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A Narrative Literature Review on the Impact of Organizational Context Perspective on Innovative Health Technology Adoption

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Abstract

Hospital Information System (HIS) is an integrated Information System (IS) designed to enhance clinical, financial and administrative functions of a hospital. HIS is vital to the healthcare sector especially in public hospitals as they need to serve the public with high-quality healthcare services. Therefore, it is important to investigate the adoption of HIS in public hospitals. The aim of this study is to provide a literature review of adoption theories (Technology Organization Environment Framework, Institutional Theory and Human Organization Technology Fit Model) in IS domains and potential factors that influencing adoption of HIS framework in public hospitals with emphasis on organizational context perspective.

Keywords: HIS adoption, TOE framework, Institutional Theory, HOT fit model, Organizational context

1. Introduction

Hospital Information System (HIS) can be considered as innovation for hospital's organization, if the hospital organization perceives HIS as new. Innovation has been studied in various disciplines (sociology, engineering, economics, marketing and psychology), for different stages of innovation (generation of innovation or adoption of innovation), at different levels of analysis (individual, subunit, organizational, industrial, national or the innovation itself), and for different types of innovation (technical/administrative, radical/incremental or product/process) (Damanpour and Schneider, 2009; Damanpour and Daniel Wischnevsky, 2006; Gopalakrishnan and Damanpour, 1997; Read, 2000; Ahmadi et al., 2015b; Ahani et al., 2016; Nilashi et al., 2018a; Ehtesham et al., 2017; Kimiafar et al., 2015). Innovation adoption refers to making decisions for employing HIS in public hospitals, work practices and encouraging healthcare professionals to apply HIS. Many adoption/diffusion theories in IS research have been developed that aim at explaining organizational and human behaviour in respect to innovation adoption and make the understanding of factors affecting adoption and acceptance of particular technologies easier (Cardozo et al., 1993; Hecht et al., 2011; Nilashi et al., 2017a). These theories can be potentially useful to this research development of a new framework of HIS adoption. Generally, studies on technology adoption and diffusion in the area on IS are conducted in two levels, user level and organizational level (Hossain and Quaddus, 2011; Lian et al., 2014; Chang et al., 2007b; Misra and Mondal, 2011; Choudrie and Dwivedi, 2005). The organizational innovation theories and models along with the existing HIS literature might help to achieve identifying these potential factors that affect the HIS adoption in the context of public hospitals (Chang et al., 2006b; Yang et al., 2013; Ismail et al., 2015; Nilashi et al., 2016c; Bashiri et al., 2017a). Previous studies indicate that organizational issues, for example lack of inappropriate organizational structure and planning have a negative effect on applying information technology in hospitals (Moghaddasi et al., 2009; Malekzadeh et al., 2018). Hence, present study focuses on a narrative literature review of adoption theories in IS domain including Technology

Organization Environment (TOE) Framework, Institutional Theory and Human Organization Technology (HOT) Fit Model as well as potential factors that influencing adoption of HIS framework with emphasis on organizational context perspective.

2. Theoretical Background

2.1 Hospital Information System

Hospital Information System (HIS) is broadly employed in the hospitals around the world (Haux, 2006; Hsiao et al., 2009; Ahmadi et al., 2018a; Nilashi et al., 2018a; Nilashi et al., 2017e; Sadoughi and Erfannia, 2017; Sheikhtaheri et al., 2014). According to the National Library of Medicine (NLM, 2011), HIS is "the integrated, computer-assisted system designed to keep, manipulate, and retrieve information concerned with the administrative and clinical aspects of providing medical services within the hospital." HIS is frequently addressed in all crucial activities within an IT infrastructure in hospitals. It assists in reducing medical errors, growing the efficiency, cost effectiveness, improving healthcare quality, and increasing involvement of patients in healthcare decision making (Zhang et al., 2002; Lee et al., 2012; Ismail et al., 2013b; Ahmadi et al., 2015b; Ahmadi et al., 2018b; Nilashi et al., 2017d; Nilashi et al., 2017c; Sadoughi et al., 2018; Sadoughi et al., 2017; Farzandipour et al., 2011; Kimiafar et al., 2014). Moreover, this system significantly affects the quality of care offered to patients, the tasks and construction of all workforces in the hospital, the performance of the departments and the

performance of each employee (Anderson et al., 2006; Alizadeh et al., 2015b). The aim of developing HIS is to make healthcare sections more valuable and help patients take advantages of it (Li, 2010; Nilashi et al., 2017d). Such system also provides patients with better security in terms of storage of their medical records which eliminates the issue of missing data and patient's medical records (Salleh, 2006). In additional, decision support modules of HIS can improve clinical decision-making and improve patient safety (Sadoughi and Sheikhtaheri, 2010).

