Managing ICT in healthcare organization: culture, challenges, and issues of technology adoption and implementation

Nasriah Zakaria
Universiti Sains Malaysia, nasriah@cs.usm.my

Shafiz Yusof Mohd Affendi
Universiti Utara Malaysia, shafiz@uow.edu.au

Norhayati Zakaria
Universiti Utara Malaysia

Publication Details
Managing ICT in Healthcare Organization: Culture, Challenges, and Issues of Technology Adoption and Implementation

Nasriah Zakaria, Universiti Sains Malaysia
Shafiz Affendi Mohd Yusof, Universiti Utara Malaysia
Norhayati Zakaria, Universiti Utara Malaysia

Abstract. The objective of this chapter is to illustrate a case study of a medical research institute in Malaysia in order to discuss issues pertaining to ICT adoption in healthcare organizations, in particular exploring the culture, challenges, and issues of ICT adoption among medical teams, patients, etc. In this chapter, we examine the question of ‘What are the challenges of implementing ICT in healthcare organizations?’ Some of the lessons learned from the case study were: ICT was successfully adopted and implemented based on several factors such as supportive organizational culture, competent IT workers, committed IT department and heavy investment on ICT infrastructure. Yet challenges also arise which hinges upon factors like initial deployment of outside IT resources or expertise for ICT implementation, lack of user training and continuous communication between involved parties in the initial stage.

1.0 Introduction

This chapter consists of six sections highlighting issues on information and communication technology (ICT) adoption and implementation. The first section discusses the phenomenon of ICT adoption in healthcare institution. Second, we include literature reviews based on three perspectives that oftentimes pose challenges to the deployment of ICT: (1) organizational, (2) people, and (3) technology. Third, we highlight the methodology of the study in this chapter which is a case study. In this section, we provide the background of a single case study -- a medical research institute in Malaysia -- to illustrate lessons learned and challenges of ICT adoption and implementation. Fourth, we present our findings which is the detailed descriptions of the issues and challenges based on an analytical framework called 5Ws (what, when, why, where, and who) as well as from the three perspectives mentioned above. Fifth, we provide the discussions in light of lessons learned and the contribution of the study. Lastly, the chapter concludes by summarizing the findings for healthcare institutions that intend to adopt and implement ICT in their organizations and presents the directions for future research undertakings.

In the era of globalization and information age, healthcare industries are intensely promoting and adopting ICT to improve patient care. When more and more patients as health consumers seek and prioritize quality in their lives through enhanced healthcare treatments and services, it places great demands on the health care industry’s information-handling abilities and infrastructure (Bodenheimer, 1999). As supported by a recent World Bank (2006) report, “Reliable information and effective communication are crucial elements in public health practices. The use of appropriate technologies can increase the quality and the reach of both information and communication.”

In line with this, Malaysia as a developing country has invested heavily in ICT with the mission and vision to improve patient care. When more and more patients as health consumers seek and prioritize quality in their lives through enhanced healthcare treatments and services, it places great demands on the health care industry’s information-handling abilities and infrastructure (Bodenheimer, 1999). As supported by a recent World Bank (2006) report, “Reliable information and effective communication are crucial elements in public health practices. The use of appropriate technologies can increase the quality and the reach of both information and communication.”

In line with this, Malaysia as a developing country has invested heavily in ICT with the mission and vision to improve patient care. Malaysia realizes that patients with healthy lives are better able to maintain healthy minds, healthy lifestyles, and a balance between work and family. In a similar vein, healthcare service organizations also seek for optimal strategies and solutions to increase their medical services. When introducing ICT, these organizations need to consider carefully the challenges that arise from it such as whether the organizational culture is supportive towards any ICT adoption and implementation, whether the organization can build ICT infrastructures that are efficiently and effectively, and whether the organization is willing to recruit, select, and employ competent human resources to use ICT as tools.

For example, according to the study by Mass and Eriksson (2006), when ICT was introduced and hospital staff were unprepared for changes because there was no adequate information given by the technology providers, the immediate result was a lack of knowledge of the new clinical requirements, and users who were ignorant of how to use the new technology; the larger consequence, was a slowed process of implementation and adoption. On the other hand, organizations like hospitals have now realized the potential of integrating ICT into their organization. Technology is reshaping organizations by blending their information systems with rapidly advancing telecommunication technology (Frenzel & Frenzel, 2004). In
addition, management teams feel that having ICT integrated into their systems will improve and strengthen healthcare systems in the future. Ragam (2007) asserts that successful ICT adoption will lessen errors considerably, if not totally eliminate them. In addition, according to the World Health Organization, technologies form the backbone of services to prevent, diagnose and treat illness and disease. ICTs are only one category of the vast array of technologies that may be of use, but given the right policies, organization, resources and institutions, ICTs can be powerful tools in the hands of those working to improve health (WHO, 2004).

