816-949X


# Revisiting the UTAUT in Iraq Public Healthcare Sector

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**Abstract:** Implementing Healthcare Information Systems (HIS) within today hospitals has become a priority and a necessity. However, this task is not free of challenges due to a range of different but inter-connected factors that need to be accounted for to assure the adoption of those technologies by healthcare professionals; otherwise, those complex and high technical projects might be faced with resistance, low adoption and even failure in some cases as reported in the literature. The use of HIS within Iraq public healthcare institutions is still below desired levels as stated by governmental evaluation reports despite the substantial funds allocated for those HIS projects. For this reason, the current study attempts to empirically investigate the factors that influence the use and adoption of HIS systems among healthcare professionals within Iraq public hospitals by employing an extended version of the UTAUT Model with the integration of additional individual and technological factors to the original model. The study's proposed model was able to explain 32 and 41% of the variance within both behavioral intention and the use of HIS. The study findings highlighted the important issues related to the staff's adoption behavior which can be very helpful for healthcare officials in order to overcome the current problems and to set better strategies for upcoming projects.

**Key words:** Healthcare information systems, adoption, Iraq, Kurdistan region of Iraq, UTAUT

## INTRODUCTION

Healthcare Information Systems (HIS) can be defined as the combination of hardware and software systems that are utilized to store, retrieve, communicate and use the patients' data to perform the hospital's different tasks (Thompson and Brailer, 2004). The term HIS provides an umbrella that describes a large range of systems operating within healthcare institutions, however, those systems can be categorized into three main divisions: clinical, administrative and strategic (Bhattacherjee *et al*., 2006). Each one of those categories is dedicated to serve a specific purpose but collectively, they present a comprehensive set of functions and services such as minimized operational costs, less medical errors, better accessibility to healthcare data and better administrative functions (Buntin *et al*., 2011; Herricck *et al*., 2010; Irani and Love, 2008).

Still, numerous HIS projects face different challenges such as staff resistance and low adoption and for multiple reasons (Niazkhani *et al*., 2008; Kijsanayotin *et al*., 2009; Kaplan and Harris-Salamone, 2009; Al Hilfi *et al*., 2013; Ali *et al*., 2011; Holden and Karsh, 2010; Boonstra and Broekhuis, 2010; Novak *et al*., 2012; Kitsiou *et al*., 2010). The current study was motivated to examine the issue of HIS adoption within Iraqi public healthcare sector depending on the findings of previous studies (Al Hilfi *et al*., 2013; Ali *et al*., 2011) which highlighted the usage of HIS as being disappointing despite the investments carried out in HIS projects. The current study target is to empirically investigate the factors that contribute to the adoption behavior among healthcare staff. Moreover, the UTAUT Model (Venkatesh *et al*., 2003) was used as the theoretical framework for this study; the UTAUT Model was also extended by adding other factors that cover other important aspects of the adoption behavior (i.e., the individual and the technological).

**HIS adoption:** The domain of information systems has a large body of research regarding the topic of technology use and adoption within different industries and several theories were developed for examining this topic (Venkatesh *et al*., 2003, 2012; Fishbein and Ajzen, 1975; Davis *et al*., 1989; Venkatesh and Davis, 2000; Venkatesh and Bala, 2008; Rogers, 1995). However, within healthcare context, the majority of studies that addressed the issue of technology adoption were conducted within Western and developed countries (Daghfous *et al*., 1999; Najaftorkaman *et al*., 2015). Furthermore, the work by McGinn *et al*. (2011) concluded that the larger percentage of studies carried out concerning the adoption of HIS were conducted on a limited scale which holds the generalizability of its findings; adding to thisthe fact that

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each context, setting and type of participants has its own distinguishing characteristics as asserted by many researchers (Boonstra and Broekhuis, 2010; Venkatesh and Zhang, 2010; Aldosari, 2014) the thing that affects the staff's adoption behavior differently and as a result requires a specific way of handling.

