

# Information Systems Implementation Failure in Malaysian Government Hospitals: How Change Management Helps?

Noraziah ChePa, Noorhayati Md Jasin and Nur Azzah Abu Bakar  
*Human-Centered Computing Research Lab, School of Computing, Universiti Utara Malaysia.*  
aziah@uum.edu.my

**Abstract**—Successful implementation of Information System (IS) in government hospitals is indeed a challenging task. Fail to prevent or control challenges of Information System (IS) implementation have led to the failure of its implementation. Government has invested a big amount of money on information system (IS) projects to improve service delivery in healthcare. However, several of them failed to be implemented successfully due to several factors. This article proposes how Change Management (CM) helps in preventing the failure of IS implementation, hence ensuring the success of it. This study starts by discovering challenges of IS implementation in government hospitals. Combination of extensive literature review and deep interview approaches were employed to discover these challenges. CM has been employed in designing a prevention model to cater the challenges. 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. Six elements of CM comprising thirteen sub-elements adopted from the three CM models have been used to handle CFFs of Human and Support issues; guiding team, resistance avoidance, IS adoption, enforcement, monitoring, and IS sustainability. Successful practice of the proposed mapping is expected to prevent CFFs to occur, hence ensuring a successful implementation of IS in the hospitals. The proposed model has been presented and successfully evaluated by the domain experts from the selected hospitals. The proposed model is believed to be beneficial for top management, IT practitioners and medical practitioners in preventing IS implementation failure among government hospitals towards ensuring the success implementation.

**Index Terms**—IS implementation, Change Management, Hospital Information Systems, IS implementation failure

## I. INTRODUCTION

Government hospital is one of the healthcare organizations which provide healthcare service to the public. Healthcare sector is different from other sectors because of its environment and the diversity of the systems and devices used [1] and [2]. Ahmad and his team [2] claimed that healthcare is a critical and complex sector as it comprises of many disciplines of services such as surgical, obstetrics & gynaecology, paediatric, radiology, psychiatric, medical laboratory, emergency & trauma and a lot more.

Hospital Information System (HIS) has become an important tool needed to efficiently manage information in hospital. HIS is defined as a computer-based information system designed to be used in healthcare environment [3]. 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 [4], [5]. 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 [6].

Successful implementation of Information System (IS) has been a challenging task. HIS is inevitable as well. To date, IS projects failure have become a global issue as it happens everywhere around the globe. A study of 50,000 software development projects around the world by Standish Group International in 2015 shown that the number of failed projects for the last five years fluctuates between 17 to 22 percent.

At the implementation phase of IS project, there are two categories of failure, namely total failure and partial failure [7]. The IS 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 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 are used by users. The third situation is where the system is utilized by only a number of designated users or departments or units while others just ignored it.

Human is a very important element in IS projects implementation. Resistance to change is one of the common issues during the implementation of a new system that need to be handled wisely [2], [7], [8], [9], [10], [11], [12], [13], [14], [15]. The success or failure of the implementation is closely related to their level of adoption to the change introduced. Staff in one organization may respond to change differently from staff in other organizations because different organization may have different culture [15], [16]. Commitment from user and team member is the key to the success of IS implementation [14].

In some situations, conflict between users in different departments may affect the overall success of the IS project implementation [14]. Cooperation between departments is very important to eliminate any obstacles during IS implementation. Monitoring and control as well as effective communication helps to overcome issues and sustain the implementation [1], [14], [16], [17]. In a sensitive environment like hospital, it is quite risky because patient lives may depend on the proper work of the systems [1]. For example, patient information received from Hospital Information System (HIS) is crucial in order to prescribe

correct medicine to patient. In Malaysia, previous studies show that IS projects in Malaysian government agencies are inevitable from suffering of failure due to several factors [8], [10], [13], [18], [19]. Based on the issues discussed, a proper approach is needed to prevent the failure of IS projects implementation in Malaysian government hospitals. This article focuses on how Change Management can be applied in helping to prevent the failure of IS project implementation in human context, particularly in Malaysian government hospitals. Change Management (CM) is chosen as a solution since it caters human aspect. The organization of this articles as follows; section II discusses current scenarios of IS project implementation in government hospitals, Change Management concepts are covered in Section II. The proposed solution is presented and thoroughly discussed in Section IV. Finally, conclusion and discussions on future works of the study are covered in Section V.