Classifications within HIS have been dependent on and vary between researchers (Kim et al., 2002; Nilashi et al., 2018b). HIS can be categorized based on its medical support system, medical documentation system, departmental management system, business, communication and networking system, business and financial system, and core system, as well as its function (Zare et al., 2016; Alizadeh et al., 2015b, Nilashi et al., 2017b; Shortliffe and Cimino, 2013). One of the essential factors considered in classifying HIS is hospital size (Ismail et al., 2013a). As an instance, the hospitals having fewer than 200 beds are in the category of BHIS, the hospitals with fewer than 400 but more than 200 beds are categorized to the category of IHIS, and if the number of the beds exceeds 400, the hospitals are grouped into the category of THIS. Furthermore, each category of HIS has different set of information systems as shown in Table 1. THIS has more complete set of features and modules than IHIS and BHIS. Additionally, hospitals implementing THIS are also known as paperless hospitals (Sulaiman, 2011a).

Table 1

Three HIS categories (Ismail et al., 2013b; Kamal Zadeh Takhti, 2013)

Categories of HIS	Components of HIS Implemented	Number of Beds
THIS	Patient Management System + Clinical Access Information System + Laboratory Information System + Pharmacy Information System + Radiology Information System + Picture Archiving and Communication System + Administration Information System + Financial Information System + Inventory Information System + Personnel Information System	More than 400 beds
IHIS	Patient Management System + Clinical Access Information System + Laboratory Information System + Pharmacy Information System	More than 200 beds but less than 400 beds
BHIS	Patient Management System + Clinical Access Information System	Less than 200 beds

2.2 HIS Adoption

The term "adoption" refers to the decision of any individual or organization to make use of innovation (Rogers Everett, 1995; Frambach and Schillewaert, 2002; Nilashi et al., 2016a). In terms of the research topic, adoption refers to the decision of employing HIS in the public hospital work practices and encouraging healthcare professionals to apply HIS (Wu, 2011; Ahmadi et al., 2017; Ahmadi et al., 2015a; Ahmadi et al., 2014d; Zare et al., 2016; Alizadeh et al., 2015a; Ahmadi et al., 2015e).

3. Methodology

The purpose of this review study is to identify the influential factors that affect hospitals adoption decision of

HIS. In our study, we follow the definition of HIS according to Kim et al. (2002) as "a healthcare information system that integrates computer systems throughout the hospital which was developed to enhance the clinical and administrative function of a hospital; additionally, it integrates clinical and non-clinical information and its key features include all areas of clinical, financial and administrative". To the best of researchers' knowledge, as of now, there are lack of studies that investigate imperative factors that can affect the adoption of HIS based on combination of three potential adoption theories in IS domain, including TOE framework, institutional theory along with HOT-fit model. Furthermore, the review was conducted in the context of health information system. To obtain a comprehensive bibliography of research papers on

HIS adoption, the present review investigated articles published in English that were available as full texts through following electronic journal databases:

- Science direct
- IEEE Xplore Digital Library
- Springer Link
- Emerald
- Proquest

The keywords for the search included "HIS adoption," "TOE Framework," Institutional Theory" and "HOT Fit Model." In addition, studies that were not defined as a journal article were excluded from this study.