Moreover, several researchers affirmed the special qualities and attributes of both the healthcare technologies and the healthcare professionals and differentiated them form other work environments and industries (Escobar-Rodriguez and Romero-Alonso, 2014; Chau and Hu, 2002; Wu *et al*., 2007) which requires healthcare officials to pay extra attention to the issue of technology adoption within hospitals. In fact, the healthcare professionals' resistance was one of the main obstacles facing the adoption of HIS (Escobar-Rodriguez and Romero-Alonso, 2014; Bah *et al*., 2011; Cresswell and Sheikh, 2013; Hung *et al*., 2014). Taking the previous challenges into consideration, adding to that the complexity and the high technicality of the HIS systems (Boonstra and Broekhuis, 2010; Avgar *et al*., 2012; Thakur *et al*., 2012) it is not strange that several HIS projects endured problems such as low adoption and resistance by healthcare staff (Kaplan and Harris-Salamone, 2009; Al Hilfi *et al*., 2013; Ali *et al*., 2011; Holden and Karsh, 2010; Novak *et al*., 2012; Kitsiou *et al*., 2010; Bah *et al*., 2011; Rigby, 2006; Al-Gahtani, 2008).

That's why, driven by all these circumstances that surround the adoption process of HIS among healthcare staff and the matter that the use of HIS within Iraqi healthcare institutions is still considered disappointing as declared by several studied (Al Hilfi *et al*., 2013; Ali *et al*., 2011), the current study main objective is to empirically examine this issue (i.e., the adoption of HIS) by surveying the healthcare staff working in Iraq public hospitals in order to obtain their opinions about the factors and barriers that are currently affecting their adoption behavior of HIS systems.

**Theoretical framework:** The UTAUT Model (Venkatesh *et al*., 2003) was utilized as the theoretical foundation for this study for examining the adoption behavior of HIS innovations among healthcare staff within Iraqi public hospitals. The UTAUT Model demonstrated to be a robust model in studying new technologies' adoption within different industries (Venkatesh *et al*., 2003, 2012; Venkatesh and Zhang, 2010; Yu, 2012; Alshehri *et al*., 2012; Lin *et al*., 2013; Duyck *et al*., 2008; Venkatesh *et al*., 2011). In the original UTAUT Model, the study was able to explain approximately, 70 and 50% of the variance of both behavioral intention and use of technology, respectively.

Venkatesh *et al*. (2011) suggested that the UTAUT Model requires more testing within healthcare context to provide a better understanding about the HIS adoption among healthcare professionals.

Furthermore, the results obtained from previous studies within healthcare context regarding the significance of the UTAUT constructs (i.e., the independent variables) were fluctuating across different technologies, participants and settings and the relationships were found to be salient in some studies and weak in other studies (Duyck *et al*., 2008; Venkatesh *et al*., 2011; Shaper and Pervan, 2007; Liu *et al*., 2015; Ifinedo, 2012; Bennani and Oumlil, 2013) which asserts the influence of the context and the environment being studied. The previous point is one of the reasons for reusing the UTAUT Model in the current study in other words, to examine the significance of the proposed relationships within the study's new environment and to prove the UTAUT generalizability and applicability across diverse contexts. Such findings from the literature in addition to the motivations mentioned in the previous section stimulated this study to utilize the UTAUT Model to examine its robustness within the study's new environment which is going to be the Iraqi public hospitals and to further improve this underpinning theory by conceptualizing individual and technological factors to be added to it.

The adoption behavior of new innovations involves different but connected dimensions that need to accounted for collectively in order to assure the adoption of new technologies in healthcare context (Chau and Hu, 2002; Cresswell and Sheikh, 2013; Jeyaraj *et al*., 2006; Yusof *et al*., 2008) as this adoption is a necessary step to achieve HIS success as stated by several researchers (Chen and Hsiao, 2012; Petter *et al*., 2008). Hence, to improve the performance of the UTAUT model within healthcare context, other potentially importantfactors need to be integrated to the UTAUT Model in order to encompass the other important aspects of the adoption behavior.

