# DEVELOPING A KNOWLEDGE MANAGEMENT PROCESS MODEL FOR HEALTHCARE ORGANIZATIONS

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**FACULTY OF BUSINESS AND ACCOUNTANCY**
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## ABSTRACT

This study explores knowledge management practices in healthcare organizations. Healthcare practitioners are a knowledge-based community who depend on knowledge management activities and embracing ICT in search for better service quality for their organizations. It is evident that healthcare is a highly knowledge-intensive industry that can establish a learning organization, implement knowledge management and establish competitive edges. However, little studies have explored in the knowledge management process in clinical environment. This study's primary goal is to examine how clinicians (doctors and nurses) employ knowledge management process and so develop a knowledge management model. This study focuses on knowledge management practices among clinicians particularly on how they build their knowledge schemes, scan and use knowledge and how they use ICT to facilitate the process. By adopting an interpretive case study approach, two distinct roles of clinicians were selected to reflect how knowledge management process is being practiced in their organization. This study aims to provide a process model that will add to the existing models on knowledge management process; extend the initial model used in this study; examine the contribution of different clinicians to the model as well as guide practitioners in understanding and applying knowledge effectively.

## ABSTRAK

Kajian ini meneroka amalan pengurusan pengetahuan dalam organisasi penjagaan kesihatan. Pengamal penjagaan kesihatan adalah komuniti berasaskan pengetahuan yang bergantung kepada aktiviti pengurusan pengetahuan dan menggunakan ICT dan aplikasi berasaskan web dalam memperbaiki kualiti perkhidmatan di dalam organisasi mereka. Ia adalah jelas bahawa perubatan adalah industri yang berintensifkan pengetahuan yang boleh mewujudkan organisasi pembelajaran, melaksanakan pengurusan pengetahuan dan mewujudkan suasana kerja yang kompetitif. Walau bagaimanapun, hanya sedikit kajian yang telah menerokai proses pengurusan pengetahuan dalam persekitaran klinikal. Matlamat utama kajian ini adalah untuk mengkaji bagaimana doktor dan jururawat mengaplikasikan pengurusan pengetahuan dalam suasana bekerja mereka seharian dan untuk membangunkan satu model pengurusan pengetahuan. Kajian ini memberi tumpuan kepada amalan pengurusan pengetahuan di kalangan doktor dan jururawat terutamanya bagaimana mereka membina skim pengetahuan mereka, mengimbas dan mengaplikasikan pengetahuan, dan bagaimana mereka menggunakan ICT untuk memudahkan proses tersebut. Dengan menggunakan pendekatan kajian kes tafsiran, doktor dan jururawat telah dipilih untuk menggambarkan bagaimana proses pengurusan pengetahuan diamalkan di dalam organisasi mereka. Kajian ini bertujuan untuk menyediakan satu model proses yang akan menambah kepada model yang sedia ada pada proses pengurusan pengetahuan; melanjutkan model awal yang digunakan dalam kajian ini; mengkaji input daripada dua pekerja klinikal yang berbeza untuk pembangunan model dan juga untuk memberi saranan dalam memahami dan seterusnya mengaplikasikan pengetahuan secara efektif.

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# CHAPTER 1: INTRODUCTION

This chapter gives an overview of the dissertation. First, it defines knowledge, knowledge management and knowledge management process model. Second, it discusses the problem that provides the cause for this research. Third, the research questions and objectives of the study are presented. Fourth, the significance of the research is provided. Finally, this chapter provides the organization of this dissertation.

## 1.1 An Overview of Knowledge Management

Knowledge plays an important role in today's organization because it facilitates decision-making capabilities and builds learning organization (Garvin, 2003). As such, the collection, creation and application of knowledge have become a critical factor in an organization's competitiveness and survival (Wu & Wang, 2006; King & Zeithaml, 2003; Hwang et al., 2008; Asrar-ul-Haq & Anwar, 2016). Consequently, knowledge management has become crucial for organizations that wish to promote best practices, increase their chances of success and create new business knowledge (McDermott & O'dell, 2001; Adams & Lamont, 2003; Chapman & Magnusson, 2006).

### 1.1.1 Defining Knowledge Management

**Table 1.1:** Knowledge Management Definitions

| Author | Definitions |
|---|---|
| Davenport (1994) | The procedure of distributing capturing and effectively applying knowledge. |
| Wiig (1995) | A group of unique and well-defined methods and procedures created to manage knowledge. |
| Nonaka & Takeuchi (1995)<br><br>Pasternack & Viscio (1998)<br><br>Pfeffer & Sutton (1999) | The process of employing a systematic method for capturing, managing, structuring and disseminating of knowledge in an organization in order to work quicker, reapply best practices and decrease expensive rework from previous projects. |

| | |
|---|---|
| Ruggles & Holtshouse (1999) | |
| Grey (1996) | An integrated and collaborative method for the capture, creation, organization, access and application of an organization's intellectual property. |
| O'Dell et al. (1998) | A conscious approach of providing suitable knowledge to suitable individuals at the most suitable time and helping them share and initiate information into action in approaches that aim to enhance organizational performance |
| Duhon, 1998 | An approach that encourages an integrated method for identifying, evaluating, capturing, sharing and retrieving an organization's information assets. These particular assets can potentially comprise documents, databases, procedures, policies and initially un-captured experience expertise of employees. |
| Beckman (1999) | The creation of experience, expertise and knowledge that creates novel capabilities, enables high performance, promotes innovation and improves value of customer. |
| Brooking (1999) | The procedure in which people manage individual-centered assets; the job of knowledge management is to protect and expand knowledge that is individual-owned and if possible, change the asset into a format where it is more easily exchanged by other workers in the organization |
| Alavi & Leidner (1999) | An organizational-specific procedure for obtaining, organizing and exchanging explicit and tacit knowledge of workers so that others may benefit from its use and thus become more productive in their tasks. |
| Stankosky (2008 ) | Leveraging intellectual assets to enhance organizational performance. |

Past literatures are rich with various knowledge management definitions, as presented in Table 1.3. Among the earliest scholars, Quintas et al. (1997) defined knowledge management as the procedure of continuously managing particular knowledge of all types to satisfy emerging requirements, in order to determine and exploit available and obtained knowledge assets and in order to create novel opportunities (Quintas et al., 1997). There are various concepts, conflicting definitions and overlapping views among the researchers and practitioners. However, the central theme is the same: managing the knowledge and encouraging people to share knowledge to create value adding products and services (Bhatt, 2001; Chorafas, 1987; Malhotra, 1998). The thought relates to exploiting and making use of personal knowledge so that it is readily available as a public resource in the organization (Anand & Singh, 2011).

As illustrated by the breadth of these definitions, knowledge management encompasses a number of activities involved in managing a firm's knowledge. For example, Wiig (1995) describes knowledge management as a group of well-defined and unique methods and procedures that manage knowledge. Other than process, it also comprises of strategies, technologies, frameworks, people and techniques. Grey (1996) defines knowledge management as an integrated method for the creation, organization, capture, access and application of one's intellectual assets. O'Dell et al. (1998) includes people as part of the definition in providing the correct knowledge to the correct people at the correct time and aiding the process by which people exchange and transform information to practical action in techniques that aim to enhance organizational performance.

Realizing the importance of practicing knowledge management in an organization, Wiig (1993) was among the first to address the need for a coherent and practical

framework for knowledge management. He has attempted to create a framework by identifying a set of organizational knowledge processing phases. His approach was based on the principle that knowledge must be organized, to be useful and valuable (Dalkir, 2011). In the following section, knowledge management process will be discussed in detail.

### 1.1.2 Knowledge Management in a Healthcare Setting

Studies have shown that healthcare practitioners have started to implement and evaluate knowledge management strategies in their organization (Russell et al., 2004; Dwivedi et al., 2002; Bate & Robert, 2002). Common knowledge management practices in healthcare are concentrated on the application of information and communication technology (ICT) (Nicolini et al., 2008; Dwivedi et al., 2002; Bate & Robert, 2002). Some examples of these systems comprise e-libraries, research article repositories, clinical guides and best practices (Caldwell et al., 2008; Fahey & Burbidge, 2008; Giehoff et al., 2009; Goddard et al., 2004; Wickramasinghe & Mills, 2002). Knowledge management activities are usually conducted during the clinical process of diagnosis, treatment, monitoring and prognosis. For example, the first step in all of these processes include the collection of data in the form of patient interviews, lab tests, imaging studies, medical history and risk factors, among others (Wills et al, 2010).

Clinicians such as doctors and nurses play an important role in collecting and analyzing the data in order to provide clinical care to patients. Information is generally a resource that has to be properly managed by healthcare personnel for providing optimal healthcare to their patients (Heathfield & Louw, 1999). Hence, the use of knowledge management techniques in order to register, communicate and augment knowledge in the healthcare sector is necessarily important (Bali & Dwivedi, 2007). Consequently, knowledge management aims to change health organizations into learning organizations

that have the capacity to formulate novel knowledge, produce knowledge systems and base organizational actions on original knowledge (Driver, 2001; Miner & Mezias, 1996).

Healthcare organizations are bogged down with a problem referred to as information overload. Researchers mention that an effective knowledge management would guide organizations to avoid this problem (King et al., 2002). IT currently supports a knowledge-centric perspective; e-health solutions have to start exploiting these novel opportunities. The healthcare sector has attempted to act upon knowledge management–enabled technology in order to enhance the transfer of e-health knowledge and information throughout the organization (including nurses, clinicians, medical officers, diagnosticians, therapists and pharmacists). The aim of knowledge management is to give the decision maker the suitable tools, strategies, technologies and procedures to transform information to knowledge assets of value (Wickramasinghe, 2007).

Since knowledge is most of the time, if not always the boundary between life and death in healthcare, a detailed or erroneous diagnosis, early intervention or extended and expensive stay at the hospital (Moody & Shanks, 1999). Healthcare organizations depend on gathering a large amount of information and also have an influx of knowledge from outside the firm (Acharyulu, 2011). The high-risk situations involved in hospitals make it necessary to collect and store large volumes of information regarding clinical trial data, patient records, administrative reports and guidelines and benchmarking results (Abidi, 2001; Abidi et al., 2008). It is evident that medical is a highly knowledge-intensive industry that could establish a learning organization, implement knowledge management and establish competitive edges (Chang et. al, 2011). Employees in the healthcare sector apply knowledge from several sources and there is a strong need for an effective management of knowledge in the healthcare

industry (Sharma et al., 2005; Wahle & Groothuis, 2005). Knowledge management presents a viable strategy for hospitals striving to simultaneously to provide quality medical services, improve operational efficiency and conform to the government's documentation and reporting regulations (Jih et al., 2006).

### 1.1.3 Healthcare as the Organizational Context

Kothari et al. (2011) debates the differences between the healthcare and business sectors in terms of organizational viewpoint. Healthcare institutions are generally under-resourced, although still needs to perform according to predefined national health policies. At the same time, private sector institutions respond mainly to goals that are internal. Consequently, healthcare institutions generally obtain political support from officials as compared to what private or independent businesses may experience (Kothari et al., 2011).

Furthermore, healthcare institutions are generally the linchpin that glues collaborations with neighboring health agencies and civil organizations; via these inter-organizational structures, practices and information are exchanged to support a spectrum of care within a particular community. Conversely, in the case of the business sector, all core information is retained for purpose of a general competitive advantage within the local marketplace (Kothari et al., 2011). Sullivan et al. (2015) also mentions that global health and development comprises of a multitude of people working on common goals that transcend geographic, sectoral, organizational and financial boundaries. These efforts require immediate access to the latest research and know-how and demand optimal use of limited resources to achieve maximum impact.

Kothari et al. (2011) continue to debate that general business is concentrated on commercial factors such as profits, while healthcare in general seeks to generate intangible public goods. Within a healthcare institution, one is predicted to consult with

various professional groups belonging to various unions and are already paid via various funding sources such as the hospital budget, or are reimbursed through the state; and are paid via various funding schemes (e.g. fee for services); or those who possess alliances with the professional community within these organizations.

Another factor of the healthcare setting is the evidence-based medicine movement which has exceeded continuing education as well as efforts for quality improvement. It is worth to mention that evidence-based practices generally concentrate on the exchange of explicit information and knowledge (i.e., academic research works), while the process of knowledge management encourages the exchange of tacit and explicit information and knowledge (Dwivedi et al., 2002; Russell et al., 2004).

Abidi (2001) debates that the healthcare sector has changed to an institution that is empowered by advanced information and knowledge resources. In the current knowledge and theoretic healthcare institutions, knowledge is referred to as a 'significant value form of information' (Davenport et al., 1998) which is vital to the enterprise's 'capacity to act' (Sveiby, 1997). It is also apparent that healthcare institutions are seen as 'data rich', since they create large amount of data, including digital medical records, data from clinical trials, records at hospitals, administrative reports and guides as well as benchmarking results (Abidi, 2001).

According to Fichman et al. (2011), a significant factor of the healthcare sector is the layer of diverse factors that characterizes patients (e.g. medical history and physical traits), professional discipline (e.g. nurses, doctors, administrators as well as insurers), treatment settings, healthcare delivery procedures and various stakeholder groups' interests (providers, patients, payers, as well as regulators). Additionally, the researchers argue about the distinctiveness of the healthcare scenario as 'The Stakes Result in Life and Death'. Medical errors and mistakes by healthcare employees have significant

consequences including increased hospital retention length of patients and amount of deaths (Classen et al. 1997; Fichman et al., 2011). At the population level, failure to retain infectious diseases may potentially result in critical public health problems. Consequently, healthcare quality must be cautiously and vigilantly carried out (Fichman et al., 2011).

## 1.2 Problem Statement

Healthcare impacts the overall quality of lives by delivering healthcare services to meet the health needs of target populations. Healthcare mistakes have serious consequences that may impact the capacity to conduct productive and social endeavors. Current reports stress the impact of adverse scenarios in hospitals as well as the consequences these events have on both individuals and the general public (Piontek et al., 2010). Generally, medical errors and mistakes (which are a leading cause of adverse events) are financially costly, results in increased length of stay in hospitals as well as cause human deaths (Classen et al., 1997). A study carried out by the Ministry of Health Malaysia (MoH) in their primary care clinics found that more than 50% of the medical records reviewed have had one medical error. Out of these errors over 93% were preventable. A lack of knowledge and skills of staff and poor documentation were shown to contribute to these medical errors (Khoo et al., 2008).

Knowledge management is central to clinical decision-making, as it involves organizations and/or individuals creating, accessing, exchanging and translating both explicit and tacit knowledge. Studies on knowledge management particularly in healthcare lack two crucial elements: (i) lack of an integrated knowledge management process model and (ii) lack of studies on how to embed knowledge management into the clinical process and work environment.

First, as many studies explore knowledge management relationships in isolation, they fall short of incorporating the end-to-end process of knowledge management. Studies found numerous relevant articles from 31 journals that were categorized as specific knowledge management process (Wills et al. 2010). It is important to study the whole process because each stage has a significant effect on the remaining consequent knowledge management steps. Furthermore, the key element of a knowledge management concept is a requirement to address people, process and technology issues in tandem (Bhatt, 2000). Thus, there is a need to study the entire process, people and technology in tandem.

Secondly, little is known on how to apply reliable knowledge and embedding knowledge management into the clinical process and work environment. There is a sufficient body of literature related to applying clinical evidence into practice, but less consideration of the manner in which management and organizational knowledge is implemented practically in healthcare institutions (Ferlie et al., 2012; Buranarach et al. 2009; Beveren, 2003). Moreover, the knowledge management currently domain seems to be currently challenged by a theory-practice gap. The vast majority of KMS frameworks are provided conceptually and do not provide action plans for realistic implementation and its employment in real-world scenarios (Booker et al., 2008). Serenko et al. (2010) reported only 0.33% of knowledge management research involves field studies. As a consequence of such 'disconnect', knowledge management practitioners face difficulties in using academic knowledge management findings in their organizations and perceive a significant portion of knowledge management research as irrelevant (Booker et al., 2008). This puts knowledge management at risk of being seen as purely theoretical with limited practical applicability.

## 1.3 Research Questions and Objectives

The main research question of this study: What are the typical knowledge management practices in Malaysian healthcare organizations?

From the main research question, five sub-questions are formulated, as follows:

(i) What are the activities required for handling knowledge?

(ii) When do these activities occur?

(iii) How do these activities occur?

(iv) Who are involved in performing these activities?

(v) What are the types of IT applications that are used?

To answer the research questions, the following research objectives have been developed:

(i) To develop a knowledge management process model for healthcare organizations.

   a. To determine the activities needed for coping with knowledge in healthcare organizations.

   b. To identify the association between the activities and knowledge management process.

   c. To determine the steps of knowledge management process in healthcare organizations.

(ii) To identify the types of IT applications that are used to facilitate the knowledge management activities.

To achieve the above objectives, the study employed interpretive case studies research. Information was mainly obtained from in-depth interviews with clinicians from a public hospital and a teaching hospital. This study focuses on doctors and nurses

where their clinical practices are examples of decision-making and knowledge utilization situations in healthcare organizations.

## 1.4 Significance of the Research

The effective management of knowledge plays a key role in organizational success. This statement is supported by the success of knowledge management strategies and practices in the business sector. Other sectors of the economy and society, including healthcare, would arguably stand to benefit from a similar emphasis on and engaged in knowledge management strategies and practices.

This dissertation focuses on how knowledge management can support a clinical work environment. The basic assumption of this study is that an effective knowledge management should be employed to ensure optimization of clinical process and decision-making. Since healthcare decision-makers use various data to make informed decisions, it is imperative that they effectively manage the knowledge they have at their disposal. In order to ensure an effective decision-making process, a more thorough understanding of knowledge management is required. Therefore, this study attempts to formulate a knowledge management process model that fits healthcare organization. This process model will add to the existing models on knowledge management process and extend the initial model used in this study by examining the contribution of different knowledge workers to the model.

In addition, this study proposes a process model that discusses the relationship between the knowledge management process and how IT/IS facilitates the process. This will determine how IT/IS should be used for managing knowledge and knowledge management process effectively. Therefore, healthcare professionals and administrators can enhance their organizational performance by understanding the relationship between knowledge management process and IT/IS facilitation. Furthermore, this study

may provide basic guideline to establish a successful knowledge management for practitioners. It may also provide the first step as to how healthcare organizations can adjust knowledge management processes to maintain their performance.

The other significance of this study is to address the gap between knowledge management theory and practice by developing a more practice-oriented knowledge management process model. The decrease in contributions by practitioners and practical research work by Serenko et al. (2010) is a crucial trend that must be rectified by creating more engagement with the sector in the knowledge management field. Knowledge workers' contribution to knowledge management framework development is critical to ensure a certain degree of applicability, as well as to avoid the construction of solely theory based frameworks that would primarily attract academics. The main concept is to produce a model that is comprehensive while being concise enough to facilitate comprehension of those that will employ it.

## 1.5 Organization of the Dissertation

The remainder of the dissertation is organized as follows. The following chapter reviews and summarizes related studies in knowledge management field. It includes the relevant literature of knowledge management, empirical studies on knowledge management and knowledge management models. In Chapter 3, research methodologies are explained such as the participants, materials and steps taken in conducting the research. This chapter also discusses the data analysis. Chapter 4 presents the findings of the data analysis. Chapter 5 discusses on the interpretation and conclusions drawn from the data findings. Finally, in the last chapter, this dissertation discusses the contributions and limitations of the study and offers suggestions for future study.

# CHAPTER 2: LITERATURE REVIEW

This chapter reviews a range of studies that have investigated knowledge management. This chapter is divided into several sections. The first section provides the overview and basic concept of knowledge. The second section discusses knowledge as an important organizational asset that may produce a firm's long-term sustainable competitive advantage. The third section demonstrates theoretical positions related to the study. The fourth section explains the evolution of knowledge management since the 1990s. In the fifth section, knowledge management model perspectives are presented and the process models are discussed in the following section. The seventh section discusses the potential role of IT/IS in knowledge management process. Finally, the last section reviews knowledge management studies in the healthcare field.

## 2.1 Knowledge: An Overview and Basic Concepts

Grant (2013) defined knowledge as an intangible resource. Combining knowledge with other firm resources (e.g. financial and physical) leads to the creation of capabilities (Grant, 2013). Knowledge is an individual's intellectual capability for purpose of the activities of organizations or firms that employees work at (Wu & Wang, 2006; King & Zeithaml, 2003; Sajeva, 2010; Hwang et al., 2008). Generally, knowledge is retained in the minds of both people and organizations and must always be readily available for usage whenever required (O'Brien & Marakas, 2006; Becerra-Fernandez et al., 2004; Tseng, 2008; Kuo & Lee, 2009). Among the typical definitions of the term knowledge is reflected by the peak of a three-layer hierarchy. For illustration, Theirauf (1999) defines the three components as follows: data being the lowest point, is an unstructured collection of facts and figures; information, the second level, is regarded as structured data; finally, knowledge is defined as "information about information". Figure 2.1 shows the three-level hierarchy of knowledge.

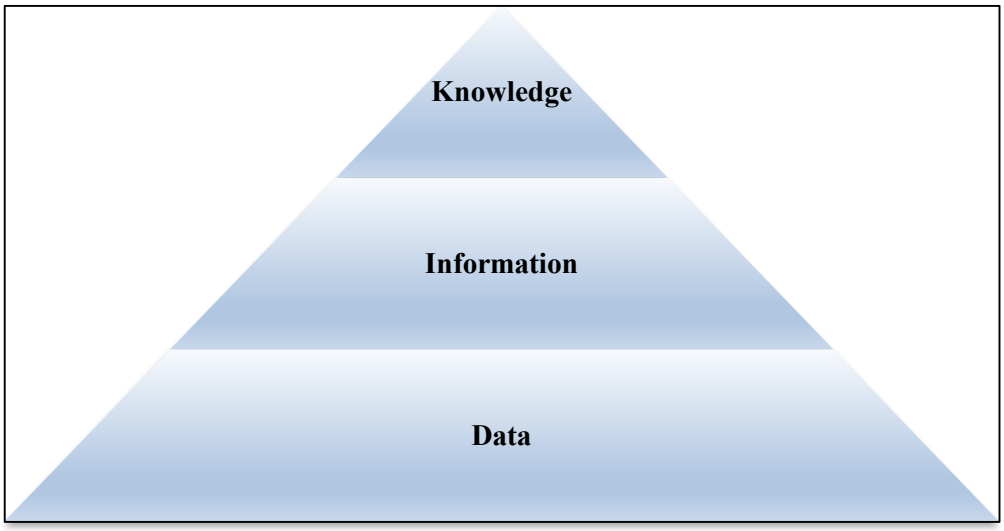



**Figure 2.1:** The Three-Level Hierarchy – Data, Information and Knowledge

It begins with data: facts and figures which relay something specific, although not organized in any way and provide no further information regarding patterns, context, etc. Data can be defined as unstructured facts and figures (Thierauf, 1999). For data to become information, it must be contextualized, categorized, calculated and condensed (Davenport & Prusak, 2000). Bali et al. (2009) defined information as data with relevance and purpose. Information conveys a trend or a pattern in the environment. For example, the pattern of sales within a specified range of time (Bali et al., 2009).

Essentially information can be found in answers to questions that begin with who, what, when, where and how many (Ackoff, 1999). Knowledge is closely linked to doing and implies know-how and understanding. The knowledge possessed by each individual is a product of his experience and encompasses the norms by which he evaluates new inputs from his surroundings (Davenport & Prusak, 2000).

Knowledge has since received many definitions. Apart from searching for knowledge from within the mentioned relational hierarchy, some researcher mention that it is simply defined as, (1) a state of mind (Schubert et al., 1998), (2) a process (Zack, 1999), (3) an object (Zack, 1999), (4) a condition that can be accessed (McQueen, 1998), or (5)

capability (Carlsson et al., 1996). The many definitions have emerged due to increased awareness of the importance of an effective knowledge management process that has become an important resource and critical success factor for organizations (Grant, 1996). Table 2.1 shows the various definitions of knowledge.

**Table 2.1:** Knowledge Definition

| Author | Definition |
|---|---|
| Wiig (1993) | Comprises of truths and beliefs, perspectives and concepts, judgments and expectations, know-how and methodologies. |
| Bohn (1994) | The impacts of input variables on the final output. |
| Nonaka & Takeuchi (1995) | A production factor. |
| Wiig (1995) | Facts, judgments, concepts and procedures. |
| Grant (1996) | Is retained within the minds of the people; existing knowledge which is known. |
| Beckman (1997) | Reasoning with information to aid in the execution of tasks, decision-making and problem-solving to learn, teach and perform. |
| Van der Spek & Spijkervet (1997) | The entire group of experiences, insights and procedures that are assumed to be true and which thus aid with behaviors, thoughts and communication. |
| Ernst & Young (1998) | Capabilities, thoughts and information which can potentially be improved and mobilized to some specific value. |
| Schubert et al. (1998) | A state of mind |
| Davenport & Prusak (1998) | In-context information along with a general understanding of the manner in which to use it. |
| Wijnhoven (1998) | A set of concrete experiences or abstract conceptualizations. |
| Alavi & Leidner (1999) | Justified belief which promotes a person's capacity to take effective steps. |

| | |
|---|---|
| Bender & Fish (2000) | Knowledge comes from a person's mind (i.e. the mental state of possessing facts, ideas, concepts, techniques and data, just as imprinted in a person's personal memory) and constructs on information that is enriched by subjective and personal experiences, values and beliefs with action-relevant and decisive meaning. Knowledge generated by one person could differ from the knowledge retained by another receiving similar information. |

Generally, knowledge can be divided into three categories; (1) 'knowing', (2) 'the capacity for action' and (3) 'codified, captured and accumulated facts' (Nickols, 2010). The act of 'knowing' is generally a state of knowing; which is also defined as to be familiar or acquainted with, to recognize facts, to be aware of, principles, methods and techniques. The typical use corresponds to what is often referred to as 'know about'. For example, Davenport & Prusak (1998) define knowledge as in-context information along with a general understanding of the manner in which to use it.

