

FACTORS INFLUENCING ADOPTION OF HOSPITAL INFORMATION
SYSTEM FRAMEWORK IN MALAYSIAN PUBLIC HOSPITALS

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To my father and beloved mother

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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. However, the investigation of HIS adoption in Malaysian public hospitals has been rarely explored in previous studies. Hence, the aim of this study is to identify significant factors that importantly driving the proposed HIS adoption framework from adopters' and non-adopters' perspective within the context of Malaysian public hospitals. This study examines the role of hospital size to determine whether it has moderating effect on the relationships among the potential factors and HIS adoption. Accordingly, this study integrates the Technology Organization Environment (TOE) Framework, Institutional Theory and Human Organization Technology (HOT) Fit Model to predict the factors influencing adoption of HIS framework in Malaysian public hospitals. Fourteen hypotheses were developed to test the proposed framework. This research applied the quantitative approach and conducted survey which involved eighty-eight small, eighteen medium and thirty-one large Malaysian public hospitals. A survey method using web-based questionnaire was conducted to examine the effects of the potential factors on HIS adoption by Malaysian public hospitals. Partial Least Square (PLS) method was performed to evaluate internal consistency, indicator reliability, convergent and discriminant validity of the survey instrument. The logistic regression method was applied to test the research hypotheses. The results from hypotheses testing indicated that relative advantage, compatibility, security concern, hospital size, mimetic pressure-competitors, vendor support, perceived technical competence of IS staff and employees' IS knowledge were the most significant factors for adopting HIS in the Malaysian public hospitals with p -value < 0.05 . The results from moderation hypothesis testing showed that hospital size has no significant effect with p -value > 0.05 on the relationships in the framework. The research findings conclude that the significant factors have the same effect 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 in both adopter and non-adopter hospitals.

ABSTRAK

Sistem Maklumat Hospital (HIS) merupakan Sistem Maklumat (IS) bersepadu yang direka bentuk untuk meningkatkan peranan bahagian klinikal, kewangan dan pentadbiran sesebuah hospital. HIS penting kepada sektor penjagaan kesihatan terutamanya hospital awam kerana ia perlu memberikan perkhidmatan yang berkualiti tinggi kepada masyarakat. Oleh itu, adalah penting untuk mengkaji penerimaan HIS di hospital awam. Namun begitu, kajian tentang penerimaan HIS di hospital awam Malaysia jarang-jarang diteliti dalam kajian sebelum ini. Justeru, kajian ini bertujuan untuk mengenal pasti faktor-faktor signifikan yang berpotensi menyumbang kepada cadangan kerangka penerimaan HIS daripada perspektif pihak yang menerima dan pihak yang tidak menerima dalam konteks hospital awam di Malaysia. Kajian ini mengkaji peranan saiz hospital untuk menentukan sama ada ia mempunyai kesan moderator terhadap hubungan antara faktor-faktor berpotensi dengan penerimaan HIS. Oleh itu, kajian ini menggabungkan Kerangka Persekitaran Organisasi Teknologi (TOE), Teori Institusi dan Model Suai Teknologi Organisasi Manusia (HOT) untuk meramalkan faktor-faktor yang mempengaruhi kerangka penerimaan HIS di hospital awam Malaysia. Empat belas hipotesis telah dibangunkan untuk menguji kerangka kajian ini. Kajian ini menggunakan pendekatan kuantitatif, dan menjalankan kaji selidik dengan melibatkan lapan puluh lapan buah hospital awam Malaysia yang bersaiz kecil, lapan belas buah hospital yang bersaiz sederhana dan tiga puluh satu buah hospital yang bersaiz besar. Kaji selidik berasaskan web telah dilaksanakan bagi mengkaji kesan daripada faktor-faktor yang berpotensi terhadap penerimaan HIS di hospital awam Malaysia. Kaedah Punca Kuasa Dua Separa Terkecil (PLS) digunakan untuk menilai ketekalan dalaman, petunjuk kebolehpercayaan, tumpuan dan kesahan diskriminan instrumen soal selidik. Kaedah regresi logistik pula digunakan untuk menguji hipotesis kajian. Dapatan kajian menunjukkan bahawa faedah relatif, keserasian, keutamaan keselamatan, saiz hospital, tekanan mengajuk-pesaing, sokongan vendor, tanggapan kecekapan teknikal kakitangan IS dan pengetahuan pekerja IS merupakan faktor yang signifikan terhadap penerimaan HIS di hospital awam Malaysia dengan nilai $p < 0.05$. Hasil kajian pengujian hipotesis menunjukkan bahawa saiz hospital tidak mempunyai kesan yang signifikan dengan nilai $p > 0.05$ ke atas hubungan lain di dalam kerangka HIS. Dapatan kajian merumuskan bahawa faktor yang signifikan mempunyai kesan yang sama kepada penerimaan HIS walaupun saiz hospital yang berbeza. Kajian ini memberikan kefahaman yang berguna tentang faktor-faktor yang mempengaruhi kerangka penerimaan HIS bagi kedua-dua jenis hospital yang menerima dan yang tidak menerima guna HIS.

