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A CM-BASED PREVENTION MODEL FOR IS PROJECTS IMPLEMENTATION FAILURE IN MALAYSIAN GOVERNMENT HOSPITALS

NOORHAYATI BT MD JASIN

MASTER OF SCIENCE (INFORMATION TECHNOLOGY)
UNIVERSITI UTARA MALAYSIA
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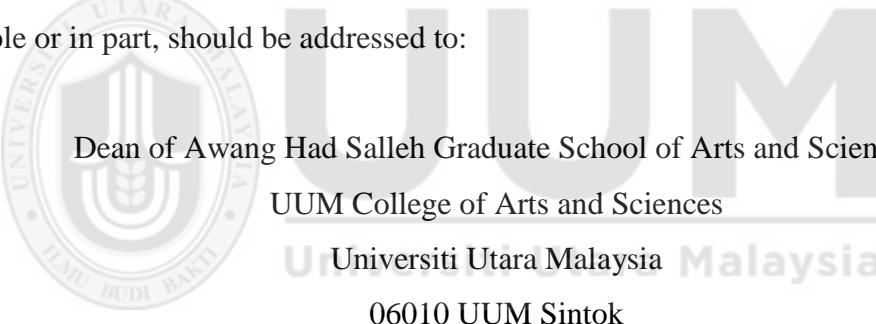
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ABSTRAK

Hospital kerajaan di Malaysia telah menggunapakai sistem maklumat (IS) sebagai pemangkin dalam menyediakan perkhidmatan yang lebih baik kepada orang ramai. Walau bagaimanapun, sebahagian daripada pelaksanaan IS menghadapi pelbagai cabaran seperti rintangan pengguna untuk berubah, pengguna tidak sedar betapa pentingnya sistem berkenaan, dan kekurangan sokongan dan pemantauan daripada pengurusan pertengahan dan pengurusan atasan. Akibatnya, ia gagal dilaksanakan dengan jayanya. Kajian awal mendapati tiada garis panduan dalam melaksanakan IS di hospital kerajaan di Wilayah Utara Malaysia. Oleh itu, kajian ini mengkaji faktor kegagalan pelaksanaan IS di hospital dan membina model pencegahan yang menggabungkan Pengurusan Perubahan (CM). Satu kajian literatur dan temu bual telah dijalankan. Faktor Kegagalan Kritikal (CFFs) pelaksanaan projek IS dan tiga model CM (model CM Lewin, model CM Kotter dan model ADKAR Prosci) telah dikenalpasti. Personel utama yang mewakili pengurusan tertinggi, pengamal IT dan pengamal perubatan daripada empat hospital kerajaan yang terpilih di Wilayah Utara Malaysia terlibat dalam pengumpulan data. Model pencegahan yang berasaskan CM telah dibangunkan berdasarkan CFFs yang telah dikenalpasti dan tiga model CM. Teknik Delphi digunakan untuk menilai model yang dicadangkan, melibatkan pakar domain dari hospital yang dipilih. Tiga puluh enam CFFs telah dikenalpasti yang dikategorikan kepada empat kategori utama; isu manusia, isu teknologi dan infrastruktur, limitasi perisian, dan isu sokongan. Model pencegahan yang dicadangkan dibahagikan kepada tiga sub-fasa Pelaksanaan; Pra-Pelaksanaan, Semasa-Pelaksanaan dan Pasca-Pelaksanaan. Model yang dicadangkan diyakini dapat memberi manfaat kepada pengurusan tertinggi, pengamal IT dan pengamal perubatan bagi mencegah kegagalan pelaksanaan projek IS di hospital kerajaan di Malaysia.

Kata kunci: projek IS, kegagalan pelaksanaan, model pencegahan, Pengurusan Perubahan, Faktor Kritikal Kegagalan (CFFs)

ABSTRACT

Malaysian government hospitals have adopted information system (IS) as an enabler in providing a better service to public. However, some of the IS implementations are facing many challenges such as users' resistance to change, users did not realize the importance of the system, and lack of support and monitoring from the middle managers and top management. Consequently, it failed to be implemented successfully. Preliminary studies revealed that there is no guideline for IS implementation in government hospitals in Northern Region of Malaysia. Hence, the study investigates the failure factors of IS implementation in hospital and construct a prevention model which incorporates Change Management (CM). An extensive literature review and interviews have been conducted. Critical Failure Factors (CFFs) of IS projects implementation and three CM models (Lewin's CM model, Kotter's CM model and Prosci's ADKAR model) have been identified. Key persons representing top management, IT practitioners and medical practitioners from four selected government hospitals in Northern Region of Malaysia were involved in data collection. A CM-based prevention model was constructed based on the identified CFFs and three CM models. Delphi technique was used to evaluate the proposed model, involving domain experts from the selected hospitals. Thirty-six CFFs have been discovered which have been categorized into four main categories; human issues, technology and infrastructure issues, software limitations, and support issues. The proposed prevention model is divided into three sub-phases of Implementation; Pre-Implementation, During-Implementation, and Post-Implementation. The model is believed to be beneficial for top management, IT practitioners and medical practitioners in preventing IS implementation failure among government hospitals in Northern Region of Malaysia.

Keywords: IS projects, implementation failure, prevention model, Change Management, Critical Failure Factors (CFFs)

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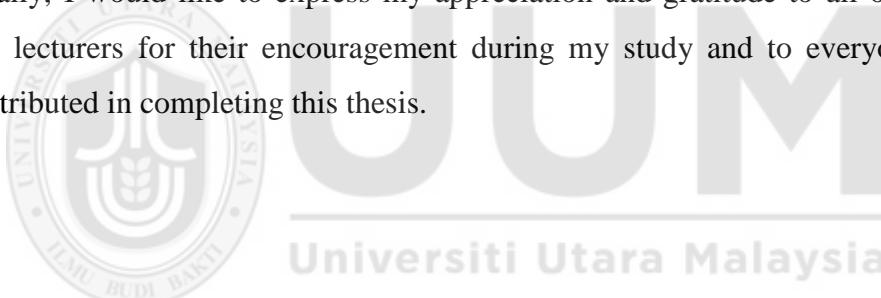
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CHAPTER ONE

INTRODUCTION

This chapter explains the overview of the study, problem statement, research questions, research objectives, significance of the study, contributions and the scope of the study.

1.1   Overview of the Study

Malaysian Government has adopted ICT as an enabler in providing a better service to the public across various departments and agencies. This effort not only has invested a big amount of money on hardware and infrastructure, but also on application development in order to manage information efficiently and effectively.

In managing information to offer a better quality of health to the public, a variety of information system (IS) applications have been introduced in Malaysian government hospitals which covers several aspects of work processes. However, IS implementation in hospital is very challenging because hospital is a very sensitive environment which deals with patient's life (Abouzahra, 2011). There are numerous systems and devices that the medical practitioners (e.g. doctors, nurses, radiologist, scientists) need to work with, while the integration between the systems is very important because the failure may result in serious harm to patients as in providing suitable treatment and prescribing precise medicine to the patient (Abouzahra, 2011).

Some of the applications that have been implemented in hospitals are Teleconsultation (TC), Hospital Information System (HIS), Pharmacy Information

System (PHIS) and many more. All systems not only used to manage information efficiently, but also provide a better access to the information which is very helpful in decision making and consequently provide a better service to the public. However, some of the systems are suffering and facing many challenges during the implementation and failed to be implemented successfully. IS implementation failure can be categorized into two; either total failure or partial failure.

When a new IS project is implemented, there might be changes in policies, procedures, processes, technology and also the way of doing job. All these changes involve peoples, technology and processes which will appear at various levels of people in the organization; top management, middle managers and also the other employees. All these changes must be managed accordingly to ensure the success of IS project implementation.

Change Management (CM) is an approach used to manage human-side of change. *"Change management is about engaging and preparing people" (Neumeier, 2013).* Moreover, previous researchers (Ziemba & Oblak, 2015; Varghese, 2014; Leyland, Hunter, & Dietrich, 2009; Gerdsri, Assakul, & Vatananan, 2008) have proved the ability of CM to tackle human issues in IS implementation. Hence, Change Management has been suggested as a solution to the problem.

1.2   Problem Statement

IS projects failure have become a global issue as it happens everywhere around the globe. In 2015, Standish Group International has conducted a study of 50,000

software development projects around the world. The findings of the study are shown in Table 1.1.

Table 1.1

Software projects performance by Standish Group International (Hastie & Wojewoda, 2015)

MODERN RESOLUTION FOR ALL PROJECTS					
	2011	**2012**	**2013**	**2014**	**2015**
SUCCESSFUL	29%	27%	31%	28%	29%
CHALLENGED	49%	56%	50%	55%	52%
FAILED	22%	17%	19%	17%	19%

The Modern Resolution (OnTime, OnBudget, with satisfactory result) of all software projects from FY2011-2015 within the new CHAOS database.

As shown in Table 1.1, there are three types of projects resolutions; successful, challenged and failed. From the study we can see that the trend of software project for the last five years is almost the same; i) Successful projects are between 27 to 31 percent; ii) Challenged projects are between 49 to 56 percent; and iii) Failed project are between 17 to 22 percent.

On the other hand, McKinsey-Oxford study presented another significant statistics of IT projects performance (Bloch, Blumberg, & Laartz, 2012). In a study of 5,400 large scales IT projects (initial budget exceeding $15M), it is found that 66 percent of the software projects faced with cost overrun and 33 percent schedule overrun, while

17 percent were faced with benefit shortfall. The findings are illustrated in Figure 1.1.

The performance of different types of IT projects varies significantly.

% of IT projects with given issue (for those with budgets >$15 million in 2010 dollars)

Project type	Average cost overrun	Average schedule overrun	Average benefits shortfall
Software	66	33	17
Nonsoftware	43	3.6	133
Total	45	7	56

Source: McKinsey–Oxford study on reference-class forecasting for IT projects

Figure 1.1. McKinsey-Oxford study on the performance of IT projects (Bloch et al., 2012)

Based on previous studies (Bindakheel & Rosnah, 2010; Handayani, Abdullah, Abdulgani, & Ahmad Dahlan, 2010; Maarop, 2011; Sutan Ahmad Nawi, Abd. Rahman, & Ibrahim, 2012; Ghanim, Munassar, & Ahmad Dahalan, 2013), it shows that IS projects in Malaysian government agencies are inevitable from suffering of this issue due to several factors.

Although the IS projects has been developed according to stakeholders' requirements within a specific scope, budget and time, it never guaranteed that the system will be implemented successfully due to many reasons. Resistance to change is one of the common issues during the implementation of a new system (Munassar, Ghanim, & Ahmad Dahlan, 2013; Bourda, 2013; Sutan Ahmad Nawi et al., 2012; Carpenter,

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Bauer, & Erdogan, 2012; Kornkaew, 2012; Levasseur, 2010; (Al-Ahmad et al., 2009); Heeks, 2002). Project management factors, top management factors, organizational factors, complexity/size of project, technology factors and process factors are some of the dimensions that contribute to the failure (Sutan Ahmad Nawi, Abd. Rahman, & Ibrahim, 2012).

To sustain the usage found to be another challenge during a new system implementation. After a significant period of implementation, there are cases where the system found not to be fully utilized such as in the implementation of Teleconsultation in healthcare organizations in Malaysia (Maarop, 2011). Another example is in University of Malaya Medical Centre (UMMC) where most of the processes are automated. However, some important application such as Electronic Medical Record has not been implemented (Bindakheel & Rosnah, 2010).

Personal communication with Ms Chua Hooi Chin (2015), an IT Officer in Hospital Kulim Kedah revealed that challenges in implementing IS projects mostly related to lack of invisible support and monitoring from the middle managers and top management. Effective communication and instruction from the top management will give a high impact to the end users to make the systems implementation a success. Furthermore, the end users did not realize the importance of the system until they are being asked by the top management for certain reports or statistics, where all the information needed actually can easily be captured from the system if the system is fully utilized. Previous researchers (Patanakul, 2014; Almajed & Mayhew, 2014; Huang, 2015; Ziemba & Oblak 2015) also highlighted that the above factors affect

the users to accept the new system. Other hospitals in Northern Region of Malaysia might also be facing the same problem when implementing a new IS project.

Ms Chua Hooi Chin also revealed that one of the challenges in providing service to public is to reduce the clients' waiting time. If a new IS is going to be implemented, it must give a positive impact to the clients. Hospital has to face complains from patients or their relatives if there is a significant increase in their waiting time. This situation may affect the degree of usage of the IS such as during the implementation of Pharmacy Information System (PHIS), where pharmacist opt for manual process instead of using the system when patients or their relatives starts to show their uncomfortable with the longer waiting time.

On the other hand, one IS 'champion' in a hospital expressed that their activities in new IS implementation simply concentrated on user training, then directly followed by the implementation itself. During the implementation, then he realized that resistance did occur due to numerous reasons such as lack of understanding about the IS, the need for the IS implementation and the impact of the IS to them and organization as a whole. It is already late and hard to change users' negative mindset and perception of the IS.

Leyland, Hunter and Dietrich (2009) in their study of Clinical Health Information Technology implementation suggested that the success of system implementation should not only be measured in terms of functional impact to the clinical environment (e.g. reducing the waiting time, cost efficiency, efficient information retrieval, etc.), but it must also be approached in terms of human perspective. In IS

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implementation, human was the main character which plays a very important role towards the success of system implementation. Moreover, many researchers (Patanakul, 2014; Hajeer, 2012; Levasseur, 2010; Jern, 2009; Deng & Gupta, 2005) noted that many IS projects failed due to lack of change management process.

Based on the issues discussed, a prevention model which is able to manage human-side of change is needed to prevent the failure of IS projects implementation in Malaysian government hospitals.

1.3 Research Questions

The main research questions of this study are:

i) What are the critical failure factors (CFFs) that impede people to change in the IS implementation in Malaysian government hospitals?

ii) How CM can be incorporated to prevent the failure of IS implementation in Malaysian government hospitals?

iii) How to determine the suitability of the proposed solution to Malaysian government hospitals?

1.4 Research Objectives

This study embarked on the following objectives:

Main objective:

To construct a CM-based prevention model to prevent the failure of IS projects implementation in Malaysian government hospitals.

Sub-objectives:

i)   To identify the critical failure factors (CFFs) that impede people to change in the IS projects implementation in Malaysian government hospitals.

ii) To design a CM-based prevention model to prevent the failure of IS projects implementation in Malaysian government hospitals.

iii) To evaluate the proposed model.

1.5   Scope of the Study

This study focuses on the human factors that influenced the successful of IS projects at the implementation phase. This study was conducted among selected government hospitals in Northern Region of Malaysia which covers three states; Kedah, Perlis and Pulau Pinang. The hospitals were proposed based on the criteria that the hospitals were using specific Hospital Information System (HIS). Key persons involved were representing the top management, IT practitioners and end users in hospitals.

Top management were the individuals at the highest level in the organization (Md. Deros et al., 2008). They were accountable in setting the overall direction of an organization and ensure the achievement of the major organizational objectives. In the context of this study, top management was represented by the hospital director, assistant director or head of directorate (e.g. directorate of management, surgical, medical and clinical support).

IT practitioners were the individuals in IT department which involved IT Officers, Assistance IT Officers and Technicians. They were responsible in providing technical support to the end users of the IS.

The end users were the individuals who directly used the implemented IS in their work. In hospital, this group of people consisted of medical practitioners such as doctors, nurses and medical assistance. In fact, the pharmacists, radiologists, scientists and clerk were among the users of the IS.

1.6   Significance of the Study

The CM-based prevention model for IS projects implementation failure constructed through this study serves as a guideline to manage human-side of change when a new IS is to be implemented. It also helps to prepare the organization for change. Thus, preventing the failure of IS projects implementation in Malaysian government hospitals.

In terms of government investment, a big sum of money was invested on IS projects. The successful implementation of each project is very important as the return of the investment (ROI) of the public's money, thus helps to gain public's trust on government services.

Successful IS implementation enables medical practitioners to access patient's treatment records efficiently, thus enables hospital to provide better service to patients.

1.7 Contributions

The outcome of this study provides a CM-based prevention model to prevent the failure of IS projects implementation. Although the study focused on HIS, but the proposed model can be used as a guideline by government hospitals in Northern Region of Malaysia to implement other IS as well.