On the other hand, knowledge as 'the capacity for action' means an understanding or grasping of methods, facts, techniques and principles that is sufficient in applying them for certain events to occur. This reflects 'know-how'. For example, Beckman (1997) describes knowledge as reasoning the information in actively guiding problem-solving, task execution and decision-making to learn, teach and perform.

Meanwhile, knowledge as 'codified, captured and accumulated facts' refers to the methods, principles and techniques. This class reflects a set of knowledge that was captured and then articulated in the format of papers, books formulas, manuals and digital code (Nickols, 2010). For example, Clinical Practice Guidelines (CPGs) is a document that contains systematically developed statements to assist medical workers to

make decisions about appropriate management for specific clinical circumstances. These guidelines were developed for various diseases such as cardiovascular disease, endocrine disease, respiratory medicine and mental health.

### 2.1.1 The Importance of Knowledge

Modern society has currently emerged as a consequence of the change from a state referred to as the industrial era, to one referred to as a 'knowledge era', creating opportunity for the collection, creation and application of knowledge (Johannessen & Olsen, 2010). Currently, organizational competitiveness is extracted from intangible sources like people's knowledge (Wu & Wang, 2006; King & Zeithaml, 2003; Hwang et al., 2008; Sajeva, 2010). Therefore, knowledge has become a critical factor for organization survival (Asrar-ul-Haq & Anwar, 2016).

There are many other scholars who have also claimed that organizations depend heavily on knowledge that has become a resource and critical success factor for the organizations (Grant, 1996; Nahapiet & Ghoshal, 1998; Yi, 2009). Literature shows that knowledge is the most important antecedent for continuous innovation and success; effective management of knowledge is when an organization brings out many positive outcomes that lift it to the horizon of success (Drucker, 1999; Kogut & Zander, 1992; Nonaka & Takeuchi, 1995).

### 2.1.2 Knowledge Classification

**Table 2.2:** Knowledge Classification

| Author | Classification |
|---|---|
| Leonard-Barton (1995) | Scientific, Industry specific, Firm specific |
| Nonaka & Takeuchi (1995) | Tacit, Explicit |
| Blackler (1995) | Embodied/embraced/embedded/encultured/encoded knowledge |
| Lundvall (1996) | Know-why/know-what/know-who/know-how |
| Demarest (1997) | Scientific, Philosophical, Commercial |
| Ruggle (1997) | Process, Catalog, Experiential |
| Millar et al. (1997) | Explanatory/Catalogue/Social/Process/Experiential knowledge |
| Arthur D. Little (1998) | Tacit, Explicit |
| Delphi (1998) | Tacit, Explicit |
| Jang & Lee (1998) | Task, Domain |
| Schuppel et al. (1998) | Inner vs outer, Actual vs future, Explicit vs implicit, Experience vs rationality |
| Alavi & Leidner (2001) | Explicit, tacit, social, individual, declarative, casual, procedural, conditional, pragmatic and relational |
| Heisig (2009) | Identified a set of 28 different knowledge dichotomies, namely: individual vs organizational, internal vs external, used vs unused, undocumented vs documented, structured vs unstructured, relevant vs irrelevant and objective vs subjective knowledge |

Researchers divide knowledge for their personal, subjective knowledge frameworks. This is due to the fact that knowledge classification is the sole foundation for processes of knowledge management. Debates exist on the type and nature of knowledge, mainly due to the philosophical aspect of this focus, as well as its reliance on personal

perspectives (Ragab & Arisha, 2013). Table 2.2 shows that there is an agreement and similarities within the literature of knowledge management on knowledge classification. The classification starts with dichotomous category and evolve into numerous category such as explicit, tacit, individual, declarative, social, procedural, conditional, causal, pragmatic and relational Alavi & Leidner, 2001). Further knowledge dichotomies were later defined, namely: individual vs organisational, internal vs external, used vs unused, undocumented vs documented, structured vs unstructured, relevant vs irrelevant and objective vs subjective knowledge (Heisig, 2009). By and large, knowledge is often classified as either tacit (implicit) or codified (explicit) and has been widely used in knowledge management studies.

Tacit knowledge refers to the knowledge in a person's mind. Polanyi (1967) described tacit knowledge as something that we know more than we can tell. Tacit knowledge is personal, embedded and contextually bounded (Johnson, 2007). It is embedded within one's judgment and experiences, thus is not able to be stored or articulated (Grant, 2007). Explicit knowledge, on the other hand, can be stored and codified in differing formats (e.g. manuals or digital databases) and can therefore be transferred reliably and without any loss of information (Nonaka & Takeuchi, 1995; Stevens et al., 2010).

Based on the tacit/explicit dichotomy, the prominent SECI conversion model (see Figure 2.2) was generated by Nonaka and Takeuchi (1995). The mentioned model reflects the fact that important tacit knowledge is retained within people's minds and may only contribute value in the case it is transformed to explicit knowledge via one among four conversion modes (Diakoulakis et al., 2004; Mouritsen & Larsen, 2005). Primarily, a 2D theory of knowledge creation was formulated (Nonaka & Takeuchi, 1995; Nonaka, 1994). The first, or "epistemological", dimension is the site of "social

interaction" between explicit and tacit knowledge, in which knowledge was changed from one particular form into a different one and the outcome was novel knowledge (Nonaka et al., 1994; Nonaka, 1994). Four modes of knowledge conversion were identified (Figure 2.2); tacit towards tacit (Socialization); tacit towards explicit (Externalization); explicit towards explicit (Combination) and explicit towards tacit (Internalization). After Internalization the procedure moved on to a novel 'level', referred as the "spiral" of knowledge (Nonaka & Takeuchi, 1995), which was also called the SECI model. This particular model is broadly applied in the body of related literature as a primary foundation for discussion of knowledge management.

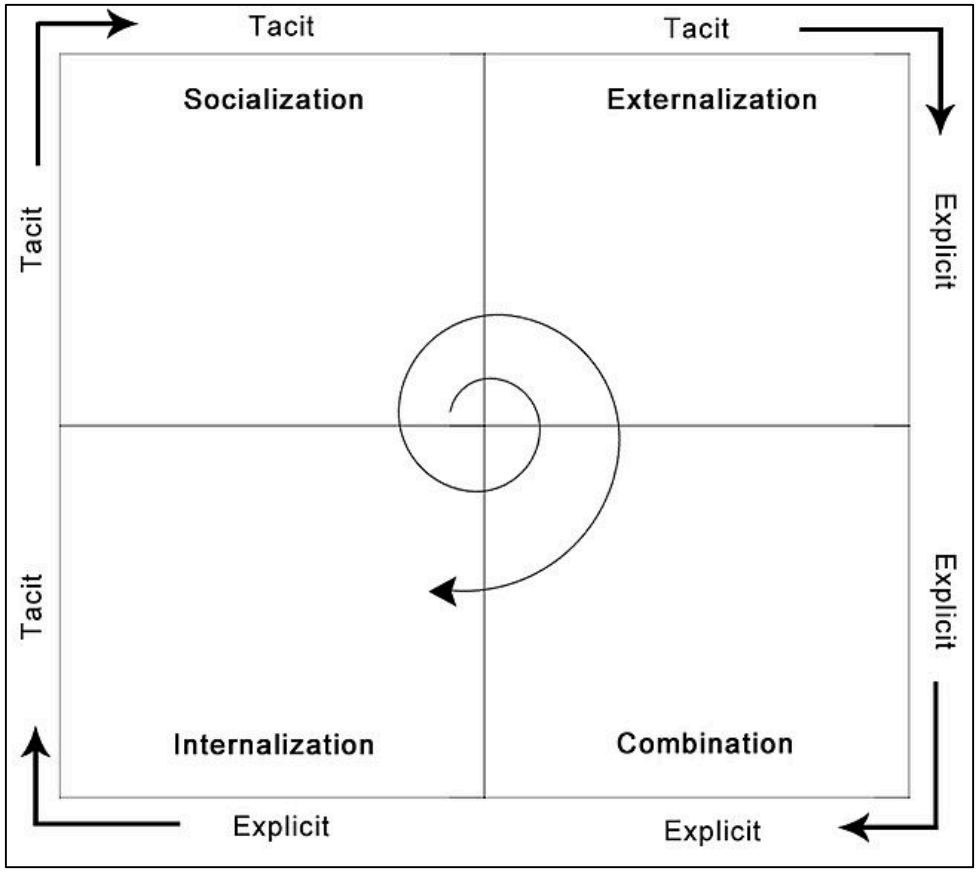



**Figure 2.2:** The SECI Model (Nonaka & Takeuchi, 1995)

Similar to other resources, the requirement to manage knowledge resources has resulted in the field of knowledge management. Knowledge is generally a basic unit of knowledge management and its classification lays the foundation on knowledge management processes.

## 2.2 Knowledge as an Organizational Asset

The argument on knowledge has emerged from the literature on strategic management, initiated by researchers from the economics field (Arrow, 1962; Hayek, 1945; Marshall, 1965), organizational theory field (March and Simon, 1958) and philosophy field (Polanyi, 1966). These views focus on the properties of knowledge and their role in organizations and have caused knowledge-based perspectives to come up. Knowledge-based views call on and extend resource-based theories of firms primarily developed by Penrose (1959) and later enhanced by Conner (1991), Barney (1991) and Wernerfelt (1984). Knowledge-based views show that the services by tangible resources rely on the manner in which they are integrated and employed, which is a function of firms' know-how (Alavi & Leidner, 2001).

Several academics have come to perceive organizational knowledge as a strategic asset. For example, Alavi and Leiner (2001) argue that knowledge-based sources are generally complex to clone and socially complicated, hence assets that may generate long-term retainable competitive advantage. Druker (1960) who was the first to coin the term knowledge worker, debates that the ability to use intellectual capability and create new solutions take a central place in the global info-economy. Zubof (1988) believes that human knowledge and capabilities have always been at the core of value-creation and it has become more visible in the information age where the "intellective" component of work is increasingly important (Zuboff, 1988).

In this era of knowledge economy, the majority of organizations have knowledge that makes them enhance their performance. Moreover, knowledge creates value within a particular organization via its contribution to processes, products and people (Sachin & Kant, 2014). Consequently, organizations today are concerned with managing their knowledge. This practice changes data, information and intellectual properties to great

value by determining beneficial knowledge for management decisions (Goh, 2006). Accordingly, knowledge management can be referred as a systematic process for organizing, acquiring, sustaining, sharing, applying and renewing all types of knowledge, to improve the organizational performance and generate value (Davenport and Prusak, 1998; Allee, 1997; Alavi & Leidner, 2001; Al-Hawamdeh, 2003; Choo, 2006).

## 2.3 Theoretical Underpinning

Ferlie et al. (2012) discuss three theoretical positions relating to knowledge management; (i) Critical theoretical perspectives, (ii) Communities of Practice (CoPs) and (iii) Resource Based View of the firm (RBV).

The first theory emphasizes the management knowledge contestability, technological social limits and the significance of power relations in knowledge management (Currie & Kerrin, 2004). Alvesson and Karreman (2001) mention that the terms 'knowledge' and 'management' are an 'odd couple', provided that knowledge is complex to manage. Such analyses commonly investigate questions of resistance and domination where knowledge management is recast as a managerial control tool. Foucault (1977, 1980) provides sophisticated and novel concepts of power. His work concentrates on the governing of 'conduct' via classification, self-surveillance and surveillance, increased by novel digital information technologies (Doolin, 2004).

Secondly, Communities of Practice (CoPs) are referred to as sets of persons who, via working as teams, construct a cohesive community of work with several mutual understandings. Strong barriers in knowledge flow may exist among CoPs so that knowledge can be retained and exchanged. This concept concentrates on the fields of social psychology and micro-sociology, stressing shared cognitions that emerge via repetitive collaborations at the workplace. This changes focus from technical based

solutions to social elements, precisely tacit knowledge exchanged via 'situated learning' (Lave & Wenger, 1991). 'Knowing' is a key element of moving towards becoming an insider in a particular community of practice; while personal knowledge is less relevant compared to communal knowledge that is accumulated with time.

The third theory comes from strategic management and industrial economics. According to RBV, a firm generates value, thus exploiting knowledge generally as an intangible asset in the process. The firm creates a competitive advantage by the protection and mobilization of available key resources (Penrose, 1959; Barney, 1991; Wernerfelt, 1984). Further arguments try to integrate relational and resource-based perceptions of knowledge by tying performance and trust within strategic alliances and collaborations (Connell & Voola, 2007). The work of Teece et al. (1997) on dynamic capability discusses organization transformation with time: dynamic capabilities are defined as "a firm's capacity to integrate, construct and reconfigure internal as well as external competences to solve quickly changing environments" (p. 516).

As knowledge is seen as a strategic intangible asset for many organizations including healthcare, the RBV is used as the theoretical underpinning of this study. Halawi et al. (2005) claimed that knowledge management (KM) could be used to create competitive advantage from the RBV of the firm. The ability to develop and leverage the value of these intangible assets is critical, particularly those providing professional services such as healthcare. In these knowledge-intensive organizations, processing knowledge is central to business success (Prahalad & Hamel, 1990; Drucker, 1999). Ferlie et al. (2012) found that the health sector related literatures has promoted several generic ideas, mostly CoP, but has not launched the performance-oriented view of the RBV of the firm (Ferlie et al., 2012).

## 2.4 The Evolution of Knowledge Management Studies

Anand and Singh (2011) categorize the knowledge management journey into three generations. The first generation was during the period of 1990-1995 where studies focused on theory development, defining knowledge management, developing framework and model, classifying knowledge, identifying knowledge management process and investigating technology involvement (Senge, 1990; Nonaka, 1991; Kogut & Zander, 1992; Quinn, 1992; Wiig, 1993; Leonard-Barton, 1995).

The second generation began in 1996 where knowledge management and its practical application to organizations were explored and implemented. Researchers investigated the role of people and their practices in managing knowledge, develop software tools, extending previous frameworks and models as well as examining strategies to increase the effectiveness of a knowledge management cycle (Grant, 1996; Swan et al., 1999; Holsapple et al., 2000; Bhatt, 2000). During this era, many studies investigated more than one perspective in tandem. Bhatt (2000) claims the key element of a knowledge management concept is a requirement to address people, process and technology. The interaction between these factors is what allows an organization to manage knowledge effectively and this application is dependent on a nurturing environment, including capacity building (Bhatt, 2001). This generation also focused on learning to maximize knowledge sharing, as technology applications that facilitated improved interaction became increasingly accessible (Alavi & Leidner, 2001).

The third generation emerged around 2002 where focus seems to be on outcomes such as the link between knowing and action. In this generation, many studies investigate the implementation of knowledge management in specific organizations such as public sector entities, education authorities, small-medium enterprises and healthcare organizations, examine the linkages and relationships between people,

process and practice as well as exploring further on technology involvement in knowledge management processes and activities (Mcadam & Reid, 2000; Carneiro, 2001; Yahya & Goh, 2002; Lee & Choi, 2003; Bose, 2003; Sun, 2010).

### 2.4.1 The First Generation of Knowledge Management Studies

The first generation of knowledge management studies was between 1990-1995. Table 2.3 shows the knowledge management studies conducted during the first generation.

**Table 2.3:** Knowledge Management Studies In The First Generation

| Year | Author | Important ideas | Area of Study |
|---|---|---|---|
| 1990 | Senge, P. M. | Developed Mastery of Senge's five disciplines to help businesses to clarify their goals, understand threats and recognize new opportunities. | Theory development (fundamental) |
| 1991 | Nonaka, I. | Introduces 'tacit knowledge' as a valuable and highly subjective insight. | Knowledge classification |
| 1992 | Kogut, B., & Zander, U. | Debate the importance of sharing and transferring knowledge among individuals and groups within an organization. This knowledge consists of information and know-how. | Knowledge classification and knowledge management process; sharing and transferring |
| 1992 | Quinn, J. B. | Discusses the use of technological innovation in the service-oriented outlook that can produce impressive business results. | Technology involvement |
| 1993 | Wiig, K. M. | Discusses what knowledge is, and how business can use, harness, enhance and manage it to produce the best value to the organization. | Theory development (fundamental) |
| 1994 | Nonaka, I. | Proposes a theoretical framework for managing the dynamic aspects of | Framework and knowledge |

| | | | |
|---|---|---|---|
| | | organizational knowledge creating processes. | classification |
| 1994 | Nonaka, I., Byosiere, P., Borucki, C. C., & Konno, N. | Confirmatory factor analyses carried out to examine Nonaka's (1994) framework of organizational knowledge creation. The outcome is to give strong support for perceiving organizational knowledge creation as a higher-order construct that consists of four knowledge conversion procedures: socialization, combination, externalization and internalization. | Framework and knowledge classification |
| 1995 | Nonaka, I., & Takeuchi, H. | Propose a framework called SECI (Socialization, Externalization, Combination, Internalization) model. This model reveals a spiraling knowledge procedure interaction among explicit and tacit knowledge. | Knowledge management model |
| 1995 | Leonard-Barton, D. | Presents the knowledge-creating procedures and actions that managers guide, encourage and control: developing problem-solving skills; experimenting to build for the future; integrating information across internal project and functional boundaries; and importing expertise from outside the firm. | Knowledge management process; creating |

The initial work started with developing theory and fundamental idea on knowledge management. Peter Senge (1990) developed theories that helped businesses to clarify their goals, to defy the odds, to clearly understand threats and to recognize new opportunities. He introduced the Mastery of Senge's five disciplines that enables

managers to overcome obstacles and turn into growth and creates a brave new future for them and their companies. The five disciplines are drawn from science, spiritual wisdom, psychology and the advances of management thought. Additionally, Wiig (1993) introduced a new set of foundation for management methods. Specifically, it is about what knowledge is and how businesses can use it, harness, enhance and manage it. Kogut and Zander's (1992) study also related to the theory development for knowledge management. According to them, the knowledge-based view of the firm is an outgrowth of the resource-based view of the firm in which argues that knowledge is the key productive resource of the firm (Kogut & Zander, 1992).

Subsequent to the Mastery of Senge's Five Disciplines (Senge, 1990), Nonaka (1991) introduced the 'tacit knowledge' as one of the knowledge classification. Tacit knowledge represents the valuable and highly subjective insights. Besides Nonaka (1991), other scholars also introduced knowledge classification such as scientific, industry specific, firm specific (Leonard-Barton, 1995); embrained, embodied, encultured, embedded and encoded knowledge (Blackler, 1995) while Demarest (1997) classifies knowledge as scientific, philosophical and commercial.

Other scholars would identify knowledge management activities or processes. For example, Kogut and Zander (1992) debated the importance of exchanging knowledge among individuals and groups within an organization. This knowledge consists of information and know-how. Leonard-Barton (1995) focuses on the knowledge-creating activities and behaviors that managers guide, control and inspire; developing problem-solving skills; experimenting to build the future; integrating information across internal project and functional boundaries; and importing expertise from outside the firm. As some knowledge creates competitive advantage, while some others do not, the author helps managers understand what constitutes a core capability for their firm.

From the activities, scholars were able to design knowledge management models. In 1994, Nonaka proposed a theory-based framework to manage the dynamic aspects of the process of organizational knowledge generation. The author introduces four main patterns of interaction that involve explicit and tacit knowledge. A theory-based framework was constructed which consists of an analytical viewpoint on the member dimensions of knowledge generation. Subsequent to his work in 1994, Nonaka and Takeuchi (1995) propose a model namely SECI (Socialization, Externalization, Combination, Internalization) model that shows a spiraling knowledge process interaction between explicit knowledge and tacit knowledge.

Other than that, scholars also started to look into integrating elements of technology. For example, Quinn (1992) discusses the use of innovative technology to improve the range of their services. The author uses examples from companies such as Apple, Honda, ServiceMaster and Merck to show how a commitment to technological innovation married to a service-oriented outlook can produce impressive business results.

### 2.4.2 The Second Generation of Knowledge Management Studies

The second generation began in 1996 where scholars explored knowledge management practical application to organizations. Table 2.4 shows the knowledge management studies conducted during the second generation.

**Table 2.4:** Knowledge Management Studies In The Second Generation

| Year | Author | Important Ideas | Area of Study |
|---|---|---|---|
| 1996 | Grant, R. M. | Explores the coordination mechanisms that firms use to merge the specialist knowledge by their employees. The study revealed that knowledge is perceived as residing in the person and the key role of the | Knowledge management and people |

| | | | |
|---|---|---|---|
| | | organization is knowledge employment as an alternative to knowledge generation. | |
| 1997 | Wiig, K. M. | The history of knowledge management in the early/mid-eighties to the year 1997. It reveals that knowledge management is the subsequent stage in a pattern of societal developments that have been in progress for a long duration. The predicted future of knowledge management is investigated along four perspectives: The management practices view, the information technology view, the organizational efforts view and the development, supply and adoption rate perspective view. | Knowledge management practice |
| 1997 | Quintas, P., Lefrere, P., & Jones, G. | Discuss the significance and complex nature of scoping and determining this emergent field and of comprehending the procedures involved, so that suitable learning programs are created. | Knowledge management as a strategic agenda |
| 1998 | Davenport, T. H., De Long, D. W., & Beers, M. C. | Solves the practical reality of knowledge management with focus on a tangible, pragmatic unit, the knowledge management effort. | Knowledge management project |
| 1999 | Alavi, M., & Leidner, D. E. | Presents analyses of modern practices and results of KMS and the nature of KMS as they evolved in a total of fifty organizations. The results indicate that interest in KMS across several industries is high, the technological foundations vary and | Knowledge management system |

| | | | |
|---|---|---|---|
| | | the great concerns revolved around accomplishing the correct volume and type of accurate knowledge and creating support for contributing to the KMS. | |
| 1999 | Swan, J., Newell, S., Scarbrough, H., & Hislop, D. | Debate that IT to formulate a network structure may limit its potential for promoting knowledge sharing via social communities. They debate for a community-based model of knowledge management for interactive innovation and differentiated this with the cognitive-based perspective that underpins numerous IT-led knowledge management initiatives. | Knowledge infrastructure |
| 2000 | Holsapple, C. W., & Joshi, K. D. | Present a descriptive framework for understanding elements that impact the success of knowledge management (KM) initiatives in organizations. The resultant framework may be applied by scholars for KM issue and hypothesis generation, by practitioners for measuring KM practices and by educators for aiding in the organization the study of KM. | Framework and success factors |
| 2001 | Alavi, M., & Leidner, D. E. | Provides a review and interpretation of knowledge management works in various fields with a focus on determining the key areas for research. The authors provide a detailed procedure perspective of organizational knowledge management with a focus on the | Knowledge infrastructure |

| | | | |
|---|---|---|---|
| | | potential role of information technology in this procedure. | |
| 2001 | Carneiro, A. | Developed a conceptual model of knowledge management efficiency in the organizations supported by the integration of intelligent agents' role and intelligent systems resources. | Process and Knowledge infrastructure |
| 2001 | Bhatt, G. D. | Debates that the knowledge management procedure may be divided into knowledge creation, validation, presentation, distribution and application activities. The study indicates to concentrate on the interaction among technology, techniques and people that enables an organization to effectively manage its knowledge. By creating a nurturing and "learning-by-doing" kind of environment, an organization can sustain its competitive advantages. | Process, people and Technology |

During the period of mid-nineties to early 2000, many researchers have explored other factors that contribute to the success of knowledge management in an organization. Knowledge management research focused on implementation and business development. For example, Grant (1996) explores the coordination functions that firms use to merge specialized expertise and knowledge for their members. The study revealed that knowledge is perceived as residing in the individual and the core task of the organization is knowledge employment rather than knowledge generation. The outcome theory has implications for the base of organizational capability, the rules of organization construction and design (particularly the analysis of hierarchy and the

organization of decision-making authority) and the factors that determine the vertical and horizontal boundaries of the organization.

Other studies in this era focused on people and processes relating to knowledge management practice. Wiig (1997) claims that the likely future of knowledge management should be investigated across four main viewpoints; (i) the management practices view, (ii) the information technology view, (iii) the organizational efforts view and (iv) the development, supply and adoption rate view. Carneiro (2001) carried out a research that aims to enhance the understanding of the process by which knowledge acquisition, technical elements and organization actors can all contribute to an organization development in creating knowledge as a systemic competitive tool. It determines the relationships among the technology and human value, since they are critical tools of the knowledge management process. A conceptual framework of knowledge management efficiency in the organizations supported by the combination of intelligent agents' role and intelligent systems resources is presented.