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LIST OF ABBREVIATIONS

AHA	-	American Hospital Association
AVE	-	Average Variance Extracted
CIS	-	Clinical Information System
CPOE	-	Computerized Physician Order Entry
DOI	-	Diffusion of Innovation
EAI	-	Enterprise Application Integration
EHR	-	Electronic Health Record
EMR	-	Electronic Medical Record
FEDI	-	Financial Electronic Data Interchange
FIS	-	Financial Information System
FIS	-	Fundus Imaging System
HAART	-	Highly Active Antiretroviral Therapy
HIE	-	Health Information Exchange
HIS	-	Hospital Information System
HLS	-	Health Level Seven
HOT	-	Human-Organization-Technology
ICT	-	Information and Communication Technology
IDT	-	Innovation Diffusion Theory
IHISAF	-	Integrated Hospital Information System Adoption Framework
IHSR	-	Institute for Health System Research
IS	-	Information System
IT	-	Information Technology
LHP	-	Lifetime Health Plan
LIS	-	Laboratory Information System
MMRS	-	Mosoroit Medical Record System
MNIS	-	Mobile Nursing Information Systems

MOH	-	Ministry of Health
MREC	-	Medical Research Ethics Committee
MSC	-	Multimedia Super Corridor
NEHAP	-	National Environmental Health Action Plan
NIH	-	National Institute of Health
NIS	-	Nursing Information System
NMRR	-	National Medical Research Register
PACS	-	Picture Archiving and Communication System
PHR	-	Patient Health Record
PIS	-	Pharmacy Information System
PLS	-	Partial Least Square
RFID	-	Radio Frequency Identification
RIS	-	Radiology Information System
SPSS	-	Statistical Package for the Social Sciences
β	-	Regression Coefficient
TAM	-	Technology Acceptance Model
TOE	-	Technology-Organization-Environment
TPB	-	Theory of Planned Behavior
U.S.	-	United States
X	-	Independent Variable

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The healthcare industry is currently one of the fastest growing industries (Chong and Chan, 2012; Hegde, 2008; Curry and Sinclair, 2002). There is a growing transformation of Information Technology (IT) into the healthcare industry (Lu *et al.*, 2012; Wilson and Lankton, 2004). Hospitals by adopting IT applications would gain the great benefit, ranging from medical systems to administration systems. The reason behind this, is that hospitals are an information intensive industry (Chang *et al.*, 2006). However, it was reported that the healthcare industry is sluggish in the adoption of technology (Lee *et al.*, 2012; Wager *et al.*, 2005; Menachemi *et al.*, 2004; Stegwee and Spil, 2001; Suomi, 2001; Wickramasinghe, 2000). The issue of what factors promoting the adoption of Hospital Information System (HIS) in a healthcare setting becomes an important question for all healthcare administrators (Ismail *et al.*, 2015; Yang *et al.*, 2013; Chang *et al.*, 2006). Even in the United States, hospitals only 17 percent have the innovation of Computerized Physician Order Entry (CPOE) by 2009 (Lee *et al.*, 2012; Menachemi *et al.*, 2004).