Besides ICT becoming the catalyst factor for economic growth, it serves as an essential medium of communication between patients and medical teams. Studies have shown that in face-to-face encounters, patients often refuse to share or disclose their illness to support groups such as medical teams, family or friends, even when such disclosure can help them cope with terminal illness. Whether ICT will make patients more or less willing to disclose their information to the support group or family members is still unknown. Hence, the main purpose of this chapter is to understand ICT adoption and implementation issues in one case study of a Malaysian hospital as an example of a health-care institution. In this chapter, we will investigate one overarching research question: What are the challenges of implementing ICT in healthcare organizations?

2.0 Culture and Challenges of ICT Adoption and Implementation

In this section, we first provide some definitions on basic concepts such as culture, organizational culture, and information system culture. We also provide the linkages between these different layers of culture. Second, we also present some literature reviews on ICT adoption and implementation based on the conceptual framework (see Figure 1.0). In specific, we investigated the culture of ICT adoption among the medical teams and support staff in the hospital environment. Culture can be defined as the way of life or the way things are done. Cultural values are usually associated with nations, though a particular nation may consist of subcultures and even subcultures (Holt & Wigginton, 2002). In addition, Robbins (1996) defines national culture as “the primary values and practices that characterize a particular country” (p.48). Culture differs in many aspects and exists between countries based on cultural dimensions introduced by several theorists. The following paragraphs explore in more detail the three types of culture with which we are concerned: national, organizational, and IS.

A cross-cultural theorist, Geert Hofstede (1980) has conducted hundreds of studies to examine the impact of cultural values on many aspects of organizational behaviors and management practices. His study illustrates national culture based on four dimensions—power distance, uncertainty avoidance, individualism vs. collectivism, and masculinity vs. femininity. Each dimension describes a different area of the cultural impact on management practices. For example, power distance illustrates the willingness of a person to accept the inequality of power in an organization. The second cultural value, individualism vs. collectivism, refers to the ‘sense of belonging’ a person feels when it comes to job satisfaction and tasks. Third, uncertainty avoidance explains the level of risk and uncertainty that people are willing to accept and undertake. The last dimension, femininity and masculinity, describes the difference between people who are ambitious, hardworking, committed and task oriented as opposed to people who are caring, and relationship-oriented.

Organizational culture comprises the attitudes, experiences, beliefs and values of an organization. According to Schein (1992), organizational culture can be defined as “A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems” (p.34 ).”Thus the impact of organizational culture is extensive and intense in organizations where it is manifested in concepts such as ‘the way we do things around here,’ or certain rites and rituals of the company, ‘our company climate,’ ‘our common practices and norms’, and ‘our core values.’ Schein (1985) suggests three levels of culture: artifacts, espoused values, and basic underlying assumptions. These organizational levels definitely overlap with the national background of an individual, which might create conflicts.

Besides organizational culture, another layer of cultural values that need to be emphasized is the information system (IS) culture. What is an IS culture? There is no clear distinction of this type of culture since it overlaps with national and organizational culture. To avoid any confusion with the already multifaceted cultural values in this chapter, we will limit our definition of IS culture to one particular instance, that of the organizational culture of the developer of the ICT and the users who either adopt or
reject the technology that he or she uses in an organization. Extending the work of Hofstede, IS culture can be defined as the set of values and practices shared by the members of an organization involved in information activities; this includes people like IT professionals, managers, and end-users. IS culture is thus a subset of an organizational culture, with unique values that are attached to the IT department. IS culture might resist technologies which threaten to change their current status, power, and working habits, especially when they may violate some of the groups’ shared values. IS culture may also be more or less compatible with certain forms of IT; when that is the case, the result can be resistance to IT changes, failure in ICT adoption, and lack of implementation. In other words, the way people perceive the usefulness and ease of use of a given ICT will be impacted by the existing national culture – in this case, that of the medical teams as well as the support staff – together with the common practices, artifacts, espoused values and underlying assumptions of the developer(s) in an organization.