As reported by many researchersthe individual factors are one of the important considerations that are necessaryto achieve technology adoption (Kaplan and Harris-Salamone, 2009; Nieboer *et al*., 2014; Frame *et al*., 2008; Elrod and Androwich, 2009; Koivunen *et al*., 2009). Indeed, several HIS projects faced low adoption, resistance and even suspension due to the staff's attitude and personal perceptions (Kaplan and Harris-Salamone, 2009; Boonstra and Broekhuis, 2010; Bah *et al*., 2011; Cresswell and Sheikh, 2013; Cash, 2008). For this reason, the current study integrated the personal innovativeness

(i.e., an individual factor) into the UTAUT Model in order to examine it within the study's new environment. Furthermore, technological issues such as HIS complexity (Boonstra and Broekhuis, 2010; Avgar *et al*., 2012; Torda *et al*., 2010; Greenhalgh and Stones, 2010; Bossen *et al*., 2013), compatibility with staff work routine (Cresswell and Sheikh, 2013; Castillo *et al*., 2010; Pirnejad *et al*., 2009) and system quality concerns (Niazkhani *et al*., 2008; Kaplan and Harris-Salamone, 2009; Boonstra and Broekhuis, 2010; Novak *et al*., 2012) are examples of the challenges that are involved with HIS implementation in hospitals and subsequently could affect the adoption of such systems. Hence, the current study integrated two technological factors (i.e., compatibility and system quality) into the study's proposed model in order to examine its effect on staff's adoption behavior.

**Conceptual model:** The current study aims atexamining the usage and adoption of HIS by healthcare staff within Iraqi public healthcare sector by employing the UTAUT model as one of the eminent theories in the domain of information systems (Venkatesh *et al*., 2003, 2012, 2011). The UTAUT Model was originally conceptualized from eight prior information systems theories (Venkatesh *et al*., 2003) and has four independent variables which are: Performance Expectance (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC); the UTAUT Model also have two dependent variables, Behavioral Intention (BI) and Use of technology (USE).

The latent variables of the UTAUT model are defined as the following: Performance Expectancy (PE) can be defined as the degree to which a person believes that using a certain system will be more beneficial for him/her and will improve the task's performance; Effort Expectancy (EE) refers to the degree of simplicity experienced by individuals when they use a certain technology; Social Influence (SI) refers to the degree to which the opinions of other collegues have an effect on the individual's behavior regarding the use of new technology while Facilitating Conditions (FC) refers to the extent to which an employee or an individual perceives the support from the organization to be sufficient to promote the use of information systems (Venkatesh *et al*., 2003). Furthermore, the UTAUT Model has two dependent variables: Behavioral Intention (BI) which refers to the degree to which a person is interested in using a technological system and use behavior (USE) which is defined as the frequency of using a certain system as reported by the user himself/herself (Davis, 1989). Thus, the hypotheses for the UTAUT main constructs within the current study are:

- $H_1$: performance expectancy will have a significant influence on behavioral intention to use HIS
- $H_2$: effort expectancy will have a significant influence on behavioral intention to use HIS
- $H_3$: social influence will have a significant influence on behavioral intention to use HIS
- $H_4$: facilitating conditions will have a significant influence on HIS usage

**Individual dimension:** Individual dimension includes those characteristics that describe the individual's merits and personality which affect his/her perceptions and daily behavior (Jeyaraj *et al*., 2006). Personal Innovativeness (PI) is one of the individual factors and it refers to the person's propensity and willingness to explore and examine new things such as new technologies and innovations (Agarwal and Prasad, 1998). This personal attribute is related to the person himself/herself, the common norms and the cultural characteristics within a certain society (Daghfous *et al*., 1999) which means that this attribute doesn't measure uniformly across different environments. Researchers have examined the innovative attitude of individuals and its relation to technology adoption behavior. For example, a study (Yousafzai and Yani-de-Soriano, 2012), examined the individuals' perceptions regarding the use of on-line banking services and found that the respondents have different levels of PI and they can be recognized as two separate groups (i.e., the pioneers and those who are less motivated or willing to use this online service). Yusof *et al*. (2008) found that despite the simple IT skills of the staff, it was the staff's enthusiasm (i.e., innovativeness) that helped to start the HIS system within the hospital. As a result, the importance of this personal merit (i.e., innovativeness), its role in accepting a certain technology and its variation among individuals and societies has encouraged the current study to re-examine it within the study's new context and the hypothesis for this factor is:

- $H_5$: personal innovativeness will have a significant influence on behavioral intention to use HIS

**Technological dimension:** Technological dimension includes factors that are related to the technology itself and the specific features that describe that technology (Jeyaraj *et al*., 2006) such as compatibility and system quality. Compatibility (CMP) can be defined as the degree to which a technological innovation is considered to be consistent with the individual's previous values, experiences and work style (Rogers, 1995). Healthcare staff have maintained a certain style of work through their years of practice (Boonstra and 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 and Broekhuis, 2010). This factor was also found to be a barrier to HIS adoption by healthcare staff in several studies (Buntin *et al*., 2011; Escobar-Rodriguez and Romero-Alonso, 2014; Gagnon *et al*., 2009). On the other hand, other studies (Chen and Hsiao, 2012; Chang *et al*., 2006) didn't find the system compatibility as a salient predictor to HIS adoption within healthcare context. These diverse findings from the literature underline the impact of the type of technology, participants and the context being studied and its influence on the adoption behavior and for that reason the current study re-examined this factor within the study's new environment and the hypothesis is:

- $H_6$: compatibility will have a significant influence on behavioral intention to use HIS

Another technological factor is System Quality (SQ) which refers to the degree to which the system under question provides the required technical features and functionalities to support the employees or the individuals in performing the job and achieving the intended tasks (Chang *et al*., 2006; Delone and McLean, 1992; DeLone and McLean, 2003). This factor can be considered as a barrier to the adoption of HIS as health 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 and Broekhuis, 2010; McGinn *et al*., 2011; Cresswell and Sheikh, 2013; Menachemi *et al*., 2007). Taking these concerns experienced by healthcare professionals and the importance of healthcare systems' quality into consideration, the current study included SQ into the study's proposed model in order to examine its effect on the staff's adoption behavior and the hypothesis for this factor is:

- $H_7$: system quality will have a significant influence on behavioral intention to use HIS

Last but not least, Behavioral Intention (BI) which refers to the individual's willingness to use a technological system (Venkatesh *et al*., 2003; Davis, 1989) was hypothesized like the following:

- $H_8$: behavioral Intention will have a significant influence on HIS usage

Figure 1 displays the study's conceptual model along with all its constructs and hypotheses.

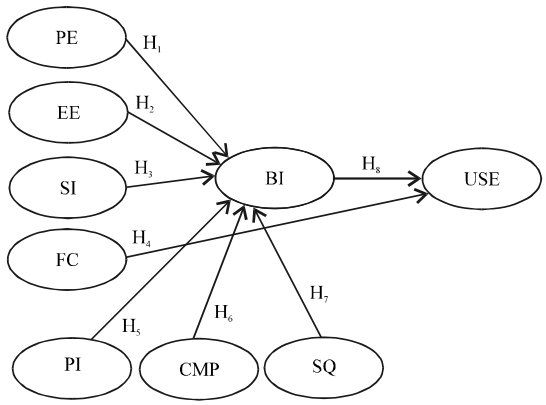


Fig. 1: Conceptual model of the study; PE: Performance Expectancy; EE: Effort Expectancy; SI: Social Influence; FC: Facilitating Condition; PI: Personal Innovativeness; CMP: Compatibility; SQ: System Quality; BI: Behavioral Intention, USE: Use Behavior

## MATERIALS AND METHODS

**Instrument development:** Previous related studies were viewed for constructing the instrument (i.e., selecting the questionnaire items) for the current study. All constructs' measures were selected and included from validated and tested measures from previous studies; those measures were adapted to fit the healthcare context. The independent variables (i.e., constructs) PE, EE, SI, FC and the dependent variable Behavioral Intention (BI) were adapted from the original UTAUT Model (Venkatesh *et al*., 2003); the second dependent variable which is use behavior (USE) was adapted from Ifinedo (2012).