## II. IS IMPLEMENTATION IN MALAYSIAN GOVERNMENT HOSPITALS

Study has been conducted at four government hospitals in Northern Region of Malaysia; Hospital Tunku Fauziah (HTF), Hospital Sultanah Bahiyah (HSB), Hospital Kulim (HKulim), and Hospital Pulau Pinang (HPP). There are two categories of hospitals under Ministry of Health; IT hospital, and non-IT hospital. Out of four hospitals involved in this study, only Hospital Sultanah Bahiyah is categorized under IT hospital while others are non-IT hospital. Each hospital implemented different types of IS, either developed by vendors or hospital's IT Department.

HIS is the main IS used in hospitals to manage patients record. For example, the main IS in Hospital Pulau Pinang (HPP) is Sistem Pengurusan Pesakit (SPP) since 1990s, while Hospital Sultanah Bahiyah (HSB) is using Total Hospital Information System (THIS) since 2007. In Hospital Tuanku Fauziah (HTF) Tele-Primary Care (TPC) is implemented since 2008 while in Hospital Kulim (HKulim), Electronic Health Information System (eHIS) is used since 2004. Each hospital faced a lot of challenges in implementing the systems. For example, although Sistem Pengurusan Pesakit Dalam (SPPD) in Hospital Pulau Pinang (HPP) has been implemented since 1990s, it was found that the system has been used only by certain wards. The Diet Order module has been abandoned. 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 Specialist Clinic, Medical Department, Radiology Department and some wards. Other departments such as Obstetrics & Gynaecology, Orthopaedic and Surgical Department are not using it. Since early 2016, ENT Specialist Clinic is no longer using the system. Hospital Kulim seems to share the same problem as the other hospitals. The implementation of its Hospital Information System (eHIS) is not successful. The system is not integrated with other systems in the hospital.

From the study, the implementation of HIS in three of the hospitals can be categorized as partial failure because the implemented HIS still in use until now, although it is not fully utilized. Analysis of the data collected from the preliminary

study, revealed the challenges in IS projects implementation in government hospitals in Northern Region of Malaysia. There are thirty-six challenges in implementing IS projects have been discovered. Fourteen challenges are from human issues (workload, readiness, priority, skill, mentality, preference, attitude, impression, initiative, understanding, commitment, awareness, self-interest, user dependency). There are six and for challenges from support and technology issues respectively, while twelve challenges are from software limitation issues. The challenges are categorized into four main factors; human issues, technology and infrastructure issues, software limitations, and support issues. This article focuses on challenges from human and support issues. CM will be used to prevent these challenges to occur, thus ensuring a success implementation of IS projects.

## III. CHANGE MANAGEMENT

Change management (CM) is one of the components in Project Management (PM) [15], [20]. CM is defined as a set of basic tools or structures, used to control change efforts [21], [22]. It comprises of process, tools and techniques used in managing change at people-side to achieve business objectives. CM helps towards successful individual transition by consolidating the organizational tools which will provide a positive implication towards the change [23]. CM concept has been applied in various industries either in public or private sector. Many organizations have proved that CM has helped to improve their efficiency. Faucheux [24] has highlighted two organizations that has adopted CM in their organizations, California State University and British Airways. The California State University has applied CM in order to implement a new version of IT system to all 23 satellite campuses which affects thousands of staffs and students, while British Airways used CM approach to restructure the company and turn it to be a profitable company.

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. CM should be in place so that the change can be managed well. However, during the implementation of IS project, the factors that determine whether the project is implemented successfully or turn to fails is highly dependent on organizational factors. 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 [25].

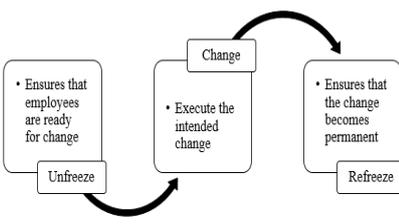
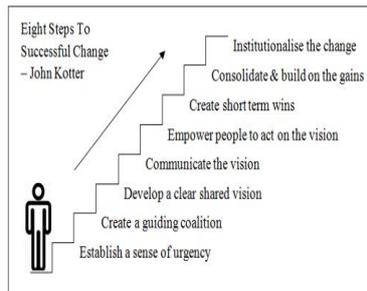
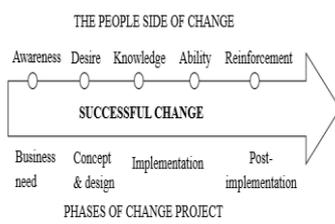
In IS project implementation, Ziembra & Oblak [26] has proved that CM has contributed to a successful implementation of IS project. They have conducted a case study on two IS projects implementation in Polish public organizations. Those two projects are similar in scope and size. However, one project has been implemented without CM, while CM has been conducted in the implementation of another project. As a result, 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 as it has not been fully used by the users and the implementation period need to be extended. Other success story of CM adoption was in the implementation of Technology Roadmapping (TRM) where CM was applied to overcome challenges and

limitations occurred during the implementation process [27]. On the other hand, Leyland and his team [29], have recommended CM to be integrated into Clinical Health Information Technology project to elevate the adoption among the users.