Subsequently, other scholars started to look into technology involvement in knowledge management processes. Bhatt (2001) argued that the knowledge management process can be categorized into knowledge creation, knowledge validation, knowledge presentation, knowledge distribution and knowledge application activities. This paper suggests that focus should be given on the interaction between technology, techniques and people that allow an organization to manage its knowledge effectively. By creating a nurturing and "learning-by-doing" kind of environment, an organization can sustain its competitive advantages. Alavi and Leidner (2001) provided a review and interpretation of knowledge management literatures in different fields with an eye toward identifying the important areas for research. The authors present a

detailed process view of organizational knowledge management with a focus on the potential role of information technology in this process.

Other perspectives that have been explored during this era were knowledge management as a strategic agenda. Quintas et al. (1997) discussed the assertion that the management of knowledge and its correlated intellectual capital, can be a key source of organizational advantage. Their work highlighted both the importance and difficulty of scoping and defining this emergent and disparate field and of understanding the processes involved, so that appropriate learning programs can be developed. Holsappe and Joshi (2000) introduced a descriptive framework for understanding the factors that influence the success of knowledge management initiatives in an organization. Researchers can use the resultant framework for knowledge management issue and hypothesis generation, by practitioners for benchmarking knowledge management practices and by educators in helping organize the study of knowledge management.

### 2.4.3 The Third Generation of Knowledge Management Studies

The third generation emerged around 2002. Table 2.5 shows the knowledge management studies conducted during the third generation.

**Table 2.5:** Knowledge Management Studies In The Third Generation

| Year | Author | Important Ideas | Area of Study |
|---|---|---|---|
| 2002 | Yahya, S., & Goh, W. K. | Examines the linkages between human resource management and knowledge management. | Process and people |
| 2003 | Ardichvili, A., Page, V., & Wentling, T. | Reports the results of a qualitative study of motivation and barriers to employee participation in virtual knowledge‐sharing communities of practice at Caterpillar Inc. The study indicates that, when employees view | Process and people |

| | | | |
|---|---|---|---|
| | | knowledge as a public good belonging to the whole organization, knowledge flows easily. | |
| 2004 | Leseure, M. J., & Brookes, N. J. | Presents the results of a research project dealing with knowledge management in project environments and the capability to transfer knowledge across projects teams. A key distinction is made between generic project knowledge (kernel knowledge) and specific project knowledge (ephemeral knowledge). For each type of knowledge, knowledge management benchmarks are described and discussed. | Process and people |
| 2005 | Darroch, J. | Presents knowledge management as a coordinating mechanism. Empirical evidence supports the view that a firm with a knowledge management capability will use resources more efficiently and so will be more innovative and perform better. | Role of knowledge management |
| 2006 | Hicks, R. C., Dattero, R., & Galup, S. D. | Define a new set of terminology and develop a five-tier knowledge management hierarchy (5TKMH) that can provide guidance to managers involved in knowledge management efforts. The 5TKMH includes all of the types of knowledge management identified in the literature. This provides a tool for evaluating the knowledge management effort in a firm, identifies the relationships between knowledge sources and provides an evolutionary path for | Knowledge management hierarchy |

| | | | |
|---|---|---|---|
| | | knowledge management efforts within the firm. | |
| 2007 | Freeze, R. D., & Kulkarni, U. | Discuss the separate sources of knowledge and defined knowledge as organizational intangible knowledge assets. These knowledge assets are referred to as knowledge capabilities (KCs); expertise, lessons learned, policies and procedures, data and knowledge documents. | Sources of knowledge |
| 2008 | Gao, F., Li, M., & Clarke, S. | Provide knowledge managers to systematically grasp "knowledge about management knowledge" and get a "deep and full" understanding of the nature, scope and methodologies of knowledge management. | People |
| 2009 | Ambos, T. C., & Schlegelmilch, B. B. | Investigated how knowledge management is embedded in their organizations and the critical issues these firms still struggle. The paper presents a general approach to embedding knowledge management along the dimensions of people, systems and business processes and develops an integrative framework that links knowledge management strategies to a typical consulting project cycle. | Role of knowledge management |
| 2010 | Sun, P. | Elicited the organizational routines that influence the three knowledge management processes. These routines were then clustered into five key organizational themes: systemic knowledge; strategic engagement; social networking (external and | Process and practice |

| | | | |
|---|---|---|---|
| | | internal); cultural context; process and structural context. | |

In the third generation, studies are still investigating the same perspectives as those in the second generation. However, authors have widen the investigation on knowledge management practice into other fields besides large business enterprises such as small and medium-sized enterprise, education, government sector, healthcare, business administration, public policy, information systems management, library and information sciences (Kothari et al., 2012).

Their studies examine the linkages between human resource management and knowledge management, knowledge management software tools and knowledge management standardization. For example, Yahya and Goh (2002) examined the association between four areas of human resource management (training, decision‐making, performance appraisal as well as compensation and reward) with the five areas of knowledge management (knowledge acquisition, knowledge documentation, knowledge transfer, knowledge creation, knowledge application).

Scholars also investigate the role of knowledge management and its hierarchy in the new era (Darroch, 2005; Hicks et al., 2006). For example, Darroch (2005) presents empirical evidence which supports the view that a firm with a knowledge management capability will use resources more efficiently thus will be more innovative and perform better. Hicks et al. (2006) defined a new set of terminology and developed a five-tier knowledge management hierarchy (5TKMH) that can provide guidance to managers involved in knowledge management efforts. The 5TKMH supports a knowledge management life-cycle that provides guidance to the chief knowledge officer and which

can be employed to inventory knowledge assets, evaluate knowledge management strategy and plan and manage the evolution of knowledge assets in the firm.

In recent years, many knowledge management studies were conducted in specific fields. This is because knowledge management is organizationally specific, has different effectiveness concerns and has different levels of representativeness, accountability and responsiveness (Massaro et al., 2015). Jones and Mahon (2012) exemplify that a more mission-critical situation like a battlefield in military environment requires real-time decisions that can have life or death consequences. Similarly, in the law enforcement context knowledge management "is not a linear sequence of actions but a more complex process, which involves mental and physical aspects of the investigator" (Nordin et al., 2009). Accordingly, public sector organizations should not import knowledge management tools and models from private companies that have been developed without the consideration of the public sector context (UNPAN, 2003). Public sector practitioners must recognize that their organizations work in a unique context in which their stakeholders and accountability differ significantly from those of the private sector – blindly applying private sector knowledge management tools and models may be counterproductive (Massaro et al., 2015).

## 2.5 Knowledge Management Model Perspectives

Literature and praxis reveal that there are many knowledge management models - from specialized functional or packaged knowledge management models of business functions to diffused knowledge management. Kakabadse et al. (2003) discussed that there are five knowledge management models: philosophy-based, cognitive, network, community and quantum. Table 2.6 provides a summary of each perspective and Figure 2.3 shows the position and the approach of the five models of knowledge management in an enterprise.

**Table 2.6:** Knowledge Management Model Perspectives (Kakabadse, 2003)

| | **Philosophy-based model** | **Cognitive model** | **Network model** | **Community model** | **Quantum model** |
|---|---|---|---|---|---|
| **Treatment of knowledge** | Knowledge is "justified true belief" | Knowledge is objectively defined and codified as concepts and facts | Knowledge is external to the adopter in explicit and implicit forms | Knowledge is constructed socially and based on experience | System of possibilities |
| **Dominant metaphor** | Epistemology | Memory | Network | Community | Paradox |
| **Focus** | Ways of knowing | Knowledge capture and storage | Knowledge acquisition | Knowledge creation and application | Solving paradox and complex issues |
| **Primary aim** | Emancipation | To codify and capture explicit knowledge and information - knowledge exploitation | Competitive advantage | Promote knowledge sharing | Learning systems |
| **Critical lever** | Questioning, reflecting and debating | Technology | Boundary spanning | Commitment and trust | Technology |
| **Primary outcomes** | New knowledge | Standardization, routinization and recycling of knowledge | Awareness of external development | Application of new knowledge | Creation of multi-reality |
| **Role of IT based tools** | Almost irrelevant | Critical integrative mechanism | Complimentary interactive mechanism | Supporting integrative mechanism | Critical-Knowledge centric |

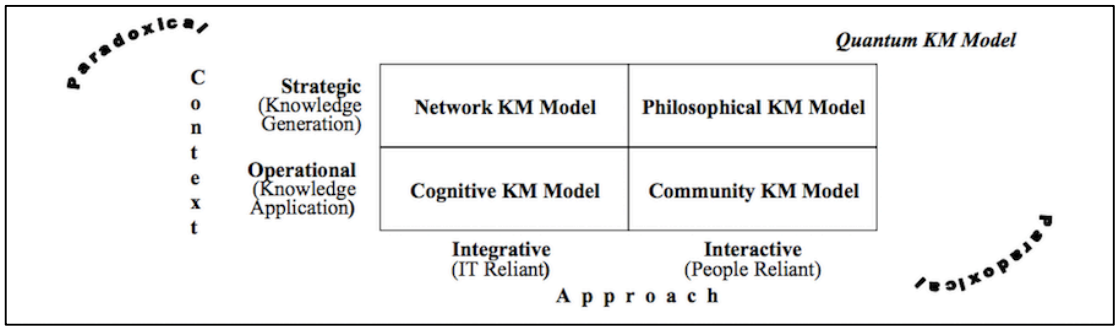



**Figure 2.3:** The Five Knowledge Management Models (Kakabadse, 2003)

Network and philosophical model lies on strategic context in an enterprise. However, their approaches are different. The network model treats knowledge as an external to the adopter in explicit and implicit forms whereas the philosophical model defines knowledge as justified true belief'. Whilst the network model is integrative because it is IT reliant, the philosophical model is almost IT irrelevant.

With advancements in the field of quantum physics, the quantum viewpoint is also the expanding (Swan & Newell, 2000). Quantum model focuses on solving paradox and complex issues. Whereas the cognitive model focuses on knowledge capture and storage, the community model claims that knowledge is constructed socially and is based on experience. Its primary outcome is the application of new knowledge.

## 2.6 Knowledge Management Process Model

To date, many knowledge management frameworks have been proposed from different perspectives such as conceptual and practical or distinguished by types i.e. prescriptive (provide direction on the types of knowledge management procedures without providing details of how the procedures should be accomplished), descriptive (describe knowledge management by identifying the attributes for their influence on the success or failure on knowledge management initiatives) and hybrid (combination of prescriptive and descriptive) (Rubenstein-Montano et al., 2001).

The activities from a total of 40 knowledge management processes from knowledge management literatures are examined. These activities have been analyzed in relation to the terms used to describe the knowledge process activities. The focus is on the content of the activities rather than the name of the activities. Table 2.7 shows the activities from various knowledge management process.

**Table 2.7:** Knowledge Management Process

| No | Author | Knowledge Management Process |
|---|---|---|
| 1 | Wiig (1993) | Build (obtaining, analyzing, reconstructing/synthesizing, codifying and organizing), hold (remembering, accumulating and embedding), pool (coordinating, assembling, accessing and retrieving at group level) and apply. |
| 2 | Slater and Narver (1995) | Acquisition of information, information dissemination, shared interpretation |
| 3 | Arthur Andersen and APQC (1996) | Create, identify, collect, adapt, organize, apply and share |
| 4 | Demerest (1997) | Knowledge construction, knowledge embodiment, knowledge use and knowledge dissemination. |
| 5 | van der Spek and Spijkervet (1997) | Conceptualize, reflect, act and retrospect |
| 6 | Meyer and Zack (1999) | Acquisition, refinement, storage/retrieval, distribution and presentation/use. |
| 7 | Bukowitz and Williams (1999) | Get, assess, build/sustain, contribute and learn. |
| 8 | Crossan et al. (1999) | Intuiting, interpreting, integrating, institutionalizing |
| 9 | Probst, Raub and Romhardt (1999) | Knowledge identification, knowledge sharing or knowledge distribution. |
| 10 | Boisot (1999) | Codification, abstraction and diffusion |
| 11 | Bukowitz and Williams | Create/capture of knowledge, storage/retrieve, |

| | | |
|---|---|---|
| | (2000) | access, distribution, sustain and disposal. |
| 12 | Alavi and Leidner (2001) | Creation, storage/retrieval, transfer and application. |
| 13 | Gamble and Blackwell (2001) | Observe, gather, hypothesize, contextualize, categorize, map, share, disseminate and simulate. |
| 14 | Abou-Zeid, (2002) | Knowledge identification, knowledge generation, knowledge elaboration, knowledge preservation, knowledge mobilization, knowledge presentation and knowledge evaluation. |
| 15 | Lai and Chu (2000) | Initiation, generation, modeling, repository, distribution & transfer, use and retrospect. |
| 16 | McElroy (2003) | Knowledge claim (validation) and knowledge integration (sharing and disseminating). |
| 17 | Frid (2003) | Knowledge chaotic, knowledge aware, knowledge focused, knowledge managed and knowledge centric. |
| 18 | Arostegui (2004) | Capturing, elaborating, transferring, storing and sharing knowledge. |
| 19 | Diakoulakis et al. (2004) | Exploration of the external environment, internal scanning, sharing/access of knowledge, retention/systemization of knowledge, combination/creation of knowledge. |
| 20 | Lettieri, Borga and Savoldelli (2004) | Acquisition, codification, storage, retrieval, creation, application and diffusion & presentation. |
| 21 | Dalkir (2005) | Create/capture, assess, share/disseminate, contextualize, apply/use and update |
| 22 | Lee et al. (2005) | Create/capture of knowledge, update, application, utilization |
| 23 | Grant (2005) | Knowledge identification, knowledge |

| | | |
|---|---|---|
| | | measurement, knowledge storage & organization, knowledge replication, knowledge integration and knowledge sharing. |
| 24 | Baptista et al. (2006) | Capturing, storing, sharing and distributing knowledge |
| 25 | Hsia, Lin, Wu and Tsai (2006) | Knowledge creation, knowledge codification, knowledge transfer, knowledge application |
| 26 | Sheffield (2008) | Creation, normalization and application of knowledge |
| 27 | Botha et al (2008) | Knowledge creation and sensing, knowledge organizing and capture and knowledge sharing and dissemination. |
| 28 | Tikhomirova et al. (2008) | Identification and capture, creation, classification and storage, circulation and distribution and application of knowledge |
| 29 | Karadsheh et al. (2009) | Knowledge combination, knowledge evaluation, knowledge filtering (organization, classification and categorization), knowledge repository, knowledge sharing, knowledge application and knowledge performance. |
| 30 | Heisig (2009) | Use, identify, create, acquire, share and store. |
| 31 | Fugate et al. (2009) | Generation, dissemination, sharing and interpretation of knowledge |
| 32 | Huang and Shih (2009) | Creation, storage, distribution and utilization of knowledge |
| 33 | Nag and Gioia (2012) | Executive knowledge schemes, executive scanning and knowledge use. |
| 34 | Amirkhani et al. (2012) | Specifying strategic knowledge goals, acquiring the required knowledge, assessment and organization of knowledge, sharing knowledge, empowerment and sustainable human resources development |
| 35 | Pawlowski and Bick (2012) | Knowledge identification, knowledge acquisition, knowledge development, |

| | | |
|---|---|---|
| | | knowledge distribution/sharing, knowledge preservation and knowledge use. |
| 36 | Tuamsuk et al. (2013) | Knowledge identification, creation and acquisition, knowledge storing, knowledge distribution, knowledge application |
| 37 | Ohkubo et al. (2013) | Knowledge assessment, generation, capture, synthesis and sharing |
| 38 | Evans, Dalkir and Bidian (2015) | Identify, store, share, use, learn, improve and create |
| 39 | García-Fernández (2015) | Creation, transfer and storage and implementation and use |
| 40 | Chauhan, Raksha and Pradhan (2015) | Detect and discover (gather, observe and deconstruct) and organize and assess (categorize, contextualize and map). |

Within these 40 knowledge management models, 109 different terms for the knowledge management activities have been identified. Some terms are more frequently used than others like “Share/Sharing” within 15 models, “Create/Creation” in 13 models, “Apply/Application” in 10 models and “Storing/Store” in 7 models, to name the four most mentioned activities.

The classification of the different terms has resulted in seven broad categories of knowledge management activities which could be regarded in knowledge management research as generally accepted basic knowledge management activities. Table 2.8 represents the most frequently used terms for the description of the knowledge management activities. Synonymous and similar meaning terms were combined within a category. The categories have been named according to the most frequently mentioned single activity in that particular activity.

**Table 2.8:** Seven Most Frequently Discussed Groups of Knowledge Management Activities

| No. | Knowledge Management activities | Total count in frameworks |
|---|---|---|
| **1** | Share (15), Share/Disseminate (2), Distribution/Distributing (7), Circulation & Distribution (1), Distribution/Sharing (1), Transfer/ Transferring (5), Dissemination (5), Contribute (1), Mobilization (1) | **38** |
| **2** | Store (7), Storage/Retrieval (4), Storage & Organization (1), Classification & Storage (2), Organize (1), Organizing & Capturing (1), Organize & Assess (1), Build/Sustain (1), Sustain (1), Capture (4), Capturing (2), Codification (3), Access (2), Retention/Systemization (1), Sustainable (1), Preservation (2), Replication (1), Repository (2), Hold (1) | **38** |
| **3** | Apply (10), Use (8), Apply/Use (1), Utilization (2), Implementation (1), Presentation (3), Adapt (1), Act (1), Simulate (1) | **28** |
| **4** | Create (13), Combination/Creation (1), Create/Capture (1), Creation & Sending (1), Combination (1), Creation & Acquisition (1), Knowledge Construction (1), Generation (4), Development (1), Build (1) | **25** |
| **5** | Assess (3), Assessment and Organization (1), Filtering (1), Validation (1), Interpreting (2), Elaboration (2), Synthesis (1), Evaluate (2), Learn (2), Reflect (1), Retrospect (2), Refinement (1), Performance (1), Measurement (1), Improve (1) | **22** |
| **6** | Identify (8), Identification & Capture (1), Specifying (1), Categorize (1), Map (1), Exploration (2), Knowledge Aware (1) | **15** |
| **7** | Acquire (4), Collect (1), Get (1), Acquire (2), Gather (1), Detect & Discover (1), Scanning (2), Observe (1) | **13** |

In most of the knowledge management models, the category of terms from the category of "share" are discussed, they are followed by the terms from the category of "store", third are the terms from the category of "apply", followed by the terms from the category of "create" and terms from the category of "identify". The next category by frequencies is the category of "acquire", followed by the category of "assess" and finally the category of "evaluate". Accordingly, the generic activities in most knowledge management models would be as follows:

1. Share
2. Store
3. Apply
4. Create
5. Assess
6. Identify
7. Acquire

### 2.6.1 Sharing Knowledge

Knowledge sharing can be defined as individuals sharing task-relevant ideas, information and suggestions with others through the actions of knowledge donating and collecting (Srivastava et al., 2006; van den Hooff & de Ridder, 2004; Karkoulian et al., 2010). Knowledge donating is the action of "communicating to others what one's personal intellectual capital is", and knowledge collecting is the action of "consulting colleagues in order to get them to share their intellectual capital" (van den Hooff & de Ridder, 2004).

In general, knowledge sharing offers numerous positive outcomes to organizations such as organizational effectiveness (Yang, 2007), organizational innovation capability (Yesil & Dereli, 2013), improved productivity (Noaman & Fouad, 2014), team task

performance (Cheng & Li, 2011) and survival strategy in this knowledge era (Witherspoon et al., 2013). Moreover, knowledge sharing also is advantageous to the individual employees. Some empirical evidence includes the association of knowledge sharing with individual performances (van Woerkom & Sanders, 2010) and individual innovative behavior (Yu et al., 2013). As such, organizations are taking various measures such as establishing communities of practice, investing on knowledge networks and rewards for knowledge sharing to foster knowledge sharing behaviors among employees (Ling et al., 2009).

Among the many processes of knowledge management cycle, knowledge sharing has been identified as the most significant process as well as the cornerstone for effective knowledge management (Blankenship & Ruona, 2009; Yesil & Dereli, 2013). This is because knowledge resource resides in employees' minds (Amayah, 2013; Lin & Hwang, 2014) and organizations have to utilize this valuable resource for their competitive advantage. Moreover, knowledge sharing is based on the foundation that knowledge is not only a tool that remains out of context; but is rather a person's interpretation of the object, thus people have knowledge that has to be encrypted and shared (Nonaka & Takeuchi, 1995; McInerney, 2002; Liebowitz, 1999). The cognitive resources available within individuals remain underutilized if knowledge is not shared (Argote, 1999). Especially, the tacit knowledge that resides in the minds of people accumulated over time must be shared (Asrar-ul-Haq & Anwar, 2016). For that reason, organizations need employees' cooperation to share their knowledge with other employees within the organization (Gupta et al., 2012; Lin & Hwang, 2014).

### 2.6.2 Storing Knowledge

Storing knowledge is an important aspect of impactful organizational knowledge management (Alavi & Leidner, 2001). Empirical results suggest that while organizations create knowledge and learn, they also tend to forget (i.e., do not remember or lose track of the acquired knowledge) (Argote et al. 1990; Darr et al. 1995). Storage acts as a bridge between earlier activities (i.e. acquisition and refinement stages that feed the repository such as product platform) and to the later activities in knowledge management process such as product generation and application (Meyer & Zack, 1999).

The storage of knowledge can be regarded at two levels; organizational memory and individual memory (Stein & Zwass 1995; Walsh & Ungson 1991). Organizational memory is classified as semantic or episodic (El Sawy et al. 1996; Stein & Zwass 1995). Semantic memory refers to general, explicit and articulated knowledge (e.g. organizational archives of annual reports, written documentation and structured information stored in electronic databases), whereas episodic memory refers to context-specific and situated knowledge (e.g. specific circumstances of organizational decisions and their outcomes, place and time) (Tan et al. 1999).

On the other hand, persona; memory is created based on subjective observations, actions and experiences (Argyris & Schön 1978; Nystrom & Starbuck 1981; Sanderlands & Stablein 1987). Organizational memory exceeds personal memory to comprise other components including organizational culture, transformations (e.g. production processes and work processes), structure (e.g. formal organizational roles), ecology (e.g. physical work setting) and information archives (e.g. those internal and external to the organization) (Walsh & Ungson 1991).

### 2.6.3 Applying Knowledge

The knowledge application procedure comprises of applying, which involves retrieving and applying knowledge in support of actions, decisions, problem-solving, creating competency maps to position people in the most suitable jobs and teams for enhancing productivity, creating communities of interest, automate routine tasks (e.g. workflows), offering job aids (e.g. customer relations and support), generating commercial value and training of employees for speed (Bose, 2003; Garvin, 1993; Karadsheh et al., 2009).

Another term used by scholars and researchers is "use". Evans et al. (2015) debate that knowledge assets can be activated (put to use) once shared. The shared knowledge can be extracted and applied throughout the organization, to solve problems, make decisions, improve efficiency, or promote innovative thinking. The use/apply stage is also key to internalizing tacit forms of knowledge. Yuasa (1987) called this 'learning with the body' and Boisot (2002) 'learning-by-doing'. This is usually done by assimilating and dwelling in the activity or with the artifact (Polanyi, 1962; 1966; Polanyi & Prosch, 1975; Tsoukas, 2005). Some of the more common activities that assist in the use stage include developing communities of practice, workshops and tutorials.

Without the application of knowledge, knowledge management is not as effective. The reason for this is that knowledge application ties knowledge with activity implementation and the direction of the organization's development (e.g. in stipulating the vision and organizational direction, in enhancing and developing work, or in creating values to products (Tuamsuk et al., 2013)).

### 2.6.4 Creating Knowledge

Creating knowledge involves the development of new content or replacing existing content within the organization's tacit and explicit knowledge (Pentland, 1995). Nonaka's (1994) model views knowledge creation as involving a continual interplay between the tacit and explicit dimensions of knowledge and a growing spiral flow as knowledge moves through individual, group and organizational levels. Four modes of knowledge creation have been identified: socialization, externalization, internalization and combination (Nonaka, 1994).

First, the socialization mode refers to the conversion of tacit knowledge to new tacit knowledge through social interactions and shared experience among organizational members (e.g. apprenticeship). Second, externalization refers to converting tacit knowledge to new explicit knowledge (e.g. articulation of best practices or lessons learned). Third, internalization refers to creation of new tacit knowledge from explicit knowledge (e.g. the learning and understanding that results from reading or discussion). Finally, the combination mode refers to the creation of new explicit knowledge by merging, categorizing, reclassifying and synthesizing existing explicit knowledge (e.g. literature survey reports).

Alavi and Leidner (2001) claimed knowledge creation process may be developed at four different levels: individual, group or collective, organizational and inter-organizational levels. First, individual knowledge creation is that obtained by one individual. Second, group or collective knowledge creation is carried out by means of a group of individuals, on the basis of the dissemination of this information, for example, in a research team and/or working group. Third, organizational knowledge creation is that obtained by a firm. Finally, inter-organizational knowledge creation is carried out between various firms cooperating together, by means of institutionalization (Alavi &

Leidner, 2001). Some common organizational initiatives that assist in the creation of new knowledge assets include expert interviews, prototyping, information and workflow analysis and competence and process mapping. An example of a technology that can be used in this phase is idea management software (Evans et al., 2015).