On the overall, culture is complex and multifaceted (Fan, 2000). As such, national culture is interrelated to organizational culture, professional culture (e.g. medical teams as doctors and nurses), as well as the IS culture. All these layers of cultural values can affect the way people handle innovation and ICT adoption. For instance, a study by Aggouram & Ingham (2003) found that when an organization attempts to standardize their information system, culture plays an important role as it affects the success of such task. Besides the multifaceted layers of culture, we also need to address the challenges that are confronted by people when a new technology is introduced. The key question is whether or not people are able to adopt the newly introduced ICT and if yes, what is the culture surrounding the ICT adoption and what are the challenges encountered by an organization?

2.1 Challenges of ICT Adoption

Based on the following conceptual framework (Figure 1.0), there are three aspects that we examined pertaining to the issue of ICT adoption in the hospital which are (1) organizations, (2) human, and (3) technology. Without a doubt, ICT has played a significant role in organizations such as hospitals and will continue to play a greater role in the aim of enhancing healthcare services. ICT is no longer just a business tool but an integral part of the organization’s strategies. ICT impacts not only the IT department but every area or department in the organization since ICT is responsible for the integration of information across the entire organization. Based on empirical studies, the challenges of ICT arise from three barriers: organization, people and technology (Nambisan & Wang, 1999; Lorenzi & Riley, 2003; Nøhr, 2005; Pare, 2007; Tanriverdi & Iacono, 1999). These challenges and issues must be managed critically and effectively in order for an organization to function successfully via the use of ICT tools and applications.

![Figure 1.0: Conceptual Framework of Challenges in Managing ICT in Healthcare Organizations](image-url)
2.2 Organizational Challenges

One of the most widely discussed questions on ICT implementation in hospitals is the cost of ICT investment – that is, the cost of the hardware and software needed to run the healthcare system. This could be actually high depending on the latest cost of software on the market, but it can also be relatively high, for example particularly costly to hospitals located in rural areas where not enough investment is made in updating or changing to new healthcare systems. In addition, organizations must consider costs associated with planning, specifying requirements, customizing and re-customizing systems, training providers, and reengineering the delivery of healthcare systems to accommodate hospitals. Miller and West (2007) suggest that the initial cost of implementing an Electronic Medical Record in a health center may be as high as $US54,000 to $US64,000 per participating physician, with ongoing costs of $US21,000 per physician per year. The key question is thus who will bear the expensive costs of ICT investment?

Another important organizational challenge is the organizational culture. An effective and efficiently managed organization normally ensures that their managers and employees understand the basic beliefs and policies governing behavior both within the organization and in external business relationships. The concept of organizational culture encompasses not only the organization as a whole, but also the individuals who are part of, or interact with it. According to Zakaria and Mohd Yusof (2001), a culture that promotes change is thought to be a more nurturing environment for technology users than a culture that promotes stability and certainty. Resistance towards usage of ICT in healthcare systems will frequently surface unless the culture is receptive towards changes, and unless people are ready to both accept new ideas and, more importantly sustain the changed conditions in the future.

2.3 Human/People Challenge

Human resources are the most important assets that contribute to organizational success. With the introduction of complex and rapidly evolving technology, organizations oftentimes are limited by the scarcity of skilled employees and experienced managers needed to operate the newly introduced ICTs. It is recommended that IT managers and their top management have a plan to cope with skill shortages because organizations that fail to manage their present staff stand little chance of obtaining and retaining outstanding individuals. Human resources that are reliable and full of capabilities will also increase the efficiency and effectiveness of the ICT. Therefore, organizations need to ensure they can recruit, train, and retain talented IT experts. This issue is directly related to organizational performance as well as individual performance; significant contributions that materially improve an organization’s performance have oftentimes been made by a small number of individuals. Another important aspect is that reliable and competent IT expertise can disseminate operations and services much faster than people who do not know or understand how to use ICTs. Thus user training must be in place in order to bring users up to a tolerable level of competence which in turn increases the user acceptance of technological change. User training must be included in all phases of ICT adoption, from the initial stage up to the implementation stage. As suggested by Johnson (2001), three important tasks need to be included: educating the healthcare professionals, conducting research to understand the importance of ICT to stakeholders, and advocating for ICT use in organizations.