Through extensive literature review, three Change Management models which suitable to prevent the discussed

issue have been identified; i) Three-stage Process of Change by Kurt Lewin; ii) Kotter’s Change Management Model by John Kotter; and iii) ADKAR Model by Prosci. Table 1 describes briefly these three models.

Table 1  
Change management models

Lewin’s Model	Kotter’s Model	Prosci’s ADKAR Model
		
<p>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 which involves Unfreeze, Change, and Refreeze.</p>	<p>Kotter’s Change Management Model which introduced in 1996 comprises of eight steps that need to be followed to drive a successful change in organizations; establish a sense of urgency, create a guiding coalition, develop a clear shared vision, communicate the vision, empower people to act the vision, create short term wins, consolidate &amp; build on the gains, institutionalize the change</p>	<p>The ADKAR Model has been introduced by Prosci (1999). ADKAR is an acronym for <i>Awareness, Desire, Knowledge, Ability and Reinforcement</i>; the important elements to prepare individuals to accommodate change. This model has been used as a tool to drive individual change [9]. It shows the milestones that an individual must achieve for change to be successful.</p>

IV. THE PROPOSED SOLUTION

From the study conducted, 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.

Current implementation of IS in government hospitals in Northern Region of Malaysia only focuses on user training, then directly followed by the implementation of IS projects among medical practitioners. The importance of the preparation before the real implementation and after the implementation process was not given an appropriate attention. No emphasis given on the team preparation and ongoing monitoring process. During the implementation, if resistance occurs due to numerous reasons, it is already late and hard to change users’ negative mindset and perception of the IS.

Due to the scenario, this article proposes three sub-phases of IS implementation for better management of processes and activities involved in IS implementation. Three sub-phases are Pre-Implementation, During-Implementation and Post-Implementation [28], as depicted in Figure 1.

A. Pre-Implementation

The purpose of this phase is 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 2.

For pre-implementation, Lewin and Kotter 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. 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.

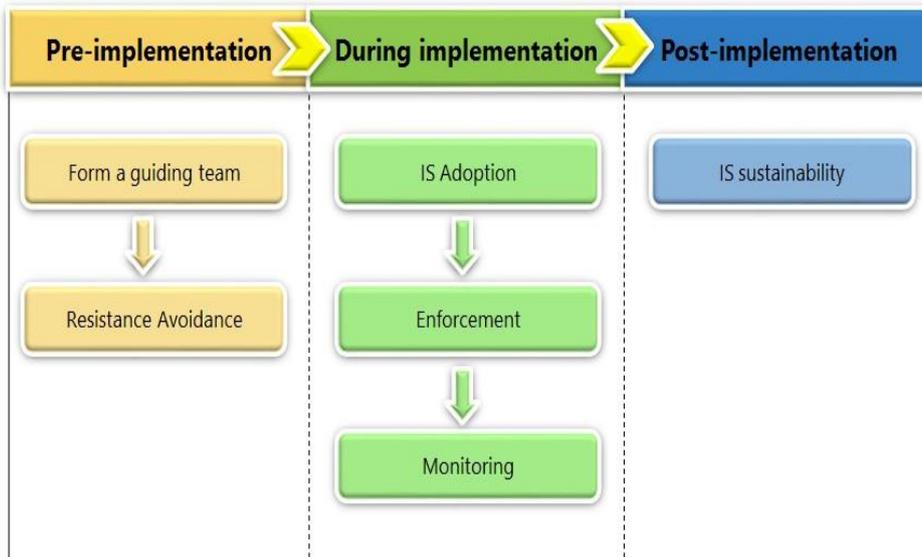


Figure 1: The proposed prevention model for IS projects implementation failure

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

Figure 2: CM elements in Pre-Implementation phase

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 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 highlights 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 emphasized by Prosci 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 and Lewin. 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.

**B. During-Implementation**

This phase 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 3.

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

Figure 3: 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 needs 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 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 and Prosci. 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.

C. Post-Implementation

This is an important phase to sustain the utilization of 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.

Post-Implementation	
IS sustainability	Continuous assessment
	Recognition
	Succession plan

Figure 4: CM elements in post-implementation phase

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 practiced 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.

Post-implementation is to ensure the continuity of the IS in organization. Kotter emphasized 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 be conducted regularly to ensure that the change stick as the culture in the organization. Other than that, regular audit can be considered as a kind of enforcement and monitoring to ensure that IS is continuously implemented by the practitioners.