### 2.6.5 Assessing Knowledge

Evans et al. (2015), Meyer and Zack (1999) were the first to introduce the notion of critically assessing knowledge before allowing it to pass on to the next processing phase. This activity includes refinement which is described as a process of breaking down knowledge into its component parts that aim at justifying and measuring the business value of the knowledge (Evans et al., 2013).

Von Krogh et al. (2000) conducted an experiment to identify three main forms of knowledge justification. The initial form, referred as (i) strategic justification, comprises the justification of newly generated knowledge across a company's enhancement and survival strategy. The second form, referred to as (ii) stakeholders' justification, concentrates on the evaluation of stakeholders' attitudes to newly produced knowledge. The final form, (iii) referred to as emotional justification, focuses on the aesthetic values of the newly produced knowledge. Furthermore, in the first form, a person may distinguish two forms of justification. The first form is the justification of conceptual-based knowledge, while the second form represents the justification of materialized/operationalized knowledge (i.e. the product, process or service in which the conceptual knowledge is applied) (Abou-Zeid, 2002).

Wiig (1993) claims analysis involves reviewing and extracting which appears to have value in the asset and abstracting it further to find potential underlying knowledge. Other models (Meyer & Zack, 1999; Bukowitz & Williams, 1999; Dalkir, 2011) include an assessment, which is meant to identify and extract patterns and relations and then

evaluate the value of the asset as a feasible solution to the problem or decision at hand. It is critical that, throughout the analysis and assessment, emphasis is placed on the quality (Meyer & Zack, 1999; Bukowitz & Williams, 1999) and relevance of the information extracted from the knowledge asset. Some general metrics include accuracy, currency, credibility and value to the organization.

Since acquiring knowledge involves various sources, the acquired knowledge can be either inaccurate or have no value to the organization, thus unrelated to the core business. Moreover, any newly obtained knowledge can be undeveloped knowledge with many mistakes (Sun & Hao, 2006). Therefore, the assessment of new knowledge gained from any source is important. de Rezende and de Souza (2007) suggest the assessment/evaluation focuses on quality and synthesizing knowledge for future application. The purpose is to determine the relevance and value of information (de Rezende & de Souza, 2007). In addition, this activity helps to establish the trust degree of knowledge, discarding of redundant knowledge and reduction of the uncertain degree of unproven knowledge to produce a deeper and broad understanding of the knowledge at hand (Karadsheh et al., 2009).

### 2.6.6 Identifying Knowledge

The knowledge identification procedure comprises of all of the activities that create the awareness of the requirement to formulate novel knowledge or to update already existing knowledge. This also comprises activities that identify the form, convertibility and owner(s) of the needed knowledge (Abou-Zeid, 2002). In addition, this activity identifies subjectively held tacit knowledge (McElroy, 2003; Dalkir, 2011) through various methods such as network analysis or brainstorming sessions. Alongside with effectively searching of knowledge assets, the identification stage subsequently involves analyzing and assessing the assets based on specific organizational rules, cultures and

evaluation criteria (Evans et al., 2015). Model by Grant (2005) mentions that the primary stage towards knowledge integration within a particular organization is knowledge identification; this refers to the examination of employee competencies and knowledge assets.

Lai and Chu (2002) claim that the initiation stage of knowledge management deals with comprehending the requirement for knowledge. It concerns with identifying what knowledge is present in an organization (identifying), who owns it; identify the thought leader and importing and collecting knowledge from external sources or learning from obtainable knowledge (discovering). Other scholars define identification activity as seeking and locating novel information, knowledge and ideas which are relevant to the organization itself (Wang & Ahmed, 2005).

Robertson (2002) emphasizes on the importance of knowledge identification activity in an organization. According to him, failure to practice knowledge identification causes several problems such as not being able to apply the right knowledge, in the right form, at the right time (Robertson, 2002). Hence, identifying knowledge is an important element in knowledge management practice within organizations.

### 2.6.7 Acquiring Knowledge

The acquisition activity refers to the knowledge that a firm can try to obtain from external sources. External knowledge sources are important and one should therefore take a holistic view of the value chain (Gamble & Blackwell 2001). It is an active process where it requires firms to provide resources for its successful management. For instance, significant R&D expenditure is required for tracking and assimilating existing knowledge external to the firm's boundaries (Allen, 1977; Cohen & Levinthal, 1989). Scholars have discussed in great detail the sources for acquisition of knowledge such as suppliers, competitors, partners/alliances, customers, external experts, books,

documents, research and development as well as communities of practice (Zanjani et al., 2008; Chan et al., 2009, Gamble & Blackwell, 2001).

The knowledge that needs to be acquired may be specific to the problem domain or to the problem-solving procedures, a general knowledge (e.g. knowledge about business), or it may be meta-knowledge (knowledge about knowledge) for example information about how experts use their knowledge to solve problems and about problem-solving procedures in general.

### 2.6.8 Summary: A Generic Knowledge Management Process Model

To summarize, this section has described and elaborated knowledge management activities based on the view from literatures. One of the important implications of this generic model is that knowledge management consists of most frequently used term in various knowledge management process models. Figure 2.4 shows the generic model of knowledge management activities.

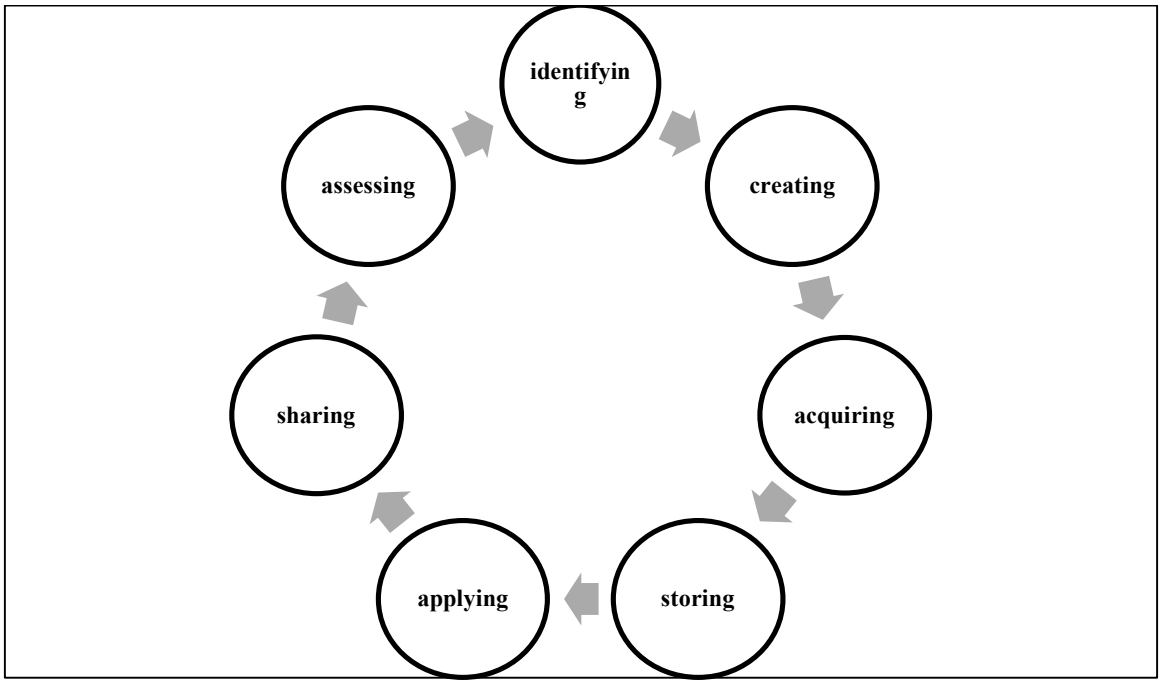



**Figure 2.4:** The Generic Knowledge Management Model

It is important to note the notion of cyclical sequence of knowledge processing steps first introduced by Bukowitz and Williams (1999). This is parallel with McAdam and McCreedy (1999) where they claim that knowledge management is not seen as a simple sequential process. Drawing upon Demerest's (1997) knowledge management model, McAdam and McCreedy (1999) added more recursive arrows in their model to represent the non-linear process in knowledge management.

## 2.7 IT/IS in Knowledge Management

Many knowledge management studies in the Information System (IS) field investigate how IT/IS facilitate knowledge management process. Alavi and Leidner's (2001) article reviews knowledge management and information systems. Alavi and Leidner developed a framework to analyze the supporting role of an information system with knowledge management. In their framework, Alavi and Leidner identified four knowledge processes namely; (i) Knowledge creation, (ii) Knowledge sharing, (iii) Knowledge transfer and (iv) Knowledge application. Additionally, they developed a systematic framework that will be used to further analyze and discuss the potential role of information technologies in organizational knowledge management as shown in Figure 2.5.

| **Knowledge Management Processes** | Knowledge Creation | Knowledge Storage/Retrieval | Knowledge Transfer | Knowledge Application |
|---|---|---|---|---|
| **Supporting Information Technologies** | Data mining<br>Learning tools | Electronic bulletin boards<br>Knowledge repositories<br>Databases | Electronic bulletin boards<br>Discussion forums<br>Knowledge directories | Expert systems<br>Workflow systems |
| **IT Enables** | Combining new sources of knowledge<br>Just in time learning | Support of individual and organizational memory<br>Inter-group knowledge access | More extensive internal network<br>More communication channels available<br>Faster access to knowledge sources | Knowledge can be applied in many locations<br>More rapid application of new knowledge through workflow automation |
| **Platform Technologies** | Groupware and communication technologies | | | |
| | INTRANETS | | | |

**Figure 2.5:** Knowledge Management Process and The Role of IT (Alavi & Leidner, 2001)

Subsequent to Alavi and Leider, there will be six other research articles within the IS literature to be discussed. First, research by Becerra-Fernandez and Sabherwal (2001) considers the link between knowledge processes and an outcome of knowledge management, specifically satisfaction among users. Their research suggests that task characteristics moderate the relationship between these two variables. The task orientation comprises of internalization, externalization, combination and socialization. Their research found that focused or broad knowledge content task-orientation positively moderated the relationship between knowledge processes and knowledge management satisfaction.

Second, research by Gold et al. (2001) also considers the link between knowledge processes and the outcome of knowledge management, specifically a single organizational construct called "organizational effectiveness" in their model. Gold et al. suggested four knowledge processes i.e. acquisition, conversion, application and protection, in parallel to three knowledge management infrastructure capabilities of an organization's technology, structure and culture. Their research found that both knowledge management infrastructure capabilities and knowledge processes positively influence organizational effectiveness.

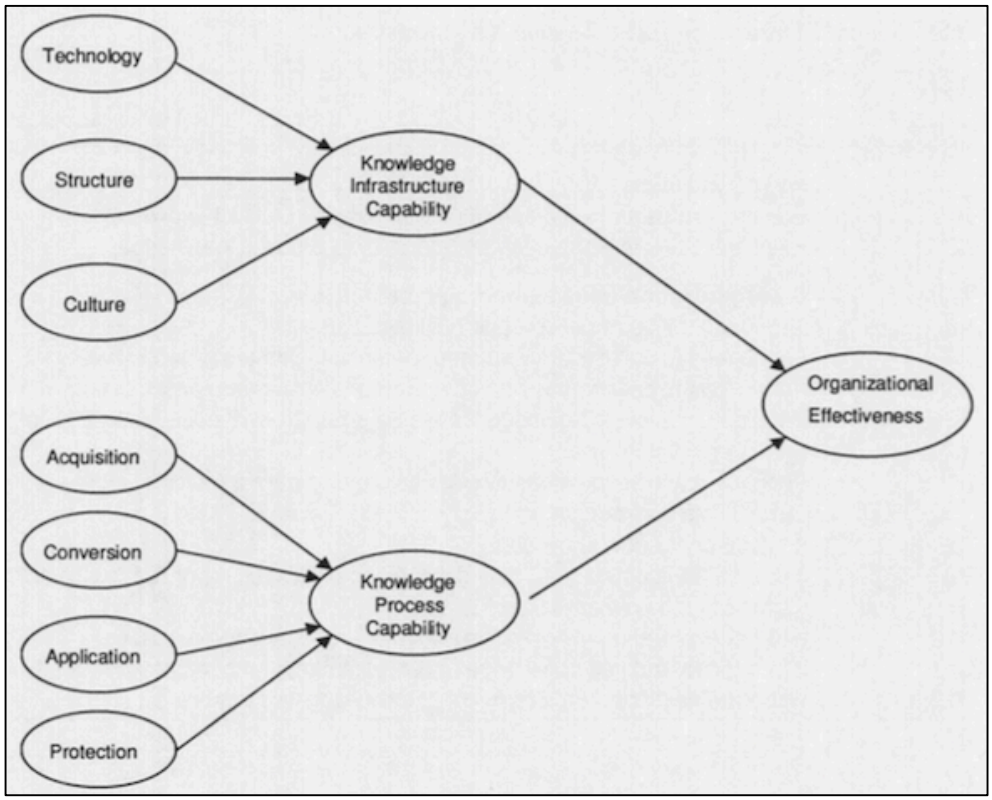



**Figure 2.6:** Knowledge Management Capabilities and Organizational Effectiveness (Gold et al., 2001)

Thirdly, research efforts by Markus (2001) mentioned steps in the direction of a theory of knowledge reuse, specifically situations and elements surrounding knowledge reuse. Her work indicates that every form of knowledge reuse activity possesses various requirements for the construction of a knowledge management repository. Additionally, Markus remarked that, owing to the design process for many knowledge reuse repositories, different users' requirements frequently remain unmet. Markus also remarked that knowledge producers rarely have the resources or the incentives required to do a good job at repurposing knowledge.

Fourthly, research by Markus et al. (2002) linked a design theory for IS that support emerging knowledge processes (EKPs). The scholars determined EKPs as organizational activities which show three main components; (i) an emergent process of deliberations with no optimal sequence; (ii) complicated knowledge requirements across

people that evolve dynamically; and (iii) an unpredictable set of actors regarding job roles or previous knowledge. Markus et al. (2002) mentions that novel product development, strategic business planning, as well as organizational design comprise EKPs and reflect unique requirements that are not supported by typical classes of information systems (e.g. expert systems, organizational memory, or repositories). The primary lasting contribution of this article links organizational design with the design of a Knowledge Management System (KMS), debating that EKPs design theory ties both organizational and information systems and model aspects of design aspects.

Fifthly, work by Lee and Choi (2003) hybridizes work by Becerra-Fernandez and Sabherwal (2001) and Gold et al. (2001), in order to assume organizational performance as comprising knowledge management satisfaction, returns on assets, returns on sales and organizational effectiveness. Their framework comprises knowledge management processes, to focus on socialization, externalization, combination and internalization in the knowledge creation procedure and knowledge management enablers, to comprise structure, culture, people and IT. Lee and Choi also regarded organizational creativity as a knowledge management intermediate result, antecedent to organizational performance. Additionally, their research suggests that an integrative knowledge management research framework, where enablers influence processes; processes influence intermediate outcomes; intermediate outcomes influence organizational performance – and organizational performance recursively influences enablers, processes and intermediate outcomes (Sabherwal, 2001; Gold et al., 2001).

Sixthly, Tanriverdi (2005) found that IT relatedness of business units enhances the cross-unit knowledge management capability of the firm, which then has a direct impact on corporate performance. Tanriverdi's model theorizes that knowledge management capability creates and exploits cross-unit synergies from the product, customer and

managerial knowledge resources of the firm. These synergies increase the financial performance of the firm. IT relatedness also indirectly influences corporate performance through the mediation of knowledge management capability.

### 2.7.1 Role of Information Technology in Knowledge Management

**Table 2.9:** Software Tools for Knowledge Management (Ragab & Arisha, 2013)

| Software type | Main features | KMS Approach |
|---|---|---|
| Document and content management | • Storing or uploading documents<br>• Retrieval using indexing functions and sophisticated searching algorithms<br>• Access from all interconnected workstations | Codification |
| Organizational taxonomy | Organization of any unstructured knowledge into categorized maps using taxonomies | Codification |
| Collaborative services | • Real time Instant Messaging<br>• On board collaboration<br>• Documents coauthoring | Codification |
| Knowledge discovery | Knowledge creation from available data using data processing and mining | Codification |
| Expert networks | • Creating a forum for solving problems using peer-to-peer technology<br>• Expert brokerage<br>• Expertise identification | People-finder |
| Knowledge portals | • Fusion of multiple information resources to enable them to become accessible from any interface<br>• Presentation of content in a | (relies on the services integrated in the portal) |

| | | |
|---|---|---|
| | personalized manner | |
| Customer relationship management | • Customer support functionality (e.g. self-help)<br>• Customer support tools (e.g. help-desk)<br>• Auto-response of customer requests to representatives using existing customer profiles and representative expertise<br>• Recording customer action | Codification |
| Competence management | • Generation of profiles for organization members using their competencies<br>• Expertise Search | People-Finder |
| Intellectual property management | • Management of copyrights, patents and trademarks<br>• Approval processes tracking | Codification |
| E-learning management systems | • Reuse of learning object databases Adaptive web course presentation Component-based authoring<br>• Schedule tools<br>• Student progress tracking | Personalization |

Knowledge management research as a research area in the field of information systems (IS) has investigated the development of new algorithms to improve the performance and ease of use of current knowledge management solutions using such programming tools as data mining, artificial intelligence, expert systems, database technologies, search techniques and modelling (Liao, 2003). Drawing on Lindvall et al.

(2003), Ragab and Arisha (2013) summarizes the features of each type of software and its Knowledge Management System (KMS) approach as shown in Table 2.9.

KMS approach can be divided into three types; codification, people-finder and personalization. Codification helps to retrieve document and content management based on indexing techniques and advanced searching mechanisms. It also organizes unstructured knowledge into structured ones based on taxonomies. On the other hand, People-finder provides a forum among subject matter experts. It creates profiles for organizational members based on their knowledge. Meanwhile, personalization allows the customization and tailoring of a service or a product to accommodate specific individuals. It helps individual trace and track progress and enables evaluation.

The software tools that facilitate knowledge management activities could be as basic as a document to a web-based information management system (Agarwal et al., 2011). For example, the documents that organizations produce such as manuals and standard operating procedure represent their explicit knowledge. Collaborative tools allow real-time interaction. For example, Medting™ solution, a cutting-edge, cloud-based software that allows clinicians to easily and securely collaborate on challenging cases with multiple colleagues across institutions and even countries in an open, transparent and nearly real-time way. Knowledge portals aid the integration of several information sources to make them accessible from one interface.

### 2.7.2 Role of IT/IS in Healthcare

For healthcare organizations, IT/IS have great potentials to decrease healthcare expenses and enhance outcomes (Agarwal et al., 2011). Agarwal et al. (2011) has also mentioned the position and role of IT sources in diagnostics and clinical equipment; IS are uniquely added to determine, process, store and exchange real-time information to decision makers for improved coordination of healthcare at the individual and public

levels. For example, data processing and mining and decision support technology, are able to determine adverse events for each patient and at the same time contribute to the overall population's health via giving insight on possible causes of diseases.

Healthcare professionals employ a wide array of ITs to exchange knowledge. These knowledge sharing procedures emphasize the exchange of explicit and practical knowledge (through trading digital documents) are much more typical compared to knowledge sharing procedures emphasizing the exchange of tacit knowledge (through technology-supported discussions and through applying technology to link employees with experts) (Whiddett et al., 2012).

## 2.8 Leveraging Knowledge Management in Healthcare

It started in the 90s when healthcare industry had increasingly made attempts to embrace new information technologies and software applications to achieve efficiency and higher-quality care (Raghupathi & Tan, 1999). The most apparent among them are Internet- and decision support- technologies (Brooks, 1999; Ba, Lang, & Whinston, 1997; Hersch, Brown, Donohow, Cambell, & Horacek, 1996; Detmer & Shortliffe, 1997; Silver, 1991; Inmon & Hackathorn, 1994; Raghupathi, 1997). In the late 1990s, healthcare institutions started to adopt electronic commerce business systems to exploit the global outreach and the potential to cope with transformations in the market place rapidly (Forgionne, Gangopadhyay, Klein, & Eckhardt, 1999). For instance, Wickramasinghe and Mills (2002) presented the case example of medical automated record system (MARS). In doing so, they showed that the true advantage of this system is that it functions as a knowledge management system (KMS) simultaneously enabling and facilitating convergence and compliance of healthcare treatment. Furthermore, it enhances and supports the creation and renewal of knowledge pertaining to healthcare

delivery. This demonstrates the importance of integrating a knowledge management focus in many e-commerce initiatives.

Also during the last two decades, healthcare organizations started to use information systems for clinical purposes to improve patient care (Anderson, 1997; McDonald et al., 1998). Computerized decision support or expert system, which is targeted at assisting healthcare providers and administrators to retrieve information, analyze data, diagnose and test, procedure and case management recommendation (Achour et al., 2001; Forgionne & Kohli, 1996; Hunt et al., 1998; Sim et al., 2001; Zitner et al., 1998). As a result, the concept of e-health which refers to the use of Web-enabled systems and processes to accomplish some combination of the following objectives: cut costs or increase revenues, streamline operations, improve patient or member satisfaction and contribute to the enhancement of medical care, evolved (Bose, 2003).

In the year 2000, Information Systems (IS) have much more to offer in managing healthcare costs and in improving the quality of care (Kolodner et al., 2008). IS are uniquely positioned to capture, store, process and communicate timely information to decision makers for better coordination of healthcare at both the individual and population levels (Fichman et al., 2011). For example, data mining and decision support capabilities can identify the potential adverse events for an individual patient while also contributing to the population's health by providing insights into the causes of disease complications.

Recently, healthcare professionals have shown growing interests in the importance of capturing, sharing and using knowledge. As a result, the healthcare sector has also begun to focus on the systematic management of knowledge and realize the potential of embedding knowledge management concepts in their own practices and organizations (Nicolini et al., 2008; Kothari et al., 2011). Knowledge management in healthcare

setting can be referred to as a systematic process and tools to promote access to and use of knowledge among health and development practitioners to improve health and development outcomes (Sullivan et al., 2015).

### 2.8.1 Knowledge Management Studies in Healthcare

Many knowledge management studies conducted in healthcare setting focused on developing decision-support services, Knowledge Management System, examining role of ICT in facilitating knowledge management practice, assessing healthcare workers' role and their practice in managing knowledge and developing conceptual model (Abidi, 2001; Wickramasinghe & Mills 2001; Bose, 2003; Bhargava, 2013; Sullivan et al., 2015).

Abidi (2001) highlighted the involvement of knowledge management in a healthcare enterprise arguing that the 'knowledge quotient' of a healthcare enterprise can be enhanced by procuring knowledge from the healthcare data repositories and subsequently operationalizing the procured knowledge to derive a suite of Strategic Healthcare Decision-Support Services (SHDS). SHDS can best be defined as a suite of knowledge/data-driven, strategic, decision-support services derived from both healthcare data and the health enterprise's knowledge bases, with the objective to improve the delivery of quality healthcare services. The general idea is to leverage the healthcare enterprise's databases, data warehouses and knowledge bases to derive experiential knowledge from it, which can in turn be used to optimize strategic decision-making and planning.

Subsequent to this work, Hsia et al. (2006) proposed a conceptual framework that integrates nursing processes, knowledge management activities and thus enabling information technology (IT) for designing a nursing KMS. The framework indicates the critical knowledge management activities in the nursing processes and the enabling of

IT based on the task/technology fit theory. With this framework, KMS developers can work with nursing professionals to easily identify the suitable IT associated with the nursing process when developing a nursing KMS.

Besides KMS, scholars have also investigated the role of other ICTs in facilitating knowledge management process and practice. For example, Bose (2003) presents and describes the knowledge management capabilities, the technical infrastructure and the decision support architecture for a healthcare management system. The research findings help the healthcare information technology (IT) managers and knowledge based system developers to identify their IT needs, while also plan for and develop the technical infrastructure of the healthcare management system for their organizations. Whiddett et al. (2012) explored the extent of the use of information technologies (ITs) for knowledge sharing by secondary healthcare organizations in New Zealand. Sheng (2013) examined the moderating role of information communication technology (ICT) competencies in enhancing knowledge transfer and mitigating the effects of knowledge barriers, thereby increasing the firm's innovation competitive advantage.

Healthcare workers play an important role in implementing knowledge management in healthcare setting. Scholars are concerned in assessing healthcare workers' role and their practice in managing knowledge. For instance, Dehaghi et al. (2015) conducted a study to discover the association between the quality of work life of nurse managers and their participation in implementing knowledge management. They have found that improvement of nurse managers' work life quality, especially in decision-making, may increase their participation in implementing knowledge management. Another example is the study conducted by Chang et al. (2011) where they investigated the cognition of knowledge management among hospital employees and the relationship between knowledge management and the knowledge management enabler activities (financial,

customer, internal business processes, learning and growth) in a regional hospital in Taiwan. The findings in this paper indicate that the cognition and demand for knowledge management in subordinates is close to the expectations of policy-makers. The policy-makers expect subordinates working in the hospital to be brave in taking on new responsibilities and complying with hospital operation norms. Knowledge management is emphasized as a powerful and positive asset. Moreover, understanding knowledge management predicts good performance in an organization.