2.4 Technological Challenge

Without doubt, ICT is changing the way health care functions. With ICT tools, organizations can enhance healthcare services electronically where barriers like time, distance and space no longer matters. What matters is the quality of services. For instance, health care organizations can offer more efficient and various services for health consumers such as ability to access their own health records, browse the Internet for further information and knowledge about one’s illness, communicate freely and speedily between patients and doctors, and reach out to online communities of patients that suffer the same illness for psychological support. However, with the amplified role played by ICT, there are some technological challenges that arise such as ease of use, usability, information security and compatibility of the system with the existing one. All the challenges transpire as a result of the technological change undergone at the organizational as well as individual level. Technological change is defined as “the change period, during which something new is planned and introduced, e.g. the period associated with the introduction of new processes that have major new technological ingredients” (Wild, 1990, p.55). The challenges that stem from such changes need to be managed. According to Benjamin and Levinson (1993), “The greater the functionality of an IT system, the more levels of learning and adjustments are required to use it (p.30).” In
support of that, Zakaria and Yusof (2001) suggest that readiness and willingness to learn about the new
technology at a greater depth and the customization of each of the processes are key issues that need to be
taken into account when planning or undergoing technological change. Only then can the learning and
transition processes during ICT adoption and implementation be a success.

3.0 Methodology
3.1 A Case Study of a Medical Research Institute in Malaysia

A case study is an ideal methodology when a holistic and in-depth investigation is needed (Feagin,
Orum, & Sjoberg, 1991). Following storytelling logic, it seeks a deep understanding of a single
organization by analyzing its social context (Dyer & Wilkins, 1991). In order to describe a rich story, case
researchers approach the field as closely as possible and apply theoretical constructs in ongoing social
settings. The descriptive and interpretive nature of storytelling enables researchers to investigate the
process by which an artifact comes to obtain its characteristics (Dyer & Wilkins, 1991). It is a backward
tracing of artifact history and an analytical conceptualization of the artifact. In other words, a case study is
an act of taking an artifact’s history apart and reassembling it within a contextual frame. Through these
processes, researchers identify the intricacies of a particular context.

In this study, we use case study as a qualitative method because it is most relevant in exploring ICT
adoption in a new setting, in this case--Malaysia. Our case study focuses on one medical research institute
(MRI) situated in the northern part of Malaysia. The institute is part of a research university which also has
its own teaching hospital located in the eastern part of Malaysia. This research institute’s mission is to
educate and train more medical and dental professionals in conducting medical research. In addition, the
institute also provides outpatient services to the local community. At the same time, the medical research
institute is planning to open its own research hospital to be fully operational in the year 2010. They hope to
become one of the biggest tertiary and advanced medical centers and to meet the medical demands in the
northern part of Malaysia.

In terms of Malaysian healthcare system, there are three types of funding: government, semi-
government and private funding. In our case study, the medical research institute is part of a semi-
government funding scheme because it is part of a higher learning (university) institution. This means that
part of the ICT investment is taken care of by the Ministry of Higher Education, so in our case study, since
this is a government run medical institute the medical cost is very minimal. In terms of policy, there is no
comprehensive policy in regard to ICT use in hospital or healthcare organizations in Malaysia. In this case,
the medical research institute adopts the policies used by the university’s teaching hospital. In addition,
most clinicians were working with teaching hospitals before they joined the medical research institute and
were familiar with the policies.

Using a Malaysian medical institute as a case does not mean that the challenges of medical
informatics as illustrated in this chapter are unique to Malaysia. We are more interested in pointing out that
implementation and adoption of ICT in hospitals involves challenges and issues that need to be addressed
by any organization. Malaysia is just one case in point, and though the case maybe unique to Malaysia it
implies that other healthcare organizations may experience the same challenges when implementing and
adopting ICT applications.

3.2 Data Collection

We began collecting preliminary data with the research objective of exploring the challenges faced
by a single healthcare organization during the early stages of ICT adoption and implementation. According
to Yin (2003), a case study is a research design that allows a researcher to understand a phenomenon in
depth and provides richer insights about the problems being researched. Based on the case study approach,
we employed structured interview to elicit as much data as possible pertaining to the phases, challenges,
and problems encountered during the technological adoption period.

In order to understand the nature of ICT implementation and adoption in the institute, we had in-
depth interviews with two key people in the institute: the clinical director and IT Director. We met the
respondents a few times and spent many hours interviewing them to obtain their perspectives on ICT
adoption and implementation. The clinical director is responsible for overseeing numerous medical
specialties like oncology, psychiatry, dentistry, family health, pediatrics, internal medicine, and obstetrics
& gynecology. She is also responsible for providing the space and tools for postgraduate research in the
institute. The ICT director oversees all the design, development and implementation of ICT systems within
the institute. These include the ICT infrastructure to support information and communication exchange within the institute. In the clinical setting, the IT department is responsible for developing a healthcare information system (HIS) within the institute. The HIS includes patient medical records (e-clinical) linked with the radiology information system (RIS) and laboratory information system (LIS) as well as nurses’ station, billing, social work department and inventory. The system was completed and launched on March 2006, the same time as the outpatient clinics began to operate.