On the other hand, the individual dimension was represented by Personal Innovativeness (PI) and the items were adapted from (Yousafzai and Yani-de-Soriano, 2012) while technological dimension was represented by two variables: Compatibility (CMP) and System Quality (SQ). The compatibility items were adapted from (Moore and Benbasat, 1991) and the source for system quality items was (Ahn *et al*., 2007). In total, 42 items were included in the questionnaire and a seven-likert scale was used to measure all the items; the scale ranged from one-to-seven with one indicating "strongly disagree" and seven indicating "strongly agree".

As part of the pretesting procedure, the questionnaire layout was evaluated independently by three university professors to get their opinions and feedback regarding the items wording being understandable and free of ambiguity for the purpose of increasing the content validity (Sekaran and Bougie, 2010); the experts' feedback was considered to help shape the final form of the questionnaire.

**The study settings:** This study used a quantitative approach by distributing a questionnaire on a large number of respondents in order to achieve the required generalizability of the findings and to keep the results free of bias, the researchers kept a neutral role throughout the study and relied on rigorous statistical methods for analyzing the data and interpreting the final results (Creswell, 2013). The researchers selected the Northern part of Iraq which is referred to as Kurdistan Region of Iraq (KRI) for conducting the empirical study as it is the most developed part of the country (Khayyat and Heshmati, 2013) which enables the study to examine the most recent developments in the field of public healthcare in Iraq by surveying the opinions of healthcare staff regarding all types of HIS systems currently working within their hospitals; this general approach was followed by several prior studies (Kijsanayotin *et al*., 2009; Chen and Hsiao, 2012). Nine public hospitals were randomly selected in Kurdistan Region from the nine hospitals, six were general and three were specialized hospitals.

Totally, 1250 questionnaires were distributed on the target respondents; 551 valid questionnaires were returned with a response rate of (44.08%) and those responses were analyzed using SmartPLS 2.0 (Ringle *et al*., 2005) to examine the proposed hypotheses for the current study. Table 1 presents the demographic profile of the respondents.

**Data analysis method:** Partial Least Squares Structural Equation Modeling (PLS-SEM) was selected as the suitable analysis technique for this study and the software SmartPLS 2.0 (Ringle *et al*., 2005) was employed to carry out the assessment for the measurement and the structural model (Hair *et al*., 2014a; Chin, 2010). The next sections present theses assessmentsin a detailed manner.

**Assessment of the measurement model:** Assessing the measurement model involves the evaluation of the reliability and the validity of the constructs and their associated items to ensure the quality and the eligibility of the final results (Chin, 2010; Hair *et al*., 2014). The assessment of the measurement model was carried out by examining four criterions: internal consistency reliability (CR) and individual indicator reliability (which represent the reliability of the indicators); convergent validity and discriminant validity (which represent the indicators' validity). In the current study, the CR values for the model's constructs ranged from 0.839 to 0.946 which were above the threshold of 0.7; therefore, it is considered acceptable (78); Table 2 presents these results for all the constructs. Moreover, the Cronbach's Alpha values were also satisfied and above the critical value of 0.7 for all the constructs. On the other hand, 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). Within the current study's model, the loadings of the items were all above the 0.7 threshold except for six indicators (i.e., items), the third indicator of the construct FC (i.e., FC3) with an outer loading (0.650); the first, sixth and seventh items of the construct personal innovativeness (i.e., PI1, PI6 and PI7) with outer loadings (0.645), (0.693) and (0.326), respectively also, two items in the construct system quality (i.e., SQ7 and SQ8) with outer loadings (0.626) and (0.672), respectively. The indicator PI7 (i.e., with an outer loading 0.326) was removed from the measurement model due to its low outer loading. However, indicators with loadings of (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 except for PI7 which was removed. Regarding the validity of the constructs, the value of the Average Variance Extracted (AVE) is used to assess the level of convergent validity; an AVE value of (0.5) and above is considered acceptable for a construct (Chin, 2010; Hair *et al*., 2014). All the constructs within the study's model have satisfied this criterion and the minimum AVE value for a construct was (0.543); Table 2 displays the AVE values for all the model's constructs.