4. Adoption Theories in IS Domain

4.1 Technology-Organization-Environment Framework

The TOE framework as presented by Tornatzky and Fleischer (1990) provides a useful analytical framework that can be used for studying the organizational adoption of different types of innovations (Oliveira and Martins, 2011; Tornatzky et al., 1990). It is the organizational level theory that predicts the technology adoption decision, explained by three different dimensions. They are described as technology, organization and environment (Ahmadi et al., 2015a; Ahmadi et al., 2014c; Ahmadi et al., 2014d; Ahmadi et al., 2014b). According to Tornatzky and Fleischer (1990), technology adoption that takes place at the organization level is influenced by factors pertaining to those dimensions. As illustrated in Fig. 1, the three dimensions interact with each other, and influence decision-making about technological innovation.
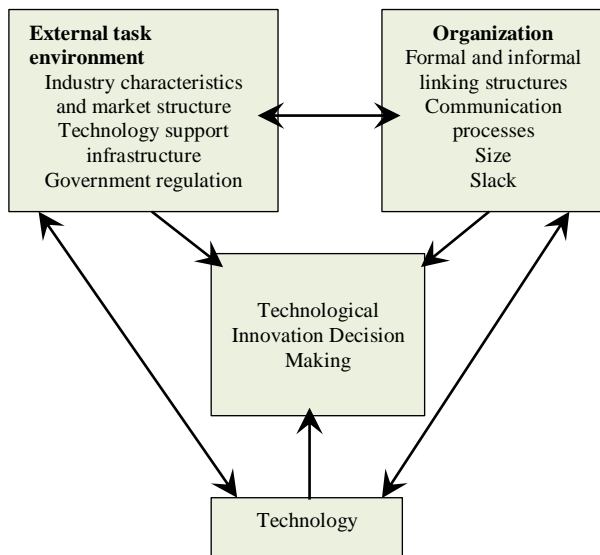

Fig. 1. The TOE Framework (Tornatzky *et al.,* 1990).

TOE framework provides details that firms should consider when studying components affecting adoption of technological innovation. TOE framework has been shown in Fig. 1. Technological dimension describes new/current

and external/internal technologies, which are related to organizations (e.g., compatibility, complexity, and relative advantage). Technological dimension consists of both technologies to be adopted and existing technologies, and primarily emphasizes on the way that adoption process is affected by the technological characteristics (Tornatzky et al., 1990; Ahmadi et al., 2015b; Ahmadi et al., 2016). The organizational dimension provides a description of characteristics of an organization that facilitates or constrains adoption of technological innovations. The amount of slack resources available internally, the quality of human resources, top management support, organization structure (e.g., centralization, complexity and formalization), and firm size are the instances of organizational characteristics (Tornatzky et al., 1990; Ahmadi et al., 2017).

Extant research has demonstrated that the TOE framework has a broad applicability and possesses explanatory power across a number of technological, industrial, and national/cultural contexts. This framework is utilized to explain the adoption of inter-organizational systems, e-business, electronic data interchange, open systems, enterprise systems, and a broad spectrum of general IS applications (Dwivedi, 2011; Ahmadi et al., 2015d). According to different studies, it can be demonstrated that in order to explain the adoption of several diverse IS innovations; TOE framework can successfully be utilized. These studies are based on circumstances and various needs of the hospital's organization according to the technology, organization, and environment dimensions, Furthermore the TOE model was applied and tested in European, American, and Asian contexts, as well as in both developed and developing countries (Zhu et al., 2003; Zhu and Kraemer, 2005; Zhu et al., 2006; Dwivedi, 2011).

As an instance, in the healthcare industry, Chong and Chan (2012) conclude that TOE framework is capable in assisting to clarify the notion of RFID (Radio Frequency Identification) adoption. In another work, Liu (2011) employs TOE framework to understand telecare adoption in Taiwanese care institutions. The study of Chang et al. (2007) indicates that the TOE framework is useful to identify e-signature adoption factors within a hospital setting. In addition, Lian et al. (2014) applied the TOE to understand the critical factors, which can influence cloud computing adoption in the hospital context. According to Lian et al. (2014), TOE framework is suitable and can be utilized for healthcare industry in understanding the adoption of IS innovation. Moreover, a significant number of previous studies based on the TOE framework have explored the critical factors for IS adoption. This is also the case for different health information systems (Yang et al., 2013; Dwivedi, 2011; Oliveira and Martins, 2011; Bashiri and Ghazisaeedi, 2017b).

4.2 Institutional Theory

Institutional theory introduced by DiMaggio and Powell (1983) focuses on the extensive and more robust

characteristics of the social framework. According to Currie (2012), "institutional theory is a multi-level construct spanning the individual, organizational, and the organizational field levels of analysis." It recognizes the process of technological innovation in the organizational field (Deephouse, 1996; Jensen et al., 2009). DiMaggio and Powell (1983) believed that three external institutional pressures lead firms that reside in the organizational field to increasingly resemble each other, resulting in institutional isomorphism. When organizations face such pressures, they are likely to conform by adopting processes, structures and strategies that have been adopted by others (Deephouse, 1996, Jensen et al., 2009). These types of pressures are exerted on organizations to achieve the organizational legitimacy. Hence, it guarantees organizations to ensure survival for a longer period (DiMaggio and Powell, 1983, Meyer and Goes, 1988).