As CM is one of the important components in project management, this model provides a guideline for IS project managers to plan for a successful IS implementation. The top management, as the decision maker, this model acts as a reference in IS projects planning on the things that need to be considered in making a decision for any IS project.

1.8 Summary

This chapter presented the overview of the study, problem statement, research questions, research objectives, scope, significance and contributions of the study. The aim of this study is to construct a prevention model which incorporate Change Management to prevent the failure of IS projects implementation. The model serves as an implementation guideline for IS project managers to prevent the failure of IS projects implementation in government hospitals in Northern Region of Malaysia. Moreover, the model provides a reference for top management in IS projects planning to prevent the failure of IS projects implementation in government hospitals in Northern Region of Malaysia.

CHAPTER TWO

LITERATURE REVIEW

This chapter covers discussion on related theories to IS projects implementation, the key concepts involved in this study and also models related to IS success. Furthermore, other studies by previous researchers were presented.

2.1   Related theories

This section reviewed some of the theories related to research topic.

2.1.1   Work System Theory

Alter (2013) describes a work system as a system in which human participants and/or machines perform work using various resources (e.g. information, technology etc.) to produce products and services for customers. Performance of the work system as a whole depends on nine elements; customers, products and services, processes and activities, participants, information, technology, infrastructure, environment and strategy as illustrated in Figure 2.1.
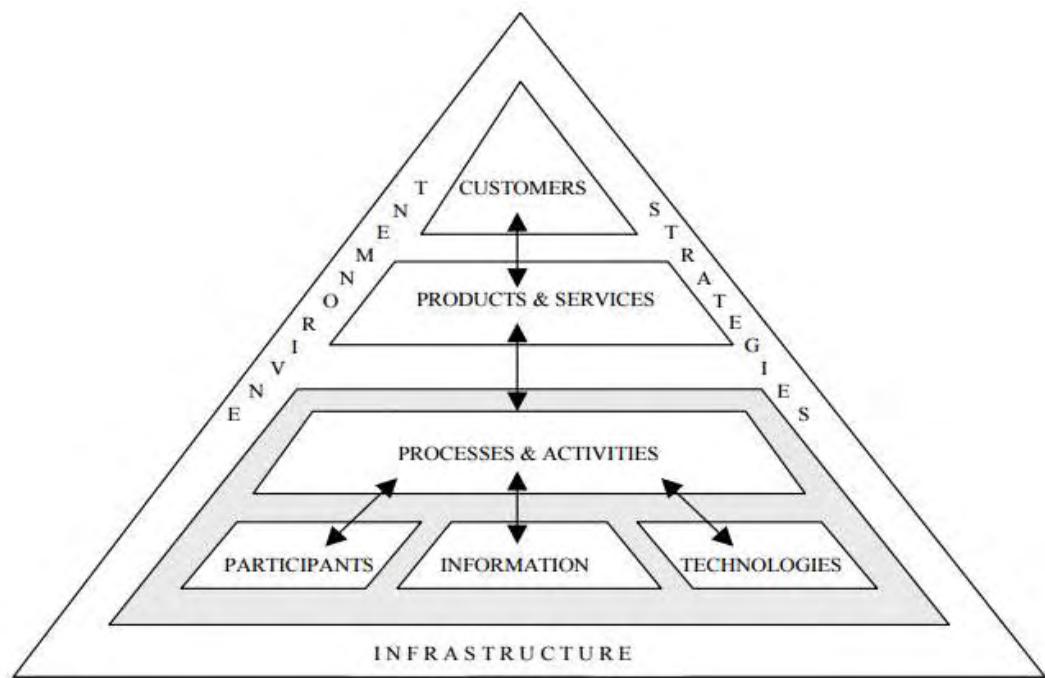
Figure 2.1. The Work System Framework (Alter, 2013)

In the Work System Framework, processes and activities, participants, information, and technologies are the elements which are viewed as complete element in the work system. However, customers usually involve in the processes and activities, while products/services are the outcome of the work system. Environment, infrastructure, and strategies used also may directly affect the work system.

As mentioned earlier, work systems produce products/services for customers. So, internal management of the work system should not only concern about doing the job efficiently and to maintain the motivation of the participant, but also need to consider about customers' expectation. Generally, customers are very concern about the total cost, quality, and other characteristics of the products/services that they receive.

The ability of the participant should be in line with the processes and activities to be performed. Whenever processes and activities change, participants may be required

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to change by having extra training or introduce new incentives through changing participant roles, replacing some participants with others, or automating parts of the work.

Finally, the theory suggests that the alignment between process and participants, process and information, and process and technologies is crucial to the performance of the work system.

All the elements suggested in Work System Theory; processes and activities, participants, information, and technologies are involved in IS implementation. A change to any of the elements will affect the implementation. For example, when a new IS is introduced, there might be a change in technology used, and the processes and activities involved. Hence, the people in the organization have to play their role to cope with the change to ensure the success of the implementation. This theory forms the conceptual of the study.

2.1.2   Theory of Reasoned Action

Ajzen and Fishbein (1975) have developed the Theory of Reasoned Action (TRA) to describe the relationship between attitudes and behaviours within human action. TRA is used in persuasion models of psychology and communication discourse to understand persuasive messages. Based on individual's pre-existing attitudes and behavioural intentions, this theory enables prediction of the individual's behaviour. An individual's expectation of the outcomes after performing particular behaviour influenced individual's decision to involve in the behaviour.

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This theory suggests two factors to determine intention; attitude and subjective norms. An attitude has been described as individual's opinion of the behaviour, either positive or negative. A subjective norm is a perceived social pressure which arose from individual's perception, the feeling either to perform the behaviour or not.

In the theory, Ajzen and Fishbein (1975) stated three conditions in which may affect the relationship between behavioural intention and behaviour. Firstly, "the measure of intention must correspond with respect to their levels of specificity". Secondly, there must be "stability of intentions between time of measurement and performance of behaviour" and lastly "the degree to which carrying out the intention is under the volitional control of the individual".

TRA has been applied in various studies. Lowry, Cao and Everard (2011) have used the theory in their case study of Instant Messaging to study the use of self-disclosure technologies. Bagchi, Kanungo and Dasgupta (2003) have applied the theory in their study of Enterprise Resource Planning (ERP) system to assess user participation and involvement during the system implementation.

IS projects implementation always facing with people's attitude; some are positive while some others are negative towards the new approach introduced. Information must be communicated throughout the organization so that they understand and know the impact of the IS implementation, thus influencing them to participate in the implementation. This theory offers a foundation to explore an approach to develop positive attitude among the individuals.

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

The aims of UTAUT is to explain user intentions to use an IS and subsequent usage behaviour. According to Venkatesh, Morris, Davis and Davis (2003), usage intention and behaviour are determined by performance expectancy, effort expectancy, social influence, and facilitating conditions.
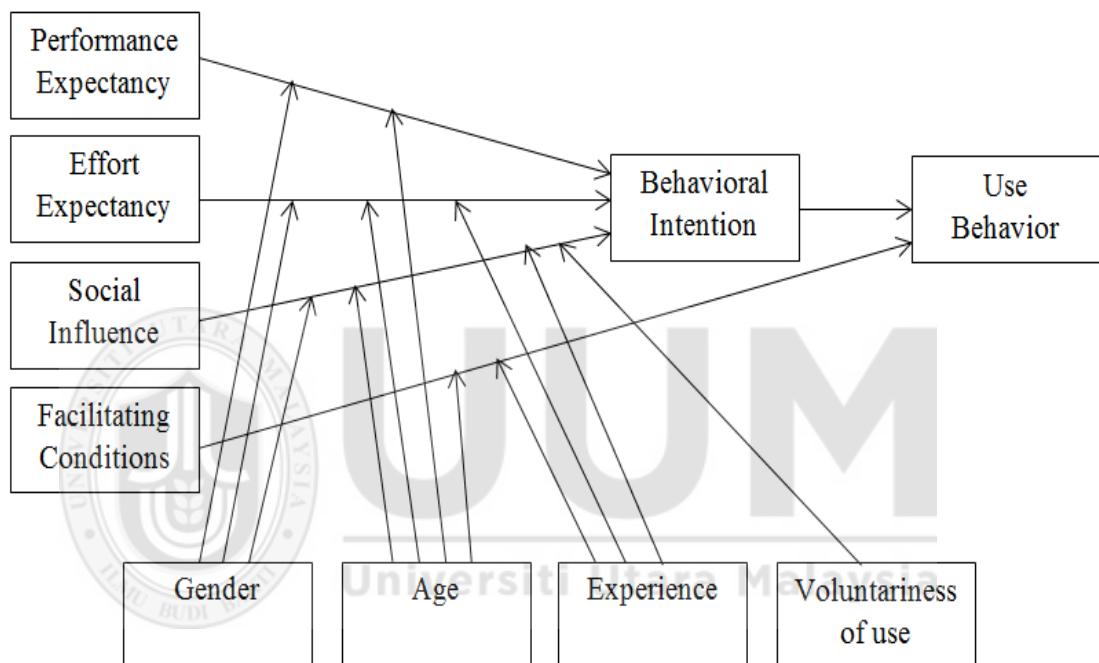
Figure 2.2. Schematic diagram of UTAUT (Venkatesh et al., 2003)

Performance expectancy refers to individuals' expectation that the new technology will help to improve their job performance. During the early stages of technology adoption, effort expectancy may significantly affect individuals' adoption of the new technology. They expect that no much effort needed to learn and adopt the new technology. However, this factor becomes non-significant over a period of time when individuals already get used to the new technology.

Social influence refers to the influence from peers, previous researchers and the organization itself. Influence from the sources may either give positive or negative effect to an individual to adopt the new technology. On the other hand, there are facilitating conditions that may affect individual's acceptance and use of technology; individual expected that an organizational and technical infrastructure must be available to support the use of the technology. However, gender, age, experience, and voluntariness of use are found to moderate the impact of the four key constructs.

UTAUT has been applied by Akbar (2013) to study the acceptance and use of technology among student, while Anderson and Schwager (2003) used the theory to study the wireless LAN technology adoption among small and medium enterprise (SME) companies. On the other hand, Algharibi and Arvanitis (2011) adapted the theory to validate user needs of a software system.

UTAUT is to explain user intentions to use an IS and subsequent usage behaviour. usage intention and behaviour are determined by performance expectancy, effort expectancy, social influence, and facilitating conditions.

Based on the problems discussed in the earlier chapter, the four main constructs of UTAUT provide a basis to study the factors that may influence user intentions to use the new IS and factors that may lead to the failure of IS implementation.

2.2   Related Concepts

Important concepts related to this research are presented and elaborated as follows.

2.2.1   IS Project

Information system (IS) project is significantly different from other types of project. IS consist of hardware, software, data, procedures, and people (Kornkaew, 2012). Pearlson and Saunders (2009) describe IS as a combination of technology, people and process used by organization to produce and manage information.

There are three approach used in Malaysian government agencies in acquiring an IS project that is in-sourcing, out-sourcing and co-sourcing. In in-sourcing approach, system is developed by agency's personnel and experts in IT Department. Using the outsourcing approach, agency appoints a company to develop the specified system, while co-sourcing is a joint development between appointed company and agency's expert (Sutan Ahmad Nawi et al., 2012).

2.2.2   IS Project Management

Project management (PM) is a process of how the elements such as knowledge, skills, tools and techniques are being applied in project activities to fulfill the project requirements (Turner & Müller, 2005). Some other researchers defined PM as the way of planning and controlling resources such as budget and time to deliver an expected product to the customers within the resources limits (Munns & Bjeirmi, 1996). According to Hoffer (2007), IS project management focuses on ensuring that the systems development projects managed to meet customer expectations besides delivering a complete system within the limitation of budget and time.

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2.2.3 Implementation Phase of Information System Project

There are many types of software development methodologies such as waterfall, spiral, extreme programming (XP) and agile. According to Kornkaew (2012), IS implementation are concerned with a number of key activities in System Development Life Cycle (SDLC); investigation, analysis, design, implementation and maintenance. However, this research will be focusing only at the **Implementation** phase of IS.

After an IS has been developed and tested successfully, it is ready to enter the implementation phase where the system will be installed and used by end users in the production environment. Implementation of a system involves important activities including delivery of system, system testing, user training, and converting to the new business system (Kornkaew, 2012). Pearlson and Saunders (2009) describe implementation phase as a stage where the system is brought up for use in the real environment in which security procedures are established, user documentation is delivered, training is conducted and system is completely monitored. It is a challenge to introduce a new system as it may involve a change in many aspects of the organization's such as structure, strategy, policies, procedures, technology and culture (Carpenter et al., 2012). Inappropriate way of managing the change may affect the successful of the IS implementation.

2.2.4 The Definition of Failure

In the context of this study, there are two categories of failure, namely total failure and partial failure (Heeks, 2002). In IS project's implementation, the project

implementation is categorized as total failure when the developed system has been implemented, but immediately after that it has been abandoned.

On the other hand, a partial failure may happen in IS project implementation in several situations. The first situation is where the project is facing with the sustainability issue where the project is successfully implemented at the early stage, however after a year and so, the project failed. The second situation is where the project has been implemented, but not all functions or features have been used by users. The third situation is where the system is utilized by only a number of designated users or departments or units while other just ignored it.

2.2.5   Hospital Information System

Government hospital is one of the healthcare organizations which provide healthcare service to the public. According to Abouzahra (2011) and (Al-Ahmad et al., 2009), healthcare sector is different from other sector because of its environment and the diversity of the systems and devices used. Healthcare is a critical and complex sector (Al-Ahmad et al., 2009) comprises of many disciplines of services such as surgical, obstetrics & gynaecology, paediatric, radiology, psychiatric, medical laboratory, emergency & trauma and a lot more.

Marchal, Belle, Brouwere, Witter and Kegels (2014) also define healthcare organizations in the same way; consists of different units and layers which deal with different task and specialized functions to provide services to the patients and community. It also involves of large number of professionals' positions such as consultants, specialists, doctors and paramedics, which makes it structurally complex (Zimmerman et al., 2012).

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Nowadays, Hospital Information System (HIS) has become an important tool needed to efficiently manage information in hospital. HIS can be defined as a computer-based information system designed to be used in healthcare environment (Yusof, Papazafeiropoulou, Paul, & Stergioulas, 2008). HIS not only helps to manage hospital's medical information related to patient care, but also support the administrative and financial information such as payment (A Rahman et al., 2010; Ahmadi, Salahshour Rad, Nazari, Nilashi, & Ibrahim, 2014). Some of the components in HIS are Patient Management, Pharmacy Information System, Laboratory Information System, Radiology Information System, Financial Information System, Inventory Information System and others (Ismail, Abdullah, Shamsudin, & Ariffin, 2013).

2.2.6 Change Management

Change management (CM) is one of the components in PM (Sabyasachi, 2013; Ćirić & Raković, 2010) as illustrated in Figure 2.3. CM is defined as a set of basic tools or structures, used to control change efforts (Hornstein, 2015). It comprises of process, tools and techniques used in managing change at people-side to achieve business objective. CM helps towards successful individual transition by consolidating the organizational tools which will provide a positive implication towards the change.
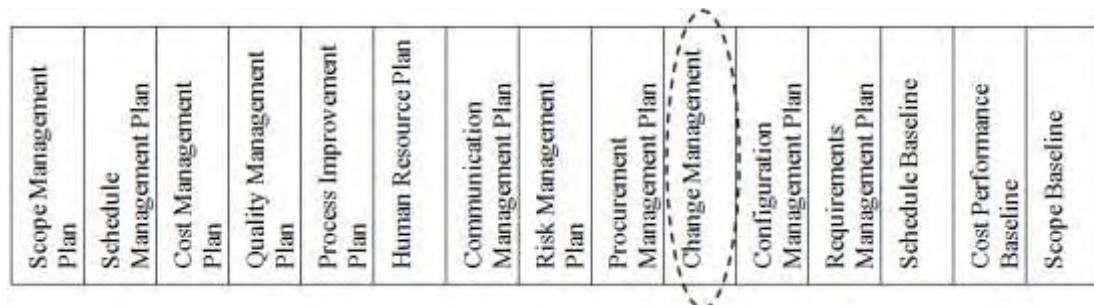
Figure 2.3. Components of Project Management Plan (Sabyasachi, 2013)

Ziemba and Oblak (2015) highlighted top management support, effective communication, training and monitoring are amongst the factors that contribute to the success of CM. while Ahimbisibwe, Cavana and Daellenbach (2015) said about top management support, organizational culture, project planning and controlling, leadership, change management as well as vision and mission. Most of the reasons are closely related to lack of change management process as agreed by Singh (2011). The importance of CM also has been highlighted by other researchers (Ziemba & Oblak, 2015; Ghanim, Munassar & Ahmad Dahalan, 2013; Basamh, Huq & Dahlan, 2013). In a study done by Ghanim, Munassar and Ahmad Dahalan (2013), they did emphasize the importance of effective CM in Malaysian Government Department to ensure the continuity of the projects. This justifies the need to adopt CM in IS projects implementation in government hospitals in Malaysia.