3.2.1 Interview Protocol and Validity of Case Study

The process of creating the interview protocol started in a formal researcher’s meeting where, we, the researchers brainstormed the main issues pertaining to ICT adoption specifically in Malaysia context. The focus was on the overall picture of ICT adoption that affected different stakeholders in the organization. The researchers then decided that the protocol should be divided into two categories. The first category contained questions related to historical background of the organization. We adopted 5W’s type of questioning (what, where, when, how, and why) so that we could explore the organization.

For the second category, we used questions that could address the success and challenges of the organization when adopting ICT. For an example, one of the questions asked the participant to give example of a “success story” during ICT development process. There is also one broad question that deals with “barriers and challenges” faced by the IT department during deployment. The “barriers” question is further expanded by setting probing questions that look into human, technology and organizational issues such as asking “How, if at all, does the communication between doctors and patients change when ICT is introduced?”

After the first draft of the protocol was completed, we sent the protocol to several researchers who are expert in the qualitative field. To ensure validity, the panel researchers examine the protocol in terms of clarity, organization, relevancy, accuracy and language-use. Once the protocol was approved, the researcher’s team went through a mock interview exercise in order to see the flow of the questions as well to know when to ask the probing questions. We also added some “scenarios” to help the main interviewer understood the meaning of each question in case the interviewer got stuck during the interview. All this exercise had helped the main interviewer to prepare for the interview.

3.3 Data Analysis—Content Analysis on the Interviews

Content analysis is an unobstrusive research technique used to explore a phenomenon that yielded rich descriptions (Krippendorf, 2004). Based on the interviews we conducted, we will discuss in detail several challenges surrounding the culture, adoption, design and implementation of Hospital Information Systems in a local context. The transcribed interviews were content analyzed. In the first set of data, since this is a preliminary study attempting to explore and understand the challenges of ICT adoption in a hospital context, we used 5Ws (what, why, when, where and who) analysis to elicit a picture of the overall IT system as well the process of development and deployment of such a system. The 5Ws analysis is a common elicitation tool which enables researchers to get in depth information from research subjects. Then, in the second set, the discussions of the findings center on the three potential barriers: organizational issues, human/people issues and technological issues. The findings are described in the following section.

4.0 Discussions on ICT Adoption in Healthcare: A Case of a Medical Institution in Malaysia

4.1 Exploring ICT Adoption Using the 5Ws Framework

a. WHAT is e-clinical system?

It is crucial to first define the concepts of ICT and electronic healthcare. We suggest using the following definition; ICTs are defined as tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means; this includes the full range of electronic digital and analog ICTs, from radio and television to telephones (fixed and mobile), computers, electronic-based media such as digital text and audio-video recording, and the Internet (Frenzel & Frenzel, 2004). Electronic healthcare, or e-health, is an emerging field of health informatics that refers to the organization and delivery of health services and information using the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a new
way of working, an attitude, and a commitment to networked, global thinking, in order to improve health care locally, regionally, and worldwide by using information and communication technology (World Bank, 2006). For purposes of our case study, we will also talk about the e-clinical system which is a healthcare information system (HIS) comprised of seven modules that serve eight clinical subspecialties in the institute. The motivation for creating such a system is to operate a paperless transaction in the medical setting. The development of this software was fully supported by the university’s IT department, who provided software and hardware infrastructure as well as manpower for software development.

At this point, e-clinical has five full functioning modules which are registration, patient screening, clinical, laboratories / radiology, and billing / inventory. When patients first enroll in the system, they are entered into the out-patient registration by registration personnel. Next, patients’ vital signs are recorded in the patient screening module by nursing staff. During patient-physician interviews, the clinical module is used and the information is dispersed into imaging, laboratory and pharmacy modules for different uses. In each module, all charges are connected with the billing module. The social department reviews cases where patients cannot afford medical care and provides necessary support for those patients. If patients are eligible to receive help, the billing information is sent directly to the social department module. The last module, inventory, is connected to the billing module in order to ensure medications and all other orders are in stock.