Understanding the impact of innovation on different categories of adopters and non-adopters has been one of the potential values which has been discussed in previous researches (Lian *et al.*, 2014; Hossain and Quaddus, 2011; Chang *et al.*,

2007; Misra and Mondal, 2011). Somewhat to-date; only the adopters' viewpoints have been studied by researchers. Nonetheless, it is noted that for two distinctive adoption processes (i.e. adopters and non-adopters setting), a particular barrier or factor could perform differently (Lin *et al.*, 2012; Low *et al.*, 2011; Khajeh-Hosseini *et al.*, 2010; Hsiao *et al.*, 2009; Chang *et al.*, 2007; Lee and Shim, 2007; Chang *et al.*, 2006). Therefore, it is imperative to study both adopters and non-adopters setting at the same time in order to get the deep understanding of factors and barriers in HIS adoption. From the above introduction, the current study is therefore, conducted to facilitate the understanding of drivers and barriers to HIS adoption and thereby assisting hospitals' decision makers or administrators to foster the trend of HIS adoption.

This chapter provides the general overview of the intended study to understand the purpose, aims and significance of this study. This is organized in nine main sections, describing the overview of this study (Section 1.1), problem background (Section 1.2), problem statement (Section 1.3), research questions (Section 1.4), objectives (Section 1.5), scope (Section 1.6) and significance (Section 1.7). Finally, the structure applied for the remaining sections of this study are provided (Section 1.8), and then this chapter is summarized (Section 1.9).

1.2 Background of the Problem

In terms of public sector, healthcare has been one of the critical areas that required a dramatic change for its improvisation (Lee *et al.*, 2012; Siddiquee, 2010; Siddiquee, 2008). In addition, the criticisms of the public sector, including public hospitals, have always been about their poor performance, red tape, inefficiencies, lack of flexibility, and ineffective accountability (Siddiquee, 2010; Siddiquee, 2006). There are competitions between Malaysian hospitals and clinics for businesses, and besides that the healthcare industry of Malaysia is competing with developing

countries such as Thailand and Singapore (Chong and Chan, 2012; Chee and Barraclough, 2007). In Malaysia, various reformation plans were outlined by the newly or re-elected government with the ambition of being competitive with other developing countries in the advent of globalization (Siddiquee, 2010; Siddiquee, 2008; Siddiquee, 2006). Although the Malaysian government has launched its vision 2020 plan for incorporating Information System (IS)/IT as the backbone of every future initiative with respect to the healthcare, the actual implementation of these plans are not as progressive as it was intended to be (Ismail *et al.*, 2013; Lee *et al.*, 2012; Sulaiman, 2011; Chin, 1998).

Basically, the Malaysian healthcare system consists of both public and private sector. Also the rural areas are mostly served by the government health clinics and hospitals (UNICEF, 2006; WHO, 2006). In Malaysia, with reasonable prices the healthcare services are provided to people. However, there are some important factors such as healthcare service demand from the citizens, population structure, lifestyle, and changing pattern of death causing diseases which have forced the application of advanced facilities and management systems to be adopted and used (Lee *et al.*, 2012; Abdullah, 2008). Healthcare cost is a big challenge to government whereas improving the quality should be improved as well (Lee *et al.*, 2012). Furthermore, critical deficit of healthcare workers particularly in developing countries has taken placed (Organization, 2006). To overcome these issues there are several projects developed by the Malaysian government with the aim of also promoting and maintaining the wellness of citizens and to provide greater access to healthcare information. According to Abidi *et al.* (1998), “Multimedia Super Corridor (MSC) began in 1996 to emphasize on the national vision of 2020.” This assists Malaysia towards becoming a developed country by year 2020 through particular objectives. Initially, MSC project is emphasized on various projects that have been recognized as flagship projects. In this regard, Telemedicine is one of the focused area for the intensive development (Lee *et al.*, 2012; Li, 2010).