Al-Shamlan and Al-Mudimigh (2011) also agrees that CM in the context of IS implementation is about handling changes of technology, processes and people when a new IS projects implemented. Basamh et al. (2013) define CM as a structured approach that helps to move individuals, teams and organizations from current state to a future state, in order to implement a specific vision and strategy.

PM and CM are closely related and both are dependent to each other. However, different skills and competencies are needed in each of the context (Crawford & Nahmias, 2010). CM could be conducted in any phase of IS project because change happens everywhere. For example, during software development, there might be changes in requirement compared to the initial requirements. So, CM should be in place so that the change can be managed well. However, during IS project

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implementation phase, the factors that determine whether the project is implemented successfully or turn to fails is highly dependent on organizational factors. So, in order to ensure the success of the IS projects implementation, organization should first execute CM. Change agent roles in CM is very important to stimulate, facilitate, and coordinate the change effort (Lunenburg, 2010).

2.3   Related Models

This section reviews related CM models that will be used to design the prevention model of IS projects implementation failure for Malaysian government hospitals.

2.3.1   Lewin's Change Management Model

Lewin's Change Management Model has been introduced by Kurt Lewin in 1951. In managing change, Lewin promotes a top-down management-driven approach. There are three stages of change processes as shown in Figure 2.4 which involves Unfreeze, Change, and Refreeze.
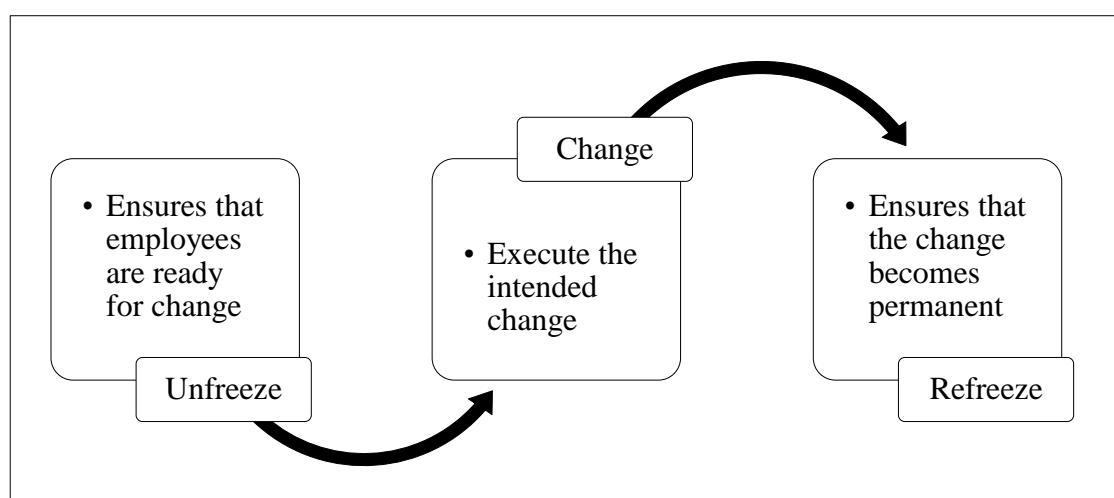
Figure 2.4. Lewin's Three-Stage Process of Change

Unfreeze stage is important to prepare members in organization for change; to move from existing situation by communicating a plan for change and develop a sense of urgency. Lewin believe that the group is the key vehicle to achieve individual behavioral change. By building a coalition, group behavior may influence and shape individual behavior. Besides, it also provides a platform for group decision-making which will helps to facilitate change. During this stage, Lewin emphasizes the importance to recognize the need for change and actions to unfreeze the existing attitudes and behaviors. It is essential to provide emotional and instrumental support and allow employees to get involved in planning of change efforts.

Then, the process followed by Change phase where organization implements the planned changes. During this challenging phase, organization must continue to provide support to employees. Creating "small wins", a short-term target that is achievable in short time may encourage change acceptance. Lewin also noted the need of empowering people to act, to eliminate obstacles that blocks the change effort.

The final stage is Refreezing, the process to make change as part of the organization's culture. This can be done by sharing the results of the change effort with employees and give reward to those who embrace the change effort to increase their confidence that the implemented change was a right decision, and to embrace continuous change effort.

2.3.2 Kotter's Change Management Model

Kotter's (1996) Change Management Model comprises of eight steps that need to be followed to drive a successful change in organizations. The eight steps are as illustrated in Figure 2.5.
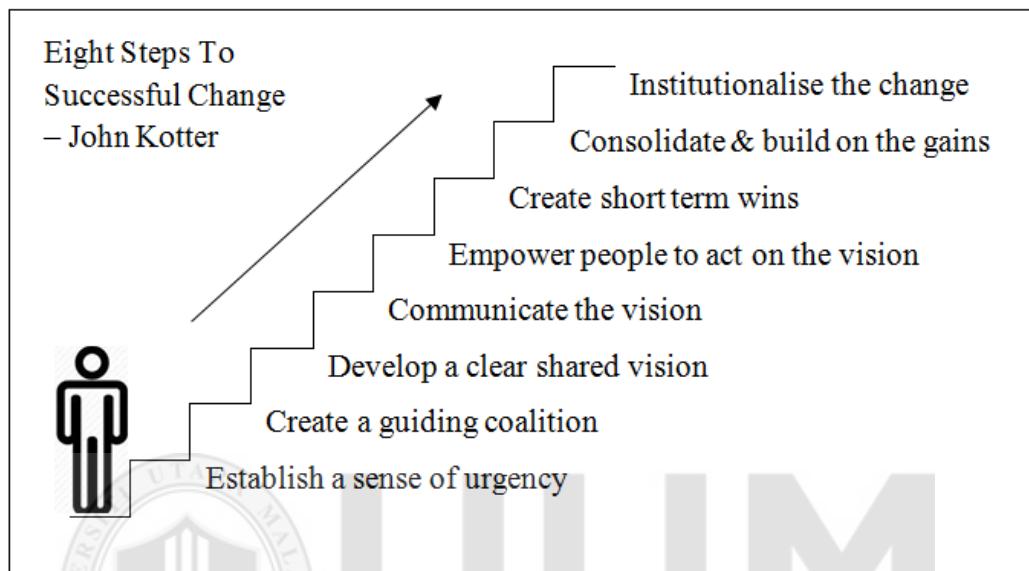
Figure 2.5. Kotter's Change Management Model

Kotter's Change Management Model involves eight steps to drive a successful change. In the first step of Kotter's CM model, in order to establish a sense of urgency, organization needs to examine the market and competitive realities as well as to identify and discuss the crisis, potential crisis, or major opportunities. The aim of this stage is to raise awareness of the need and importance of change. This step is very important to drive people out of their comfort zones.

In second step, organization has to create a guiding coalition by assembling a group of people with shared commitment and having sufficient power to lead the change effort. The coalition should comprise of a core senior managers and other relevant individuals such as the stakeholders. Kotter also emphasizes the importance of

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leadership skill among the team members to drive successful change. Teamwork between the team members is highly important.

The third step is to develop a clear shared vision which will help to drive the change effort. A vision helps to coordinate actions and to identify behaviors that should be encourage or eliminated. In order to achieve the vision, specific strategies must be formulated.

In step four, the vision and strategies must be communicated using all possible approach and to teach new behaviors by the example of the guiding coalition. The purpose of communicating the vision is to develop understanding about necessity of the change effort and to convince people to participate and support the change.

In step five, Kotter emphasizes on the need to empower people which enable them to act on the vision set. It is important to remove obstacles that blocks the successful of the change effort. This may involve in changing the systems or structures that give significant undermine to the vision. Moreover, the guiding coalition should encourage others to try the new approaches.

In step six, Kotter has place the importance of creating short-term wins. Short-term win is a target that is achievable within a short period of time. Visible performance improvement must be defined and engineered. Employees' contribution in the improvements shall be recognized and rewarded to sustain their motivation and commitment on the change efforts. Furthermore, the achievement serves as a visible proof to stakeholders of the pays off of the change effort.

In step seven, Kotter defines the need to consolidate improvements and build more changes. As the change progresses, the short-terms wins achieved provide a momentum for the change effort to move forward. The systems, structures and policies that are not fit to the vision should be refined or replace. Employees who can work the vision should be hired, promoted and developed. To build more changes, the process should be reinvigorated with new projects, themes and change agents.

Finally, Kotter emphasizes on the importance of institutionalizing the change; to embed the new approaches as the culture of the organization. The connections between the new behaviors and corporate success should be articulated. Leadership development at all levels in the organization is important to overcome the barriers to change. Appropriate succession plans must be created to support the new approach.

2.3.3   Prosci's ADKAR Change Management Model

The ADKAR Model has been introduced by Prosci (1999). ADKAR is an acronym for *Awareness, Desire, Knowledge, Ability and Reinforcement;* the important elements to prepare individuals to accommodate change. This model has been used as a tool to drive individual change (Bourda, 2013). It shows the milestones that an individual must achieve for change to be successful. The ADKAR model as in Figure 2.6. shows the ADKAR elements and its respective phases involved.

```
THE PEOPLE SIDE OF CHANGE

Awarenes    Desire    Knowledge    Ability    Reinforcement
   ○          ○           ○            ○             ○
            SUCCESSFUL CHANGE

Business    Concept                               Post-
need        & design    Implementation           implementation

        PHASES OF CHANGE PROJECT
```
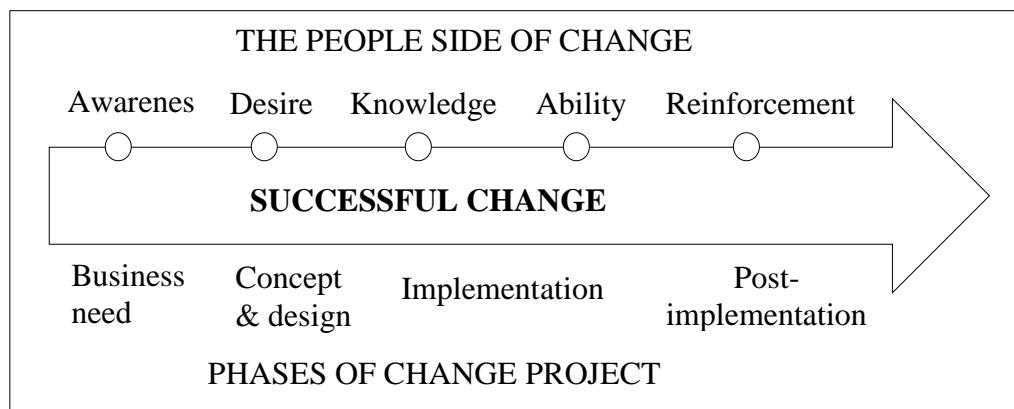
Figure 2.6. Prosci's ADKAR Model

To prepare individuals for change, firstly Prosci focuses on awareness. Awareness represents an individual understanding of the nature of the change. They need to know and understand the reasons why the change is being introduced. The consequences of not accepting the changes should also be highlighted.

The steps followed by desire; the willingness of individuals to support and participate in a change. Desire is particularly related to individual preference influenced by numerous factors such as the nature of change, motivation and support. It is essential to develop individuals desire to support and participate in the change effort.

The next step, Prosci emphasizes on knowledge. In order to change, individuals must have knowledge on how to change. Proper guidance such as training and workshop is needed to obtain the knowledge on how to perform their task with the new introduced approaches.

Then in the next step, Prosci focuses on the importance of the ability element. Ability represents the ability of individuals to implement the required skills and knowledge obtained towards a successful change.

Finally, Prosci stressed on the need for reinforcement to anchor the new behaviour in the organization's culture. This is vital to sustain the change in the organization. Instead of individual's satisfaction with his/her achievement, external reinforcement such as recognition and reward should be practice to sustain individual motivation and commitment on the change effort as well as motivates others to support and participate in the change.

2.3.4 Comparison of the Three Change Management Models

There are some similarities and differences between Lewin's, Kotter's and Prosci's Change Management models. Lewin's and Kotter's approaches emphasize on the importance of group or teamwork to drive a successful organizational change, while Prosci's approach concentrated on individual aspects of change (ADKAR elements).

One of the similarities between Lewin and Kotter is that, both researchers emphasized on the importance to recognize the change and communicate the change throughout the organization in order to give them understanding on the need for change, thus bring them out from their comfort zones. It is also noted in both approaches that it is essential to empower people to act on the vision because by having the power to act, it help them to take an appropriate action to eliminate obstacles that blocks the change effort. Furthermore, Lewin and Kotter believe that creating short-term wins, a short-term target that is achievable in short time may help to encourage change acceptance among the affected individuals.

The three scholars agree on the importance of awareness in order to develop the understanding and knowledge on the need for change among the individuals in the organization. They also emphasize that recognition and reward is one of the important aspects which may help to sustain individuals' motivation and commitment on the change efforts, thus influencing others to participate.

Compared to Lewin and Prosci, Kotter's approach clearly emphasizes the importance of leadership skill among the guiding coalition members. He believes that the group should have leadership skill and sufficient power to lead the change effort. Kotter also suggested that creating a vision for the change may help to coordinate actions that lead to the success of the change. Moreover, Kotter suggested that succession plans must be developed to sustain the implemented change.

The three Change Management practices discussed above have their own strengths and limitations. However, combination of the three model seems to compliment the lacking in the other models.

2.4   Related Works

This section presents the factors that influenced the success/failure of IS projects implementation as noted by previous researchers, as well as the success stories of Change Management adoption in several organizations.

2.4.1 Factors Influencing the Success/Failure of IS Projects Implementation

The failure of IS projects implementation is not a new phenomenon, it has been a global issue. Previous researchers have pointed out a lot of factors that influenced the success/failure of IS projects implementation. Resistance to change is one of the common issues during the implementation of a new system (Munassar, Ghanim, & Ahmad Dahlan, 2013; Bourda, 2013; Sutan Ahmad Nawi et al., 2012; Carpenter, Bauer, & Erdogan, 2012; Kornkaew, 2012; Levasseur, 2010; Ćirić & Raković, 2010; Al-Ahmad et al., 2009; Wong, Chau, Scarbrough, & Davison, 2005; Heeks, 2002; Garg, 2010). A lot of factors that contribute to the resistance has been discussed by previous researchers. Most of the factors are related to human, technology, hardware and infrastructure issues.

Top management play an important role to support IS implementation; financially and morally. Many researchers have identified that this factor significantly influence the success of IS implementation (Almajed & Mayhew, 2014; Namakula & Kituyi, 2014; Sutan Ahmad Nawi et al., 2012; Hajeer, 2012; Levasseur, 2010; Garg, 2010; Jern, 2009; Wong, Chau, Scarbrough, & Davison, 2005). Moreover, stakeholders involvement in IS implementation shows that they care and committed about the success of the implementation (Abouzahra, 2011; Levasseur, 2010).

Misunderstanding on the concept of the nature and use of the system may affect user acceptance of the IS (Patanakul, 2014; Wong et al., 2005). This issue usually happens due to lack of knowledge among the users and they don't understand why they need to adopt the IS. Some of them treat IS implementation as an IT project (Garg, 2010). Hence, effective communication is important to ensure that the

information about the new IS implementation is communicated and reach all level in the organization (Huang, 2015, Almajed & Mayhew, 2014; Alfaadel, Alawairdhi, & Al-zyoud, 2012; Abouzahra, 2011; Levasseur 2010). On the other hand, it is a challenge to motivate and gain user commitment to participate in IS implementation. Failure to gain user commitment found to give a big trouble to IS implementation (Hajeer, 2012; Levasseur, 2010).