![Figure 1.0: General Architecture of E-clinical System](image)

b. WHY develop in-house Electronic Medical Record (EMR)
One of the goals of this medical institution is to operate a paperless hospital. In doing so, the organization planned and developed an in-house EMR by customizing their own system using their local clinical requirements. The initial requirements were generated by the top management of the medical institute followed by a series of user feedbacks after the system was launched. Another motivation for developing the in-house system was to reduce costs. Development was also encouraged by their ability to get technical expertise from the university Information Technology division.

c. WHEN the roll-out takes place
The system rollout took place in March 2006. The director of the research institute wanted the system to be available as soon as the outpatient clinic was open. The decision to roll out the system in parallel with the service was quite brave, and was, made even though there were issues in system design at that point. The IT personnel met regularly afterwards and listened attentively to user requests. Changes and modifications to the system were made directly and the IT people took time to sit down and help the users. The local champion participated in the IT daily meeting to report user requests and complaints. In this case, local champions are the first group of people who adopts ICT in this hospital.

d. WHERE the ICTs are introduced in the institution
E-clinical operates in the outpatient clinic, laboratory, pharmacy and imaging centers.

e. **WHO are the users**

The users of the system include clinicians, nurses, and registration, billing, inventory and social department personnel. However, each user has limited access control as assigned by the IT department. For an example, the registration personnel can only enter and view patient registration and cannot access other modules. Most clinicians have direct access to all patient information in order for them to track any patients with multiple diseases and get appropriate care from various medical specialties.

### 4.2 ICT Adoption: Issues on Organizations, Human, and Technology

In the context of the medical institute that we researched, we found that people, especially within the top management, were very receptive to and supportive of the organizational change. In other words, organizational change was part of the culture in which people are not only willing to accept changes but also accepted the role of the ICT and recognized the benefits that they would reap from using it. ICT is expected to facilitate the operations and change the way people in the institute work and the way they provide their medical treatments and services. All members of the board of directors, which is comprised mainly of clinicians, are very open towards ICT implementation in their organization. This is evidence that clinicians are actively accepting ICT in their workflow instead of resisting it, as found in many previous research studies. The institute’s director himself made sure the e-clinical system was in place in parallel with the outpatient clinic opening because he wanted to make sure that the transitions went hand in hand. In addition to the sophisticated e-clinical system, the clinical director said that the institution has been using e-mail for their interactions with nurses and students.

Based on our case study, the IT director said one important lesson for future in-patient system development is to include all levels of users at the beginning of system development. For example, the IT department should get insights from registration personnel, nurses and clinicians from different specialties, billing officers, social workers, and any other potential users. The users would be able to give ideas on how to make their workflow as smooth possible, and may be able to see if some design would hinder their work process. In addition, they should review the requirements together with decision makers such as the institute’s board of directors. All these inputs are important to ensure that ICT facilitates their daily routine and interaction with patients.

The IT director acknowledged the importance of local champion who becomes a liaison to the development team. During the initial roll-out phase, there were daily meetings among the developers and the clinical side on usage issues from the clinical side; the nurse champion was instrumental in gathering feedback from the clinical side and was able to suggest necessary remedies to the problems that occurred. The IT director mentioned that the local champion understood the day to day challenges in using the system because she was herself an avid user and knew the clinical environment well enough to be able to diagnose the problems faced by other users. The IT director also added that the local champion will be included in the early stage of inpatient system development. The advantages of an in-house development team were that it included knowledgeable end users as well as strong technical support from the university’s IT department and an in-house developer that understood the system. The programmers were able to interact with the users and make changes instantly because they understand their own system in depth.

The institute only provided a few sessions of user training at the beginning of system deployment. There was no formal training afterwards. The IT director mentioned that most users refer to their own colleagues if they find problems when using the system. However, we feel that this organization should take extra measures to provide user training. The in-house training should be done in a consistent manner whereby training on the overall system and the potential uses of system would be cleared up among the users in the early stage. In a later phase, training should be provided as a continuous learning and improvement tool for the organization.

There were strong collaborative efforts between the IT department and the clinician side. After the system deployment, the IT people met the clinical end users every day to discuss any issues that arose. After a few weeks of daily meeting, the IT top management asked the programmers to work hand in hand with the users. At this point, all the programmers understood the nature of clinical use of the system. It is important to note that the process of cyclical communication is most important at the early stage of ICT
adoption. What is even more effective is that the IT top management takes a leading and proactive role to ensure that the technological as well as organizational change transpires smoothly and effectively.

Based on the case study, one of the main questions during the interview was to understand the technology issues surrounding the development. As mentioned earlier, the medical research institute is part of a research university. The university itself has an established IT department that oversees all IT implementation in the university. The e-clinical system template was taken directly from the university's health center, which had been using an electronic medical record system that was designed by the university IT department. When the medical research institute began their own ICT initiative, they immediately adopted the university's electronic medical record system. However, the IT director said they had to do some minimal modifications because the medical research institute handles more medical specialties compared to the university's health center. For the modification process, MRI had to "borrow" the university's IT department programmers. The migration and modification process took several months during which programmers and MRI IT personnel traveled back forth (the university and MRI are 40 minutes away). This back and forth process was not an easy task, and eventually the top management decided to hire their own programmers to handle e-clinical. Finally, they obtained two full-time programmers to operate e-clinical. In addition, MRI also hired an IT manager to lead the development team. Even though MRI now has its own development team, they still rely on the university's IT department for technical advice. Besides the issue of adapting to the university's electronic medical record format, we also found that MRI did not have to spend any money on the software because all licenses are bought by the university. In this case, MRI was able to cut costs in the development system which is an added advantage to the organization.