Table 1: Demographic profile of the respondents

| Characteristics | Percentage |
|---|---|
| **Gender** | |
| Males | 49.7 |
| Females | 50.3 |
| **Age** | |
| 21-30 | 49.9 |
| 31-40 | 31.9 |
| 41-50 | 13.4 |
| 51-60 | 3.8 |
| Above 60 | 0.9 |
| **Job-position** | |
| Medical staff | 75.3 |
| Administrative staff | 24.7 |

Table 2: Measurement model assessment

| Construct | CR | AVE | Cronbach's alpha | $R^2$ |
|---|---|---|---|---|
| Behavioral Intention (BI) | 0.926 | 0.806 | 0.879 | 0.323 |
| Compatibility (CMP) | 0.920 | 0.742 | 0.884 | |
| Effort Expectancy (EE) | 0.915 | 0.730 | 0.877 | |
| Facilitating Conditions (FC) | 0.859 | 0.605 | 0.781 | |
| Performance Expectancy (PE) | 0.877 | 0.641 | 0.814 | |
| Personal Innovativeness (PI) | 0.876 | 0.543 | 0.830 | |
| Social Influence (SI) | 0.839 | 0.565 | 0.744 | |
| System Quality (SQ) | 0.912 | 0.566 | 0.890 | |
| Use Behavior (USE) | 0.946 | 0.815 | 0.924 | 0.412 |

Table 3: Discriminant validity assessment

| Variables | BI | CMP | EE | FC | PE | PI | SI | SQ | USE |
|---|---|---|---|---|---|---|---|---|---|
| BI | 0.8977 | | | | | | | | |
| CMP | 0.4544 | 0.8616 | | | | | | | |
| EE | 0.4561 | 0.5393 | 0.8546 | | | | | | |
| FC | 0.4244 | 0.4749 | 0.4602 | 0.7780 | | | | | |
| PE | 0.3643 | 0.5436 | 0.6097 | 0.3223 | 0.8007 | | | | |
| PI | 0.4310 | 0.4926 | 0.5163 | 0.5069 | 0.3668 | 0.7368 | | | |
| SI | 0.4602 | 0.4857 | 0.6104 | 0.4970 | 0.5068 | 0.4415 | 0.7518 | | |
| SQ | 0.4243 | 0.6630 | 0.5659 | 0.4848 | 0.5341 | 0.4615 | 0.5025 | 0.7523 | |
| USE | 0.5902 | 0.4277 | 0.3999 | 0.4780 | 0.3430 | 0.4623 | 0.4583 | 0.4691 | 0.9026 |

Table 4: The structural model assessment

| Paths | Path Coefficients | t-values | Hypothesis supported/not |
|---|---|---|---|
| BI→USE | 0.472 | 10.855*** | Supported |
| CMP→BI | 0.163 | 2.928*** | Supported |
| EE→BI | 0.119 | 1.825** | Supported |
| FC→USE | 0.278 | 6.872*** | Supported |
| PE→BI | 0.004 | 0.075 | Ns |
| PI→BI | 0.169 | 3.447*** | Supported |
| SI→BI | 0.197 | 3.800*** | Supported |
| SQ→BI | 0.070 | 1.390 | Ns |