Normative pressures, coercive and mimetic are three mechanisms of institutional isomorphic change. Mimetic pressures are those that cause organizations to imitate or copy the behaviour of other organizations in their environment that are perceived to be similar (Porac et al., 1999); consisting of board interlock, information and resources (Galaskiewicz and Bielefeld, 1998); with great prestige or status (Burns and Wholey, 1993); and with high degree of success (Kraatz, 1998). Through imitating the behaviour of other organizations, an organization expects to be able to decrease the costs of experimentation to reach the lowest amount and gain organizational legitimacy. Moreover, first-mover risks will not be a threat to such an organization (Cyert and March, 1963; Levitt and March, 1988; Lieberman and Montgomery, 1988; Ahmadi et al., 2014d).

DiMaggio and Powell (1983) introduce the second pressure named coercive pressure. This form of pressure can be imposed on organizations through the firms that those organizations closely rely on, the society's cultural assumptions as well as organization's stakeholders to fulfil their expectation or demands (Srinivasan et al., 2002; DiMaggio and Powell, 1983; Currie and Guah; 2007; Klöcker et al., 2014). In the context of healthcare, example of coercive pressure is government pressure, which enforces strict regulatory and legal requirements on healthcare organizations, requiring them to conform to contemporary standards (Currie, 2012).

Normative pressure is the final institutional pressure. According to the institutional theory, normative pressure is imposed on organizations to adopt new business practices while experiencing different types of entrepreneurial norms and values, including educational organizations, media, and business partners, and professional (DiMaggio and Powell, 1983; Chiravuri and Ambrose, 2002; Spell and Blum, 2005).

The decision taken in the adoption of health information system in healthcare organizations, including hospitals have a complex nature and involve multiple stakeholders. Additionally, rather than being dependent solely on the characteristics of the technology, environmental influences deriving from institutional pressures play a crucial role in organizations and individuals adoption and migration to IS innovations with respect to the hospital setting (Klöcker et al., 2014; Currie, 2012; Jensen et al., 2009; Gibbs and Kraemer, 2004; Teo et al., 2003; Mohr, 1992; Son and Benbasat, 2007; Jeyaraj et al., 2004; Miscione, 2007; Ahmadi et al., 2015c). In the complex nature of hospital's organization involving multiple stakeholders benefit by institutional perspective, institutional theory offers a highly suitable analytical framework for health information system adoption in hospital organizations (Jensen et al., 2009; Currie, 2012). Up to date, some previous studies have explored and explained the role of institutional pressures in shaping individuals' opinion or behaviour on the new technology health information system (Currie, 2012; Klöcker et al., 2014; Jensen et al., 2009; Sahay et al., 2009, Ahmadi et al., 2013b). The theoretical model based on institutional perspective has been shown in Fig. 2.
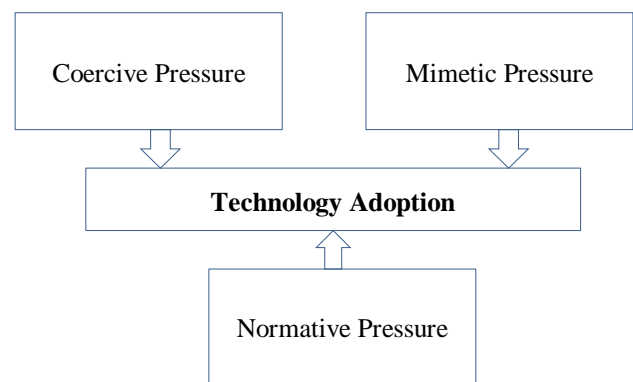

Fig. 2. Theoretical model of IS innovation based on institutional perspective (Teo et al., 2003; DiMaggio and Powell, 1983).