Another important factor that may influence the success of a new IS implementation is the lack of skills among the users due to training issue (Patanakul, 2014; Namakula & Kituyi, 2014; Bindakheel & Rosnah, 2010; Garg, 2010; Jern, 2009; Qassim, 2008; Sood et al., 2008). Due to insufficient or lack of training, users felt that the IS is complex and difficult to use and consequently resulted to poor adoption of the new IS (Huang, 2015; Croteau & Vieru, 2002).

A part from that, monitoring and control (Almajed & Mayhew, 2014; Patanakul, 2014) of IS implementation is an important element to prevent the failure of IS implementation. The lack of standard, procedure and metrics to monitor and control IS implementation not only affect the implementation, but also the sustainability of the IS in the future (Patanakul, 2014).

According to Patanakul (2014), Hajeer (2012), Levasseur (2010), Jern (2009) and Deng and Gupta (2005), a proper change management process is vital as IS implementation may involve many kind of changes; policies, procedures etc. Failure to manage change properly may give negative impact to the success of IS implementation.

In terms of technical issue, infrastructure and hardware limitation (Bindakheel & Rosnah, 2010; Garg, 2010; Wong et al., 2005) are the common issues arise in IS implementation. The available infrastructure and hardware either insufficient or outdated. System integration is another significant issue that may influence users to adopt the new IS (Patanakul, 2014; Abouzahra, 2011; Bindakheel & Rosnah, 2010; Jern, 2009). Integration between different systems used in the organization help users to perform their job efficiently and effectively.

On the other hand, insufficient number of IT staff (Bindakheel & Rosnah, 2010) and lack of technical experience (Abouzahra, 2011) among the IT staffs have result in to the poor technical support during IS implementation. Consequently, it affects others trust to IT staffs (Huang, 2015).

In a study by Sood et al. (2008), they noted that dependency on one individual as the 'champion' of the IS implementation was another factor that lead to the failure of the implementation. The consequences can be seen whenever the champion is leaving the organization; the IS implementation is suffering to sustain due to poor knowledge transfer activity (Garg, 2010; Wong et al., 2005).

All the factors influencing the success/failure of IS projects implementation as discussed above are summarized in Table 2.1.

Table 2.1

Factors Influencing the Success/Failure of IS Projects Implementation

	Factors	Researcher (s)
	Factors	Researcher (s)
1	Top management support	Almajed & Mayhew (2014); Namakula & Kituyi (2014); Sutan Ahmad Nawi et al. (2012); Hajeer (2012); Levasseur (2010); Garg (2010); Jern (2009); (Wong et al., 2005)
2	Stakeholders involvement	Abouzahra (2011); Levasseur (2010)
3	Misunderstanding of concept and nature of the system	Patanakul (2014); Wong et al. (2005)
4	Treat IS implementation as an IT project	Garg (2010)
5	Effective communication	Huang (2015); Almajed & Mayhew (2014); Alfaadel et al. (2012); Abouzahra (2011); Levasseur (2010)
6	Failure to gain user commitment	Hajeer (2012); Levasseur (2010)
7	Lack of skills	Patanakul (2014); Namakula & Kituyi (2014); Bindakheel & Rosnah (2010); Garg (2010); Jern (2009); Qassim (2008); Sood et al. (2008)
8	Complexity of the system	Huang (2015); Croteau & Vieru (2002)
9	Monitoring and control	Almajed & Mayhew (2014); Patanakul (2014)
10	Lack of standard, procedure and metrics to monitor and control	Patanakul (2014)
11	No proper change management	Patanakul (2014); Hajeer (2012); Levasseur (2010); Jern (2009); Deng & Gupta (2005)
12	Infrastructure and hardware limitation	Bindakheel & Rosnah (2010); Garg (2010); Wong et al. (2005)
13	System integration	Patanakul (2014); Abouzahra (2011); Bindakheel & Rosnah (2010); Jern (2009)

14	Insufficient IT staff	Bindakheel & Rosnah (2010)
15	Lack of technical experience	Abouzahra (2011)
16	Dependency on a single champion	Sood et al. (2008)
17	Poor knowledge transfer	Garg (2010); Wong et al. (2005)

The success of IS implementation is influenced by many factors and the level of influence may differ from one sector to another. The factors discussed above are some of the common factors influencing the success of IS implementation identified by earlier researchers from several field such as education and healthcare.

2.4.2 Change Management Success Stories

CM concept has been applied in various industries either in public or private sector. Many organizations have proved that CM helped to improve their efficiency. One of the cases highlighted by Faucheux (2015) was California State University which comprises of 23 satellite campuses. A change in IT system at the main campus will affect all other satellite campuses with thousands of staffs and students. However, with proper change management strategy they manage to cope with the change which involves a large crowd of people.

In IS project implementation, Ziemba & Oblak (2015) have conducted a case study on two IS projects implementation in Polish public organizations. Those two projects are similar in scope and size. However, one project has been implemented without CM, while CM has been conducted in the implementation of another project. As a result, at the end of project's implementation period, the project in which CM has been introduced shown a successful implementation where the system has been fully used by the users, while the project implemented without CM only partially success

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as it has not been fully used by the users and the implementation period need to be extended.

Other story of CM adoption was in the implementation of Technology Roadmapping (TRM). Gerdsri et al. (2008) have adopted the Change Management practices of Prosci's ADKAR and Kotter to guide the organization to implement TRM, to overcome challenges and limitations occurred during the implementation process.

In healthcare sector, various Change Management practices have been used to implement clinical information system. Leyland et al. (2009) has recommended CM to be integrated into Clinical Health Information Technology project to elevate the adoption among the users. A combination of McKinsey 7S framework, Kotter CM Model, William Bridges CM Model and Prosci's ADKAR Model have been adopted for the implementation. In Electronic Medical Record (EMR) implementation, Neumeier (2013) has adopted Kotter's CM practice to address human issues of the implementation, thus allowing efficient access to patient information. For Electronic Medication Management System in a Nursing Home, Varghese (2014) chose HSE Change Model to promote the adoption of the system among the medical practitioners in the Nursing home.

Although different approaches of Change Management were employed in IS implementation, but they share the same goal; to manage human-side of change to ensure the success of IS implementation.

2.5   Summary

In this chapter, three theories related to IS project's implementation have been explored; Work System Theory, Theory of Reasoned Action, and Unified Theory of Acceptance and Use of Technology (UTAUT). Three change management models that will be adapted to construct a CM-based prevention model of IS projects implementation failure identified were Lewin's Change Management Model, Kotter's Change Management Model and Prosci's ADKAR Model. Furthermore, factors that may influence the success of IS implementation and the success stories of Change Management were presented.

CHAPTER THREE

METHODOLOGY

This chapter describes the research methodology used to conduct the research. There were five phases involved in this research as illustrated in Figure 3.1.
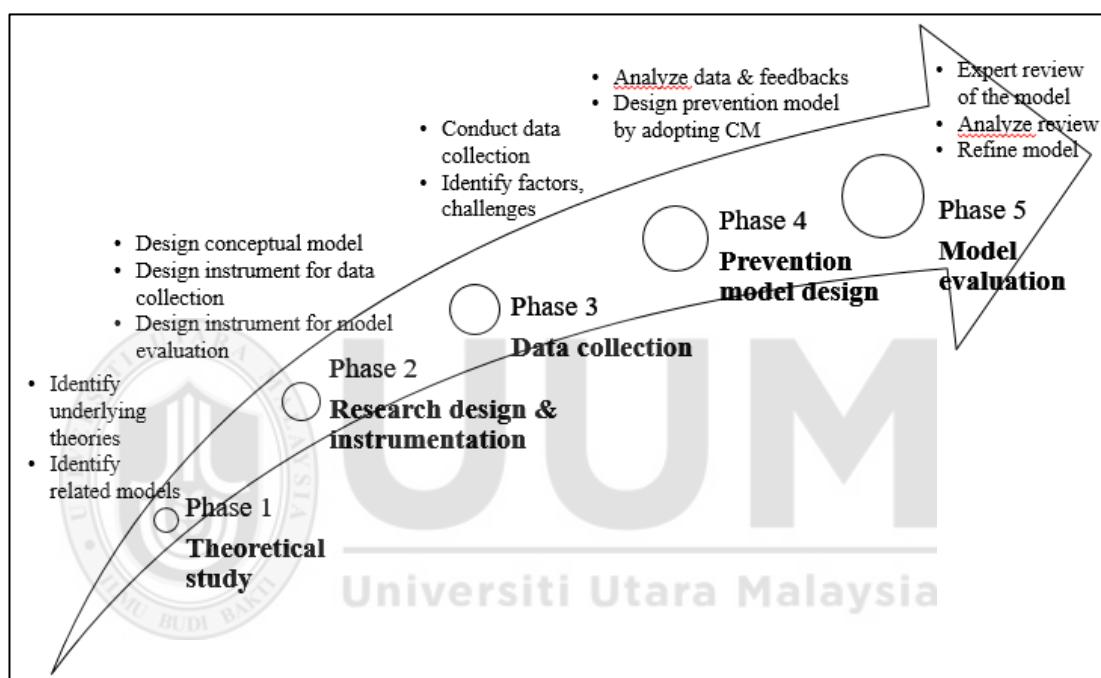
Figure 3.1. Flow of Research Activities

The population of this study was the government hospitals in Northern Region of Malaysia. Four government hospitals were selected to be involved in this study; i) Hospital Tuanku Fauziah, Kangar, Perlis (HTF); ii) Hospital Pulau Pinang (HPP); iii) Hospital Sultanah Bahiyah, Alor Setar, Kedah (HSB); and iv) Hospital Kulim, Kedah (HKulim). The hospitals were selected based on the criteria that the hospitals are using specific Hospital Information System (HIS). Convenience sampling was used in selecting the samples because researcher has working experience in government

hospitals, involved with IS implementation and has a good contact with IT personnel in other hospitals. Then, purposive sampling was used in selecting the key persons to be interviewed, in which the respondents were selected based on the judgement of the IT personnel in the selected hospitals. Only individuals with at least 4 years of experience working in hospital and involved in HIS implementation or using the HIS were selected. The study was conducted by using combination of a series of face-to-face in-depth interview approach and Delphi technique. Details of the activity for each phase are explained as follows:

3.1   Theoretical Study

In this phase, extensive literature review was used in identifying the underlying theories and related models. The outcomes of this phase are underlying theories and major models of CM. Three theories that have been concentrated on are Lewin's Change Management Model, Kotter's Change Management Model, and Prosci's ADKAR Model.

3.2   Research Design and Instrumentation

In this phase, a conceptual research framework was constructed based on the identified problems, research objectives and formulated research questions. The instruments used in the study were developed. There are two instruments needed; data collection and model evaluation.

The instrument for Data Collection was constructed based on extensive literature review. The CFFs of IS projects implementation were identified according to three contributing parties; top management, IT technical team and system user. For Model

Evaluation, the instrument needed was constructed to evaluate the suitability of the proposed model to be implemented in government hospitals.

Pilot test of the instruments was conducted at UUM Health Center and UUM-IT to validate the instrument as they are not part of the study population. Domain expert and IT practitioner were involved in the pilot test. The instruments were refined based on the feedbacks from the pilot test. The instruments are included in Appendix I and Appendix II.

3.3   Data Collection

In this phase, a series of face-to-face in-depth interview were conducted involving respondents from Hospital Tuanku Fauziah (HTF), Hospital Pulau Pinang (HPP), Hospital Sultanah Bahiyah (HSB) and Hospital Kulim (HKulim) to identify the CFFs of IS projects implementation in government hospitals in Northern Region of Malaysia. Other than to help in eliciting respondents' perspective and experience, interview also provide in-depth information pertaining to specific issues (Turner III, 2010).

There are eleven respondents interviewed from July to August 2016. The interview was conducted in respondent's office which takes between 20 to 50 minutes for each respondent. Besides notes taking, the interview was recorded for in-depth analysis. The instrument constructed in Phase 2 was used as an interview guide. The respondents' profile is depicted in Table 3.1.

Table 3.1

Respondents' Profile

Respondent	Hospital	Respondent's position	Work experience in hospital (Years)	Gender F-female M-male
R1	HTF	Hospital Deputy Director	>15	F
R2	HTF	IT Officer	7	F
R3	HTF	Senior Medical Officer	8	M
R4	HTF	Radiologist	8	F
R5	HPP	Head of IT Department	4	M
R6	HPP	IT Officer	4	M
R7	HPP	Nurse	6	F
R8	HSB	Head of IT Department	8	F
R9	HKulim	Head of Pharmacy Department	6	F
R10	HKulim	Assistant IT Officer	5	F
R11	HKulim	Head of Nursing Unit	5	F

The selected respondents were representing the top management, IT practitioners and system users in hospitals. Experienced individuals with at least four years working experience in hospital and involved with IS implementation were selected for the interview.

To analyze the data, the recorded interview has been transcribed. The raw data were systematically analysed and the identified CFFs were categorized into meaningful categories using open coding (Price, 2012). The outcome of this phase is the list of CFFs of IS projects implementation which has been used in the next phase.

3.4   Prevention Model Design

In this phase, data and feedbacks collected in the previous phase were qualitatively analysed. A solution for IS projects implementation failure which is a CM-based prevention model was designed based on the identified CFFs of IS implementation and three CM models (Lewin's Model, Kotter's Model and Prosci's ADKAR Model) which have been identified through extensive literature review. The outcome of this phase was the early prevention model of IS projects implementation failure in government hospitals in Northern Region of Malaysia. Further, the model was evaluated in the next phase. Figure 3.2 depicted the conceptual design of the prevention model.
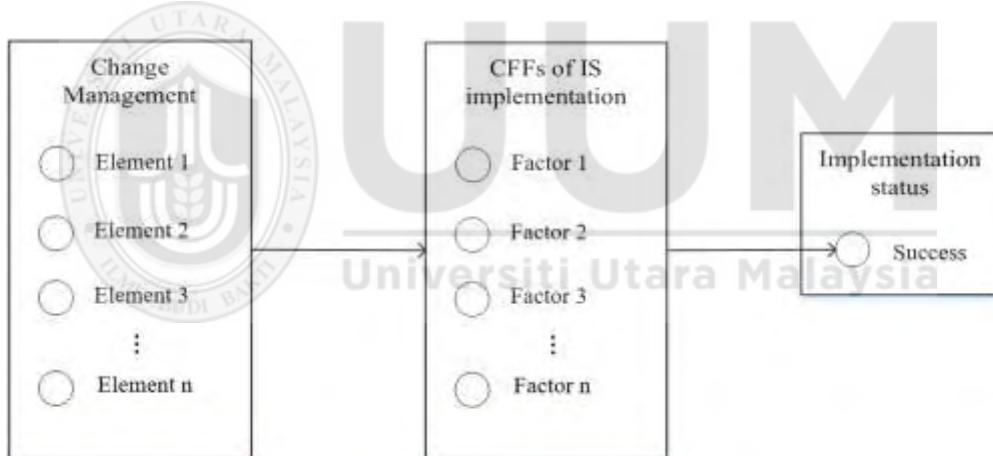
Figure 3.2. Conceptual design of prevention model

The conceptual design of the prevention model shows that the CFFs of IS implementation and CM elements were included into the model. Related CM elements were identified to solve CFFs in order to achieve a success implementation of IS projects.

3.5 Model Evaluation

Delphi technique was used to evaluate the prevention model which has been designed in previous phase. Using Delphi technique, domain experts were involved in the model evaluation (Keeney, Hasson, & Mckenna, 2001; Thangaratinam & Redman, 2005).

There are five domain experts involved in model evaluation. The model evaluation was conducted in October 2016. Each domain expert was interviewed separately to ensure the anonymity of the respondents; meaning that one domain expert didn't know what the other domain experts' response (Keeney et al., 2001; Thangaratinam & Redman, 2005). The interview was conducted in respondent's office which takes between 20 to 40 minutes for each respondent. Besides notes taking, the interview was recorded for in-depth analysis. The instrument for model evaluation constructed in Phase 2 was used to evaluate the model. The domain experts' profile is depicted in Table 3.2.