In terms of infrastructure, there were some issues of physical layout during the initial phase. For example, there was some discussion about where to place the servers; later on they were able to create a separate space just to store the servers. The IT director added that there was no proper planning of where to install the hardware until later on, when they discovered how disorganized it was to have the servers in various places. In other words, when the decision to adopt ICT was made, people were excited at the idea and accepted the decision without taking into consideration many details like space. In future ICT efforts, they have decided to plan hardware space first. She also mentioned that careful planning has been done in the design of the new hospital building. The institute selected one commercial system, which handles the radiological information system; this commercial system is developed in the USA, thus it incorporates standards like DICOM in the system. The IT department has to take into account these standards when incorporating it with the e-clinical system. In addition, the IT department is exploring other suitable standards for their own system.

5.0 Lessons Learned from the Case Study

In this section, we first present several key perspectives based on the lessons learned from the above case study to highlight the critical success factors and best practices of healthcare organizations. Subsequently, we present the contributions based on the case study. The following observations were made:

5.1 Plan the ICT investment more effectively

Since ICT investment is costly and time consuming, for example in getting the right supplier or vendor, top management needs to plan more proactively by taking factors like time, cost, and benefit into consideration. In the case of MRI, the decisions to invest in ICT applications were not solely made by the top management, particularly the IT Director. Instead, the ICT projects were adopted directly from the University with which the medical research institute has a strong affiliation. Thus in the initial planning stage of buying or adopting ICT and the process of making decisions, questions like what types of ICT to invest, what are the cost and benefits of using one particular or several applications, who are involved in decision making, and timeline to adopt the ICT were not discussed at length. Yet, initial planning is as important as any other stage of the ICT adoption. It is crucial that these issues be addressed at the initial stage of decision making processes and as early as possible so that any problems can be identified and solved much quickly. In the case of MRI, it is fortunate that the adoption of the e-clinical system was not much of a problem.

5.2 Recruit, select, and retain local IT experts
By having the in-house experts as gate-keepers, organizations will benefit by continuous improvements and modifications to suit the needs of the organizations. Additionally, IT experts will also become the main advocates for technological changes as well as the liaisons between users and support staff, because they will learn much faster than others. IT experts are expected to be more equipped with knowledge about the information technology systems and applications. Based on the MRI case, the top management strongly felt that when the IT people, e.g. the programmers, were recruited in-house, it was much easier to manage the time allocated for ICT adoption and to educate other users on the ease of use and usability of the new system. With such recruitment, MRI no longer needs to depend on the vendors for help as their own IT people can handle any ‘bugs’ or problems that they encounter. As a result, the ‘layperson’ or non-IT people in the institute have frequently consulted the IT experts for any kinds of problems and difficulties that they encountered not only during the early stage of ICT adoption and implementation, but also on a continuous basis. In essence, IT experts become the main source of reference to help the amateur users in the organizations.

5.3 Build a strong organizational culture that supports technological changes

When organizations provide a conducive and supportive environment for ICT, the adoption and implementation process becomes less problematic or challenging. People are more willing to try and use the technology in place. Although in our case study we observed less involvement in decision making and planning in the initial stage of ICT adoption, the organizational culture of the MRI was highly supportive. In fact the IT top management agrees that only with a supportive culture can ICT adoption be successful. As evidence, the processes of adoption and implementation were smooth in the MRI. Personnel at all levels knew that ICT would be part of the normal ways of doing things in the organizations. They welcome such changes because they know that ICT will simplify their work and help them provide their services. Without support, resistance may surface and adoption and implementation will take a longer time.