Finally, studies relating to knowledge management in healthcare also look into model development. In 2003, Beveren explored knowledge management within an Australian regional healthcare organization. He identified and discussed many barriers inherent in the organizational structure and design of the organization that are indicative of the public health sector. From the results and discussion, it is concluded that new models, tools and techniques for knowledge management specific to the environment of the public sector and particularly the health sector are required (Beveren, 2003). Subsequent to this finding, Lau (2004) described the conceptual organizing scheme for managing knowledge within the health setting. It focuses on the concepts of production, use and refinement of three specific knowledge sources—policy, evidence and experience. These concepts are operationalized through a set of knowledge management methods and tools tailored for the health setting.

Buranarach et al. (2009) developed a Web-based Semantic model in constructing a knowledge management platform that enables the merging of knowledge with patient databases and supported, standard publications. The model is constructed to support two chronic care components, which are decision support and clinical information systems. The model aims to construct the healthcare knowledge resources that link clinical guideline knowledge with patient registries and medical literature databases to support

evidence-based healthcare. The Semantic Web technologies provide an effective platform to support the knowledge management process. It supports modeling of ontologies and metadata in the standard formats that can enable semantic-based integration, processing and access of the knowledge resources.

## 2.9 Summary

The review of previous studies reveals several distinguished observations. Firstly, the review reveals the most recent stage of knowledge management development where studies focus on the implementation of knowledge management in specific organization such as public sector, education, small and medium enterprises and healthcare. Additionally, researchers extended the previous model/framework to suit specific organization and further explore on technology involvement.

Secondly, knowledge management related studies conducted in healthcare setting focus on five main areas. They are the development of software/tools as conducted by (Abidi, 2001; Wickramasinghe & Mills, 2001; Whiddett, 2012; Quinn, 2014), examine knowledge management process (Bose, 2003; Hsia et al., 2006; Wilkesmann & Wilkesmann, 2011; Radaelli et al., 2011; Kim et al., 2012; Oborn et al., 2013), assess workers' role and practices (Ellingsen, 2003; Ryu et al., 2003; Hsia et al., 2006; Chen et al., 2011; Chang et al., 2012; Myllärniemi et al., 2012; Dehaghi et al., 2015) and only recently, although a small few studies look into model/framework development (Landry & Amara, 2012; Leal-Rodríguez et al., 2013). However, most of the studies only look into single process such as knowledge sharing and develop a conceptual framework/model.

# CHAPTER 3: METHODOLOGY

This chapter discusses the research methods employed in this study. First, it explains the research approach. Second, it discusses the initial research model. The third section discusses the research context. Fourth, the discussion of ethical clearance procedure before commencing the field study is provided. In the later sections, sampling, data collection and analysis are discussed.

## 3.1 Research Approach

The study adopted a qualitative research approach by conducting an interpretive case studies. The intention of a case study research is generally proposed as to gain an in-depth understanding of the concerned phenomena in a real-life setting. Yin (1994, p. 13) defines a case study as "an empirical enquiry that investigates a contemporary phenomenon within its real life context especially when the boundaries between phenomenon and context are not clearly evident". Qualitative research is a broader term. In general, it refers to a study process that investigates a social human problem where the researcher conducts the study in a natural setting and builds a whole and complex representation by a rich description and explanation as well as a careful examination of informants' words and views (Creswell, 1998; Miles & Huberman, 1994; Morgan & Smircich, 1980).

The study's primary goal is to examine doctors and nurses' views on knowledge management and how they employ the process. Specifically, this research focuses on how they build their knowledge schemes, scan and use knowledge, as well as how they use ICT to facilitate the process. The purpose of qualitative approach for this study is to gain an in-depth understanding of clinical practices in order to develop the process model. As such, gathering data which provide a detailed description of how clinicians practice knowledge management in their day-to-day work is required.

### 3.1.1 Interpretive Case Studies

There are many qualitative techniques which can be used at the data collection stage such as case study research, ethnography, grounded theory among others (Cooper & Schindler, 2011). This research employed case study research as the main technique in order to achieve comprehensive understanding of the situation. Case study research can be completed in a multitude of different ways; as Cavaye (1996, p. 227- 228) argues:

"Case study research can be carried out taking a positivist or an interpretive stance, can take a deductive or an inductive approach, can use qualitative and quantitative methods, can investigate one or multiple cases. Case study research can be highly structured, positivist, deductive investigation of multiple cases; it can also be an unstructured, interpretive, inductive investigation of one case; lastly, it can be anything in between these two extremes in almost any combination."

This research took the interpretive stance as an interpretive approach provides a deep insight into "the complex world of lived experience from the point of view of those who live it" (Schwandt, 1994, p. 118). Interpretive research assumes that reality is socially constructed and the researcher becomes the vehicle by which this reality is revealed (Cavana, Delahaye, & Sekaran, 2001; Walsham, 1995). This approach is consistent with the construction of the social world characterized by interaction between the researcher and the participants (Mingers, 2001). The researcher's interpretations play a key role in this type of study bringing "such subjectivity to the fore, backed with quality arguments rather than statistical exactness" (Garcia & Quek, 1997, p. 459).

In qualitative and interpretive case studies the researcher is directly involved in the process of data collection and analysis (Creswell, 1998; Klein & Myers, 1999; Morgan & Smircich, 1980; Morse, 1994). It provides an opportunity to obtain a deep insight into the problem being studied because "an interpretive explanation documents the

participant's point of view and translates it into a form that is intelligible to readers" (Neuman, 1997, p. 72). Interpretive research makes it possible to present the researcher's own constructions as well as those of all the participants (Guba & Lincoln, 1994; Neuman; Walsham, 1995).

In this research, the two organizations involved represent two different case studies. Multiple cases provide a more rigorous and complete research than a single research. Scholars argued multiple cases to help increase confidence in the robustness of the emerging theory, which in turn is due to triangulation of evidence (Eisenhardt, 1989; Stake, 1995; Yin, 2003). In addition, the evidence of multiple case studies is often considered more compelling and is regarded as more robust (McLaughlin, 2010).

## 3.2 Research Model

The study's initial research model is adopted from Nag and Gioia (2012). The model is chosen because it presents a process view of how knowledge is linked from one's plan of action (schemes), acquiring to using knowledge. It is important to understand how one schema relates to the interpretation, search for and utilization of knowledge. The differences in the ways that executives scan for information might lead to the acquisition of different kinds of knowledge that might be useful in practice (Nag and Gioia 2012). In addition, this model enables the study to encapsulate the multifaceted and vigorous characteristics of knowledge management. Figure 3.1 depicts the three dimensions that constitute the core of the overall process model: (i) knowledge scheme; (ii) knowledge scanning; and (iii) knowledge use.

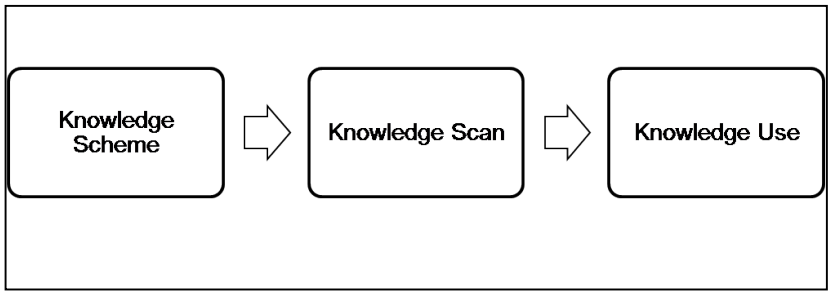



**Figure 3.1:** The Initial Research Model

Knowledge Scheme is a framework of tacit knowledge that allows people to impose structure upon and impart meaning to ambiguous situational information (Gioia, 1986). Research on the use of schemas has shown that the cognitive framework of executives affect strategic choices made for their organizations (Axelrod, 1976; Barr, 1998; Calori, Johnson, & Sarnin, 1994; Porac, Thomas & Baden-Fuller, 1989; Thomas et al., 1993). For instance, Gioia and Chittipeddi (1991) studied how "sensemaking" (meaning making) and "sensegiving" (providing meaning for others) activities of a university president affected process of change in that university. In addition, the interests towards organizational capabilities and competitive advantage have called for scholars to investigate the role played by managerial cognition and search behaviors in the development of routines and capabilities (Gavetti, 2005). These works emphasized the importance of understanding how managerial schemas relate to the interpretation, search for and utilization of knowledge in an organization.

Knowledge Scanning is referred to the amount of knowledge and information search conducted in a particular domain (Hambrick, 1982; Sutcliffe, 1994). It can also be recognized as knowledge acquisition (Nag & Gioia, 2012). Recent studies concerning knowledge acquisition have offered some rich insights into conditions under which groups or organizational units acquire knowledge and have also looked at the outcomes of such processes (Darr, Argote & Epple, 1995; Schulz, 2001; Zellmer-Bruhn, 2003). For example, Schulz (2001) study of knowledge flows in multiunit organizations, the

importance of knowledge acquisition as a transformative link between individual, localized knowledge and organization-level knowledge. Another study conducted by Zellmer-Bruhn (2003) found that certain types of interruptions in routine work prompt efforts to search for knowledge but do not necessarily lead to knowledge acquisition.

Knowledge use is the modes of using knowledge (Nag & Gioia, 2012). Other studies in knowledge management field regard knowledge use as knowledge utilization. Scholars have developed a practice perspective on knowledge wherein it is seen as localized and embedded in the performance of day-to-day activities (Pentland, 1992; Dougherty, 1992; Brown & Duguid, 2001; Carlile, 2002). Pentland (1992) employed Ryle's (1949) argument that knowledge refers to individual performances and shows that the organizational knowledge refers to organizational performances.

Since 1965, knowledge management related studies have paid attention to processes of creation, acquisition and dissemination as important means in managing knowledge (Cangelosi & Dill, 1965; Huber, 1991; Schulz, 2001). As knowledge management consists of a series of activities, the earlier process has a significant impact on the other consequent knowledge management activities such as knowledge utilization. Therefore, underlines the need to explore the complete process of managing knowledge in an organization.

## 3.3 Research Context

This research was conducted in two hospitals; a public hospital – Selayang Hospital and a teaching hospital – University of Malaya Medical Center (UMMC). These hospitals are among the largest hospital in its own category and responsible for improving the health of the public. These hospitals have similar bed counts and comparable in size. They are located in central Malaysia and serve a large population in Petaling Jaya (1,782,375) and Selayang/Gombak (>682, 996). The study conducted in these hospitals help to increase access to more experienced doctors (i.e specialist) and nurses. According to a study conducted by National Clinical Research Center, a total number of 3009 specialists work for public hospitals and 911 specialists work for university hospitals (Faizah et al., 2011).

Each hospital is the subject of an individual case study, but the study as a whole cover these two hospitals and in this way uses a multiple-case design that follows replication logic (Yin, 2003). The evidence from multiple cases is often contemplated more compelling, therefore the overall study is regarded as being more robust (Herriott & Firestone, 1983). Upon uncovering finding from the first case study, the immediate research goal would be to replicate this finding by conducting the second case. The replications might have attempted to duplicate the exact condition of the first case study or might have altered the original finding. Only with such replications could the finding can be considered robust and compelling to develop a rich theoretical framework (Yin, 2003).

Input for the case studies were received from doctors and nurses from the generic medical department in both hospitals. Doctors and nurses are most actively engaged in direct patient care and provide leadership in clinical work environment. They work hand-in-hand to make a collective decision for patient care. In the interest of

safe patient care, doctors and nurses collaborate by sharing personal and professional knowledge and joint responsibility to ensure the utilization of best knowledge to produce positive patient outcomes.

Apart from providing patient care, both doctors and nurses play a leading role in generating medical evidence and engaging in clinical research. They collect, track and analyze clinical and patient data to help build the scientific foundation for clinical practice, prevention and improved patient health outcomes as well as evaluating and improving their own practice.

### 3.3.1 Case I: Selayang Hospital

Selayang Hospital has a total of 960 patient beds as well as 20 clinical disciplines located in Selayang in the Gombak District, Selangor. This hospital offers secondary and particular national tertiary care services. Selayang Hospital has been constructed and ready for a Total Hospital Information System (THIS) setting with the main objective of paperless and filmless hospital operations and functionality. It is the only hospital in the country and the world to function with THIS, comprising all elements of its operation. In order to meet the objective of the state of the art facility, a highly qualified effective organization, operation and management has to be ensured for the success of this hospital. Being an electronic hospital that has taken the initiative to implement THIS, patients' medical records, clinical protocols and guidelines are readily available and may be accessed in one merged workstation at any location and time within the hospital.

Figure 3.2 shows the organizational chart for Selayang Hospital. The organization is led by a Director and assisted by three deputies for different areas; (i) medical, (ii) surgical and (iii) management. The Medical and Dental Advisory Committee is responsible for advising the governing body on clinical governance i.e. plan, coordinate,

implement, control and improve activities relating to clinical services. In this hospital, there are six clinical and non-clinical directorates; Non-Clinical Support Services, Diagnostic & Clinical Support Services, Medical Services, Surgical Services, Women & Children Services and Management.

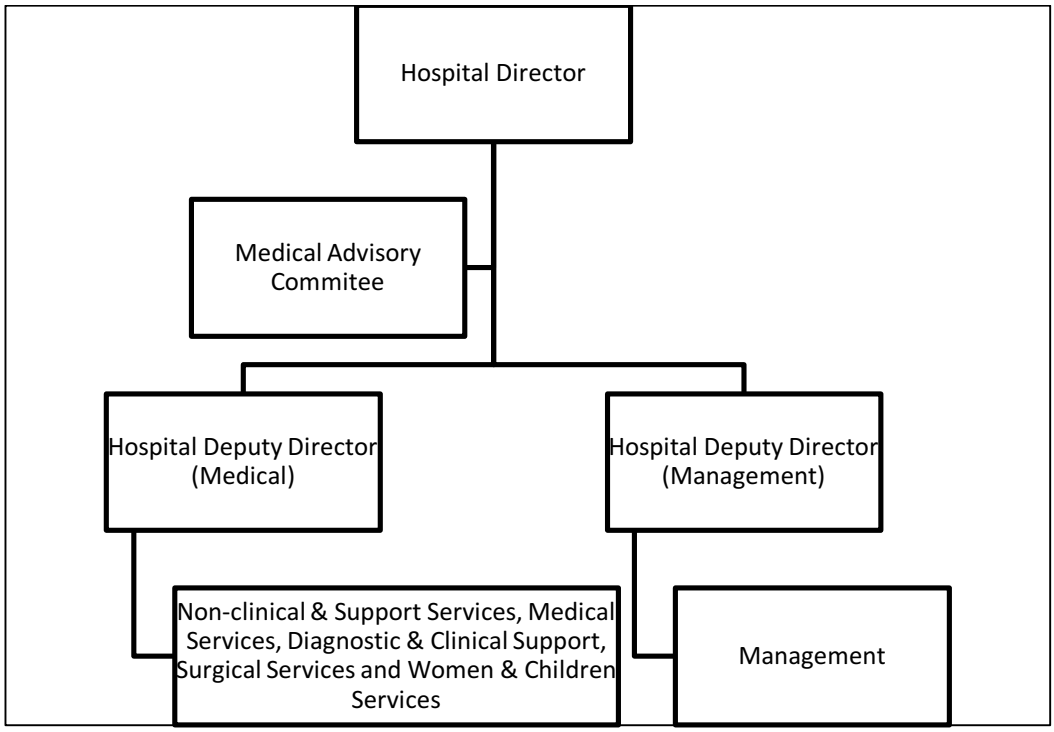



**Figure 3.2:** Organizational Chart for Selayang Hospital

In the Medical Services Directorate, there are six departments providing various services; specifically, in areas of General Medical, Dermatology, Psychiatry, Nephrology, Hepatology and Palliative. This research focuses on General Medical department. This department is led by Dr. Azmillah Rosman.

The role of this department is important in ensuring the quality and comprehensive care to patients in the hospital. In addition, it also engages in producing competent specialist doctors. The department consists of four main units which includes General Medicine, Rheumatology, Endocrinology and Geriatrics. The department is manned by specialists of Rheumatology, Endocrinology Specialists, General Physicians, Geriatrics

Physicians, Rheumatology Specialist training and seventeen medical officers as well as graduate medical officers. Figure 3.3 shows the organizational chart for General Medical department at the Selayang hospital.

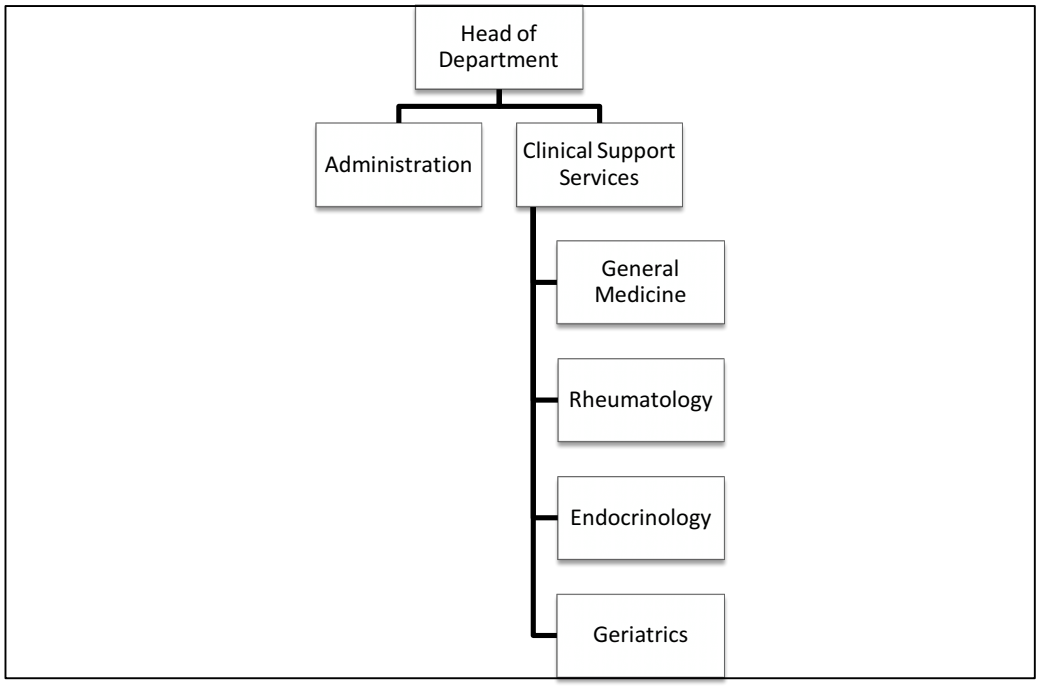



**Figure 3.3:** Organizational Chart for General Medical Department

### 3.3.2 Case II: University of Malaya Medical Center

University of Malaya Medical Center (UMMC) is a premier teaching hospital in the country located in the south-west corner of Kuala Lumpur. Besides providing health services, it also provides quality training to medical and para-medical students to become responsible members of the medical fraternity. The university status of the hospital means that extensive research and education is carried out. For example, UMMC is responsible for undergraduate and postgraduate medical education as well as training in the Life Sciences. UMMC has implemented electronic health record (EHR) which is viewed as part of an automated order-entry and patient-tracking system providing real-time access to patient data. EHR helps to systematize patient registration, billing and laboratory investigations where results can be retrieved online.

UMMC is a 500-bed hospital led by a Director and assisted by three deputies for different areas; (i) clinical support, (ii) clinical and (iii) management. Figure 3.4 shows the organizational chart for UMMC. Each directorate has several departments that contribute to the running of the hospital's operations.

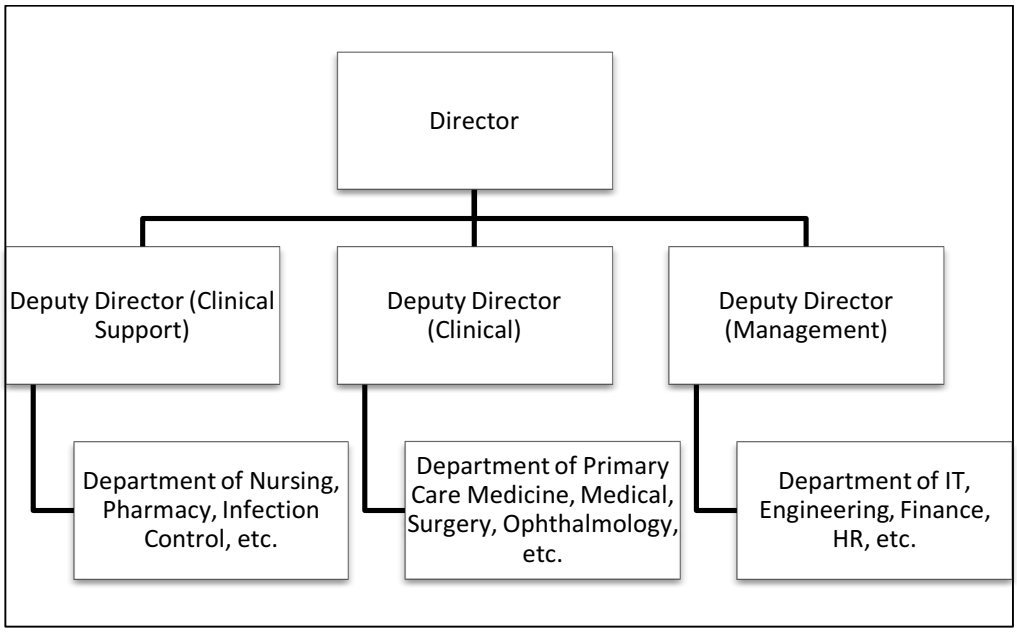



**Figure 3.4:** Organizational Chart for UMMC

The study focuses on Primary Care Medicine department. This department caters clinical services for outpatients in UMMC through General Clinic, Family Clinic, Home Treatment Service and K.I.D.D.S. Clinic. Figure 3.5 shows the organizational chart for Primary Care Medicine department. It provides treatment, long-term follow-up, immunization, health and developmental assessment, health education and counselling for patients with diabetes mellitus and consultation for acute medical problems (e.g. fever, diarrhea, abdominal pain, etc.) and chronic medical problems (e.g. diabetes, hypertension, asthma, etc.).

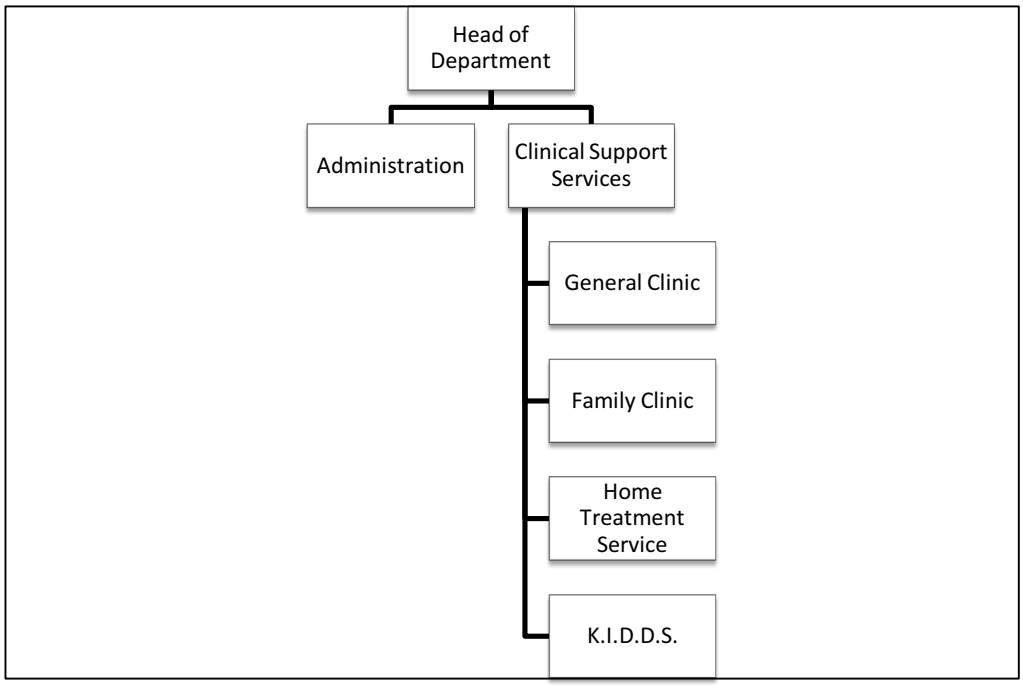



**Figure 3.5:** Organizational Chart for Primary Care Medicine Department

## 3.4 Ethical Clearance

The study was conducted in two hospitals; Selayang Hospital (hereafter referred as Case I) and University of Malaya Medical Center (hereafter referred as Case II). In order to conduct the study in these hospitals, I was required to seek approval from the Medical Ethics Committee of both Ministry of Health and the hospital. I was responsible for abiding with the approved researcher-participant agreement for the collection and protection of research data and to strictly follow the guidelines for conducting research in Ministry of Health institutions and facilities as prepared by National Institutes of Health (NIH). Therefore, there will be no clues to informants' identity appearing in the thesis and any extracts from what the informants say that are quoted in this thesis will be entirely anonymous. In the following sub-sections, the ethical clearance for the two research cases is summarized.