Telemedicine is a healthcare reform initiative that known as the Telemedicine Blueprint under MSC Telehealth project which has been launched to reform the Malaysian healthcare system. Under the MSC telemedicine, Lifetime Health Plan (LHP) is seen as a very complex project that involves continuous personalized contact with healthcare providers. In addition, improving a healthcare platform is the focus of LHP that would facilitate primary healthcare provider or the general hospitals in fulfilling Personal Lifetime Health Plans (PLHP) to the public. Under the LHP project, HIS was introduced to start the process of digitalization of the healthcare sector (Ismail *et al.*, 2013; Lee *et al.*, 2012; Mohd and Syed Mohamad, 2005; Abidi *et al.*, 1998). In addition to that, three types of HIS were introduced: Total Hospital Information System (THIS), Intermediate Hospital Information System (IHIS), and Basic Hospital Information System (BHIS). HIS applications decision is according to the number of beds that the particular hospital has. THIS gives an integrated system whereas BHIS is the lowest and limited system. One of the vital factors in determining the categories of HIS is hospital size. Hospitals that have less than 200 beds, are categorized as BHIS hospital, while hospitals that have number of beds between 200 and 400, are categorized as IHIS hospital. Finally, those hospitals that have more than 400 beds, are categorized as THIS hospital (Lee *et al.*, 2012). In addition, different categories of HIS face different challenges (Ismail *et al.*, 2013; Ismail *et al.*, 2010; Li, 2010; Mohan and Razali, 2004).

There are currently 141 public healthcare facilities including 137 hospitals and four special medical institutions in Malaysia having more than 39000 beds (MOH-Malaysia, 2014). It has to be noted that the percentage of total Ministry of Health (MOH) allocation to national budget is 8.39% (MOH-Malaysia, 2014). It has been also reported that only 22 out of 137 public hospitals are referral and tertiary hospitals equipped with either fully integrated or partially integrated HIS since the Telehealth initiative was launched more than a decade ago. In addition, there is no precise information regarding the state of HIS technology adoption level (MOH-Malaysia, 2014; Ismail *et al.*, 2013; Lee *et al.*, 2012; Sulaiman, 2011; Ismail *et al.*, 2010; Sulaiman and Alias, 2006).

With the rapid developments in IS providing support for specialized healthcare tasks and services (Chen and Hsiao, 2012), and in recognition of the Malaysian government's plan for implementing HIS, many hospitals started the initiatives to adopt HIS to support clinical and administrative operations. Some hospitals have reached this level of computerization (Lee *et al.*, 2012), however instructions from the Malaysian MOH to automate all hospitals have yet to be complied with (Ismail *et al.*, 2013; Kamal, 2013). According to Fadhil *et al.* (2012), adoption of HIS in many public hospitals in Malaysia is still at an early stage. Hence, it appears that HIS diffusion is still in its early stage and there is slow rate of adoption among large, medium, and small public hospitals in Malaysia.

HIS is complex in nature (Lee *et al.*, 2012). HIS, Electronic Medical Record (EMR), telemedicine and CPOE are those, which fall into the category of complex IS. They generally bring about the usage of IS as a means to provide better health services for the community and overcome challenges that have been perceived as cumbersome for people seeking medical treatment (Jha *et al.*, 2008). Therefore, there can be a significant effect of IS adoption on the quality and performance of the medical services provided by hospitals. Nevertheless, these health information system innovations have not escaped from various challenges and issues both from internal and external factors (Wager *et al.*, 2005). Although a remarkable number of previous researches on organizational IS adoption have been conducted, the nature of IS adoption process in the healthcare is still not well understood (Lian *et al.*, 2014; Marques *et al.*, 2011; Lee and Shim, 2007). Despite the fact that much has been written about the process of innovation adoption (Zhu *et al.*, 2006; Frambach and Schillewaert, 2002; Gallivan, 2001; Fichman and Kemerer, 1997; Rogers Everett, 1995; Cooper and Zmud, 1990; Tornatzky *et al.*, 1990; Meyer and Goes, 1988; Zaltman *et al.*, 1973), there is little information concerning the process of innovation adoption in hospitals (Omachonu and Einspruch, 2010). Furthermore, the healthcare industry has been criticized for being slow in the adoption of technology to support the delivery of care (Sulaiman, 2011; Wager *et al.*, 2005; Stegwee and Spil, 2001; Suomi, 2001; Wickramasinghe, 2000).