Table 3.2

Domain Experts' Profile

Domain expert	Hospital	Position	Work experience in hospital (Years)	Gender F-female M-male
DE1	HTF	Hospital Deputy Director	>15	F
DE2	HTF	Senior Medical Officer	8	M
DE3	HPP	Head of IT Department	4	M
DE4	HSB	Head of IT Department	8	F
DE5	HKulim	Assistant IT Officer	5	F

The domain experts were selected among the respondents involved in the interview sessions in Phase 3 since they already have the idea about this study. Experienced individuals with at least four years working experience in hospital and involved with HIS implementation were selected for the interview as they have relevant knowledge and experience (Keeney et al., 2001; Thangaratinam & Redman, 2005) about IS implementation in hospital.

The refinement of the early model is made based on reviews from the domain experts. An evaluated model was the output of this phase and becomes a prevention model for IS projects implementation failure in government hospitals in Northern Region of Malaysia. Although this study has focused on HIS, the model can also be used to prevent the failure of other IS implementation as well.

The summary of research activities and deliverables are presented in Table 3.3 while the Gantt Chart of the research activities is included in Appendix III.

Table 3.3

Summary of Research Activities

Phase	Activities	Technique	Deliverables
Phase 1	Theoretical study	Extensive literature review	• Underlying theories • Related models
Phase 2	Research design and instrumentation	Validity and reliability test (pilot test)	• Conceptual framework • Instruments
Phase 3	Data collection	• Extensive literature review • Face to face in-depth interview	• List of CFFs • Sub-objective (i)

| Phase 4 | Prevention model design | CFFs from Phase 3 & extensive literature review | • Proposed model
• Sub-objective (ii) |
| Phase 5 | Model evaluation | Delphi technique | • Evaluated model
• Sub-objective (iii) |

3.6 Summary

This chapter presented the research methodology used to conduct the study. The study was divided into five phases; theoretical study, research design and instrumentation, data collection, prevention model design, and model evaluation. The method used for each activity as well as the deliverables were presented to ensure the achievement of the research objectives.

CHAPTER FOUR

FINDINGS AND DISCUSSION

This chapter presents the findings for the three sub-objectives of the study. The findings are explained and discussed as follows:

4.1 Critical Failure Factors (CFFs) of IS Projects Implementation

From the interview with eleven respondents (depicted in Table 3.1) from four government hospitals in Northern Region of Malaysia, there are two categories of hospitals under Ministry of Health; IT hospital, and non-IT hospital. From the four hospitals involved in this study, only Hospital Sultanah Bahiyah is categorized under IT hospital while others were non-IT hospital. As this study was focusing on the implementation of Hospital Information System (HIS), each hospital implemented various versions of HIS either developed by vendors or hospital's IT Department.

HIS is the main IS used in hospitals to manage patients record. Each hospital implemented different version of HIS. Hospital Pulau Pinang (HPP) is implementing Sistem Pengurusan Pesakit Dalam (SPPD) since 1990s, while in Hospital Sultanah Bahiyah (HSB) is using Total Hospital Information System (THIS) since 2007. In Hospital Tuanku Fauziah (HTF) Tele-Primary Care (TPC) was implemented since 2008. All systems were developed by different vendors appointed by Ministry of Health (MOH) Malaysia. In Hospital Kulim (HKulim), Electronic Health Information System (e-HIS) was used since 2004. The IS was developed by a vendor appointed by the hospital. However, there were some similar and dissimilar characteristics between the four HIS.

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All the HIS used by the respective hospitals to manage patients record for efficient access to patient's medical history in order provide better consultation and treatment to the patient. Each new patient visited the hospital will be registered into the HIS by a clerk at the counter. The doctors, nurses, radiologist, scientists and dieticians are amongst the users of the HIS where they are responsible to enter information according to their scope of job. For example, the result of laboratory test will be entered by the scientist, while the x-ray result will be entered by the radiologist. Their level of commitment determined the success of the HIS implementation.

The scope of Sistem Pengurusan Pesakit Dalam (SPPD) in Hospital Pulau Pinang (HPP) is to manage the in-patient records; warded patients. In-patient will be registered at Admission Counter. In the ward, doctors or nurses are responsible to enter their treatment records. Besides that, nurses are able to order patient's diet to the Dietetics and Food Services Department through the system. At the Revenue Collection Counter, the system is used to collect Hospital Bill payment. Although the system has been implemented since 1990s, it was found that the system has been used only by certain wards, not all wards were using the system. Moreover, the Diet Order module has been abandoned.

Total Hospital Information System (THIS) in Hospital Sultanah Bahiyah (HSB) covers broader scope because it is not only managing patient records, but it is integrated with Laboratory Information System (LIS) and other systems used by their Radiology Department. Its scope covers all disciplines in the hospital. It holds a smooth implementation since it was introduced in 2007. Minor issues arose

successfully tackled with the active involvement of top management and Head of Departments.

In Hospital Tuanku Fauziah, the implementation of Tele-Primary Care is very suffering. The scope of the system is complete, except that it is not integrated with other important system in the hospitals such as LIS and financial system. Since its implementation in 2008 until now, the system has been utilized by only a small group of users. During the early years of implementation, the system is used by ENT (Ear, Nose & Throat) Specialist Clinic, Medical Department, Radiology Department and some wards. Other departments such as Obstetric & Gynaecology, Orthopaedic and Surgical Department are not using it. Since early 2016, ENT Specialist Clinic no more using the system.

Hospital Kulim seems to share the same problem as the other hospitals. The implementation of its Hospital Information System (e-HIS) is not successful. The system covers both in-patient and out-patient records. The system is used at every Specialist Clinic in the hospital including the Emergency Department to register patients. If the doctor ordered the patient to be warded, the clerk at the Admission Counter will update the patient's record as in-patient. Doctors are responsible to enter patient's treatment information accordingly. At the Revenue Collection Counter, e-HIS is used to collect Hospital Bill payment. However, this system is not integrated with other systems in the hospital.

From the interview with the key persons from the hospitals, the implementation of HIS in three of the hospitals can be categorized as partial failure because the HIS is

still in use until now, although it is not fully utilized. This is based on the response from the respondents:

"The implementation of TPC here can be considered as fail because not all doctors are using the system. Actually I'm the only one using the system in this department." – R3

"SPPD started in 1990s, more than 10 years already. It is still being utilized until now, but it has its failure. Its core users were at Revenue Collection Unit and Admission Counter. It was fully utilized there for billing purpose. There is one module in the system for diet order. Nurses in wards should use it to order patients' diet. However, they rarely use it." – R5

"There are a lot of useful modules available in e-HIS. However, just a few modules being utilized although e-HIS has been introduced more ten years back. The system was not fully utilized." – R10

"Some departments not fully utilizing it because of hardware limitation. But the implementation is considered okay, about eighty percent is used." – R8

Analysis of the data collected during data collection, revealed the challenges in IS projects implementation in government hospitals in Northern Region of Malaysia. The challenges are categorized into four main factors; human issues, technology and infrastructure issues, software limitations, and support issues as illustrated in Figure 4.1.
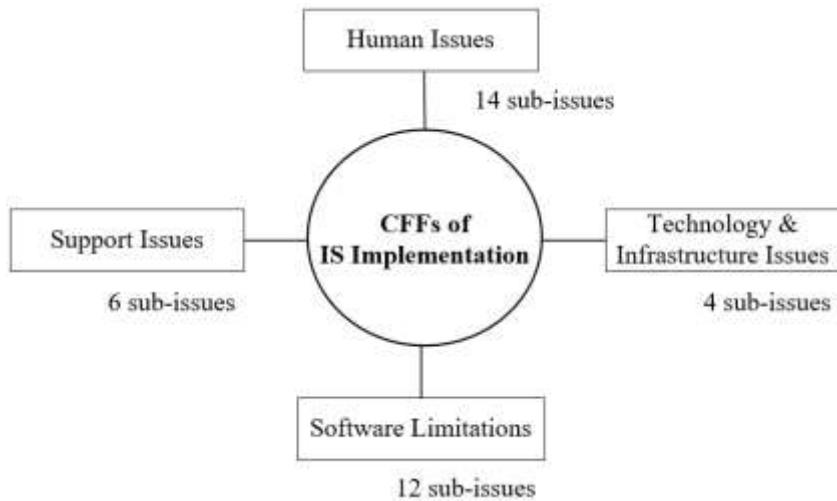
Figure 4.1. Four main categories for CFFs of IS projects implementation

Depicted in Table 4.1 are the sub-issues for human issues identified from data collection phase which occur in the four selected hospitals.

Table 4.1

Human Issues

Issues		HTF	HPP	HSB	HKulim
1	Workload	/	/		
2	Readiness			/	
3	Priority		/		
4	Skill	/	/	/	
5	Mentality	/		/	/
6	Preference	/	/	/	
7	Attitude	/			/
8	Impression	/			
9	Initiative	/	/		
10	Understanding			/	/
11	Commitment		/	/	/
12	Awareness	/	/		/
13	Self-interest		/		/
14	User dependency	/	/		

Human issues referred to the issues of the users themselves which include several groups of practitioners such as doctors, nurses, medical assistants, pharmacists, radiologists, scientists, dieticians, as well as the clerks who did the registration at the counter. Fourteen sub-issues that impede them from successfully implementing HIS were identified.

As depicted in Table 4.1, amongst the most significant issues are related to mentality, awareness, preference, skill and commitment. The mentality of the users gives a very significant influence to the failure of IS implementation. The negative mind-set on HIS implementation were notified in most hospitals as noted by the respondents:

> *"... they feel that the system doesn't facilitate them, because they have to key-in everything into the system. Furthermore, it doesn't give much impact to them." – R8*

> *"Mentality among the senior nurses, especially those who are about to retire. They are not interested to learn new things anymore, especially related to IT." – R11*

> *"As early as the system is introduced, they already set in their mind that the system is a burden." – R3*

Some practitioners are reluctant to use the HIS because they are not ready to change from the existing system. Their knowledge about the HIS is very shallow due to insufficient awareness.

To ensure awareness reach all level in organization is a big challenge in IS implementation, especially for a big hospital. However, it is a must in order to avoid misunderstanding about the concept and nature of the system. Due to lack of awareness, users tend to ignore the HIS because they don't see how it will help them to improve their work performance and provide better service to patients. They rather interpret it as a burden to them. Consequently, the system was adopted only by certain departments or wards. Respondents comments on this issue are as follows:

"When a new IS to be implemented, we give training, then we implement the system. Then, just during the implementation we realize that many users still didn't have clear understanding how the system will give impact to their work. It looks like a burden to them." – R3

"Don't be surprise if you found that some nurses in the ward didn't know about SPP (Sistem Pengurusan Pesakit) although they have served this hospital for more than 5 years, because maybe the system is not being used there. So, they are unaware of the existence of the system." – R6

"Sometimes the subordinates are aware about the benefits of the system, but their bosses are not really aware about it. This is where the problem starts." – R10

In terms of preference, although computerized system has been introduced, there are some practitioners who still prefer to use the manual process instead of the new approach. This is due to many factors such as lack of knowledge and awareness about the system, mentality, priority of work and lack of enforcement. There are

some practitioners who were not comfortable with the technology employed in the system. This issue is noted by the respondents as follows:

"According to one practitioner he said that he prefers to write. Using the system is difficult because everything has to key-in. So, he doesn't have the freedom to write; to write anything and can cancel it at any point of time. Using a computerized system, they cannot do like that." – R3

"We can see that doctors are more interested to use system because easier for them to view patient's treatment history and to prepare discharge summary, but not the nurses. To nurses, patient care is their priority. So, most of their time were spent on patients, like to distribute drugs etc." – R5

"Doctors prefer to use WhatsApp application rather than Tele-consultation. faster. Just snap photo and send to specialist in Penang for example, instead of go to the computer and have to key-in patient name and everything, takes time." – R8

Although some medical practitioners prefer manual process rather than computerized system, TPC has its own supporters:

"The registration counter staffs prefer to use the TPC system because it is easier for them to register and easy to search. Easier for them to do any report needed, just extract the data and print from the system." – R3

Furthermore, the respondent shares his experience during early implementation of the system:

"At the beginning, it takes quite some time to adapt to the system, but after that I feel very comfortable and the system makes my job much easier. I can retrieve patient's treatment history very fast." – R3

Due to frequent relocation of staff within healthcare agencies, lack of skills among the practitioners to operate the system are another issues arose by many respondents because the skilful staffs have been transferred to other healthcare agency. They noted that:

"Other factor maybe insufficient training because doctors didn't have much time to allocate for training; too busy with patients and all. So, they have lack of skill to operate the system. In my experience as an implementer, when we call for training, out of 20, just 5 to 6 people came." – R3
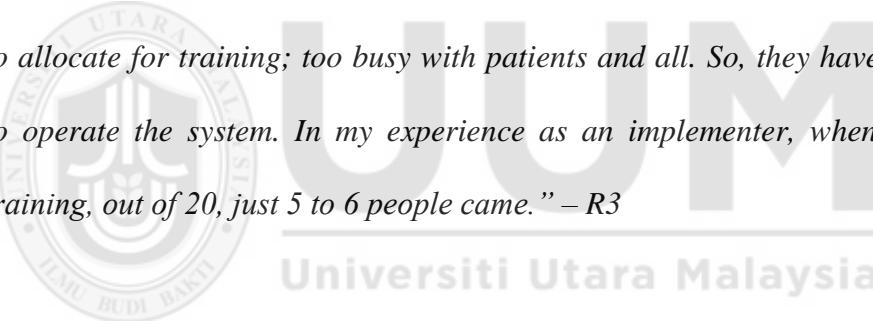
"... knowledge and skill among the practitioners is very important. They have to know how the system works; the process flow in the system. If not, how are they going to use the system. We are facing with this problem when there are staffs transferred in." – R8

"... staff transfer is so frequent. The new comers were not trained how to use the system. Because of that, the use of the system keeps decreasing." – R7

To gain commitment from the practitioners to participate in HIS implementation is a tough task. However, without their support and commitment, HIS implementation will not succeed. This issue occurs in most hospitals. The respondents said that:

"User thought that by having a system, they can directly get the report needed. They don't realize that actually they are the one who have to enter the data and update the data. So, when they have to give commitment on that, they feel like it is a burden to them. That's why they reluctant to use it." – R8

"It is hard to gain commitment from the users especially if their immediate boss also didn't care about the success of the system implementation." – R5

"We have to work very hard to get them involve with the implementation. With the heavy workloads awaiting them, to gain their commitment is not an easy task." – R10

Moreover, lack of commitment is also related to self-interest and initiative issues. Sufficient initiative from the leaders or supervisors is important to develop self-interest among their subordinates and consequently helps to gain their commitment towards the success of the HIS implementation.

The priority of work for the practitioners in hospital is more to patient care. Due to the situation, heavy workload was one of the factors that leads to the failure of HIS implementation because the priority is given to their core duty to treat the patients. Amongst the respondents' comments are as follows:

"The most common reason we heard was workload, especially among the nurses. They have to assist the doctors during procedures or ward rounds, also they are the one to distribute drugs (medicines) to patients in wards. So, most of their time were spent on patients." – R5

"The number of patient is very high, but the number of doctors is insufficient to cope with crowd of patients. That's why many doctors reluctant to use the system because according to them, it takes time to key-in everything into the system. They also have to do ward rounds and many other task as well. To me, actually it is related to their own work process in which they do their work twice; write manually then transcribe it to the system. It is a waste of time." – R3

The attitude "let the juniors do" among the seniors also affects the success of HIS implementation because each level of staff has different task or role to be carried out. Each individual should do their parts according to the roles given. The importance of the positive attitude in IS implementation has been highlighted by Barki, Pare, and Sicotte (2008).