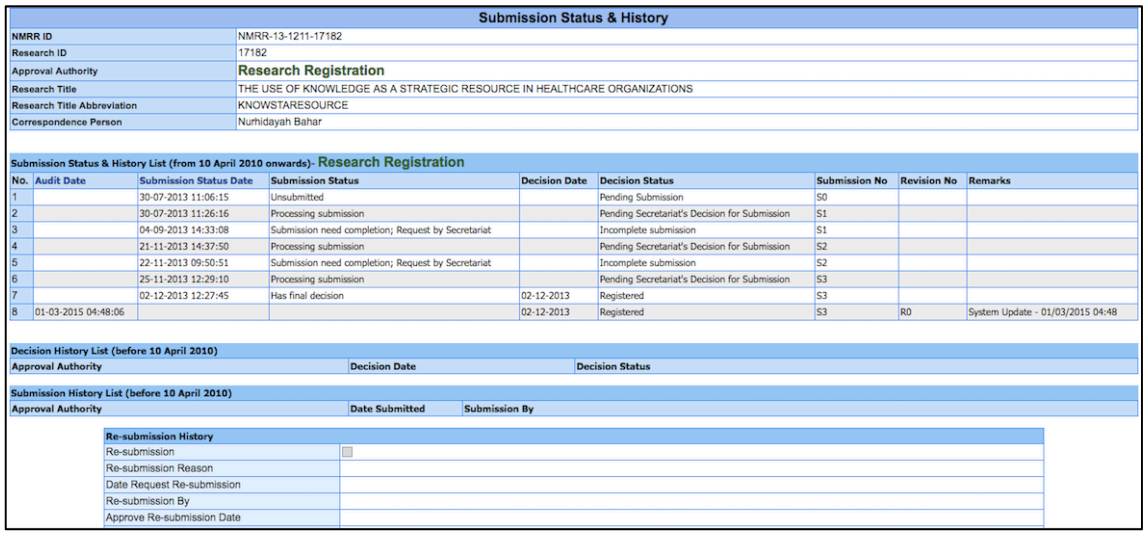
### 3.4.1 Case I

The current Ministry of Health's (MOH) policy on research, requires; (i) registration of all research that involve MOH personnel or is to be conducted in MOH facility or to be funded by MOH research grant, (ii) review and approval of the research by a designated entity to whom authority has been delegated for the purpose, (iii) research involving human subjects require prior review and approval by the MOH Research and Ethics Committee (MREC) and (iv) approval of all research publications, whether in the form of research report, journal article or conference proceeding, by the National Institutes of Health (NIH) initially and thereafter by the Director General of MOH.

In order to conduct research in any hospital under the purview of MOH, I was required to submit an online application for research registration through a web-based portal, National Medical Research Register (NMRR). In July 2013, I registered the research title into the system and at the same time, a cover letter describing the study's purpose was sent to the hospital director (see Appendix A). The letter then was circulated to the hospital's Clinical Research Centre (CRC) for granting permission. CRC's core functions are to coordinate research done by healthcare providers at the hospital including clinical registries and organize training related to research.

In order to get the application complete, I was required to get a field supervisor among doctors/specialists from the hospital. In October 2013, an email was sent to Dr. Azmillah Rosman, the Head of General Medical Department, to request for her involvement as field supervisor. The research topic was then presented to her and she agreed to become the field-study supervisor. The application was finally submitted in November 2013. After a thorough screening and approval process, my application was finally approved in April 2014. The approval letter was issued by Medical Research and

Ethics Committee, MOH on 25th April 2014 (see Appendix B). Figure 3.6 shows the application submission status and history.



**Submission Status & History**

| | |
|---|---|
| NMRR ID | NMRR-13-1211-17182 |
| Research ID | 17182 |
| Approval Authority | Research Registration |
| Research Title | THE USE OF KNOWLEDGE AS A STRATEGIC RESOURCE IN HEALTHCARE ORGANIZATIONS |
| Research Title Abbreviation | KNOWSTARESOURCE |
| Correspondence Person | Nurhidayah Bahar |

**Submission Status & History List (from 10 April 2010 onwards)- Research Registration**

| No. | Audit Date | Submission Status Date | Submission Status | Decision Date | Decision Status | Submission No | Revision No | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | | 30-07-2013 11:06:15 | Unsubmitted | | Pending Submission | S0 | | |
| 2 | | 30-07-2013 11:26:16 | Processing submission | | Pending Secretariat's Decision for Submission | S1 | | |
| 3 | | 04-09-2013 14:33:08 | Submission need completion; Request by Secretariat | | Incomplete submission | S1 | | |
| 4 | | 21-11-2013 14:37:50 | Processing submission | | Pending Secretariat's Decision for Submission | S2 | | |
| 5 | | 22-11-2013 09:50:51 | Submission need completion; Request by Secretariat | | Incomplete submission | S2 | | |
| 6 | | 25-11-2013 12:29:10 | Processing submission | | Pending Secretariat's Decision for Submission | S3 | | |
| 7 | | 02-12-2013 12:27:45 | Has final decision | 02-12-2013 | Registered | S3 | | |
| 8 | 01-03-2015 04:48:06 | | | 02-12-2013 | Registered | S3 | R0 | System Update - 01/03/2015 04:48 |

**Decision History List (before 10 April 2010)**

| Approval Authority | Decision Date | Decision Status |
|---|---|---|

**Submission History List (before 10 April 2010)**

| Approval Authority | Date Submitted | Submission By |
|---|---|---|

**Re-submission History**

| | |
|---|---|
| Re-submission | |
| Re-submission Reason | |
| Date Request Re-submission | |
| Re-submission By | |
| Approve Re-submission Date | |

**Figure 3.6:** Application Submission Status and History

Upon completion of the field study, I was required to report the findings and produce the final report (see Appendix C). Finally, the study termination memorandum (see Appendix D) and termination letter (see Appendix E) were sent to NMRR to officially end the field study.

### 3.4.2 Case II

This is similar to the first case study where I was required to seek approval from the hospital's Medical Ethics Committee in order to conduct research at the hospital through iResearch website portal. Prior to the ethical clearance, I was required to find a representative from University Malaya Medical Centre (UMMC) or Faculty of Medicine (FOM), University of Malaya to become the co-investigator and the corresponding person for the application.

In April 2014, an email was sent to Associate Professor Dr. Sajaratulnisah, to request for her involvement as a co-supervisor. She has shown great interest towards the topic and has helped to submit the application for granting an approval to conduct my second

case study at UMMC. We started to work on getting an ethical research approval immediately after our first meeting, however, due to a technical glitch, our application was only registered in the system in August 2014. It took another four months for the research topic to be reviewed before it was finally approved in November 2014 (See Appendix F). Figure 3.7 shows the application details in iResearch.


**Figure 3.7:** Application Details for Case II

## 3.5 Sampling

This study relied primarily on doctors and nurses to describe how they acquire, process and apply knowledge in their clinical work environment. Doctors and nurses play an important role in clinical work environment. The vast majority of diagnosis and patient care is performed by doctors and nurses. Specifically, doctors diagnose and treat patients, including prescribing medications. Doctors make decisions regarding patient care and then consult with nurses to make sure the care instructions are carried out.

Nurses, on the other hand, are responsible to perform physical examinations and enquire health histories prior to sending the patient to see the doctor. Other than that, nurses are also responsible in providing health promotion, counseling and education to patients. In this study, 59 healthcare workers were interviewed. These included doctors from several specialties and nurses from a variety of settings.

Given the research objectives, I concentrated on understanding the content of clinicians' schemas (belief structures) about knowledge, their knowledge scanning tendencies and the use of knowledge in clinical practices. I followed a purposeful sampling approach which gathers participants to collect responses to the formulated research questions (LeCompte & Preissle, 1993). Table 3.1 provides a breakdown of the informants. A total of 59 informants consisting of doctors and nurses were interviewed from Selayang Hospital (Case I) and University of Malaya Medical Centre (Case II). A confidential code number was assigned to each informant to identify the informant in interview scripts and reports.

The different types of roles in the organization were treated as multiple sources for assessing similarities and differences in knowledge management practices, which enabled the generation of knowledge management process model and their interrelationships.

**Table 3.1:** Informants

| No. | Informant Code | Position | Work Experience (Years) | Case |
|---|---|---|---|---|
| 1 | N101 | Nurse | 5 | I |
| 2 | N102 | Nurse | 6 | I |
| 3 | N103 | Nurse | 6 | I |
| 4 | N104 | Sister | 8 | I |
| 5 | N105 | Nurse | 5 | I |
| 6 | N106 | Nurse | 12 | I |
| 7 | N107 | Nurse | 10 | I |
| 8 | N108 | Nurse | 7 | I |
| 9 | N109 | Nurse | 10 | I |
| 10 | N110 | Nurse | 16 | I |

| | | | | |
|---|---|---|---|---|
| 11 | N111 | Nurse | 23 | I |
| 12 | N112 | Nurse | 10 | I |
| 13 | N113 | Nurse | 11 | I |
| 14 | N114 | Nurse | 9 | I |
| 15 | N115 | Nurse | 9 | I |
| 16 | N116 | Nurse | 14 | I |
| 17 | N117 | Nurse | 5 | I |
| 18 | N118 | Nurse | 12 | I |
| 19 | D101 | Doctor | 3.5 | I |
| 20 | D102 | Doctor | 7 | I |
| 21 | D103 | Doctor | 5 | I |
| 22 | D104 | Doctor | 23 | I |
| 23 | D105 | Doctor | 7 | I |
| 24 | D106 | Doctor | 14 | I |
| 25 | D107 | Doctor | 5 | I |
| 26 | D108 | Doctor | 10 | I |
| 27 | D109 | Doctor | 6 | I |
| 28 | D110 | Doctor | 4 | I |
| 29 | D111 | Doctor | 4 | I |
| 30 | D112 | Doctor | 20 | I |
| 31 | D113 | Doctor | 5 | I |
| 32 | D114 | Doctor | 5 | I |
| 33 | D115 | Doctor | 5 | I |
| 34 | D116 | Doctor | 5 | I |
| 35 | D117 | Doctor | 5 | I |
| 36 | N201 | Nurse | 19 | II |
| 37 | N202 | Nurse | 20 | II |
| 38 | N203 | Nurse | 4 | II |
| 39 | N204 | Nurse | 21 | II |
| 40 | N205 | Nurse | 10 | II |
| 41 | N206 | Nurse | 6 | II |
| 42 | N207 | Nurse | 8 | II |
| 43 | N208 | Nurse | 30 | II |
| 44 | N209 | Nurse | 27 | II |
| 45 | N210 | Nurse | 16 | II |
| 46 | N211 | Nurse | 28 | II |
| 47 | N212 | Nurse | 25 | II |
| 48 | D201 | Doctor | 8 | II |
| 49 | D202 | Doctor | 12 | II |
| 50 | D203 | Doctor | 9 | II |
| 51 | D204 | Doctor | 7 | II |
| 52 | D205 | Doctor | 7 | II |
| 53 | D206 | Doctor | 11 | II |
| 54 | D207 | Doctor | 10 | II |
| 55 | D208 | Doctor | 12 | II |
| 56 | D209 | Doctor | 9 | II |
| 57 | D210 | Doctor | 9 | II |
| 58 | D211 | Doctor | 15 | II |
| 59 | D212 | Doctor | 7 | II |

### 3.6 Data Collection

I conducted on-site interviews with informants who played key parts in the execution of knowledge management process in the clinical care. Walsham (1995) debated that interviews are the main data source because through this approach the researcher can easily access the interpretations made by the participants, on the events in question. Over a three-month period, I performed 37 interviews involving all the informants from Case I, beginning in June and ended in September 2014. For Case II, I interviewed another 24 participants since March 2015. Due to hectic schedule of the doctors and nurses from Case II, who were only available once a week to participate in the interview. The data collection ended in early January 2016.

The informants were selected based on the suggestion of field supervisors or selected informants. The informants that were interviewed had a minimum of 3 to 30 years of work experience. All informants first received information about the study and the interview via e-mail, after which interviews were scheduled either via e-mail or phone. Topics covered during the interviews included the backgrounds and roles of interviewees, their belief structures about the nature of valuable knowledge, knowledge search and/or acquisition patterns and modes of using knowledge.

To ensure the well-being of the research participants and to comply with regulations, I followed the approval and notification procedures prescribed by the hospital's Medical Ethics Committee. I informed the participants about the research and its purposes and provided them with an information sheet regarding their rights such as confidentiality and anonymity. Their consent was also obtained prior to participating in the study. The interviews were conducted at informants' premises and lasted about 45 minutes to one and a half hours. They were electronically recorded with the consent of the parties involved for data reorganization and analyses afterwards.

Apart from collecting data from interviews, I conducted archival analysis which involves seeking out and extracting information electronic records such as hospitals' official websites, Malaysian Academy of Medicine's website, online medical references sites and social media sites. The following figures show the sources used for archival analysis.


**Figure 3.8:** Selayang Hospital's Official Website


**Figure 3.9:** University of Malaya Medical Centre's Official Website


**Figure 3.10:** Academy of Medicine of Malaysia's Official Website

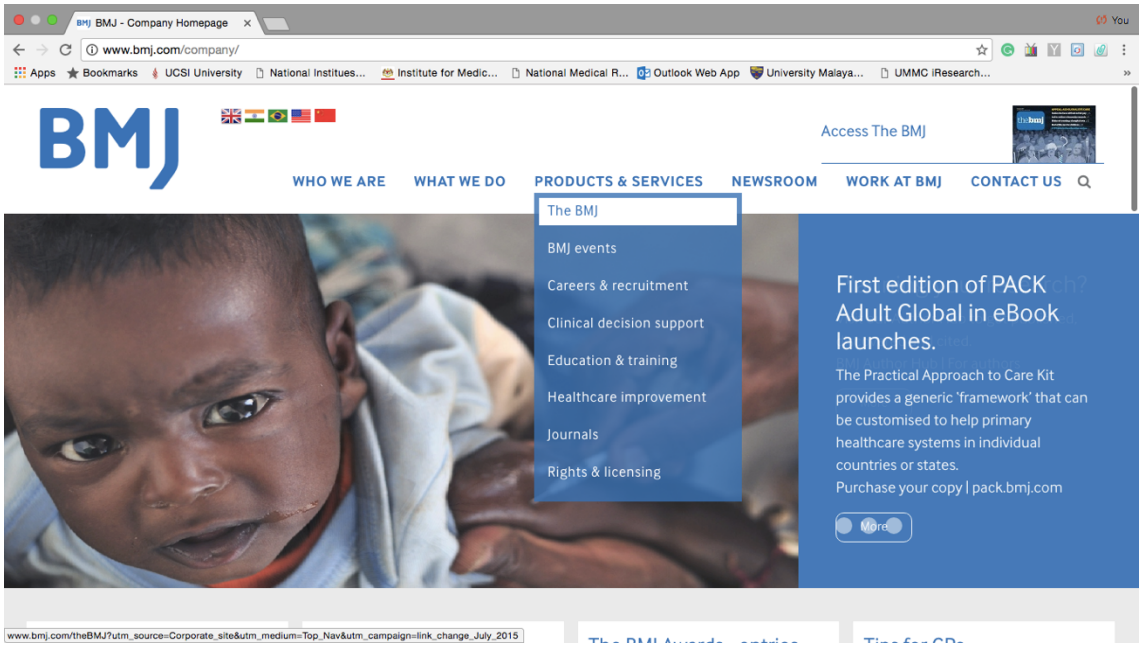



**Figure 3.11:** BMJ – An Example Of Online Medical Reference Website


**Figure 3.12:** Ministry of Health's Official Facebook Account

From the analysis, rich information such as organization background and structure, clinical services being offered, the implemented hospital information system and health members' activities were gained.

## 3.7 Data Analysis

As the data collection progresses, the data were analyzed by interweaving data collection and analysis from the very start. This had help to cycle back and forth between thinking about the existing data and generating strategies for collecting new data (Miles, Huberman & Saldana, 2013). The interviews were recorded while notes were taken to identify the major points. The recordings were then, transcribed verbatim. The focus is on words as the basic form in which the data are found.

As for the methods, I began with first cycle coding, then second cycle or pattern codes. First cycle coding is a way to initially summarize segments of data whereas second cycle coding is a way of grouping those summaries into a smaller number of categories, themes or constructs (Miles, Huberman & Saldana, 2013). In the first cycle

coding, I employed in vivo coding and process coding techniques. In vivo coding uses words or short phrases from the participant's own language in the data record as codes while process coding method uses gerunds ("-ing" words) to connote observable and conceptual action in the data (Miles, Huberman & Saldana, 2013). Table 3.2 shows the example of outcomes from first cycle coding and second cycle coding.

**Table 3.2:** Informants Quotes Underlying First and Second Cycle Coding

| **Informant Quotes** | **First Cycle Coding** | | **Second Cycle Coding** |
|---|---|---|---|
| | **In Vivo Coding** | **Process Coding** | **Theme** |
| • For uncommon diseases, we have to search information worldwide. For example, some foreign patients were infected by a disease that origin from their country. It usually takes a lot of work to identify the information retrieved from multiple external sources.<br>• If I don't know about something, I should not hesitate to seek advice. | We know what we don't know. | Identifying | Scan |
| • The changing nature of knowledge requires us to bring our know-how to date. It is therefore very important to search for the latest information especially the diagnosis made by doctors which can place a patient between life and death.<br>• We need to attend seminars, medical courses and training on certain days in a year. Furthermore, there is a frequent update on medications and prescription drug information. | We know how to find what we don't know. | Discovering | |

| | | | |
|---|---|---|---|
| • We consulted experts from other hospital when was not available in our hospital. At times, CPG alone was insufficient.<br>• Normally, I accessed UpToDate website to get the latest information.<br>• The external sources are very important especially in dealing with international diseases. | We know where to find what we don't know. | Acquiring | |
| • Nurse will perform the first-level assessment and provide us (doctors) the outcome.<br>• I will verify the outcomes from the assessment before making decision.<br>• Patient's story is important because they know their body better.<br>• Lab tests and medical record can be accessed from our electronic medical record system. It aids the process of deciding what to do. | We make judgments based on numerous evidences. | Gathering | Assessment |
| • Based on patient's data, I have to deliberate on what could happen and thus look for evidence to support my assumption.<br>• I will have to carefully review patient's records and examine lab test results.<br>• We analyze problems to figure out solutions. | We look for patterns and compare with precious cases. | Analyzing | |
| • I gained my clinical knowledge from experiences.<br>• We key-in information to the system after the assessment with the patient. | We take note the outcomes of the decisions made for future references. | Capturing | Store |
| • I keep my notes in my smartphone thus enabling easy access.<br>• I use my personal laptop to keep | We have our own way of keeping information | Organizing | |

| | | | |
|---|---|---|---|
| files related to my work. | and acquired knowledge. | | |
| • When diagnosing disease and providing treatment to patients.<br>• Decision-making and long-term planning. | Our knowledge is important in managing the disease and providing patient care. | Applying | Use |
| • New case of disease requires us to do numerous lab tests.<br>• Every patient has a different reaction to medicine or treatment. We need to find out the most suitable treatment for them.<br>• When the patient comes back to us with better health condition after our treatment, we know that the treatment given is suitable for such cases. | We propose a treatment and observe the outcomes. | Experimenting | |
| • We work in a team. Doctors and nurses work together to provide care to patients.<br>• Senior staff and doctors are always there to guide me and share knowledge.<br>• It is common for clinicians to conduct Continuing Medical Education (CME) on a weekly basis. | We conduct and attend presentations to get the latest information. | Disseminating | Share |
| • We always share new knowledge among our team members.<br>• We talk about patient and their cases formally or informally.<br>• We have group discussions on Whatsapp.<br>• We use Facebook to share information. | We discuss about work formally or informally. | Communicating | |

As I discerned the codes that were similar, I collated them into in vivo terms or phrases, employing the language used by the informants whenever possible. Subsequent to applying this method, I started discerning linkages among the categories that could lead to the development of codes based on process coding method. Finally, the second cycle codes pull together method from first cycle codes into an emergent theme.

To recap, a generic knowledge management model was produced based on previous models and frameworks reported in the literatures and the initial model was adopted from the framework of Nag and Gioia (2012). Figure 3.13 summarize the progression of the generic model and initial model to the final process model.

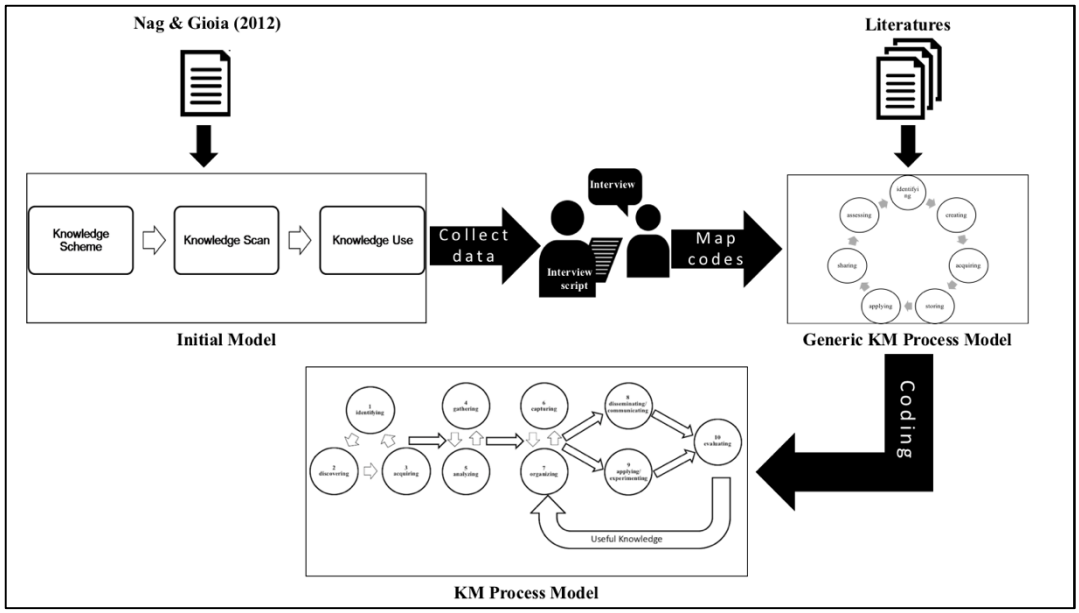



**Figure 3.13:** The Progression of Generic Model and Initial Model to the Final Process Model

The initial model was adopted from Nag and Gioia (2012) serves to guide the design and data collection. The motivation for using this model in the earlier stages of these cases studies is to create an initial theoretical framework which takes into account of previous knowledge and which creates a sensible theory related to the study (Walsham, 1995). However, interpretive studies suggest not to use the theory in a rigid way which

restrains opportunities of exploration, instead, preserve a significant degree of openness to the field data and allow modification of the initial assumptions and theories (Walsham, 1995). Eventually, the initial theories will be expanded or revised altogether.

The activities in the generic model were developed based on the most frequently used terms from various models and frameworks. I mapped the codes found in the interview scripts with the generic model to ensure appropriate terms were used to name and describe the activities in the final model. The generic model has helped to guide the process development and activities sequence in order to produce the knowledge management process model for healthcare organizations.

To achieve data saturation, I continued coding interviews in this manner until I could not ascertain any more distinct, shared pattern among informants and when there was enough information to replicate the study (Fusch & Ness, 2015). The main outcome of the analysis is a process model that shows how doctors and nurses identify and apply their knowledge in healthcare organizations. After all the data were analyzed and the themes identified, they were described in writing. Following that I presented the findings to the co-supervisor to review the results and suggest recommendations.

# CHAPTER 4: RESULTS

This chapter discusses the finding of this study. First, the overview of the findings is provided. Second, the knowledge management process model for healthcare organizations is presented and discussed in detail.

## 4.1 Overview of The Findings

Although two hospitals were studied, I combined the data into a single analysis because the analysis indicates that doctors and nurses from the two hospitals display similar patterns on their clinical practices. The only difference is in the intensity of practicing the knowledge management activities. For example, majority of the doctors from Case II are more active in doing research because they are pursuing postgraduate studies.

Doctors and nurses were chosen to provide inputs for this study mainly because they are heavily involved in direct patient care as well as provide leadership in clinical practices. Their clinical practices are examples of decision-making and knowledge utilization situations in healthcare organizations. The clinical practices can be identified as follows;

i. Initial assessment at triage counter by triage nurses to prioritize the patients based on their conditions when they arrive at the facility (clinic).
ii. Second assessment will be conducted by nurses to examine the patients, retrieving patient's medical history and deciding the needs to conduct laboratory tests for further investigation.
iii. Doctors will do further assessment on patients and synthesize information and lab test results prior to diagnosis and propose treatment plan.

iv. At the final stage of providing care to patients, doctors will decide on patient's dispositions.

v. Doctors and nurses communicate their clinical decisions and experiences among colleagues during clinical practice or at the educational session such as Continuing Medical Education (CME).