4.3 Human-Organization-Technology Fit Model

Several evaluation studies on health information technology adoption highlighted that a large number of adoption problems were attributed to the lack of fit between technological, human and organizational contexts (Davis, 1993, Goodhue et al., 2000; Tsiknakis and Kouroubali, 2009; Marques et al., 2011; Ahmadi et al., 2014d; Ahmadi et al., 2017). Recently studies (Yusof et al., 2008a; Yusof et al., 2008b) conducted a rigorous evaluation of health information system to identify the important dimensions, which can intensively affect the system adoption. By making a critical assessment of the results obtained from the current IS evaluation research and health information system, they developed a new model based on human, organization and technology dimensions. Yusof et al. (2008) suggest that their new framework might be applied in a flexible way, considering stakeholders' point of views, phases in system development life cycle, different contexts and purposes, and evaluation methods. The researchers emphasize that there is a positive relationship between the possibility of health information system and the degree in which organization, human and technology match with one another. Fig. 3 shows the HOT-fit model. The dimensions addressed technological, human and organizational issues.
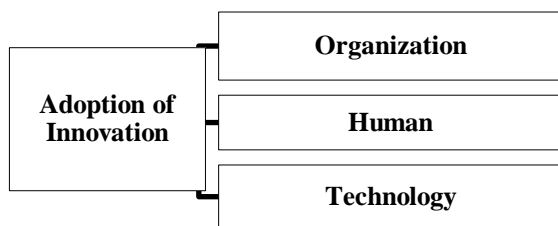
Fig. 3. HOT-fit Model (Yusof et al., 2008b).

According to Yusof et al. (2007), practitioners and researchers can take advantage of the HOT-fit model to conduct rigorous evaluation research on IS or IT applications adoption in the context of healthcare centers. The emphasis of the majority of available research on the HIS is clinical processes or technical issues that leave the reason of success or failure of HIS in certain context and with certain user (Kaplan, 2001; Coiera, 2003). Yusof et al. (2008) provided a comprehensive, specific evaluation factors, dimensions and measures (HOT-fit model) which are suggested to be applicable in HIS adoption evaluation study (Lian et al., 2014; Marques et al., 2011). Hence, there is a debate on the use of such a framework to be useful not only for comprehensive evaluation of the particular Fundus Imaging System (FIS) in primary care, but potentially applicable and useful for any health information systems in general (Yusof et al., 2008a).

5. Previous Researches on HIS Adoption

Previous researches developed various instruments for measuring the degree of adoption with respect to the HIS in the context of hospitals (Esfahani et al., 2017; Ahmadi et al., 2012; Lian et al., 2014; Huang et al., 2006). One of the prominent determinants of technology adoption within the hospital organization context is the study of Hu et al. (1999). Their study have emphasized on the process-oriented view to the assessment of technology adoption. In addition, they defined the logical and distinct phases, each of which could have served as a foundation for the succeeding adoption phase and also to distinguish the adopters and non-adopters of the innovation in the context of hospitals. According to previous studies there are different factors, which influence the adoption of HIS. Lee et al. (2012) discovered that future studies of HIS adoption should focus on the four dimensions of HTOE. Additionally, a survey of 400 family physicians by Paré et al. (2014) showed that "behavioural", "cognitive or knowledge-based", "economic" and "technological" barriers can inhibit the decision to adopt HIS technology. Another survey by Lin et al. (2012) indicated that factors including "staff's technological capability", "hospital's scale", "top management attitude toward HL7", "environmental pressure", and "system integrity" influenced the HIS adoption among Taiwanese public, private and military hospitals.

6. Factors Related to the HIS Adoption

The research framework requires being comprehensive to investigate drivers and barriers of HIS adoption in the hospital context. The literature provided the foundation for developing the research framework by identifying variables that are crucial. The studies regarding the technology adoption have attempted to identify major variables that have a critical role in determining the adoption behaviour (Ahmadi et al., 2015d, Ahmadi et al., 2013a; Ahmadi et al., 2014c; Ahmadi et al., 2013b; Ahmadi et al., 2014e; Alizadeh Savareh et al., 2017; Savareh et al., 2017b; Lian et al., 2014; Lee et al., 2012; Hsiao et al., 2009). Nevertheless, it is not feasible to incorporate all possible variables in one research framework. Hence, to produce empirical results with high validity and reliability, researchers usually choose and examine a few important variables in one research framework. According to the results achieved from a review of relevant research, four dimensions including technology, organization, environment and human are well suited in this research for studying the HIS adoption by public hospitals (Hsiao et al., 2009; Lee et al., 2012; Lian et al., 2014). Table 2 lists variables extracted from the TOE framework, institutional theory and HOT-fit model based on the prior HIS empirical studies regarding the adoption context.