User dependency is another issue which influenced the smooth implementation of the HIS in most hospitals. Dependency on a single 'champion' or certain users to implement the system will put it in a risk if the champion or users move out from the organization. The continuity of the system will be a very challenging task as noted by the respondents:

"We are trying to reduce the dependency on a single champion especially for the a few important systems. We try to develop a number of champions; transfer the

knowledge and develop the skills needed, to sustain the implementation of the system." – R6

"At the moment, the 'champion' of TPC in this hospital is myself. So, I'm a bit worried about the future of the system if I am no more here because TPC is a good system." – R2

Other issue arose by one of the respondent was the user's first impression of the HIS without getting to know the exact contents and applicability of the HIS. The respondent said that Tele-Primary Care system (TPC) has been developed by Tele-Health Division in MOH to be used in Health Clinics. Health Clinic is the primary care provider. So, the name of the system has created a negative impression towards the TPC acceptance in hospital because hospital is the secondary care provider. The respondent said that:

"One of the comments from the specialist in hospital was: Why we need to use TPC in hospital? Hospital is secondary care provider" – R3

However, the respondent who has an experience working in both healthcare agencies (health clinic and hospital), TPC is a good system. He noted that:

"Although TPC has been developed for health clinics, but the modules contained in the system are also applicable to hospital. Some of the modules are tele-consultation, view x-ray result, referral, admission and also payment." – R3

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As human is the main character in IS implementation, all the issues discussed above have a significant impact on the failure of IS implementation. All the issues need to be addressed accordingly to prevent the failure of IS implementation in hospitals. Depicted in Table 4.2 are the sub-issues for technology and infrastructure issues identified from data collection phase which occur in the four selected hospitals.

Table 4.2

Technology & Infrastructure Issues

Issues		HTF	HPP	HSB	HKulim
1	Compatibility	/	/		/
2	Readiness	/	/		/
3	Availability	/	/	/	/
4	Network stability	/	/		/

There are four sub-issues identified related to the technology and infrastructure available at the hospital; compatibility, readiness, availability, and network stability. All the issues are common in non-IT hospitals; HTF, HPP and HKulim. Since HSB is an IT-hospital, not much issues encountered.

All the selected hospitals are having problems in terms of the availability of the hardware and infrastructure to operate the HIS. Respondents from all of the selected hospitals are talking about this issue:

"The system must be accessible around their working environment; don't need to go to other place. But the problem is, not enough computer supplied." – R1

".. the available computer is still not enough. Printers in the wards are having all sorts of problem and need to be replaced." – R8

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"Not all wards have internet connection. Not all wards have computer and label printer." – R7

"Computer is not available at the needed location. For example, in Pharmacy Consultation Room, to access TPC they have to walk out and use any available computer at the Pharmacy area." – R3

"When we go to clinics (medicine consultation clinic), only have laptop, no printer. In doctor's room, no computer. How to tell the doctor about our findings. So we have to re-write the things on paper and give it to the doctor. Double work for us." – R9

Besides insufficient hardware (e.g. computer, printer and other devices) supplied to implement the HIS, there are cases in which the available hardware couldn't be utilized for the HIS purposes due to compatibility issue. For example, the HIS has been used since early 2000s cannot be operated on the new computers which are on Windows 8 or Windows 10 platform. This issue is encountered in most of the hospitals as noted by the respondents:

"Currently, when we buy a new computer, it comes with either Windows 8 or Windows 10. The problem is, e-HIS is only compatible with Windows 7 and Windows XP." – R10

"The recent computer generation is using a very advanced technology. When we install our system, sometimes it shows some compatibility issues." – R6

"TPC is only compatible with IE (Internet Explorer). However, it cannot support up to IE 11. If we use other browsers such as Mozilla and Chrome, some components will not work." – R3

Furthermore, all HIS used in the hospitals either running on web platform or client-server based, its operation is highly dependent on the stability of the network in the hospital. The network stability issue is encountered in the three non-IT hospitals; HTF, HPP and HKulim. The respondents' comments are as follows:

"We feel quite distracting because sometimes network is down, slow or unstable. If it takes a long time to settle, we have to opt for the manual process." – R3

"Sometimes the network is slow in some departments, but in other departments it is just fine." – R5

"Our dependency on the system is very high. So, when the network is down for a long period of time, it affects our performance." – R9

All the issues encountered above led to the readiness matter. Due to those issues, users are not ready to implement the HIS because they don't have enough suitable computers and other needed devices, as well as a stable network access. As discussed above, we can see that the technology and infrastructure issues give a significant impact to the failure of IS implementation.

Depicted in Table 4.3 are the sub-issues for software limitations identified from data collection phase which occur in the four selected hospitals.

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Table 4.3

Software Limitations

Issues		HTF	HPP	HSB	HKulim
1	System's complexity	/			/
2	Compatibility	/	/		/
3	Wrong workflow		/		
4	Suitability		/		
5	System integration	/	/		/
6	Redundancy		/		
7	System ownership		/		
8	Data sharing		/		/
9	Efficiency	/			
10	Reliability	/			
11	System's limitation (e.g. not editable)	/			
12	No replication	/			

There are thirteen sub-issues categorized under software limitations. Software limitations refers to the limitation of the HIS itself. Limitations of the software somehow affected users' adoption of the HIS.

The most significant issues are the compatibility of the system software and system integration issue. These two issues are closely related to each other. In non-IT hospitals, instead of the main HIS, there are numerous systems used to support their

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daily tasks. However, all the systems are not integrated to each other. That is one of the factors contributed to the failure of the HIS implementation.

Some HIS software is not compatible to be integrated with other systems used in the hospitals because the data coding is not standardized. The most common field is Identity Card Number (IC No.). In one system, patient's IC No. is recorded as 860122-14-5564, while in other system it is recorded as 860122145564. With the bulk of data, integration between several systems is a very big challenge. Some of the respondents' comments are presented below:

> *"We have SPP, LIS, Pharmacy System, and a few others. But all of them are not integrated to each other due to some compatibility issues." – R6*

> *"We use e-HIS. We also use PHIS (Pharmacy Information System). Because of the two systems are not linked, for a new patient we have to re-enter the patient's profile into PHIS although the patient has been registered in e-HIS at the specialist clinic's counter." – R9*

> *"Actually TPC system should involve with Lab because when we check-up patient, we need to view lab result. The problem is, LIS used here still using a system which is not compatible for integration with TPC. Due the problem, doctors are not interested to use TPC because they are unable to view lab result. If all systems are integrated, it will be more encouraging." – R3*

Due to the two issues discussed above, practitioners felt reluctant to use the HIS since they can't see the impact and efficiency of the system because patient's data is unable to be shared between related systems.

System ownership is another issue that should not be omitted because it led to data sharing issue. Clear understanding of who is the owner of the system is very important because some departments claimed that the system is theirs and they are not willing to share the data due to confidentiality of the data. One of the respondents said:

> *"... the business owner for each of the systems are different. Some of them are not willing to share the data. Why is it so difficult to share the data? So many red-tapes. Like SPPD, if anyone request for data, we are willing to share but we do control the data privacy and data security." – R5*

According to the respondent, the owner of all the data is the Ministry of Health and it could be shared with other departments under the ministry in order to offer a better service to the patients. Only the workflows applied in the system are in respect to the respective department. For example, Pharmacy Department hold the workflows related to the processes in Pharmacy, while Nursing Unit hold the workflows of the processes in wards.

On the other hand, limitation of the HIS software functionality itself might hinder users to utilize the HIS. For example, non-editable for some important fields may lead to data reliability issue. A respondent from said that:

"Once the data has been keyed-in and save, that's it. Cannot alter or edit anymore. Sometimes human error did occur and we need to correct the data so that data stored in the system is reliable." – R3

Furthermore, the respondent suggested that the system need to be replicated because at the moment when the network is down, he has to revert to the manual process. He noted that:

"There is offline-mode of TPC, but only certain modules are included. So, I think the whole system need to be replicated." – R3

Sometimes, users felt that the HIS is too complex and it takes a long time to adapt, while some others said that some modules in the system is not suitable to be implemented in their hospital because the workflow in the system is incorrect. This suitability issue arose because the system has been developed based on requirements from other hospitals. Moreover, data redundancy also did occur. As a result, the HIS is not being fully utilized.

All the software limitations issues discussed above, indirectly has affected the HIS implementation and contribute to the failure of HIS implementation. Compatibility of the system software and system integration issue found to be the most significant.

Depicted in Table 4.4 are the sub-issues for support issues identified from data collection phase which occur in the four selected hospitals.

Table 4.4

Support Issues

Issues		HTF	HPP	HSB	HKulim
1	Financial	/	/	/	/
2	Technical	/	/		/
3	Peer influence		/		/
4	Moral	/	/		
5	Enforcement	/	/	/	/
6	Monitoring	/	/	/	/

There are six sub-issues identified under support issues category; financial support, moral support, technical support, peer influence, enforcement, and monitoring. HIS implementation need support from many parties and it can be seen as the main hurdle in implementing HIS. Financial support, enforcement and monitoring are the most common issues faced by all the hospitals.

In terms of financial, support from top management is very important to allocate some amount of budget for HIS implementation. This issue is faced by all the hospitals. Instead of the need of money for hardware acquisition, some money is needed to initiate programmes to promote and create awareness among the staffs. Hence, the commitment from the top management toward the success of HIS implementation is vital. The respondents noted that:

"In terms of financial, budget is very limited. We don't have enough computer. Even the equipment from last 10 years is still in use." – R8

"To implement a system we need sufficient computer as well as printer. We don't have special budget for IT. So, in that matter top management should support us." – R10

"Hospital is facing with budget constraint. When a new system is to be implemented, the ministry should supply sufficient amount of computer and all the devices needed. If not, a successful implementation is hard to be achieved." – R1

"… no special budget for IT. So, when we want to implement a new system, we have to work very hard to convince the top management to allocate some money for that purpose." – R6

Enforcement is another most significant issue in HIS implementation. As identified in all hospitals, the lack of enforcement found to be one of the factors contributed to the failure of HIS implementation. There are several level of enforcement involved; top management, middle manager and immediate supervisor. Respondents' comments are as follows:

"One of the failure factors is very weak enforcement. From the top management side, we give instruction to HOD (Head of Department). If the HOD is not enforcing their subordinates to use the system, the implementation will not succeed." – R1

"... if the Director give instruction, but the Head of Department is still reluctant, it is not an easy task to proceed with the implementation." – R3

"Some systems failed to be implemented because Head of Department does not enforce, although they are the one who requested for the system earlier." – R8

"Feedback from medical practitioners: It is difficult to enforce, staffs transferred in and out is very high and very frequent." – R5

"Top management and Head of Department did not enforce because they themselves didn't understand the importance and benefit of the system." – R10

In order to ensure HIS implementation runs as planned, monitoring is an essential activity. Monitoring issue is encountered in all the selected hospitals. Lack of monitoring during HIS implementation has contributed to the failure of the implementation because the progress of the implementation is not monitored accordingly. The respondents commented that:

"Top management does not really monitor the implementation because there is no KPI (key performance indicator) set for this programme that need to be monitored." – R3

"Monitoring is very important, but sometimes we overlooked this issue. It is important to ensure that any issues arise can be solved quickly. If not, it will affect the success of the implementation." – R1

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"One of the factors why HIS is not fully utilized is because no one is monitoring it." – R10

"Top management is not monitoring the implementation. At IT side, we don't have enough strength to do the monitoring." – R5

"At the early implementation of the system, top management is not really monitoring it. We are facing with many problems and the implementation is suffering. But, when top management get involve and monitor the progress, it helps very much." – R8

Technical support is a common issue in the non-IT hospitals. Insufficient number of IT staff is amongst the reason of the poor technical support of HIS. Some of the respondents commented that:

"Sometimes when network having problem, not being solve quickly. We want it to be fast, especially when it occurs during clinic session. It will be a troublesome." – R3

"The number of IT staff is very small to cope with IT workload in hospital. Moreover, not all IT staff have sufficient knowledge and skill about the HIS." – R6

"We can support in terms of technical issues like installation and connection issue. But, in terms of the flow of the system, we think the user knows better." – R10

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A part from that, lack of moral support were identified to influence the users to adopt HIS. Support from top management of course is the main motivation for them to continue the effort. However, support from the middle managers such as the head of department/unit and their immediate supervisor might boost their desire to get involve and support the implementation. This issue has been highlighted by the respondents as follows:

"HOD did support the implementation, but they didn't really get involved. They pass it down to other people to coordinate, for example the senior nurse in the department. That individual does not really understand about the system. That's why the implementation being abandon." – R5

"Top management is supporting the TPC implementation, but the didn't get involved, didn't go the ground. They are not monitoring it. But there are some HOD's that is not supporting TPC." – R3

Influence from a friend also may give some impact to the success of HIS implementation. According to some respondents, the practitioners are not attracted to use the system because only a few of their friends are using it, while the others are not involved. This issue is also related to the enforcement from the leaders.

As the support issues play an important role to prevent the failure of HIS implementation, all the factors presented above need a serious attention and commitment from all parties involved. Suitable approach should be employed to tackle this issue.

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4.2 The Proposed CM-Based Prevention Model

As discussed above, four main factors contributed to IS implementation failure were identified; human issues, technology and infrastructure issues, software limitations, and support issues. By incorporating Change Management approach in the prevention model design, only two of the main factors that contributed to the failure of IS implementation are tackled; human issues and support issues. Thirteen elements of Change Management identified from the CM approaches of Lewin, Kotter and Prosci were employed to tackle fourteen sub-issues of human and six sub-issues of support.

Currently, the IS implementation in government hospitals in Northern Region of Malaysia is only focusing on training and adoption of the IS among the medical practitioners. The importance of the preparation before the real implementation and after the implementation process was not given an appropriate attention. Due to that reason, three sub-phases of IS implementation has been proposed for better management of processes and activities involves in IS implementation. The three sub-phases are Pre-Implementation, During-Implementation and Post-Implementation (Mohd & Syed Mohamad, 2005) as depicted in Figure 4.2.
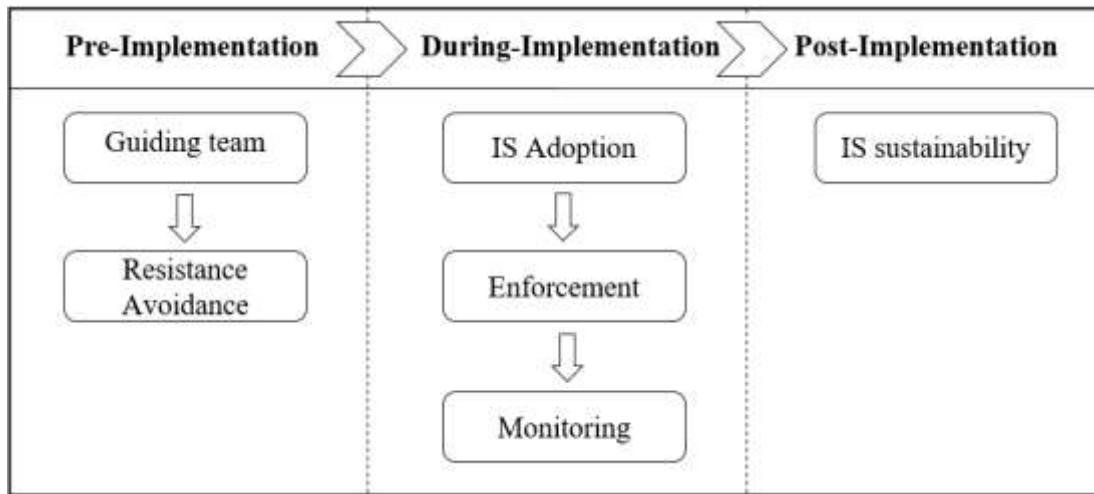
Figure 4.2. The proposed prevention model for IS projects implementation failure

Pre-Implementation is a phase to prepare the organization and the people before a new IS being implemented; to break them out from their comfort zone. The phase involves two processes; to form a guiding team, and resistance avoidance activities. The guiding team is responsible to set vision and plan strategies to achieve the vision. Resistance avoidance is an important process to prepare individuals in the organization for the new IS implementation. Activities involve are related to giving information about the need for change, to develop voluntariness to participate in the IS implementation and to provide appropriate skills needed for the implementation. CM elements involve in this phase are depicted in Figure 4.3.

Figure 4.3. CM elements in Pre-Implementation phase

Lewin (1951) and Kotter (1996) emphasized on the importance of guiding team to drive a successful change. It is important to form a group of people with shared commitment and having enough power to lead the change effort. In IS implementation, the guiding team should not only consist of IT personals but also top management, system owner and other relevant individuals. Leadership skill among the group members is also important. Having sufficient power enables the group to make a decision that can facilitate the change.