PE: Performance Expectancy; EE: Effort Expectancy; SI: Social Influence; FC: Facilitating Condition; PI: Personal Innovativeness; CMP: Compatibility; SQ: System Quality, BI: Behavioral Intention; USE: Use Behavior; ns = not supported; **p<0.05; ***p<0.01

On the other hand, discriminant validity can be evaluated using the Fornell and Larcker (1981). If the construct's square root of the AVE value is greater than the construct's correlations with other latent variables (i.e., constructs) within the same model, then discriminant validity is satisfied (Chin, 2010; Hair *et al*., 2014). Discriminant validity condition was met for the current study and Table 3 presents the results of the Fornell-Larcker method with more detail.

**Assessment of the structural model:** Assessment of the structural model was carried out using PLS-SEM andanalyzing the dataproduced the values of the coefficient of determination ($R^2$), path coefficients and the empirical t-values to evaluate the significance of the relationships (Chin, 2010; Hair *et al*., 2014). The extended version of the UTAUT model presented by this study was able to explain (0.323) of the variance in BI and (0.412) of the variance in HIS usage.

The bootstrapping technique was used to produce the empirical t-values from the dataset which included 551 observations. All proposed hypotheses were supported within the structural model except for $H_1$ (i.e., from PE to BI) which was not supported as the path coefficient from PE to BI was 0.004 (t-value = 0.075) and $H_7$ (i.e., from SQ to BI) was also not supported as the path coefficient from SQ to BI was 0.070 (t-value = 1.390), further details regarding the study path coefficients and their associated t-values can be found in Table 4.

## RESULTS AND DISCUSSION

The current study combined additional individual and technological factors to the UTAUT Model due to the importance of those factors to the adoption of HIS within healthcare context. Our model was able to explain 32 and 41% of the variance within the model's two dependent variables (i.e., behavioral intention and USE).

The investigation of the factors that drive HIS adoption within healthcare institutions is still relatively lagging compared to other industries (Escobar-Rodriguez and Romero-Alonso, 2014) and since the empirical testing of the UTAUT Model within healthcare setting is still relatively limited as stated by Venkatesh *et al*. (2011) and the fact that the majority of technology adoption studies are performedwithin developed countries (Venkatesh and Zhang, 2010), the current study's theoretical contribution was affirming the UTAUT generalizability and applicability throughout different contexts and filling the gap by empirically testing the UTAUT in this new environment. Moreover, knowing that the adoption behavior of new technology is a multidimensional process (Jeyaraj *et al*., 2006; Yusof *et al*., 2008), the second theoretical contribution was by examining other important aspects of the adoption behavior (i.e., the individual and the technological) by integrating potentially important factors to measure their effect which will give the UTAUT Model a more holistic and comprehensive shape.

The current study combined oneindividual factor (i.e., personal innovativeness) with the original UTAUT model andthis factor was found to be a significant predictor of the adoption of HIS; thus, $H_5$ was supported. This finding confirmed the resultsfrom prior studies (Yousafzai and Yani-de-Soriano, 2012; Lewis *et al*., 2003; Wells *et al*., 2010) and asserts that personal attributes such as innovativeness can influence the staff's attitude towards new technology and thereby increasing his/her adoption behavior (Agarwal and Prasad, 1998).

This study also integrated two technological factors into its proposed model and they are compatibility and system quality. As hypothesized, compatibility had a

significant effect on the intension to use HIS and therefore $H_6$ was supported in this study. The characteristic of HIS technologies being compatible with staff's work routines and work style is an important issue that many researchers have emphasized as it could play a role in adopting new technologies within healthcare domain (Wu *et al*., 2007; Hung *et al*., 2014) while failing to incorporate these technologies smoothly into the work environment might be a disrupting matter that could become a barrier to adoption (Buntin *et al*., 2011; Boonstra and Broekhuis, 2010; Escobar-Rodriguez and Romero-Alonso, 2014; Gagnon *et al*., 2012).