There has been a huge investment in Malaysia in a lot of Information and Communication Technology (ICT) resources to enhance healthcare services. However, the level of ICT integration in healthcare particularly in hospitals is still not promising (Lee *et al.*, 2012). Only 15.2% of the Malaysian public hospitals are referral hospitals equipped with either fully integrated or partially integrated HIS since the Telehealth project was launched more than a decade ago (Ismail *et al.*, 2013; Sulaiman, 2011; Ismail *et al.*, 2010). Therefore, this indicates slow progress on the trend of HIS adoption in Malaysia. Furthermore, the issue of which factors promote the adoption of IS in a healthcare setting becomes an important question for all healthcare administrators (Lian *et al.*, 2014; Omachonu and Einspruch, 2010; Hsiao *et al.*, 2009; Chang *et al.*, 2006). With regard to the Malaysia, the government healthcare initiative involving telemedicine is currently being used in selected hospitals and is heavily criticized to be just a technology (Sulaiman, 2011; Bulgiba, 2004; Merican and bin Yon, 2002).

According to the above discussion and in the direction of theories for adoption, Technology Organization Environment (TOE) perspective is suggested as a comprehensive lens to identify the imperative factors of health information system adoption at the organization level (hospital) by focusing on the dimensions of technology, organization, and environment (Lian *et al.*, 2014; Sulaiman and Wickramasinghe, 2014; Hung *et al.*, 2010; Chang *et al.*, 2007; Zhu *et al.*, 2006; Zhu *et al.*, 2003). In this regard, institutional theory discusses the external environmental pressures that exist in the institutional environment which force organizations to follow the new action as others (isomorphism). In addition to both theories discussed above, Human Organization Technology (HOT) fit model (Yusof *et al.*, 2008a; Yusof *et al.*, 2008b) concentrates on human, organization, and technology dimensions in the healthcare environment and examines the effects of those dimensions on the successful adoption of health information system (Lian *et al.*, 2014). Therefore, the importance of human aspect in the development and implementation of IS was advocated with regard to the IS literature (Tsiknakis and Kouroubali, 2009; Goodhue *et al.*, 2000; Davis, 1993).

It can be concluded that a study that examines the factors related to the four dimensions of technology, organization, external environment and human is important. In other words, it helps in how technology can be successfully adopted throughout the innovation adoption phases. This study serves to fill a gap in the existing literature through explaining of “how can HIS be adopted by Malaysian public hospitals?”; by identifying the potential factors of and barriers to the adoption of HIS in settings of both adopter and non-adopter groups. In addition, this study is the stream of innovation diffusion research and it follows the statement by Fichman (2000) in which there are several characteristics for each type of innovation where each of them has possessed at least two of the characteristics. Hence, there are occurred confusion and overlaps in theoretical model among them. As a result, combining multiple theoretical streams into a more integrated view of IS innovation is heavily encouraged (Fichman, 2000; McGrath and Zell, 2001). According to the above discussion, there are reasonable motivations for this study in developing a suitable incorporated view of theoretical framework. This can be built on the basis of relevant aforementioned theories for public hospitals to foster the adoption of HIS technology which can provide plenty of benefits to both parties including hospitals and more importantly to the patients community.