When a new IS to be implemented, the guiding team need to recognize the change; what will be changed and whom will be affected with the new approaches; any changes or adjustment need to be done to any work procedures or policies to fit the new approaches; and what is the impact of the new IS to the practitioners as well as the organization.

Next, the guiding team need to create a clear vision which will help to drive the change effort as noted in Kotter's approach. The guiding team need to formulate strategies to achieve the vision. By recognizing the change and its impact to the organization together with the vision and strategies set, the guiding team are able to convince the top management to support the IS implementation. There are two important support needed from top management; financial and moral.

In IS project implementation, one of the important things is to prevent user resistance as early as possible. From Prosci's ADKAR model, three elements of individual Change Management have been adopted to prevent user resistance in IS implementation; awareness, desire and knowledge. Creating awareness is essential to

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prepare individuals for change. Guiding team need to communicate the vision set and the reasons why the IS is to be implemented, to develop their understanding of the need to utilized the IS. Moreover, the guiding team need to highlight how the IS will give a good impact to them; to change their mentality that the implementation of the new IS is a burden and adding more workloads to them.

Furthermore, it is important to develop individuals' desire to support and participate in the IS implementation. Hence, helps to develop their self-interest and having the initiative to contribute to the success of the IS implementation.

The knowledge element emphasizes by Prosci (1996) is vital to completely prepare practitioners to utilize the new IS. Hands-on training sessions are able to develop practitioners' skills to use the IS, thus makes them ready to utilize the IS. Their training experience with the IS may increase their self-interest and change their negative mentality as well as the bad impression of the IS implementation.

In order to adopt the new IS into practitioners daily routine, top management need to empower relevant individuals to act on the vision as suggested by Kotter (1996) and Lewin (1951). For example, to appoint a change agent for each department involved and empower them to act on the vision. As in the issue of workload, the change agent has the power to take actions to accommodate the IS implementation. Thus, helps to them to be ready for IS implementation.

During-Implementation is the phase in which the real implementation takes place. It involves three processes; IS adoption, enforcement, and monitoring. IS adoption is a

process in which individuals apply their knowledge and skills to adopt the IS in their daily work or task. Enforcement is an essential process to put a responsibility to ensure that the users implement the new IS. Enforcement must be followed with monitoring process to ensure that the implementation works according to schedule. Furthermore, proper monitoring helps to identify and remove obstacles that blocks the smooth implementation. CM elements involve in this phase are depicted in Figure 4.4.

Figure 4.4. CM elements in During-Implementation phase

During the implementation of a new IS, guidance and coaching from the guiding team not only helps them to adapt to the IS but also helps to gain practitioners' commitment to utilize the IS. Visible support especially from the top management by getting involved during the implementation provides a very good moral support to the practitioners. Since the guiding team also consists of IT personnel, it helps to tackle the issue of technical support.

The adoption process need to be followed with enforcement. In government hospitals, instruction from the top management is very powerful. Hence, the top-down management driven as promoted by Lewin (1951) is suitable to enforce the practitioners to use the IS. Although awareness, training and coaching has been

carried out, some practitioners still prefer to use the manual system, while some others prioritize more on patient care. In this situation, enforcement from the top management is the best way to tackle the problem. The approach may help to gain practitioners commitment to use the IS and to change their negative attitudes on the adoption of the IS.

The IS adoption process need to be monitored to ensure that implementation works accordingly as planned. Monitoring can be done through assessment and regular meeting as proposed by Kotter (1996) and Prosci (1999). Assessment of the progress of the IS implementation need to be conducted regularly to resolve issues arise as quickly as possible to avoid it to affect the smooth implementation of the IS. A part from that, regular meeting may also serve the same purpose.

Post-Implementation is an important phase to sustain the utilization of the IS in the organization. This phase involves activities to encourage further involvement of individuals in IS implementation as well as activities that may continuously monitor and enforce the users to utilize the IS. CM elements involve in this phase are depicted in Figure 4.5.

Post-Implementation		
IS sustainability	Continuous assessment	(K)
	Recognition	(K, L, P)
	Succession plan	(K)

Note:
L – Lewin
K – Kotter
P – Prosci

Figure 4.5. CM elements in Post-Implementation phase

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After a successful implementation of IS project, actions need to be taken to sustain the IS; to make the IS as a part of the culture in the organization. Recognition and reward should be practice (Kotter, 1996; Lewin, 1951; Prosci, 1999) as an appreciation to those contributes to the success of the IS implementation and may influence others to participate and support the IS implementation. Besides offering moral support, the approach helps to motivate other practitioners to take appropriate initiatives and giving their commitment to ensure the success of the implementation. To ensure the continuity of the IS in organization, Kotter (1996) emphasizes the importance of developing a succession plan to avoid the dependency on certain users. In IS implementation in hospital, dependency on certain users or champion is very risky due to frequent relocation of staffs within healthcare agencies.

In Kotter's CM approach, he noted on the need for continuous assessment to sustain the change. An assessment procedure need to be developed to identify what is working and the things that need to be improved. The assessment need to conducted regularly to ensure that the change stick as the culture in the organization.

Adoption of CM practices of Kotter, Lewin and Prosci into the proposed prevention model provides an approach to prepare the organization as well the individuals in the organization for successful IS implementation. The detail action plan for the prevention model is included in Appendix IV.

4.3   Model Evaluation

The proposed prevention model was presented to five domain experts (depicted in Table 3.2) in the selected hospitals to seek for their comments and suggestions.

Different level of positions has distinctive views and comments on the proposed model.

All domain experts agree that a powerful implementation guiding team must be formed to drive the IS implementation. Their responses are as follows:

"System implementation is not an easy task. There must be a team with enough power to make it works. It is not a single person job to manage the implementation." – DE1

"Guiding team is a must. A powerful team is important to manage and give guidance throughout the implementation process." – DE2

"In current implementation, we don't have specific team to manage and monitor the implementation. How to make it works is all depends on IT Department." – DE3

"As I can see from the success of HIS implementation in this hospital, powerful guiding team is very important. This team have sufficient power and very committed towards the success of the implementation because they know that by successfully implementing the system it will improve service delivery to the patients." – DE4

"I agree that for an effective implementation of a new system, an implementation team must be formed. The people with enough power is important to enforce and make decision towards the success of the implementation." – DE5

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One of the domain experts expressed her agreement on the need to set a vision:

"It is important to set the objectives, target and a clear vision and mission of the implementation, so that at the end of the day we can assess whether the objectives are achieved or not. The implementation plan must be in place; the target of the implementation, and the timeframe." – DE1

Furthermore, all domain experts agree that awareness is a very important element in IS implementation and it need to be conducted before the IS is implemented. They noted that:

"Awareness must include in terms of knowledge, skills, attitude. The three factor must be covered in awareness. The skill must be followed-through to ensure that the individual understand and able to apply it during the real implementation." – DE1

"For me, Pre-Implementation is very important. If awareness programme was not done, or done at later time, it is a trouble. When people have set in their mind that the new IS a burden, it is very hard to change their mind." – DE2

"I agree that in Pre-Implementation phase, awareness is one of the important elements to give them knowledge about the new system, to prepare them for the system implementation. Training is also important." – DE3

"From my experience with HIS implementation, awareness is so important. It must reach to all level in the hospital; not only the system users, but everyone especially the leaders." – DE4

"Awareness is very important, not only to the user, but the head of the departments and top management as well." – DE5

From the top management view, a strong leadership skill among the members of guiding team is important in order to guide and facilitate the change process. Two of the domain experts share their view and experience. They noted that:

"The individual to be selected to become the member of the guiding team should have a strong leadership skill, so that he or she has ability to lead and guide the implementation." – DE1

"During the early time of HIS implementation, the core team was chaired by the Hospital Director for a few years. The 'champion' of the implementation was a Medical Specialist which hold a principal post. They have the leadership skill and power to enforce others to use the system." – DE4

Furthermore, empowerment also being emphasized by the domain experts because top management need to empower the identified individuals to act on the vision set. Having enough power will enable the individuals to take appropriate action to remove obstacles that blocks the successful of the change effort. A domain expert said that:

"Sometimes we appoint an individual to manage an implementation at his department, but we didn't give the authority to the individual. Empowerment is important for them to act." – DE1

In terms of Monitoring, the domain experts expressed that:

"Sometimes we implement a system and just let it be, but we did not analyze and audit the effectiveness of the implementation. Walk your talk, means that you want to do it you must monitor it regularly, must have commitment from top management." – DE1

"To ensure the success of the implementation, I agree that there must be a team which will monitor the implementation process. They have to define an effective way to monitor the implementation." – DE3

One of the domain experts suggested that, having online monitoring is an effective approach to monitor how far the IS being adopted in the organization. Furthermore, the online monitoring can be extended to be used to sustain the utilization of the IS. She noted that:

"There are many ways to do an enforcement. For example, each meeting we have an agenda. So, we want to know what is the progress. Head of departments have to present the progress. So, either like it or not, they have to know and be prepared. Having online monitoring is a very good approach. Just a click, we are able to monitor the performance of each department involved. It should be a fixed agenda. To change something, the effort must be held continuously." – DE1

The same domain expert also commented that the term Assessment used in Post-Implementation phase should be replaced with Regular Audit as it is more relevant to the context of Post-Implementation.

"Assessment is used in monitoring, to regular assess the progress of the implementation, while audit is to assess the effectiveness of the change effort." – DE1

Another domain expert suggested that the system ownership must be highlighted as early as the Pre-Implementation phase. He noted that:

"Another thing that need to be highlighted at Pre-Implementation phase is system ownership. The user need to know that only the owner has the authority to add or amend any pre-configured data in the system, IT personnel only responsible for IT related issue. For example, a doctor requested to add a new dosage of drug (with specified percentage of its components), IT personnel have no rights to do it because only the Head of Pharmacy Department have the rights to decide." – DE3

In terms of top management support, all domain experts agree that visible support from top management will motivate users to adopt the IS in their daily work. They commented that:

"To gain commitment from the medical practitioner to use the system is a challenge task. So, top management should show their commitment as well. They should go down to the ground to monitor and identify if there are any issues that they can help. Indirectly, it helps to increase the motivation among the medical practitioners." – DE1

"Sometimes the user felt that the top management ask them to use the system, but they never came down to see and understand the problems that they are facing on the ground. The moral support is not there. So, visible support from the top management is important." – DE2

"Moral support from the top management gives a significant impact to the users' adoption of a new system. Visible support from the top management shows that they are committed towards the success of the implementation." – DE3

"Top management involvement to enforce and monitor of the progress of the implementation not only motivating the users but IT people as well." – DE4

"We know that top management is supporting our effort, but their visible support is very valuable to the users and have a significant impact to their motivation." – DE5

For Post-Implementation phase, all domain experts claimed that Recognition is a significant approach to reward those successfully adopt the IS. Furthermore, it may motivate others to adopt the IS.

"... those who are contributing to the success of the implementation should be recognized and give them some kind of reward." – DE1

"I agree that recognition have a significant impact to increase the motivation among the users and it may influence other to participate." – DE2

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"To me, recognition is not only about to reward the success people, but also to increase the motivation of the others and to gain their commitment to support and participate in the implementation." – DE3

"Users have contributed their effort toward the success of the implementation. Hence, their effort and commitment must be rewarded accordingly." – DE4

"Everyone will feel motivated if what they have done is being recognized. So, recognition is important." – DE5

They also agreed on the need to have a succession plan to avoid user dependency issue or the dependency on a single 'champion'. This is due to the frequency of staff turnover which is relatively high in the hospitals.

"Dependency on certain people should be avoided because the person may leave the hospital at any time due to any reason. So, succession plan is important." – DE1

"I agree on the succession plan approach because we need to transfer the knowledge and skill about the system to other people to ensure the sustainability of the system." – DE2

"As we are aware of the issue of dependency to a single' champion' or user dependency, succession plan must be developed an implemented." – DE3

"... succession plan must be created to sustain the system adoption among the users." – DE4

"Proper plan to transfer the knowledge and skill is important because we don't want to see the moving down of the system's utilization when the 'champion' or certain people leaving the hospital." – DE5

Based on the feedbacks from domain experts in the four hospitals, the prevention model was further refined. Relevant comments and suggestions are considered. The refinements are depicted in Table 4.5.

Table 4.5

Refinements for the Prevention Model

	Refinements	Reference
1	Terms "Continuous assessment" used in Post-Implementation phase is replaced with the term "Regular Audit".	Figure 4.6
2	System ownership is added to the action plan.	Appendix IV – Step A2.c
3	Online monitoring is added to the action plan.	Appendix IV – Step B3.c

Based on the domain experts' review the Post-Implementation phase has been refined as depicted in Figure 4.6.
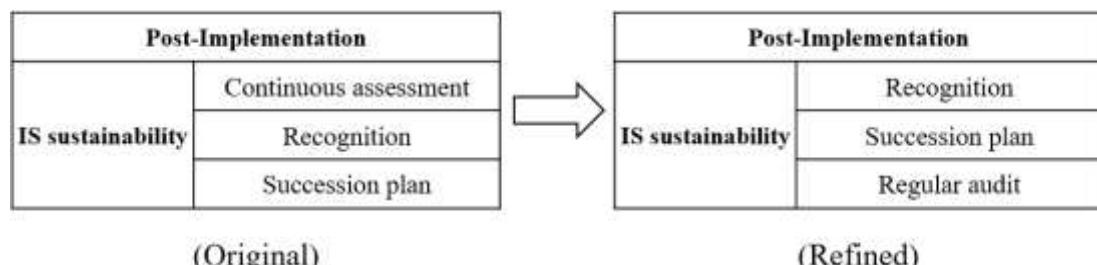
Figure 4.6. CM elements in Post-Implementation phase (*refinement*)

The other two refinements are system ownership and online monitoring. System ownership has been added under action plan for Resistance Avoidance, while Online Monitoring has been added under action plan for Monitoring. These refinements are reflected in Appendix IV.

Since the early prevention model has been successfully evaluated and refined, the main objective of the study is achieved. The evaluated model is presented in Figure 4.7 and becomes the CM-Based Prevention Model for IS Projects Implementation Failure in Malaysia Government Hospitals.
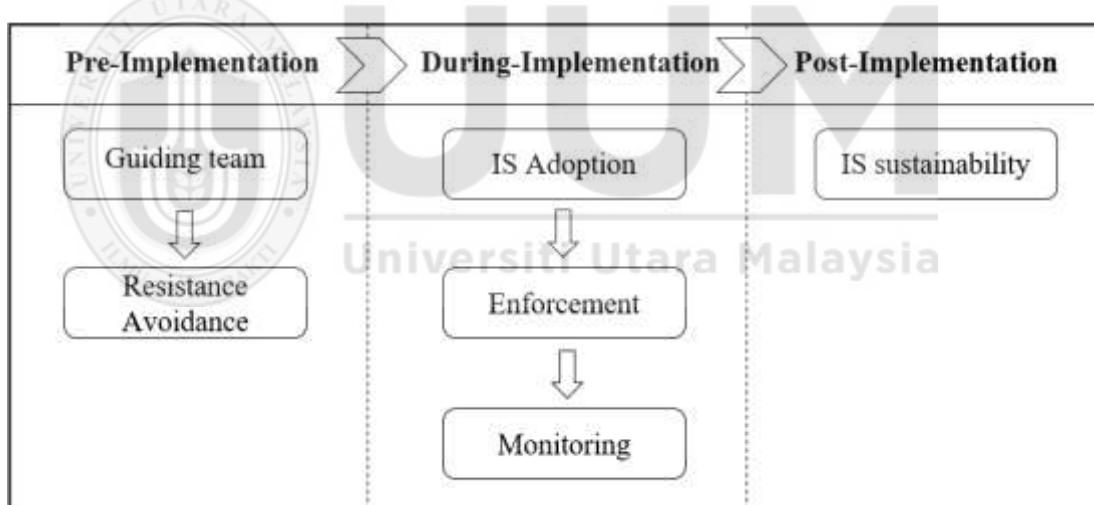

Figure 4.7. The CM-Based Prevention Model for IS Projects Implementation Failure in Malaysia Government Hospitals

All the CM elements involve in sub-phases of Implementation phase are depicted in Figure 4.8.