5.4 Involve all users and key people in the organizations

These people can present their needs and provide perspectives on what is desired versus what are the obstacles. By using this strategy, the organization creates an awareness of the change that will take place. When people have first hand information on the changes that will take place, as well as an avenue to voice any grievances, frustrations and anxieties about such changes, they will be more willing and ready to accept such changes. In the end, people will adopt ICT more willingly and become more accountable towards the changes. Our MRI was a unique case because the decision to adopt ICT was not inclusive at the initial planning stage. Rather than “adopt” it was more an issue of “adapt,” taking the existing e-clinical system from the other institution -- almost like having a customized system to fit within MRI. But once the e-clinical system was adopted and implemented, the IT director played an active role by ensuring all levels of users participated in the success of the systems. So there are continuous ‘loop’ feedbacks from end users that provide extensive inputs to programmers on what needs to be done and improved.

5.5 Provide continuous user training to all levels of users

From top management to lower management that will use ICT-- Training is essential at all stages of the transition because educating people on the ICT tools makes them familiar with the new work context, and eventually they become experts in using the tool. Training needs to be given phase by phase, for different people at different times. Top management may take precedence so that they can advocate changes to the subordinates.

5.6 Contribution of Study

Without doubt, making investments in ICT can be expensive, for examples in terms of the financial cost, time, and resources. Not only is the infrastructure becomes one of the main concerns for organization, but also the cost of recruiting, training, and sustaining the people as the human resources are as crucial. By looking at the findings based on the lessons learned, there are few implications that can facilitate organizations in managing the rate of ICT adoption among employees. Hence, the contributions of this study come in twofold. First, by looking at the dynamic layers of culture, it helps an organization to fully understand the underlying values of the employees as well as evaluate and improvise the
organizational culture, structure, and processes. As such, organizations will incorporate a compatible culture that is consistent with its objectives, vision and mission. Second, organizations can take preventive measurements, proactive plans and strategies to overcome three challenges as previously mentioned (see Figure 1.0). For example, organizations need to invest in training programs for the medical teams and support staffs to use and adopt ICT such as administering electronic medical records. Essentially, failure to use and adopt ICT effectively will result in unsuccessful management of patients and its healthcare services.

6.0 Conclusion and Future Directions

In essence, it must be clearly noted that the case study presented in this chapter comprises only the preliminary data on the practices and lessons learned from an organization that adopts and implements ICT – in this case an e-clinical system. As such, the case provides insights on a Malaysian context in which the effort for ICT adoption is partly supported by the government. In the future, as an emerging healthcare organization, it is expected that the medical research institute will be developing and integrating more ICT applications to support their mission of becoming an excellent medical research center. Although we have presented the issues and challenges surrounding an ICT implementation in the Malaysian health care environment, the challenges can be applied in any other organizational context or in different country-based perspectives. Inherently, there are some important lessons to be learned from this case study as illustrated above. In a nutshell, managing ICT adoption and implementation requires that the organization build effective communication among people who are involved in the technological change processes; create awareness of both the organizational and technological changes that are going to take place; develop continuous and rigorous training to increase familiarity, competency, and knowledge about the ICT to be used; recruit, select, and retain local IT experts to move the ICT adoption processes to success; and promoting supportive organizational culture that supports technological changes. Given these five lessons learned obtained from the case study, we suggest some fruitful questions for future research:

- How, if at all, does ICT change how healthcare delivers its services?
- How has patient care changed, and what are the trends?
- How, if at all, does the work of doctors and nurses change when ICT is introduced in a health care institution?
- How, if at all, does the communication between doctors and patients change when ICT is introduced?
- Does ICT deskill or facilitate doctors and nurses?
- What are the critical success factors for ICT adoption in healthcare organizations?
- How do organizations manage technological changes to ensure effective ICT adoption?

References


An International Journal, 7(2), 3-10.

Key Terms and Their Definitions
1. Culture—basically includes knowledge, belief, art, morals, law, custom, and many other capabilities and habits acquired by a man as a member of a society.
2. Case study—is defined as a research strategy, an empirical inquiry that investigates a phenomenon within its real-life context. Case study research means single and multiple case studies, can include quantitative evidence, relies on multiple sources of evidence and benefits from the prior development of theoretical propositions.
3. Electronic medical records (EMRs) — are computerized or electronic based health records of a person used by physicians, clinic or hospitals. It is a comprehensive record that combines information across multiple providers.
4. **Information Communication Technology**—defined as tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means which includes the full range of electronic digital and analog ICTs.

5. **Medical informatics**—analysis and dissemination of medical data through the application of computers to various aspects of health care and provisions.

6. **Organizational culture**—comprises the attitudes, experiences, beliefs and values of an organization. It can also be defined as the specific collection of values and norms that are shared by people and groups in an organization and that control the way they interact with each other and with stakeholders outside the organization.

7. **Technological change**—the change period, during which something new is planned and introduced, e.g. the period associated with the introduction of new processes that have major new technological ingredients.