1.3 Statement of the Problem

The healthcare industry is seen as one of the most information intensive industries (Lu *et al.*, 2012; Wager *et al.*, 2005; Wickramasinghe, 2000; Lian *et al.*, 2014). Progressively, IS has been recognized as a tool to facilitate more efficient utilization of all the data and information within the healthcare industry (Sulaiman, 2011). There are many advantages of HIS. As an instance, hospital data management is improved through a repository for valuable data. In addition, through its automated system, record tracing activity, statistics, and projections are performed more easily and systematic. Consequently, within hospital, the requirement of extra manpower to do those tasks is decreased due to the fact that everything is automated. Additionally,

by integrating IS in healthcare, patient's safety can be improved. It is well known that hospitals must consider to make a wise decision to successfully adopt HIS if they are to gain healthcare privileges. Accordingly, the main research issue in this study is to investigate the adoption of HIS by Malaysian public hospitals. Nevertheless, it is important to understand the reasons for identifying the imperative factors affecting the hospital's adoption of HIS. In the following discussions, the researcher tries to elaborate on these reasons:

First, the healthcare industry is seen as one of the most information intensive industries (Wager *et al.*, 2005; Wickramasinghe, 2000). According to Omachonu and Einspruch (2010), "IT has played a vital role in the innovation of healthcare systems." Practitioners especially those involving patients with complex medical history may perceive that the process of transforming medical records from ordinary written style to electronic style is time consuming. Meanwhile, a standard method is required to record and integrate new information into the system to allow an appropriate diagnosis to be taken. Hence, ensuring the accuracy of medical records to medical professionals become very imperative to establish a high quality of healthcare to be delivered (Lee *et al.*, 2012). According to Ismail *et al.* (2013) and Sulaiman (2011), HIS is important to healthcare sector especially in public hospitals, as they need to serve the public with high quality healthcare treatments. In Malaysia HIS covers all aspects of the hospital's operation such as clinical, administrative and financial systems (MOH-Malaysia, 2014). Furthermore, HIS manages all the information processing activities within hospital to achieve high quality patients care services and medical research (Winter and Haux, 1995).

HIS undeniably provides valuable assistance to the clinical work practices, especially in storing and retrieving information on patient's medical histories. Efficient services providing almost immediate clinical test results have subsequently lead to easier and faster decision making on the patient's medical treatment. The HIS has also been acknowledged as a medium of communication amongst medical staff in providing a diagnosis for cross department cases. Accordingly, in order to cater for the increasing demands of the society regarding the healthcare services, there are

requirements for healthcare services to be redesigned through integrating ICT-enabled function (Lee *et al.*, 2012; Abdullah, 2008).

Second, a major transformation is being experienced by the healthcare industry in terms of IT (Wilson and Lankton, 2004; Omachonu and Einspruch, 2010). By nature, hospitals are in an information-intensive industry and hence they will benefit greatly from the adoption of IT applications (Hsiao *et al.*, 2009). The issue of HIS integration has been reported in the literature for decades and is unfortunately still among the core issues in HIS success that remain relevant yet unsolved (Haux, 2006; Chang, 1996; Li, 2010). Integration of medical records between local and regional hospitals has been argued to be of significant importance in creating a complete HIS and in providing significant benefits to clinicians who are in need of inter-department collaboration in solving patient's cases (Otieno *et al.*, 2008; Anderson *et al.*, 2006; Lin *et al.*, 2012). Notwithstanding the significance of health information systems and the diverse challenges of their adoption, the scarcity of study in the IS literature exists with regard to the domain of healthcare. Although by adopting the HIS systems, healthcare professionals and patients can obtain plenty of advantages, there is a high incidence of unsuccessful HIS projects and problems with initiating their adoption (Yang *et al.*, 2013; Sulaiman and Wickramasinghe, 2014).

Third, the HIS project was first launched in Malaysia in late 1999 as a direct result of the Prime Minister's vision for Malaysia to become a developed country by the year 2020 (Lee *et al.*, 2012; Abdullah, 2008). It was the aim of Malaysia to be the first in the world to have a single HIS which covers all aspects of hospital's operation, both clinical and non-clinical (Sulaiman, 2011; Ismail *et al.*, 2015). Nevertheless, the trend of integrated technology adoption such as HIS in the hospitals has been slow. Lee *et al.* (2012) note that in Malaysian hospitals the level of integration of ICT into the healthcare delivery system is unsatisfactory.