On the other hand, the relationship between system quality and behavioral intention was found insignificant in the current study and as a result $H_7$ was not supported. This finding was not in-line with results obtained from previous studies. One explanation for this finding is that the staff perceives HIS systems In Iraq hospitals as being below their expectations and not fulfilling the high criteria required for healthcare provision. This comes consistent with a government report which evaluated HIS systems in Iraq and concluded that the use of those systems was problematic at many aspects (Ali *et al*., 2011). Furthermore, within the current study performance expectancy also had no significant effect on the intention to use HIS and $H_1$ was not supported; a similar finding was also concluded by other studies (60). Consequently, those two factors (i.e., performance expectancy and system quality) were both found to have weak effect on the adoption of HIS within Iraq public hospitals which emphasizes the shortage of high quality and dependable HIS, the insufficiency of those systems to perform the required and the necessary hospital functions and as a result, perceived by study's participants as not fulfilling their aspirations and not affecting their adoption behavior.

Effort expectancy effect on behavioral intention was significant within the current study and hypothesis $H_2$ was supported. This finding was also affirmed by other studies (Kijsanayotin *et al*., 2009; Venkatesh *et al*., 2011; Shaper and Pervan, 2007). Additionally, healthcare staff declared through their responses that social influence plays a significant role in regard to adopting new technologies and hypothesis $H_3$ was supported. This comes in-line with prior researchers' findings (Kijsanayotin *et al*., 2009; Venkatesh *et al*., 2011; Al-Gahtani *et al*., 2007; Hu *et al*., 2010). In regard to the dependent variable use behavior, both Facilitating conditions and behavioral intention significantly predicted this usage and therefore, hypotheses $H_4$ and $H_8$ were supported; similar findings were present within the literature (Duyck *et al*., 2008; Venkatesh *et al*., 2011; Ifinedo, 2012 ). All the summarized results and hypotheses can be found in Table 4.

From a practical point of view, this study attracts healthcare officials' attention to the importance of several factors including individual and technological ones. Personal characteristics such as personal innovativeness should not be neglected; rather it should be promoted and fostered in order to achieve higher levels of use and adoption of HIS. Furthermore, the deployed HIS projects should be consistent with staff's work style and daily routine rather than being disruptive; this point should also be considered by developers when designing HIS for a specific purpose or context. Moreover, to make the process of HIS adoption smoother, the necessary support and training should be adequately provided. Also, the role of the influential people in the healthcare institution is a motivating factor for other staff and encourages them to use and adopt these new technologies on a faster pace. In regard to performance expectancy and system quality, more concern should be devoted to the type and quality of the systems chosen for healthcare sector not only to increase the staff's adoption but to improve the overall healthcare services in Iraq. Thus, the combination of these factors needs to be considered collectively to achieve HIS adoption and success.

## CONCLUSION

The current research exhibited an extended version of the UTAUT Model to examine the factors that influence HIS adoption within public hospitals of Iraq. Confirming the generalizability of the UTAUT Model within the Iraqi healthcare sector was one of this study's goals. Moreover, the study empirically affirmed the multi-dimensionality of the adoption behavior among healthcare staff and the importance of considering each dimension.

Future researchers are encouraged to conduct in-depth qualitative research to provide a better understanding of the issue under question by exploring the work-field from within; moreover, evaluating the implementation and adoption of HIS projects within private sector and comparing it with public sectorcan be another domain worthy of exploration by researchers. Selecting a specific type of respondents, technologies or settings rather than taking a general perspective can be very advantageous to spot the important issues and needs within each branch of healthcare provision. Finally and to the best of our knowledge, this study is the first empirical study that investigated the issue of HIS adoption within Iraq public healthcare sector on a large

scale and therefore can be utilized as a practical foundation to improve the situation of HIS adoption in Iraq healthcare institutions and stimulate other researchers to inspect other factors that might contribute positively to the issue of HIS adoption in order to help healthcare officials to improve HIS deployment in the future.

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