7. Discussion

Studies on technology adoption and diffusion of innovation has been a long source of research across various IS domains (Straub, 2009; Nilashi et al., 2016b; Nilashi et al., 2015; Ahmadi et al., 2014b; Ahmadi and Bashiri, 2014; Bashiri, 2016). According to Parker and Castleman (2009), at least 128 journal articles related to technology adoption and diffusion of innovation were published in IS journals between 2003 and 2008. Historically, adoption theories have similarity in content and objectives, but some differences exist in practice (Straub, 2009; Ahmadi et al., 2014a; Bashiri and Ghazisaeedi, 2017a; Savareh et al., 2017a). The purpose of theories of adoption in IS disciplines is to understand, explain, or predict how, why and to what extend individuals or organizations will adopt and decide to deploy a new technology (Choudrie and Dwivedi, 2005; Ahmadi et al., 2015c; Mohammadi et al., 2014; Bashiri et al., 2017b). In the broadest sense, adoption theories describe the significant factors influencing technology adoption by individuals or organizations. Thus, adoption theories are aimed at recognizing and examining all these determinants (Kuan and Chau, 2001; Ahmadi et al., 2016). In this study, the theories of adoption such as Technology, Organization, Environment (TOE) framework (Tornatzky et al., 1990b), institutional theory (DiMaggio and Powell, 1983), and Human, Organization, Technology (HOT) fit model (Yusof et al., 2008a, Yusof et al., 2008b), in the health information systems domain were explained by relying on the organizational context.

Applying TOE framework in several researches on health information systems adoption demonstrates the possibility of fitting TOE framework into the context of HIS adoption. Using TOE framework (Tornatzky et al., 1990b; Ahmadi et al., 2015c), the understanding of IS adoption in the context of healthcare industry on multiple occasions becomes easier (Chang et al., 2007b; Chong and Chan, 2012; Liu, 2011; Lian et al., 2014; Lee and Shim, 2007; Hung et al., 2009; Kazley and Ozcan, 2007; Hsiao et al., 2009; Li et al., 2005; Chang et al., 2006a; Lin et al., 2012; Hung et al., 2010). Also, according to the complex nature of hospital's organization involving multiple stakeholders benefit by institutional perspective, institutional theory offers a highly suitable analytical framework for health information system adoption in hospital organizations (Jensen et al., 2009; Currie, 2012, Klöcker et al., 2014; Gibbs and Kraemer, 2004; Teo et al., 2003; Mohr, 1992; Son and Benbasat; 2007, Jeyaraj et al., 2004; Miscione, 2007). In addition, user involvement, clarity of system purpose, user skills, user roles, user perception and user training in the human context have been measured on the organizational adoption of health information systems. Hence, the HOT-fit model is a suitable model that can be applied to assess and determine the relevant factors affecting the decision process of HIS adoption within public hospitals regarding a developing country (Yusof et al., 2007; Lian et al., 2014).

In order to understand more about IS adoption decisions in the organizational level, previous researches have applied different theories. Few studies combined the institutional theory with the TOE framework (Yu-hui, 2008; Gibbs and Kraemer, 2004; Soares-Aguiar and Palma-dos-Reis, 2008). In addition, the institutional theory adds institutional external pressures to the environmental context of the TOE framework, which include pressure from competitors and pressure exerted by structure and trading partners. Furthermore, HOT-fit model adds human dimension to the TOE dimensional framework as another complementary important dimension (Lian et al., 2014; Marques et al., 2011).

According to findings, one of most predicting dimensions for HIS adoption is organizational dimension. It is related to the internal factors of an organization (a hospital, in the present context) that are controllable and manageable by the organization. Organizational factors were operationalized from four constructs: IS infrastructure, top management support, financial resources, and hospital size.

According to Zhu et al. (2006) and Ismail et al. (2013) Public hospitals in developing countries encountered some issues regarding the IS infrastructure. So that, in Pakistan, hospital sector faces barrier of IS infrastructure which find difficulty in obtaining a suitable software and hardware. They found that infrastructure issue should be considered as well within the country. The review of the prior

empirical studies of IS innovation adoption in the healthcare domain for the introduction of PACS innovation and for adopting vital sign monitoring system technology indicated that the frequent role of top manager's support has a positive effect to change the attitude of the organization towards adopting the IS innovation (Jeyaraj et al., 2006).To adopt and implement HIS, hospital organizations may need some resources. Additionally, it is important to have a sufficient knowledge or experience regarding the HIS technology. Therefore, hospital organizations with top management support for HIS technology are highly possible to have more willingness in adopting it (Chang et al., 2007b; Hung et al., 2010; Lin et al., 2012).