According to Abdullah (2008), Sulaiman and Wickramasinghe (2014), and Lian *et al.* (2014), key factors that influence the adoption of IS in healthcare industry can be categorized into four dimensions: human dimension, organizational dimension, environmental dimension, and the characteristics of IS itself. In addition, according to Chang *et al.* (2006), the different critical factors explain the special concerns needed at the specific stage of technology diffusion including initiation, adoption, and routinization. Hence, applying the factors divided into four aforementioned dimensions would be essential to increase the adoption of HIS since they have been identified and supported through the literature of IS adoption with regard to healthcare context. Accordingly, by integrating institutional theory along with recently developed HOF-fit model into the dimensional framework of TOE, it would provide an important contribution to the theory to understand specific type of IS innovation. It also provides theoretical contribution in the context of healthcare industry as to study the adoption of HIS by Malaysian public hospitals (Fichman, 2000; Rogers Everett, 1995).

1.4 Research Questions

In the current study, the researcher focuses on the following research question:

How can HIS be adopted by Malaysian public hospitals? Accordingly, the main research question is supported by the following sub questions:

- (i). What are the potential factors that affect the adoption of HIS?
- (ii). What is the integrated theoretical framework that aims in fostering the adoption of HIS by Malaysian public hospitals?
- (iii). Does the difference in hospital size influence the relationship between the potential factors and HIS adoption?

1.5 Objectives of the Research

The research objectives are defined based on the problem statement and research questions as follows:

- (i). To identify the potential factors that affect the adoption of HIS.
- (ii). To develop and validate an integrated theoretical framework that aims in fostering the adoption of HIS by Malaysian public hospitals.
- (iii). To examine if hospital size moderates the relationship between the potential factors and HIS adoption.

1.6 Scope of the Research

The scope of this study covers the following:

- (i). This study focuses on the area of Malaysian public hospitals including small, medium and large hospitals that are complied with the initiative of HIS.
- (ii). This study considers groups of Malaysian public hospitals including small, medium and large hospitals (adopters and non-adopters setting) as the units of analysis. In details, the researcher concentrated on both groups with regard to managerial level of public hospitals' perspectives as the scope of the study.
- (iii). Due to the nature of HIS, this study provides focus on adopting HIS that covers hospital workflow including both clinical and non-clinical aspects.
- (iv). This study is a survey-based questionnaire that targets the decision makers whom are the seniors within the hospital management or the

key influential people in the HIS adoption project, for collecting the data.

- (v). In this research, positivism approach is used as a research paradigm and the quantitative method has been applied to achieve the main goal of this research.
- (vi). For the quantitative approach, SPSS v.22 and SmartPLS 2.0 software are utilized to analyze the findings of the study.

1.7 Significance of the Research

The significance of this study is based on two main perspectives, which are as follows:

From the first perspective, this study is amongst the first survey-based studies in Malaysia to contribute in fostering HIS adoption in organizational level (hospital organizations). By integrating ICT into healthcare daily work routine, it brings considerable benefits, since MSC Telehealth project was initiated in Malaysia in 1996 at aiming to reform the Malaysian healthcare system and nurturing the national vision of 2020. Hence, the research in this nature is important in motivating and trying to streamline reform strategies. Thus, findings from this study would contribute to the idea and body of knowledge about better understanding of adoption decision of technology in the healthcare industry. To this end, this study is based on firm/organization analysis where its respondents are decision makers that are positioned at the seniority level. Therefore, this can be important to increase validity of findings to facilitate decision process towards technological innovation adoption in the healthcare environment.

From the literature in the field of study, there is not sufficient study regarding integrated technologies with direct consideration on healthcare industry as for HIS. Besides, healthcare organizations continue to struggle with integrated technology challenges and therefore more confusion remains. As described in the literature, HIS is becoming an essential tool in hospitals that is integrated and embedded in the core business processes. This will create an environment that information can be easily shared throughout all the hospital's departments, work processes are automated, patient safety in the management of illness will be improved as well as workflow is enhanced through the reengineering of work processes. Therefore, this study makes an effort to inspire and provide a clear perspective on integrated technology that intended to identify and explain the imperative factors that affect adoption of integrated HIS. As a result, it provides more insight on why organizations are willing or unwilling to use the HIS. Hence, this can inaugurate the analysis of such integrated technology in facilitating the healthcare organizations that hospital decision makers consider to adopting this technology.