Based on these practices, a knowledge management process model for clinical work environment was formed. Figure 4.1 depicts the process model and the linkages among the activities. According to this model, knowledge management model in clinical work comprises of the following activities;

i. Identifying the knowledge that they need
ii. Knowing the various sources to discover the knowledge
iii. Acquiring the knowledge from the identified sources
iv. Gathering the acquired knowledge
v. Analyzing the gathered knowledge
vi. Organizing the analyzed knowledge
vii. Capturing the organized knowledge
viii. Disseminating/communicating knowledge to others
ix. Applying/experimenting knowledge during clinical practice
x. Evaluating outcome/result from previous process

Each of these activities will be discussed in detail in the following sections. Besides the activities, it is also important to note the iterative processes shown in this model. There are three stages in this model that display the iterative processes, as follows;

i. Identifying, discovering and acquiring
ii. Gathering and analyzing

iii. Organizing and capturing

This iterative process shows a cycle of operations before achieving the desired result or outcome. For example, in order to acquire information in solving clinical problem, doctors will identify the required information and choose the possible sources to search for (discover) the information. Once, the information is found but deemed to be irrelevant or additional information is required, doctors will again repeat the activity of identifying the information needed until the desired information fulfilled the needs.

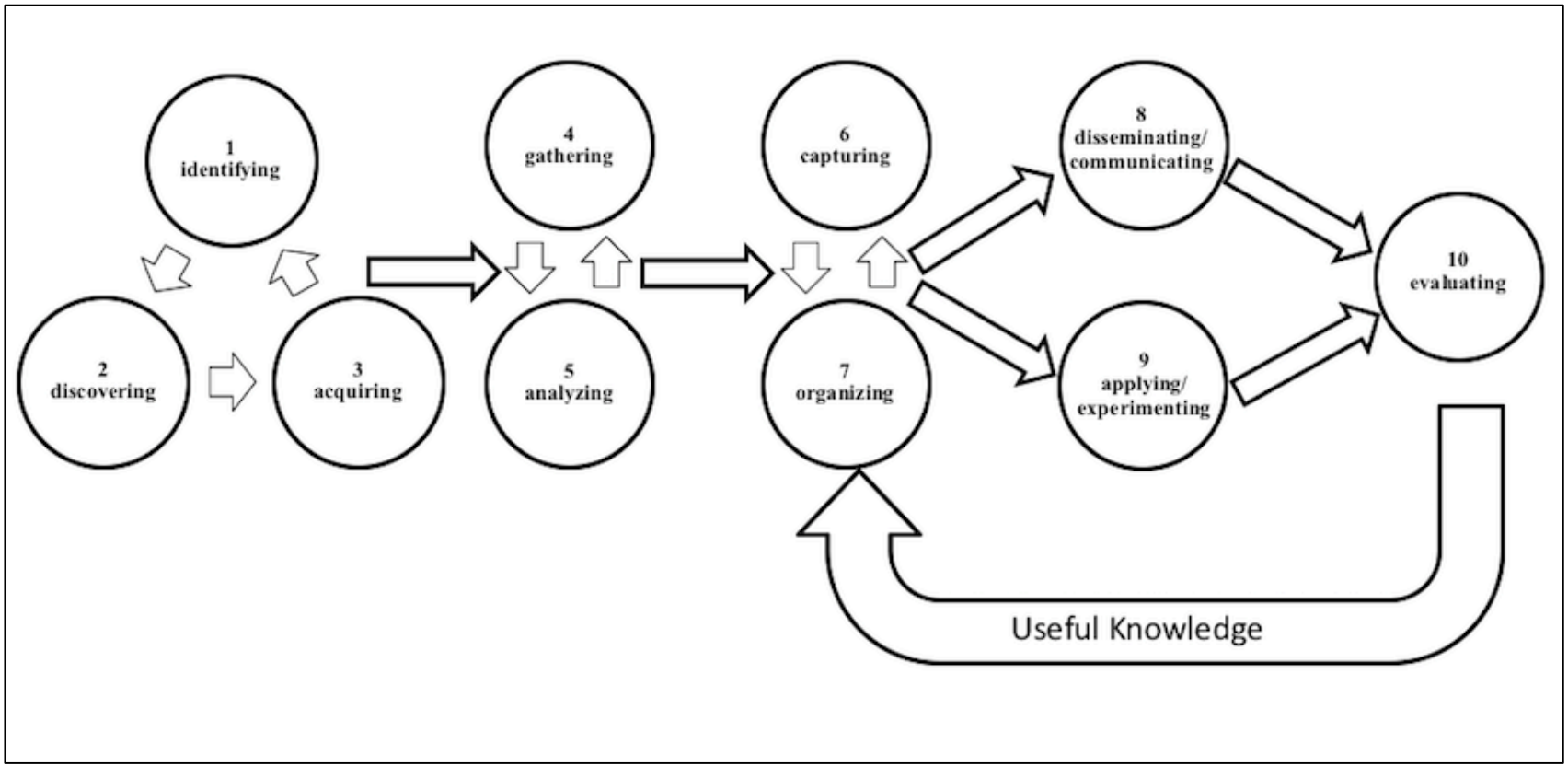



**Figure 4.1:** Knowledge Management Process Model

## 4.2 Knowledge Management Process Model

Building on Nag and Gioia's (2012) model, the knowledge management process model in this study consists of ten activities: identifying, discovering, acquiring, gathering, analyzing, organizing, capturing, disseminating/communicating, applying/experimenting and evaluating.

### 4.2.1 Identifying Knowledge/Information

In the first activity, doctors and nurses will indicate what knowledge/information is involved in order to perform their clinical care process such as assessment, diagnosis, treatment, monitoring, prognosis and patient's disposition. This study found four types of knowledge/information that was commonly involved in clinical work environment; (i) personal knowledge and competency, (ii) patients' experience of illness and health condition, (iii) clinical evidence and practice guideline and (iv) technology know-how.

#### 4.2.1.1 Personal Knowledge and Competency

Doctors and nurses are aware that their profession requires strong knowledge and competency in order to provide care for their patients. They displayed a clear pattern in how they understood and evaluated the role of knowledge in their day-to-day work. For example, most doctors believed that their ability and competency in diagnosing were critical in placing the patient between life and death. Therefore, doctors must keep their knowledge and skills up-to-date by engaging in lifelong learning. This has long been recognized by doctors as a responsibility integral to medical professionalism which underpins the relationship between themselves and the public and which helps to maintain trust. According to one of the doctors:

*"As doctors, we must keep our knowledge and skills up-to-date throughout our working life. We should be familiar with relevant guidelines and developments that affect our work. We should regularly take part in seminars, medical courses and training that maintain and further develop our competence and performance in treating our patients. Furthermore, we*

*must keep up-to-date with and adhere to, the laws and codes of practice relevant to our work. Our viewpoints about patients' needs especially those with chronic disorders are very important to ensure we can cure diseases and save lives."(D101, Case I)*

Having a strong belief about the importance of their personal knowledge as well as acquiring the most recent ones for their profession, it helps to develop the awareness of the need to continuously discover new knowledge or to update the existing ones. As one of the doctors claimed, there's a frequent update on drug prescription and practice guidelines that affect their work.

*"I must keep my professional knowledge and skills up to date by regularly taking part in activities that maintain and develop my competence and performance. For instance, read the latest evidence-based practice, because, there's a frequent update on drug prescriptions… For example, I used to prescribe drug A (as an example) for cough, then, we no longer can prescribe the same drug. This guideline and regulation are updated regularly." (D103, Case I)*

#### 4.2.1.2 Patients' Experience of Illness and Health Condition

Doctors and nurses see the importance of listening to the patient. Prior to assessment, doctors and nurses will spend time to talk to their patients and listen to what they say, their stories and experiences. From there, doctors will decide on the type of assessment required or order for laboratory test. Knowing patients' stories such as past medical history will provide some clues in order to make better judgment on their condition.

*"We must have the ability to listen to patient, what they say – what they don't say… How do they look when they come to visit…? Do they look pale? This will give some clues on their health condition." (D201, Case II)*

#### 4.2.1.3 Clinical Evidence and Practice Guideline

Knowing the clinical and medical evidence to support doctors' judgments is also important. There are many evidences-based practice a doctor can refer to such as Clinical Practice Guidelines (CPGs), online journals, books and clinical standard operating procedure. The main evidence in clinical practice is CPGs. CPGs are systematically developed statements that include recommendations to doctors and nurses on how to provide patient care in specific circumstances and diseases. For example, there are different sets of CPGs for cardiovascular disease such as management of heart failure, hypertension, atrial fibrillation and pulmonary arterial hypertension.

*"We have CPGs for every disease. It provides us with recommendations based on the best available evidence… The main idea is to reduce variation in practice among physicians. Ultimately, the aim is to deliver the best health care possible by improving our care." (D105, Case I)*

#### 4.2.1.4 Technology Know-How

Most doctors and nurses whom I interviewed agreed that technology know-how is important to facilitate the clinical process. This study found that doctors and nurses are adopting IT/IS for clinical purposes. They believe that utilizing IT/IS in inputting clinical data, communicating with colleagues and visiting professional resources will lead to advance patient care and help smoothen the process. For example, doctors and nurses use mobile and non-mobile devices including smartphones and desktop/laptops throughout their workday to access hospital information system, download CPGs and access online resources to find for more information. The doctors and nurses who emphasized the importance of technology know-how, commented:

*"I think it is necessary for doctors and nurses to know how to use … at least, the computer. That is where we can access numerous information required in providing care to our patients." (D107, Case I)*

*"Our hospital has implemented electronic medical record. Patient data resides in the system. Like it or not, we have to keep ourselves updated with the latest practice …. to learn how to use the computer (in order to access the system)." (N101, Case I)*

### 4.2.2 Discovering Knowledge/Information

Once the required knowledge is identified, the next step is to discover them. Discovering in this context means finding and locating the required knowledge/information. This study found common techniques practiced by the doctors and nurses in searching for personal knowledge, patient experience, clinical evidence and guideline as well as the know-how to use IT/IS in their profession.

#### 4.2.2.1 Searching for Personal Knowledge

Doctors and nurses discover new knowledge or update the existing ones through medical school, seminars, continuing medical/nurse education, research and development, clinical practice and online medical reference sites. Doctors and nurses' profession builds on the basis of education and experience throughout their professional careers. One of the doctors quoted:

*"The changing nature of knowledge requires us to bring our know-how to date. It is very important to search for the latest information especially the diagnosis made by doctors will place a patient between life and death." (D203, Case II)*

The discovering of knowledge activity among doctors and nurses has started long before they started practicing. Both doctors and nurses completed formal training at a medical school and trained to work in actual environment during their period of studies. They are also encouraged to pursue their studies to the next level. For example, after completing at least a four-year bachelor's degree, a doctor can pursue advanced education in a medical or surgical specialty. By doing so, doctors and nurses promote the development of their personal knowledge.

Besides getting formal education from medical school, the doctors and nurses are actively attending seminars to broaden and deepen their medical knowledge. They normally attend seminars organized by external parties for at least three to four times per year. This is when they discover the latest knowledge in their field of work. Internally, the hospitals practice to conduct Continuing Medical Education (CME) and Continuing Nursing Education (CNE) on a monthly basis for doctors and nurses respectively. These are the platforms where doctors or nurses can gain new knowledge and lessons learned from peers' experience. This activity is exemplified by the following observations:

*"There are frequent updates on clinical evidences, medications and prescription drug information. Attending seminars, medical courses and training will keep us updated on the latest news." (D205, Case II)*

*"After we come back from external seminars, we are required to present the knowledge and information in CNE (Continuing Nursing Education). Since not everybody has the chance to attend the external seminar, this is when they can also benefit from the seminars that I attended."(N201, Case II)*

Conducting research is another way to discover new knowledge and evidence-based practice. The organizations encouraged every medical practitioner to contribute to the generation of evidence by conducting research. Majority of the doctors involved in this study demonstrated a fairly good knowledge and positive attitude toward research. For the nurses, although they rarely conduct their own research, they always assist the lead researcher to collect clinical data or conduct clinical trials. When asked to describe the importance of conducting research as part of discovering new knowledge, the doctors said:

*"It is the duty of every doctor to care for his patients and provide the best available treatment. In order to be able to provide the best available treatment… or what we called evidence-based medicine, we need to conduct clinical research."(D207, Case II)*

*"Research does not only improve medical knowledge, but also keeps us (doctors) in touch with changes in our field. For me, evidence of research is a must to ensuring that patients are given the best possible care, in the most effective and efficient manner."(D109, Case I)*

Online medical reference sites are among the popular sources used by doctors and nurses to search for knowledge and information. Doctors that I interviewed are very active in accessing online references such as UptoDate, PubMed, Medscape, Webmd, BMJ and Medline. They access the medical references to support their clinical decision making, research work and to keep abreast with latest trends of medical evidence. These online references have designed specific search engines that are fully dedicated to providing medical workers with all the resource materials they need by publishing academic research, providing professional development solutions and creating clinical decision support tools. Most doctors access the references from their smartphone as these are available in the form of mobile apps whereas majority of the nurses claimed they prefer to use office or personal computer.

*"Besides CPGs (Clinical Practice Guidelines), I normally access UpToDate… It has wide coverage of medical evidence." (D102, Case I)*

*"These online resources are very helpful. I can access them through my mobile quickly during my consultation with patients."(D202, Case II)*

*"Since now I'm conducting research for my master's final year project, I regularly access academic journals from PubMed and BMJ. There are many evidence-based medicine related research... It helps not just my project but also my decision making during clinic hours." (D204, Case II)*

*"I access online journals to look for more information about the topic that I'm required to present for CNE. I either do it after clinic hours at work or at home." (N203, Case II)*


**Figure 4.2:** Samples of Online Medical Reference Sites

In clinical work environment, doctors regularly interact with peers and nurses to frame issues, brainstorm, validate and share information as well as make decisions, all of which contribute to learning in practice, enhancing professional practice and professional judgment. This situation represents communities of practice. Clinical practice is another platform for doctors and nurses to discover new knowledge that others have gained from their personal clinical experience. This activity is reflected in the following observation:

*"Our hospital is promoting communities of practice among the workers as a means of generating and sharing knowledge and improving performance. We (doctors and nurses) do not work solo. We always communicate the potential decision to our peers before we carry out. It's important to work hand-in-hand with others. Nurses are the first to examine the patient and listen the patient's story. So, a good communication with them will help the process to make decision. And they need the doctor to eventually provide the diagnosis and propose a treatment plan. I see communities of practice as a tool to enhance knowledge and improve practice." (D208, Case II*)

*"We are a community of practice. We make a collective decision and always work together with peers in order to provide care to our patients. I don't see myself working solo without the help of others especially nurses. Their role is important to screen and filter cases and highlight the important notes about the patient. This will help us (doctor) to make judgment in a timely manner before attending to another patient. We (doctors and nurses) are the backbone of our health care system because the vast majority of diagnosis and patient care is performed by doctors and nurses." (D112, Case I)*

#### 4.2.2.2 Searching for Patient's Experience and Medical Information

First, patient's information and medical information from past visits are available in both electronic or hardcopy document. The hospitals that I studied have implemented electronic medical record to store and manage their patients' information. Doctors and nurses are able to access to the system at the point of care. Every consultation room and selected counters are equipped with a desktop.

Doctors and nurses must also encourage patients to speak up about their experience of illness and their current health situation. This would enable doctors and nurses to discover more information that can facilitate a more accurate diagnosis. Nurses normally ask detailed and direct questions, whereas doctors will further ask probing questions, or more open-ended questions in order to get some insights of patients' condition. They will listen carefully to the patient's answers and ask more follow-up questions when the answers are vague.

Besides talking to the patient, doctors and nurses use other methods to get more information and data to assess the patient's condition. Firstly, they will check for vital signs including taking blood pressure reading, checking heart rate and respiratory rate. Secondly, visual and physical exams will be conducted to review a patient's appearance for signs of any potential conditions. Finally, to complete the assessment, doctors or nurses will order for laboratory tests such as blood test, urine test, cholesterol test among others. By collecting information from various methods and stories from patients could help promote improved outcomes. This activity is exemplified by the following observation:

*"Patients nowadays always voice their concerns and are active in asking questions. They don't come empty-handed but with a lot of information regarding their health condition. I personally think that this is an advantage to the doctors. We don't have to struggle to get the stories from them. In fact, they know what are they allergic to…. what they can or cannot take… or maybe their preference. In a way, it's easy to make a decision." (D210, Case II)*

#### 4.2.2.3 Searching for Clinical Evidence and Guideline

Clinical evidence and guideline are stored digitally and can be downloaded in PDF format. For example, doctors and nurses can access and download CPGs from the Academy of Medicine of Malaysia's website (http://www.acadmed.org.my/index.cfm?&menuid=67) or Ministry of Health's portal (http://www.moh.gov.my/cpgs). Doctors usually carry them in their smartphone for ease of access at the point of care. Apart from this guideline, doctors and nurses also use other online medical reference sites such as UpToDate (http://www.uptodate.com/home) and PubMed (http://www.ncbi.nlm.nih.gov/pubmed).

#### 4.2.2.4 Searching for Know-How to Use IT/IS

Doctors and nurses are also concerned about the know-how to use technology-mediated device such as desktop/laptop, tablet and smartphone. They know how to operate the devices based on personal experiences or product trainings. When the electronic medical record (EMR) was implemented in their organizations, they would have attended the training to learn how to use the system or what they learnt from their peers during clinical practice. This activity is exemplified by the following observations:

*"The smartphone is the device I have with me all day… and I use it for both personal and work matters. I can quickly learn on my own on how to use it." (D114, Case I)*

*"Yes, the IT team has organized training when EMR was implemented. But, I did not have the chance to attend due hectic schedule. I learnt on my own… or I can ask my colleagues to show me how to use certain functions in the system." (D212, Case II)*

### 4.2.3 Acquiring Knowledge

The discovery activity will lead to knowledge acquisition where doctors and nurses extract information from the identified sources to enhance their knowledge. They will validate whether the extracted information is the information they need. If there is any missing information, the process will go back to identifying then discovering knowledge. Acquisition of knowledge from the identified sources by doctors and nurses will lead to enhancing personal knowledge, skill and competency; improved understanding of patient's health condition; ability to manage different clinical problems and situations; as well as obtaining more evidence to support judgments and decisions.

#### 4.2.3.1 Enhanced Personal Knowledge and Competency

Doctors and nurses will acquire personal knowledge by building up the skill sets required for their professions from their education in medical school, clinical practice and the latest knowledge gained by attending seminars or conducting research. Some key skills that will help their role include strong medical skills, dexterity to perform procedures, problem-solving ability, attention to detail and interpersonal skills. As their experience develops, they will identify and build a set of cases with identifiable patterns and typical outcomes that can provide valuable background knowledge when dealing with any given situation. For example, they would be able to recognize disease pattern based on their past experience managing a similar or the same disease.

*"In straightforward or common situations, I often make such decisions informally; For example, during a flu epidemic, a healthy adult who has had fever, aches and harsh cough for 2 days is likely to be recognized as another case of influenza." (D116, Case I)*

*"For a complex situation, we have to make good judgment…. beyond the scope of protocols and guidelines. So, we must be able to recognize when to apply protocols…. recognize changing circumstances and adapt them to the situation at hand." (D206, Case II)*

#### 4.2.3.2 Better Understanding of Patient's Health Condition

Doctors and nurses will be able to acquire more knowledge and information by actively engaging listening to patients. Patients will share their story, current conditions, experiences and preferences that help to capture and gather patient's information before analyzing the results. Laboratory test results will indicate some vital signs of a patient's health condition. Other than that, patient information can also be acquired from the hospital's electronic medical record (EMR). EMR contains all of a patient's medical history that will be used by doctors and nurses for diagnosis and treatment.

*"I normally start with talking to the patient before assessment. Patient's story is important because they know their body better. On top of that, I accessed lab test results and medical record from our electronic medical record system. It aids the process of deciding what to do." (D104, Case I)*

#### 4.2.3.3 Evidence-Based Practice

There are many ways doctors and nurses can acquire evidence for clinical purposes. Some of the evidences that need to be acquired are; online medical references, Clinical Practice Guidelines (CPGs) as well as lab and radiology test results. Online medical references such as UpToDate® is an evidence-based clinical decision support resource to help healthcare practitioners in making the right decisions at the point of care. Doctors and nurses are able to acquire medical encyclopedia articles and images for diseases, symptoms, tests and treatments.

From the CPGs, doctors and nurses are able to acquire the know-how to manage and make decisions for specific clinical circumstances based on the best available evidence at the time of development. CPGs contain, among others, introduction of the disease, definition and pathogenesis, pre- and in-hospital management, risk management, checklists for follow-up visit and clinical audit indicators. Other than that, both hospitals in my study have their own standard operating procedure as a reference for medical workers to perform their clinical routines. These activities are exemplified by the following observations:

*"For uncommon diseases, we have to search information worldwide. For example, some foreign patients were infected by a disease originating from their country. It usually takes a lot of work to identify the information retrieved from multiple external sources. And if I don't know about something, I do not hesitate to seek advice." (D209, Case II)*

*"The changing nature of knowledge requires us to bring our know-how to date. It is very important to search for the latest information especially the diagnosis made by doctors will place a patient between life and death." (D211, Case II)*

### 4.2.4 Gathering Knowledge/Information

In clinical care process, it is important to gather the necessary information to make decision and outcome. The information can be gathered through direct observations, examinations, listening to the patient's story and their concerns, accessing patient records from EMR or hardcopy report and clinical lab test results.

#### 4.2.4.1 Patient's Information and Laboratory Test Results

Nurses will take charge to collect a patient's information and medical history, perform initial assessment and order for clinical lab tests such as blood tests, urine tests and swab tests. This information will then be presented to doctors for further assessment and judgments. At this stage, doctors and nurses will also gather opinions from peers and seniors. Some of them may already have the experience of managing the same situation which can be shared and help improve the decision making process.

#### 4.2.4.2 Information from Evidence-Based Guidelines

Doctors will look for evidence best practice guidelines such as Clinical Practice Guidelines (CPGs) together with available information on Quick Reference (QR), Training Manual (TM) as well as Patient Information Leaflet (PIL). These guidelines offer concise instructions on which diagnostic or screening tests to order, how to provide medical or surgical services, how long patients should stay in hospital, or other details of clinical practice.

*"I normally start with talking to the patient before assessment. Patient's story is important because they know their body better. On top of that, I accessed lab test results and medical record from our electronic medical record system. It aids the process of deciding what to do." (D106, Case I)*

*"Nurse will start with the assessment and provide information to doctors before they diagnose the patient." (N204, Case II)*

*"There are wide variety of online journals and references which I can utilize to research about the patient's case that I'm handling… Sometimes there is information overloaded. So, I will filter them." (D117, Case I)*

#### 4.2.4.3 Opinions from Team Members

This study found that doctors do ask for a second opinion from seniors and peers in the following situations:

(i) Lack of clinical experience and handling the problem for the first time

(ii) Encounter with a serious or life-threatening disease

(iii) Risky treatment

(iv) Unclear diagnosis with the treatment being experimental in nature

*"As a junior doctor, I may lack clinical experience and I need someone to verify my decision I intend to make before carrying it out. It's good to have peers and senior doctors during clinical hours – I can ask them questions when in doubt." (D108, Case I)*

*"I do ask for second opinion from others when the case is very serious and life-threatening. Providing random treatment can be very risky. In some cases, we acquire opinions from external people… such as specialists from other hospitals. We will try our very best to reduce negative consequences." (D110, Case I)*

### 4.2.5 Analyzing Knowledge/Information

Once the knowledge and information are acquired, doctors and nurses will systematically gather the relevant ones before analyzing them. Analysis activity involves reviewing and examining data. Based on the analyzed data, doctors will make judgments of what they think could be happening, search for patterns and assess whether there are any additional information needed. The doctors and nurses practice relies on previous experience for a focused analysis of problems and solutions with individual patient modification in order to meet the desired outcomes. At this stage, the doctors play an important role as the diagnosis of patients conditions take place. They must have the ability to combine exact and interpreted information to their existing knowledge base in order to make accurate decisions. The following descriptions were captured from a doctor when asked to give an example of analysis in clinical process:

*"Let's take stool analysis as an example. A stool sample is collected and then sent to the laboratory. Laboratory analysis includes microscopic examination, chemical tests and microbiologic tests. The stool will be checked for color, consistency, amount, shape, odor and the presence of mucus. The pH of the stool also may be measured. A stool culture is done to find out if bacteria may be causing an infection. This analysis is conducted to help diagnose certain conditions affecting the digestive tract such as from parasites, viruses, or bacteria. When the diagnosis is made known, we propose treatment plan such as prescribing medicines depending on which kind of stool analysis we have."(D112, Case I)*

### 4.2.6 Capturing Knowledge/Information

After analyzing, useful knowledge/information will be recorded. The outcomes from solving the clinical problems are beneficial for future use and reference. Therefore, doctors and nurses claimed it is important to remember how to resolve the problem. This is when the doctors and nurses putting the information in a form that can be used by them or read by a person or computer. For instance, nurses are able to capture the procedure of abdominal examination based on complaints such as pain, distension, enlarged organs, or masses from practical session. This activity is exemplified in the following quotes:

*"I know how to conduct some clinical protocols from practical session. For example, to examine patient's abdomen requires a few steps starting from observation and then sequentially performing auscultation, palpation and percussion." (N206, Case II)*

*"I take note of important information or observation from my clinical practice when you find a similar case again in the near future, you will already know how to solve it." (N209, Case II)*

*"Well, most of the times I have no chance to systematically keep notes from my clinical experience… But, if there's anything new, I am sure it is recorded in my personal memory. It's a natural process to me." (D201, Case II)*

The useful knowledge/information is mainly recorded in individual memory and the details such as patient's information, medical report, physical examination result and final diagnosis will be recorded in a hard copy form or electronic medical record.