The whole idea of the proposed CM-based model in tackling the identified challenges of IS implementation are clearly depicted in Figure 5. Thirteen elements of three selected CM models are mapped into relevant processes of the three sub-phases to prevent IS implementation failure.

However since CM is embedded in the model, the proposed ideas only focusing on challenges involving IT practitioners; human and support issues. Change Management is well-known as an approach to manage human side of change. The model can be further enhanced by including the other two challenges, which are software limitations, technology and infrastructure issues.

V. CONCLUSION

Preventing or controlling issues or challenges of IS implementation will lead to its success. A prevention model has been constructed in ensuring IS implementation in government hospitals a success. Change Management concept has been incorporated into the model by adapting the CM models introduced by Lewin, Kotter and Prosci.

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 in planning of IS projects implementation to prevent the failure. The prevention model also act as a guideline by top management in IS project planning to prevent the failure of the projects implementation.

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.

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.

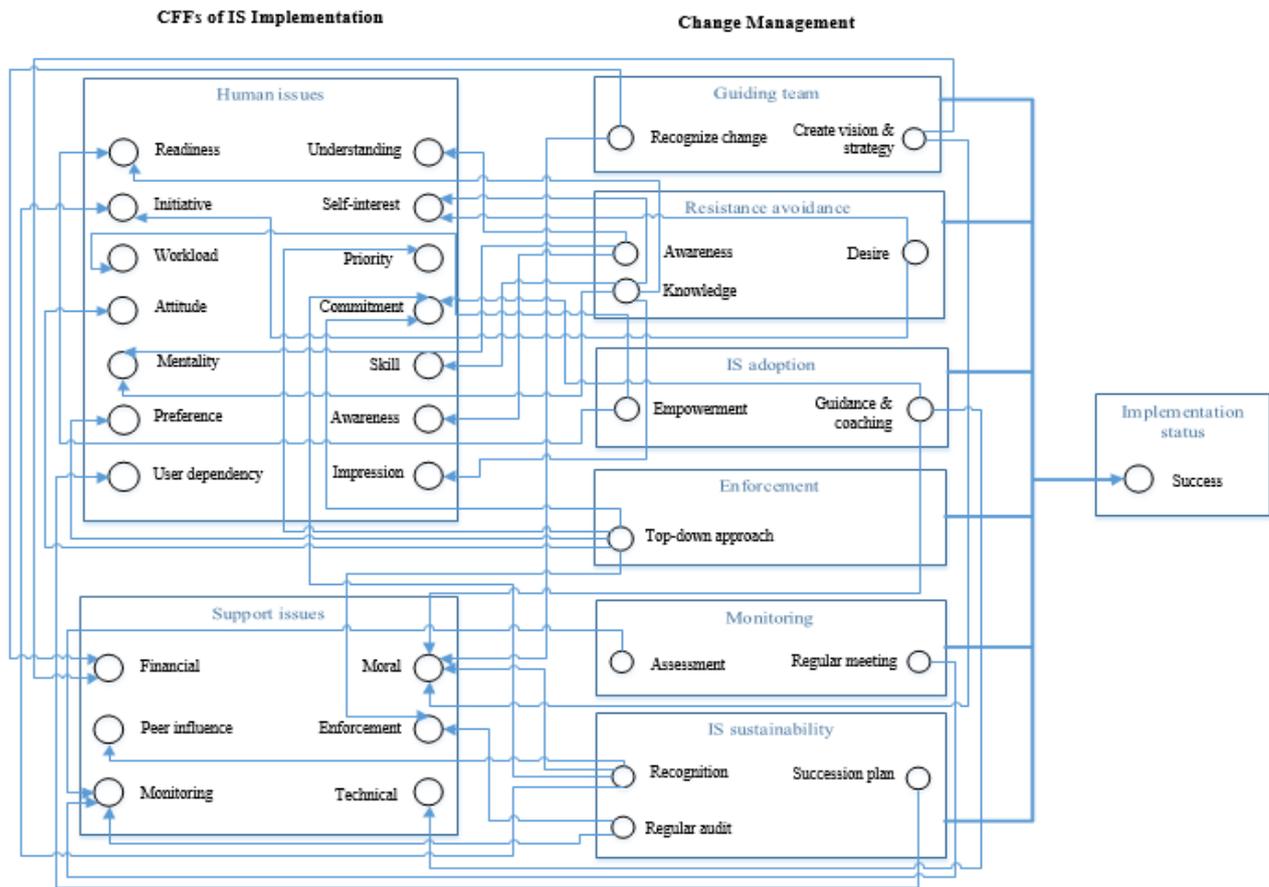


Figure 5: A proposed CM-based prevention model for IS projects implementation failure in Malaysian government hospitals

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