From the second perspective, regarding the existing IS adoption literature, very few studies have examined empirically the influence of institutional external pressures on organizational adoption of IS innovation using institutional theory. To the best of researcher's knowledge, there is no study to examine this effect on hospital technology adoption with respect to organizational level, since the healthcare industry is a very institutionalized environment (Currie, 2012; Jensen *et al.*, 2009; Mohr, 1992). Hence, it is imperative for greater attention to be directed towards understanding institutional isomorphism when investigating IS innovation adoption with regard to the healthcare industry and in particular hospitals (Currie, 2012; Jensen *et al.*, 2009; Teo *et al.*, 2003) where the current study has undertaken it.

There is a lack of theories being developed for a specific type of innovation and for a particular adoption context such as healthcare organization due to the lack of generic theory of technology innovation. This is more emphasized by scholars, on advocating the need to study more than one innovation characteristic, which will lead

to increase the relative predictive power of characteristics in evaluating the organizational adoption process. Hence, the current study made an effort to incorporate these statements as was suggested. Furthermore, since IS innovations possess two or more of the distinctive characteristics, and also there are theoretical overlaps among them, combining multiple theoretical streams into a more integrated view of IS innovation is required. Consequently, the explanatory power would be increased to justify the adoption of IS innovation in the organizational context.

Finally, to the best of researcher's knowledge, by reviewing carefully the IS adoption literature, no study up to now incorporated the TOE and institutional theory along with the HOT-fit model in order to more understand the potential factors influencing the HIS adoption in the organizational context. In addition, a moderator, which is the size of hospital in terms of number of beds was introduced and proposed by this study.

1.8 Organization of the Thesis

This thesis is organized and presented in six chapters. The chapters are well-related and complimentary to each other. The brief outline about the chapters is as follows:

Chapter 1 provides a brief introduction to the subject and the context of the study together with the research problem. It then highlights the objectives of this study together with the scope and significance. Finally, this chapter also presents the overall organization of the current thesis.

Chapter 2 reviews the literature on hospital information systems, Malaysian healthcare system and the current state of HIS in healthcare. In addition, this study reviews the existing literature on HIS adoption, TOE framework, HOT-fit and institutional theory. The review also includes a critical analysis of relevant theories in IS domains and particularly in health information system. Furthermore, the potential factors of and barriers to HIS adoption resulted by the selected theories of this study are identified.

Chapter 3 focuses on the appropriate research paradigm and research approach (method) that are particularly relevant to this study. Then, the research design along its operational framework including all stages in details involved, throughout the study is provided. Besides that, a pilot survey that was conducted to develop the survey instrument is described.

Chapter 4 presents the formulation of the initial research framework, which is based on the results of Stage 2 (literature review) and in line with the related existing literature on HIS adoption incorporated by TOE, institutional theory along with HOT-fit model. The research hypotheses are also proposed.

Chapter 5 presents the main data analysis related to testing and developing the initial integrated theoretical framework by utilizing the measurement model analysis with SmartPLS 2.0 software and statistical analysis of logistic regression model with SPSS v.22 software. Consequently, findings are discussed.

Chapter 6 presents the summary of the research and provides contribution of the research findings, based on theoretical and practical perspectives. This chapter acknowledges the limitations of the current research and hence proposes suggestions for future research.

1.9 Summary

This chapter started with the overview of the research. Then, the problem background of this study was discussed. The discussion contains the importance of the research and the gaps in existing literature. In addition, the discussion was to determine the focus of the study that leads to present the research questions and the research objectives. Following this, the scope of this research was elaborated to concentrate on the very specific areas, units of analysis, research methods and software used. Finally, this chapter provided the significance of research followed by organization of the thesis.

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