Pre-Implementation	
Guiding team	Recognize the change
	Create vision & strategy
Resistance Avoidance	Awareness
	Desire
	Knowledge

During-Implementation	
IS Adoption	Empowerment
	Guidance and coaching
Enforcement	Top-down approach
Monitoring	Assessment
	Regular meeting

Post-Implementation	
IS sustainability	Recognition
	Succession plan
	Regular audit
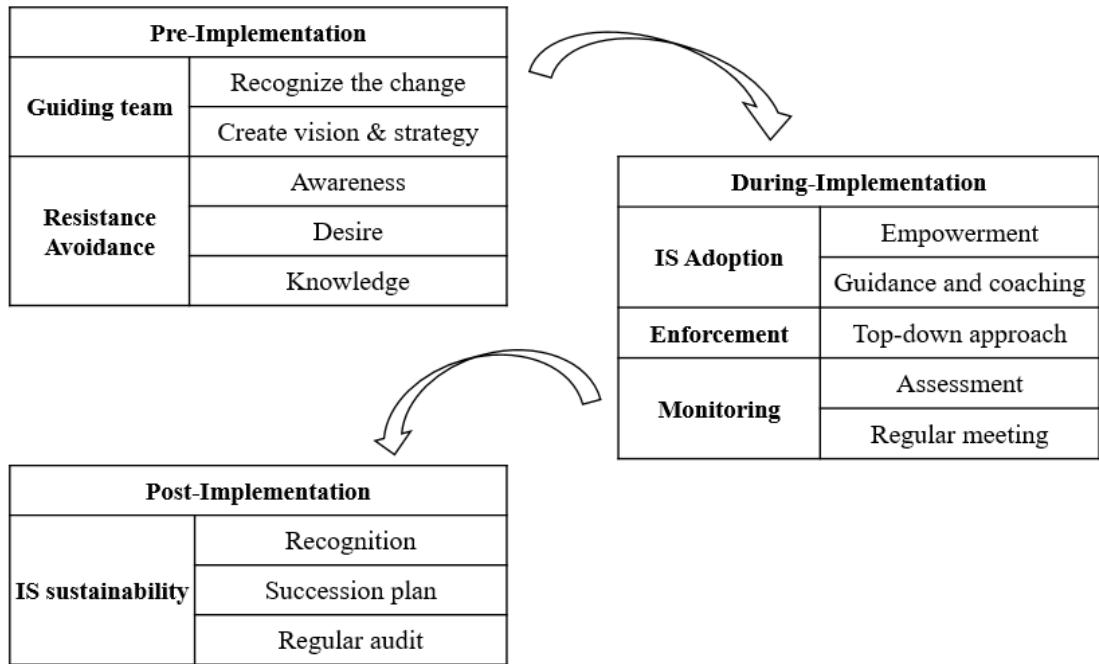
Figure 4.8. CM elements incorporated into the sub-phases of Implementation phase

The details explanation of the CM elements in Figure 4.8 remains the same as in Section 4.2, while the detail action plan can be referred to Appendix IV.

4.4   Summary

In this chapter, the findings of the three sub-objectives of the study have been presented. The Critical Failure Factors of IS Projects Implementation Failure in Malaysian Government Hospitals have been discussed in detail. Then, the CM-Based Prevention Model for IS Projects Implementation Failure in Malaysian Government Hospitals has been constructed and evaluated. By completing all the processes, the main objective of the study has been achieved.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

This chapter discusses the conclusion of the study, limitation of the study and recommendation for future works.

5.1   Conclusion

The study was successfully conducted. All objectives of the study are achieved.

Sub-objective 1: To identify the critical failure factors (CFFs) that impede people to change in the IS projects implementation in Malaysian government hospitals.

Sub-objective 1 is achieved by discovering the CFFs of IS implementation failure among the government hospitals in the four selected hospitals in Northern Region of Malaysia. Thirty-six CFFs have been discovered which then been categorized into four main categories. There are fourteen, six, four and twelve sub-issues of human, support, technology and infrastructure, and software limitations respectively. However, since CM will be incorporated in the proposed model, this study only concentrated on CFFs of human and support for designing the prevention model.

Sub-objective 2: *To design a CM-based prevention model to prevent the failure of IS projects implementation in Malaysian government hospitals.*

Prevention model has been designed by incorporating CM. Therefore, only CFFs of human and support have been considered in designing the model because CM only

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cater for human side of change. There are fourteen sub-issues from human (workload, readiness, priority, skill, mentality, preference, attitude, impression, initiative, understanding, commitment, awareness, self-interest, user dependency) and six issues from support (financial, technical, peer influence, moral, enforcement, monitoring) have been concentrated on. CM approaches of the three selected models have been included in the proposed model in solving and handling the identified CFFs.

The model caters three main phases of implementation; Pre-Implementation, During-Implementation, and Post-Implementation by adopting CM practices of Lewin's, Kotter's and Prosci's CM model.

Sub-objective 3: To evaluate the proposed model.

Delphi technique was used to evaluate the proposed model. Domain experts from the selected hospital who involved in data collection part were selected to evaluate the model. The early model was refined based on reviews from domain experts.

5.2   Limitation of the Study

In this study, four categories of CFFs of IS projects implementation have been identified; human, support, technology and infrastructure, and software limitation. However, since Change Management approach being employed, only human issues and support issues are tackled in this study. Change Management is well-known as an approach to manage human side of change.

Furthermore, this study is focusing on the implementation phase of IS projects. Technology and infrastructure issues as well as software limitations are the issues which should be handled before the implementation phase starts.

To evaluate the prevention model, Delphi technique has been employed. Using Delphi technique, evaluation should involved at least two cycle of Delphi method (Keeney et al., 2001; Thangaratinam & Redman, 2005). However, due to time constraint only one cycle of Delphi method was conducted.

5.3 Future Work Recommendation

Future work of the study should cater all identified CFFs of IS projects implementation. Other possible approaches should be considered to resolve the technology and infrastructure issues, and software limitations. Combination of Change Management approach with other possible approaches might help to cater all the identified factors. Thus, helps to improve stakeholder's satisfaction and confidence on IS projects.

5.4 Summary

The proposed model will be beneficial in ensuring the success of IS implementation in government hospitals. It is believed that if the model is being use accordingly, it can help to prevent the failure of IS implementation. Hence, the addressed problems can be avoided and prevented. Preventing the failure will ensure the cost and effort given in worth spent.

Other benefits of the model can be seen in terms of the management of IS implementation. It can be used as a guideline for top management for monitoring purpose. IT practitioners in hospital can get benefit as well in terms of work efficiency. Successful implementation of IS will benefit medical practitioners who have been waiting for it since ages. For example, successful integration of systems will allow data sharing across department, even can be shared between hospitals.

This study is successful conducted. The proposed model is accepted to be implemented in Hospital Pulau Pinang as a pilot hospital to implement their new application, MyMeeting. It is a big hope that the proposed model can be implemented in ensuring a success implementation of MyMeeting application.

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INTERVIEW GUIDE FOR DATA COLLECTION

Title of the Study : IS Projects Implementation Failure in Government Hospitals in
Northern Region of Malaysia

Purpose : To identify the critical failure factors (CFFs) that contribute to
the failure of IS projects implementation in government
hospitals.

Section I: Demographic Data

Age: ☐ 20-30 years ☐ 31-40 years ☐ 41-50 years ☐ 51-60 years

Gender: ☐ Male ☐ Female

Role in IS system implementation:

☐ Top management ☐ IT practitioner

☐ System user ☐ Others: ....

Working experience in hospital:

☐ < 3 years ☐ 3-6 years

☐ 7-10 years ☐ > 10 years

Section II: Challenges and CFFs IS Projects Implementation

Introduction:

This study focuses on the failure of Hospital Information System (HIS) in
government hospital. The purpose of this interview is to identify the challenges and

critical factors that contribute to the failure of IS in IS Projects Implementation. There are two categories of failure; total failure and partial failure. IS project's implementation is categorized as total failure when the developed system has been implemented, but immediately after that it has been abandoned. A partial failure may happen in several situations. The first situation is where the project is facing with the sustainability issue where the project is successfully implemented at the early stage, however after a year and so, the project fails. The second situation is where the project has been implemented, but not all functions or features have been used by users. The third situation is where the system is utilized by only a number of designated users or departments or units while other just ignored it.

Questions:

1. What is the HIS implemented in this hospital?

2. What are the challenges faced in implementing the HIS?

3. When a new system is ready to be implemented, what are the steps taken to implement it? (e.g. awareness programme, training etc.)

4. Is there any team being formed to facilitate the HIS implementation?

5. Medical practitioner's tasks are more concentrated on patient care. Did HIS implementation interfere practitioner in doing tasks?

6. Does top management provide sufficient support towards the success of HIS implementation?

7. How about top management commitment and involvement in IS implementation?

8. How about the practitioners' commitment in utilizing the HIS?

9. If any issues arise during the implementation, how it being resolve?

10. In the case of relocation of staff, how did you ensure continuity of the HIS utilization?

11. Is there any kind of enforcement applied to enforce practitioners to use the HIS?

12. Who is monitoring the progress of the HIS implementation?

13. In terms of IT technical support, is there any issues arise?

14. In terms of training, does the HIS training provided is sufficient?

15. Does practitioner able to practice what has been learned in the training?

Section III: Concluding Question

1. Overall, how do you categorized the HIS implementation in this hospital? Is it partial failure, total failure or can be considered success?

2. Do you have any comments or suggestions that can improve the implementation of HIS?

Thank you for spending your valuable time for this interview session.

INTERVIEW GUIDE FOR MODEL EVALUATION

Title of the Study : IS Projects Implementation Failure in Government Hospitals in

Northern Region of Malaysia

Purpose : To evaluate the CM-based prevention model for IS projects

implementation failure.

Section I: Demographic Data

Age: ☐ 20-30 years ☐ 31-40 years ☐ 41-50 years ☐ 51-60 years

Gender: ☐ Male ☐ Female

Role in IS system implementation:

☐ Top management ☐ IT practitioner

☐ System user ☐ Others: ....

Working experience in hospital:

☐ < 2 years ☐ 2-5 years

☐ 6-10 years ☐ > 10 years

Section II: Challenges and CFFs IS Projects Implementation

Introduction:

This study focuses on the failure of Hospital Information System (HIS) in government hospital. From previous interview session, critical failure factors (CFFs) of HIS implementation has been identified. Based on the CFFs, a prevention model

for IS projects implementation failure has been constructed which incorporate Change Management concept. The purpose of this interview is to evaluate the model.

Note: To present the proposed model (Figure 4.2, 4.3, 4.4, 4.5 and Appendix IV)

Questions:

1. What do you think of this model? Is it suitable to be implemented?

2. Is there any part of the model that need to be refined?

3. Is there any comments or suggestions to improve the model?

Section III: Concluding Question

1. Is there any other comments or suggestions that you would like to highlight?

Thank you for spending your valuable time for this interview session.
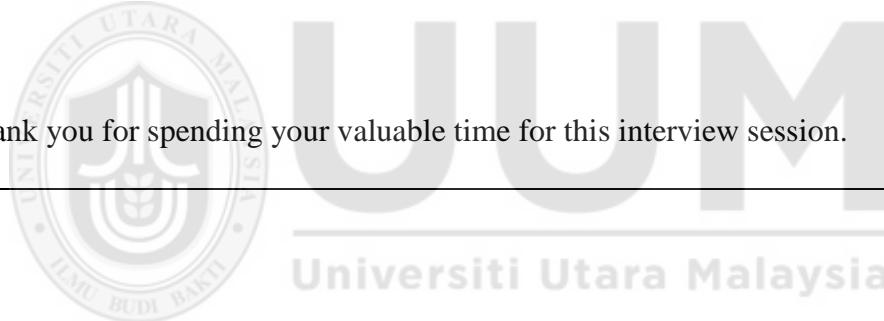
APPENDIX III

GANTT CHART OF RESEARCH ACTIVITIES

Year	2016									
Month	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Theoretical study	███	███								
Research design & instrumentation			███	███						
Data collection					███	███				
Prevention model design						███	███			
Evaluate model								███		
Documentation								███	███	

Universiti Utara Malaysia

APPENDIX IV

ACTION PLAN FOR CM-BASED PREVENTION MODEL FOR IS PROJECTS IMPLEMENTATION FAILURE

Phase	Steps	Purpose	Action Plan

Pre-Implementation (A)	**A1.** **Guiding team**	To form a team that have the ability to lead and guide the implementation of IS.	**a. Form a guiding team**
			 • Consists of people with shared commitment, have sufficient power to make required decision, and have leadership skills to lead the change effort.
			 • The group should consist of:
			   - Top management
			   - System owner
			   - IT personnel
			 • Other relevant individuals such as having expertise in specific domain.
			 • Ensure that each member know their roles as the team member.

			b. Recognize the change • Recognize what will be changed and whom the change will affect. • Are there any needs for changes in organization's processes, employee's task and responsible?

Phase	Steps	Purpose	Action Plan
			c. Create vision and strategies • Create a vision of the IS implementation. • Define strategies to achieve the vision. • Develop detail implementation plan. • Build achievable target that can be easily achieved
	A2. Resistance Avoidance	To avoid resistance to change at very early stage among those who will be affected.	**a. Awareness of the need for change.** • Conduct awareness programs to give understanding on the rationales for change and the nature of the change: - Why need to change? - What are the changes? - Who will be affected? • The need for different medium of awareness for different level of employees. For example; - Top management & Head of department – special awareness session/meeting - Others – CME sessions / table talk • Constantly communicate the vision to change. • Promotion approach – banner/streamer/website/email.

Phase	Steps	Purpose	Action Plan
			b. Desire to participate and support the change. • Head of Department (HOD)/Unit/Supervisor need to engage in awareness programs to motivate their subordinates and identify how to remove or minimize barriers/obstacles.
			c. Knowledge on how to use the IS. • Conduct the IS hands-on training sessions to give users early experience with the IS. - How their task/work process will change or looks like. - How to do it. • HOD/Unit need to organize and allocate time for staff to attend IS training. • The ownership of the system should be highlighted during the training to ensure that the user understand the segregation of task between IT Department and the system owner.

Phase	Steps	Purpose	Action Plan
During-Implementation (B)	**B1.** **IS Adoption**	To adopt the IS in their daily work/task.	**a. Empowerment** • Appoint a change agent for each department identified for the implementation. • Select people with good leadership skill and have strong influence on colleagues and subordinates. • Change agent is responsible to organize and manage the implementation in his department.
			b. Guidance and coaching • Guidance and coaching from implementation guiding team together with change agent; to guide the users to adopt to the IS. • Visible support from top management will provide a good moral support to those involve. • Strong technical support is vital to overcome any difficulties specially at the early stage.
	B2. **Enforcement**	To put a responsibility to implement the IS.	**a. Top-down approach** Instruction from top management. For example, to set a KPI to the Head of Department (HOD). HOD is accountable for the successful adoption of the IS in his department.

Phase	Steps	Purpose	Action Plan
	B3. **Monitoring**	To ensure that the implementation works according to schedule and helps to remove obstacles.	**a. Assessment of the progress of implementation** • The guiding team may use implementation plan as a reference to assess the progress of implementation. • On-site assessment is more effective because immediate action can be taken to resolved issues arise.
			b. Regular meeting • Guiding team need to arrange for regular meeting with the top management and Head of Departments to monitor the progress of the IS implementation. • The guiding team may present the outcomes of the assessments done. • Unresolved issues during the implementation able to be discussed at higher level and appropriate decision can be made.
			c. Other relevant approach: • Online monitoring (if possible) - Easier for top management to monitor each department's performance. - By having an online monitoring, data presented is a real-time data.

Phase	Steps	Purpose	Action Plan
Post-Implementation (C)	**C1.** **IS sustainability**	To ensure that the IS is constantly utilized and become a culture in the organization.	**a. Recognition** • Reward those embrace the change to motivate others to participate and support the IS implementation.
			b. Create succession plan • To train and develop a number of champions to continue with the change effort, since the rate of relocation of staffs is relatively high. • Documentation need to be available for reference. The documentation helps new leaders or employees to understand the direction of the IS and their responsibility.
			c. Regular audit • Guiding team need to build an assessment procedure to identify what's working and what needs to be improved. • Plan for regular audit. • Present the outcomes of the audit in a meeting for further action. • Regular audit act as an enforcer to enforce users to utilize the IS.