According to Jeyaraj (2006), one of the best three predictors of IT adoption by organizations is size. Dewar and Dutton (1986) stress that more resources and infrastructure are available in a large-scale organization aimed at promoting an innovation. Previous studies indicate that large organizations have better ability than small organizations to allocate professionals (i.e. IT knowledge professionals) and possess more resources for shifting business strategy (Hung et al., 2010, Chang et al., 2006a; Alpar and Reeves, 1990). Additionally, regarding the context of technology innovation adoption in healthcare, previous studies strengthen that calculating return on investment, high costs, and sufficient financial resources are important challenges and contributions to adopting HIS technology (Chang et al., 2007b; Sulaiman, 2011b).

According to the study conducted by Sulaiman (2011) within public hospitals in Malaysia, it was found that financial issues can be seen as one of the main causes of why the assimilation of HIS is slow and in many ways unsuccessful and financial resources positively affect the decision of organizations in IS adoption (MacKay et al., 2004). In this respect, adequate fund supported by adequate monetary management has been emphasized strongly to be associated with the HIS adoption and implementation (Chang et al., 2007b, Sulaiman, 2011b; Sulaiman, 2011a). Therefore, hospitals need to ensure financial resources in terms of IT budget in order to facilitate HIS implementation.

Overall, the most obvious finding emerged and showed that the HIS adoption can be reasonably predicted by the four dimensions of Technology, Organization, Environment, and Human factors which were derived through the critical investigation of the literature review in developing the research framework. In addition to that, Relative Advantage, Compatibility, Complexity, Security Concern, IS Infrastructure, Top Management Support, Hospital Size, Financial Resources, Mimetic Pressure-Competitors, Coercive Pressure-Government, Vendor Support, Perceived Technical Competence of IS Staff, and Employees' IS Knowledge were found as the influential factors on HIS adoption.

Table 2
Review of prior studies using TOE, institutional theory and HOT-fit model and variables results by these theories/models with respect to HIS adoption.

Author(s)	Hospital Innovation/ Technology Studied	Theories/Models Used	Organizational dimension			
			IS Infrastructure	Hospital Size	Top Management Support	Financial Resources
Yang et al. (2013)	Vital signs monitoring System	TOE		√	√*	√*
Hsiao et al. (2009)	MNIS	TOE			√	
Lin et al. (2012)	HL7	TOE		√*	√*	
Chang et al. (2007)	E-signature	TOE		√*		√*
Hill (2000)	Hospital costing systems	Institutional theory				
Chang et al. (2006)	PACS	TOE			√*	
Lee and Shim (2007)	Hospital RFID	TOE (need pull & technology push)				
Lian et al. (2014)	Health cloud computing	TOE+HOT-fit			√*	√*
Gagnon et al. (2004)	Telehealth adoption	Institutional theory				
Li et al. (2005)	Mobile nursing technology	TOE			√	
Hung et al. (2010)	Hospital CRM system	TOE	√*	√*		
Liu (2011)	Telecare	TOE			√	
Marques et al. (2011)	Medical Records System	TOE+HOT-fit		√		
Klöcker et al. (2014)	E-health	Institutional theory				
Alam et al. (2016)	Hospital Human Resource Information System	TOE+HOT-fit	√		√	
Ahmadi et al. (2016)	Hospital Information System	TOE+HOT-fit+ Institutional theory		√		
Erlirianto et al. (2015)	Electronic Medical Record	HOT-fit			√	
Alhari et al. (2016)	Health cloud computing	TOE+HOT-fit			√	
Frequency/ Support			2/ 1	6/ 3	9/ 4	3/ 3

8. Conclusion

This study provided a literature review relevant to the organizational context in successfully adopt the HIS innovation. According our review, the factors of and barriers to HIS adoption, were uncovered from results of existing related literature on HIS adoption incorporated by TOE framework, institutional theory and HOT-fit model. It could be concluded that TOE framework accompanying institutional theory and HOT-fit model were the most comprehensive, eligible and suitable theories in developing a theoretical framework for HIS adoption. Also, the research findings conclude that human, technology; environment and organization are significant factors on HIS adoption within the different sizes of hospitals. This study provides a useful understanding of factors in the hospital context influencing the adoption of HIS framework.

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