### 4.2.7 Organizing Knowledge

Once the important knowledge/information is captured, they will be organized accordingly. At this stage, the information that comes from various sources will be restructured. The study found that knowledge in healthcare organization exists in individual experts, databases, documented organizational procedures such as Clinical Practice Guidelines (CPGs) and standard operating procedures (SOPs).

#### 4.2.7.1 Individual Experts

In this context, individual experts are referred to doctors and nurses. The analysis suggests that in clinical work environment, knowledge mainly possessed by individuals, who are the clinicians (doctors and nurses). They are the main actors to capture knowledge that includes collecting and organizing the documents in a meaningful manner for easy access and retrieval of knowledge content. Each doctor and nurse captures and organizes knowledge in their own way and which is individually embedded. As observed before, knowledge is stored in documents; there are some records in notebooks, for example, a record of personal experience. These activities are exemplified by the following observations:

*"I gained my clinical knowledge from experiences. I normally write notes in my notebook and if necessary compile my notes in my PC." (D101, Case I)*

*"I keep my notes in my smartphone. I carry my phone all the time so it's easy to access". (D203, Case II)*

*"After many years of practicing, we know what we should do…. We know how to handle situations without referring to other sources. We just know how to do it." (N109, Case I)*

#### 4.2.7.2 Patient Information and Medical History Record

Patient's information and medical history can be found in the electronic database or in the form of hardcopy documents. Having electronic medical records in the hospitals, doctors and nurses are responsible to key-in information, write medical reports and set the next appointment date into the system. However, there are other information which are still kept in a hardcopy form such as X-ray film, some medical reports, clinical and laboratory form as well as appointment book for patients to keep.

*"Well I prefer to view the X-ray from the film itself as compared to on the screen. It's still important for patients to keep the film in case they need to bring it to another hospital for reference. The system in our hospital is not integrated with other hospitals." (D208, Case II)*

*"I still rely on hardcopy records. At least I can be assured that the information given is from the authorized person (doctor or colleagues)." (N111, Case I)*

#### 4.2.7.3 Clinical Guidelines and Standard Operating Procedures

CPGs are developed by a group of people comprising of a chairperson, secretary, expert panel members and external reviewers. They can be accessed from authorized websites. Figure 4.3 shows the list of CPGs which can be downloaded from the Academy of Medicine of Malaysia website.

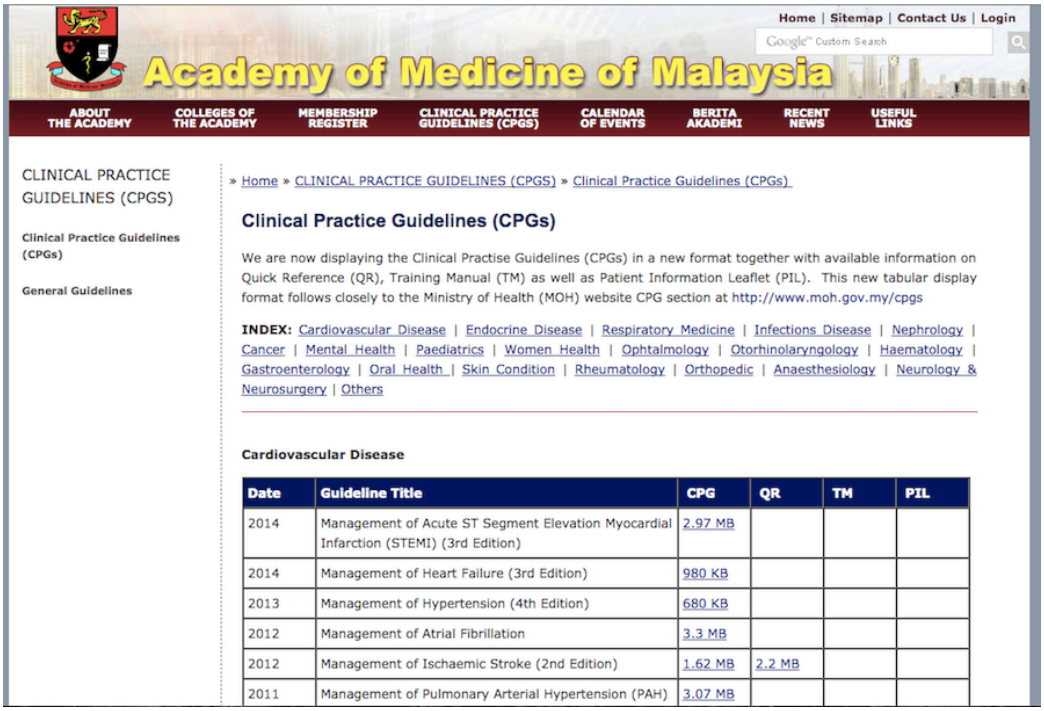



**Figure 4.3:** List of CPGs from the Academy of Medicine of Malaysia Website

Some standard operating procedures (SOPs) for clinical practice are available on the hospital's websites, printed and posted on the clinic's wall and circulated through email. For example, there are SOPs for patients who are brought in an unconscious state; nurses at triage counter have SOPs in prioritizing the patient; and laboratory technicians have SOPs for handling, testing and subsequently discarding body fluids obtained from patients.

### 4.2.8 Disseminating/Communicating

It has been found that doctors and nurses spread abroad their intellectual knowledge among colleagues. There are various tools which a doctor or nurse can use to disseminate information such as through informal chat using social media and instant messaging application and formal sessions like continuing medical/nurse education, meetings and email to disseminate detailed information and data to others and electronic news services from organization websites.

#### 4.2.8.1 Social Media and Instant Messaging Application

Majority of the doctors and nurses claimed using social media has become an integral part of their personal and working lives. This study found that doctors or nurses utilize social media to create awareness and educate the public. For example, they use their Facebook personal account to post health related information or articles. In that way, they help to spread the word to a much broader audience of people.

*"I have people come up to me and thank me for posting this particular article." (D115, Case I)*

*"I actively use social media to post health related information. I look at it as a valuable way to spread health information, but I set a guideline to separate my personal and professional online identities to maintain professional boundaries." (D113, Case I)*


**Figure 4.4:** A Doctor Shared A Post From Ministry Of Health's Facebook Account

Doctors and nurses also utilize instant messaging application such as WhatsApp to disseminate information among their peers. To them, WhatsApp is a great tool with the ability to send and receive a variety of media, such as images, videos and audio messages.

*"I find the app as handy and fast. I can send information to others in any forms (image, text or video). And they can receive the information real-time." (D212, Case II)*

*"During the clinical hours, not many of us have the chance to access our email. So, WhatsApp is the alternative to convey message or send information. Especially, most of us carry our smartphones all day long." (D210, Case II)*

#### 4.2.8.2 Continuing Medical/Nurse Education

Healthcare organizations have been practicing to conduct educational activity such as Continuing Medical Education (CME) for doctors or Continuing Nurse Education (CNE) for nurses to develop and enhance the knowledge, skills and professional performance among doctors and nurses. This activity has become a monthly activity where doctors and nurses who are experts in their individual clinical areas will be nominated to present a topic to their colleagues. The topic could be something that they learned from recent seminar or workshop they have attended or from their clinical practice.

*"It's good that we have been practicing to conduct CME and CNE in our hospital. It's a platform where the person who is expert in certain areas to educate others. We normally share our clinical experience and knowledge that we gained from our research or after attending seminars." (D104, Case I)*

*"We work in a team. Doctors and nurses work together to provide care to patients. Senior staff and doctors are always there to guide me and share knowledge. It is common for clinicians to conduct Continuing Medical Education (CME) on a monthly basis." (D207,*

*Case II)*

*"When we come back from workshop or seminar, we have to conduct a presentation to share the knowledge with others."(D113, Case I)*

#### 4.2.8.3 Clinical Practice

In order to make any clinical decision, it does not only involve doctors and nurses, instead patients and their family members are also involved in the process as well. This study found that doctors and nurses communicate the possible course of action with others such as colleagues, patients and patients' family members before carrying out any decision. They practice shared or negotiated decision-making when providing care to the patients. They claimed communication is essential to ensure everyone involved is in the know about what is going on and be clear about their role and responsibility. Furthermore, patients nowadays no longer play a passive role, rather they and their family need to be well informed about the diagnosis and treatment options. This combination is reflected in the following observations:

*"We always share new knowledge among our team members. We talk about patient cases formally or informally. We have group discussion on Whatsapp or use Facebook to share information." (N104, Case I)*

*"We talk about our patients' case during the meeting, lunch time … and over the weekend too. It seems like we don't have other things to talk about (laugh)."(D204, Case II)*

*"I work with my team closely to solve patients matters."(N105, Case I)*

*"We are practicing shared decision making. That means, we take input from colleagues, patients and their family members before making any decisions. In the past, patients played a passive role but not now."(D116, Case I)*

*"I also educate the patient's care givers so they will know how to clean the wound at home."(N118, Case I)*

*"The family must be well-informed about appropriate diet and exercise the patient must do at home."(N212, Case II)*

#### 4.2.8.4 Email and Meeting

On a daily basis, doctors and nurses use email to communicate and disseminate information. Majority of the doctors and nurses agreed that email is a quick and efficient method for sharing information between colleagues or receiving announcements from management. In addition, they claimed that email permits both parties to read and respond when it's convenient and it also allows supporting documents to be attached, if necessary.

*"I don't have plenty of time to check email during clinic hours so I normally access my email when it's convenient. Usually, no urgent information is sent through email… they will right away call us if there's any urgency. So, I have no rush to check my mail." (D102, Case I)*

*"I check email for latest announcements from management." (N114, Case I)*

The hospitals under my study practiced to conduct monthly meetings with the staff. This keeps their staff up-to-date with the latest development and enforcement of new guidelines. Furthermore, the departmental meeting provides an opportunity to keep informed on what is going on and enables them to understand, appreciate and support each other's work especially doctors and nurses.

*"We conduct department meetings on a monthly basis. We us this opportunity to make announcements on latest developments or any new guidelines to be imposed. By doing so, we are able to seek opinion and input from departmental members. Other than that, each member can also voice out their concern on any matters related to their work." (D211, Case II)*

#### 4.2.8.5 Publication

Majority of the doctors claimed that the organizations are always encouraging them to obtain publications. There are many motives and reasons for doctors to publish their work such as the opportunity to voice-out important facts or information, provoke debate, share experiences, educate others and change practice. After the clinical practice, they normally write a case report, based on an unusual case or to remind others of an important message. They may come across a medical issue or a new development that they would like to write about. From there, the doctors might start writing for an educational article. Some examples of journals are Journal of Advanced Nursing, PLOS ONE, Asia-Pacific Journal of Public Health and Southeast Asian Journal of Tropical Medicine and Public Health.

### 4.2.9 Applying/Experimenting knowledge

At the clinical level, knowledge use is seen as a process through which clinicians formulate a solution in order to solve their day-to-day problems in providing patient care. They apply their knowledge to make judgments and priorities these judgments are based on the current patients, the situation and the environment. Eventually, deciding what to do and how to do it, deciding who might need to be informed and consulted. Throughout the interviews, a similar pattern emerged showing doctors or nurses, when faced with a problem; they will acquire and gather information in order to find a solution for a specific problem. To them, knowledge has a high value in solving problems in their practices as it helps to enrich

decisions and actions. When they apply and at the same time experiment where they can evaluate whether the outcome of the decision determined is the desired outcome that has been achieved, as represented in the following descriptions:

*"Every patient has a different reaction to medicine or treatment. We need to find out the most suitable treatment for them. When the patient comes back to us with better health condition after our treatment, we know that the treatment given is suitable for such cases." (D105, Case I)*

*"We are community of practice. It's all about applying and practicing knowledge in our day-to-day routine."(D114, Case I)*

*"Based on previous experience, I'm able to make better decision and faster."(N116, Case I)*

*"Most of the cases I encounter now, are considered common. Very occasionally I have new case that I do not know how to handle. I can solve my daily problem at work without difficulty."(N106, Case I)*

### 4.2.10 Evaluating Outcomes

Doctors and nurses are active decision makers who determine who needs what and when. Once a decision is made, evaluation must take place to ensure decision effectiveness. Based on the interviews, doctors and nurses practice to assess the significance or quality of outcomes derived from the previous activities i.e. clinical decisions. This activity is essential to ensure that the decision has been effective and helped to refine their existing knowledge.

As part of the evaluation process, doctors are responsible to administer a particular medical treatment given to patients. They have to balance the treatment's efficacy (that is,

how likely the treatment is to help the patient and by how much) against negative side effects (that is, how likely the treatment is to harm the patient and how badly). The idea is to ensure that they are making the best choice and avoiding negative consequences. It also helps to enhance practice delivery in the future. If the treatment plan is found effective, the knowledge will be captured and organized for future reference. However, if the action taken is deemed to be irrelevant and insufficient, they will then review, reflect and adapt the lessons learned.

*"We do evaluate the decisions made. Mistakes that we made in the past should become a lesson learned." (N207, Case II)*

*"We cannot afford fallacy decision making. Evaluating yesterday's decision will help us make a better one (decision) today." (N208, Case II)*

*"Evaluating clinical trials is important because properly conducted, randomized clinical trials are the best sources for determining the best available treatment." (N211, Case II)*

#### 4.2.11 IT Applications/Tools That Facilitate the Knowledge Management Activities

In previous sections, I have discussed on how doctors and nurses used IT in their practices. Table 4.1 summarizes the IT applications/tools that facilitate each knowledge management activity in healthcare organizations as well as the basic infrastructure.

**Table 4.1:** IT Applications/Tools That Facilitate the Knowledge Management Activities

<table>
<tr><th>Identifying</th><th>Discovering</th><th>Acquiring</th><th>Gathering</th><th>Analyzing</th><th>Capturing</th><th>Organizing</th><th>Disseminating</th><th>Applying</th><th>Evaluating</th></tr>
<tr><td colspan="4">Online medical references sites such as UptoDate, PubMed, Medscape etc.</td><td>Mobile/Computer applications</td><td colspan="2">Information repository</td><td>Social media sites</td><td rowspan="4">Clinical tool such as ultrasound machine and diagnostics instrument</td><td rowspan="4">Word spreadsheet to produce lesson learned report</td></tr>
<tr><td colspan="4">Electronic documents such as CPGs, SoPs, evidence-based guidelines etc.</td><td rowspan="3">Related software/tool to analyze data</td><td colspan="2">Electronic Database and Documents such as CPGs, SoPs, evidence-based guidelines etc.</td><td>Online medical references sites</td></tr>
<tr><td colspan="4">Electronic medical record / Hospital Information System</td><td colspan="2" rowspan="2"></td><td>Communication application such as Instant Messaging and E-mail</td></tr>
<tr><td>Presentation</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | software<br>Electronic documents | | |
| **Infrastructure** | | | | | |
| Desktop and laptop computers<br>Handheld devices<br>Servers<br>Network including Wi-fi | | | | | |

# CHAPTER 5: DISCUSSION

This chapter provides a discussion of the study. First, an emerging knowledge management process model is presented and discussed. It also provides the explanation on how this emerging model is generated. Second, comparison of the findings with previous studies on knowledge management process model is provided.

## 5.1 An emerging knowledge management process model

This emerging knowledge management process model is derived from the process model as discussed in the previous chapter. From the interviews, in vivo codes were developed by employing language used by the informants, followed by process codes (researcher-induced concept). The codes that were derived from first cycle coding (i.e. identifying, gathering, capturing, applying) led to the generation of the knowledge management process model as reported in the previous chapter. From there, emergent themes were identified by applying second cycle coding methods that enable the generation of an emerging model of knowledge management process (see Figure 5.1).

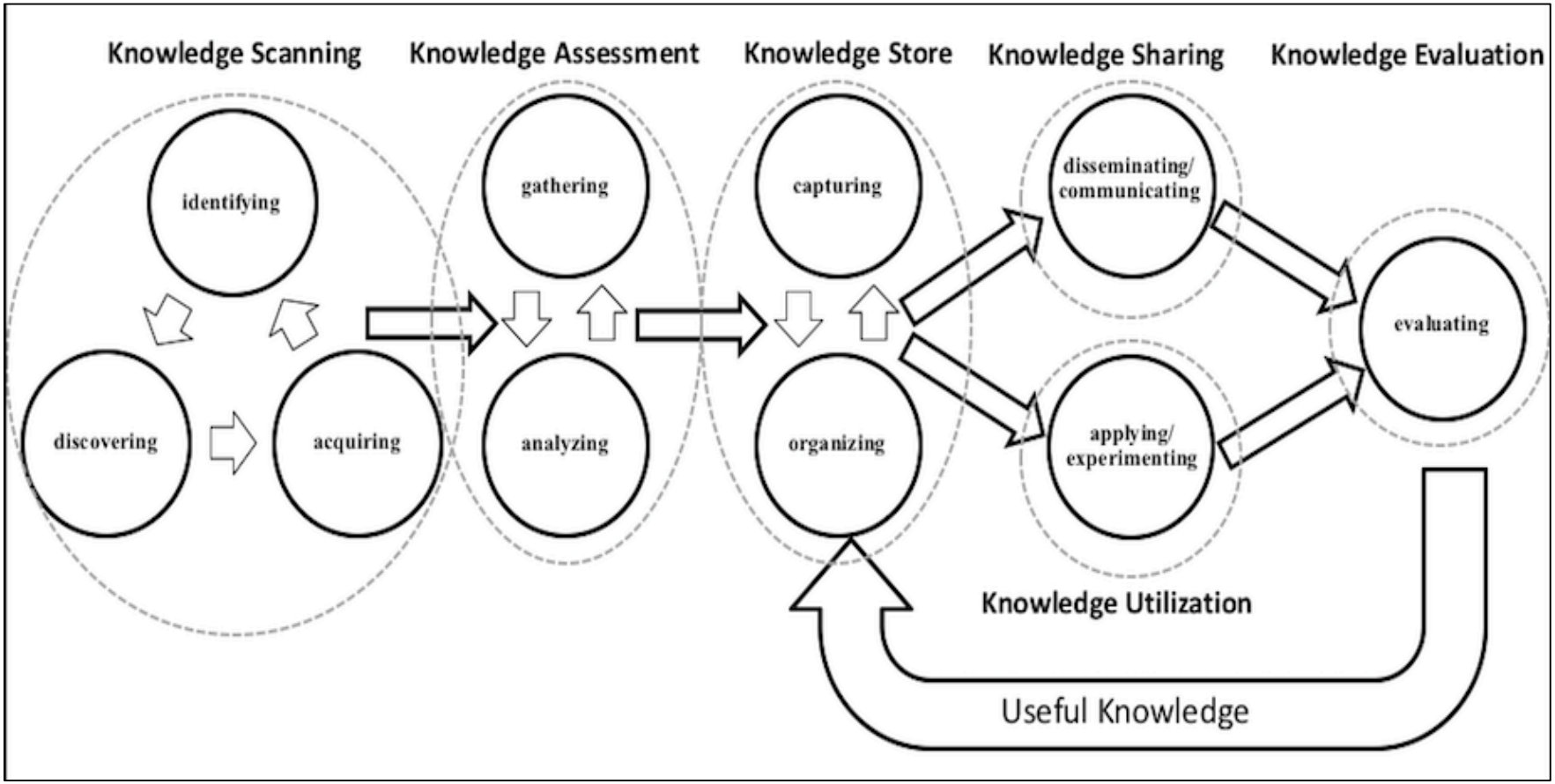



**Figure 5.1:** Generating An Emerging Knowledge Management Process Model

The emerging model developed in this study constitutes a framework for embedding knowledge management in clinical process and work environment. Figure 5.3 displays the emerging model that comprises of six elements; (i) knowledge scanning, (ii) knowledge assessment, (iii) knowledge store, (iv) knowledge sharing, (v) knowledge utilization and (vi) knowledge evaluation. To recap, the initial model that was adopted in this study, consists of three elements; (i) knowledge scheme, (ii) knowledge scanning and (iii) knowledge use (Nag & Gioia, 2012). As I conducted this study in healthcare organizations, four more elements were identified and added to the model; (i) knowledge assessment, (ii) knowledge store, (iii) knowledge sharing and (iv) knowledge evaluation. In general, this model is similar with the generic knowledge management model as presented in literature review chapter (see Figure 2.4). The generic knowledge management model consists of seven activities; creating, identifying, acquiring, storing, applying, sharing and assessing. However, this study's model has found and added five more activities; discovering, gathering, analyzing, capturing and organizing. The details of each element will be discussed separately in the following sections. Figure 5.2 shows the comparison between the study's models and other models.

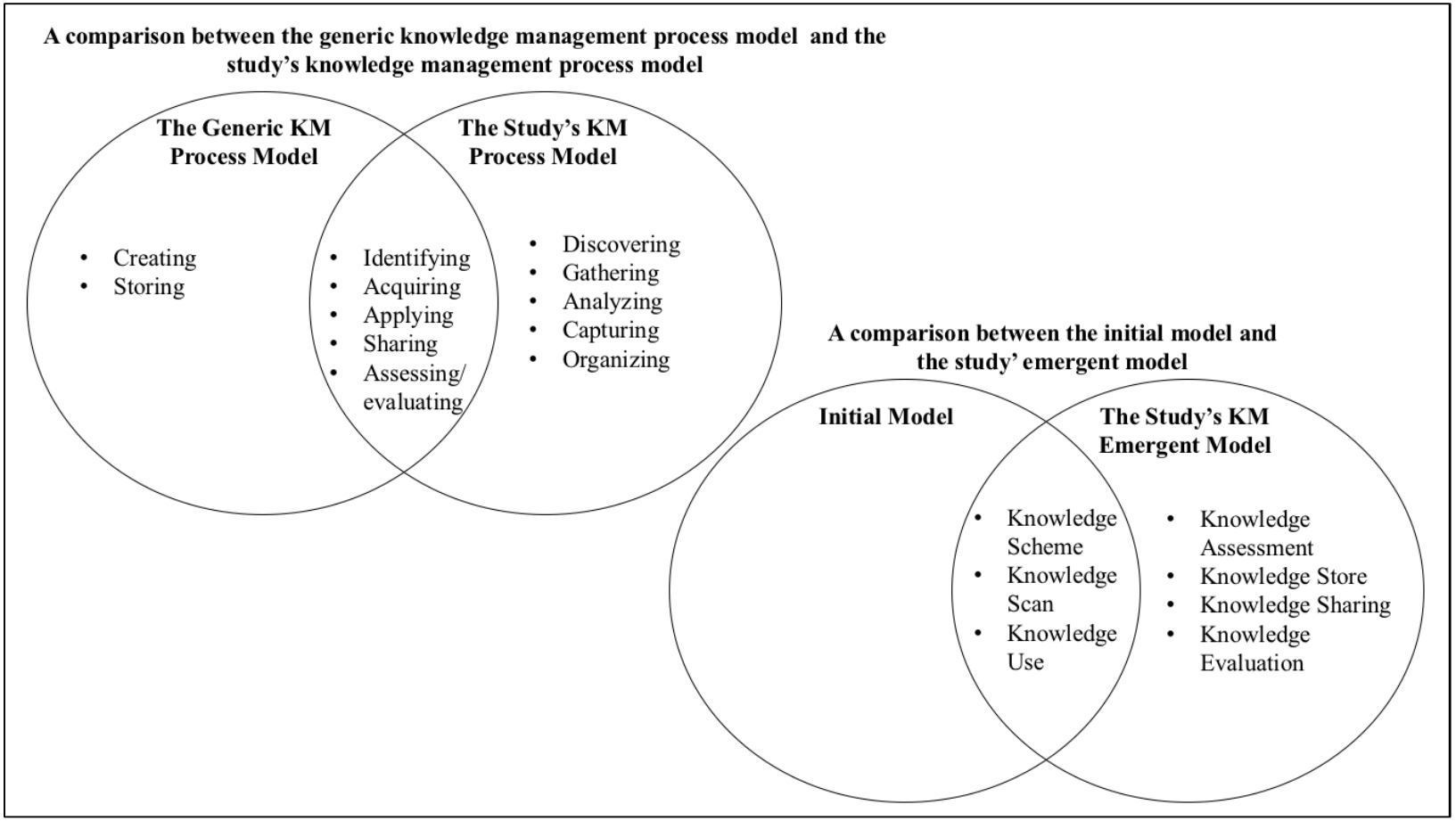



**Figure 5.2:** Comparison Between The Study's Models and Other Models

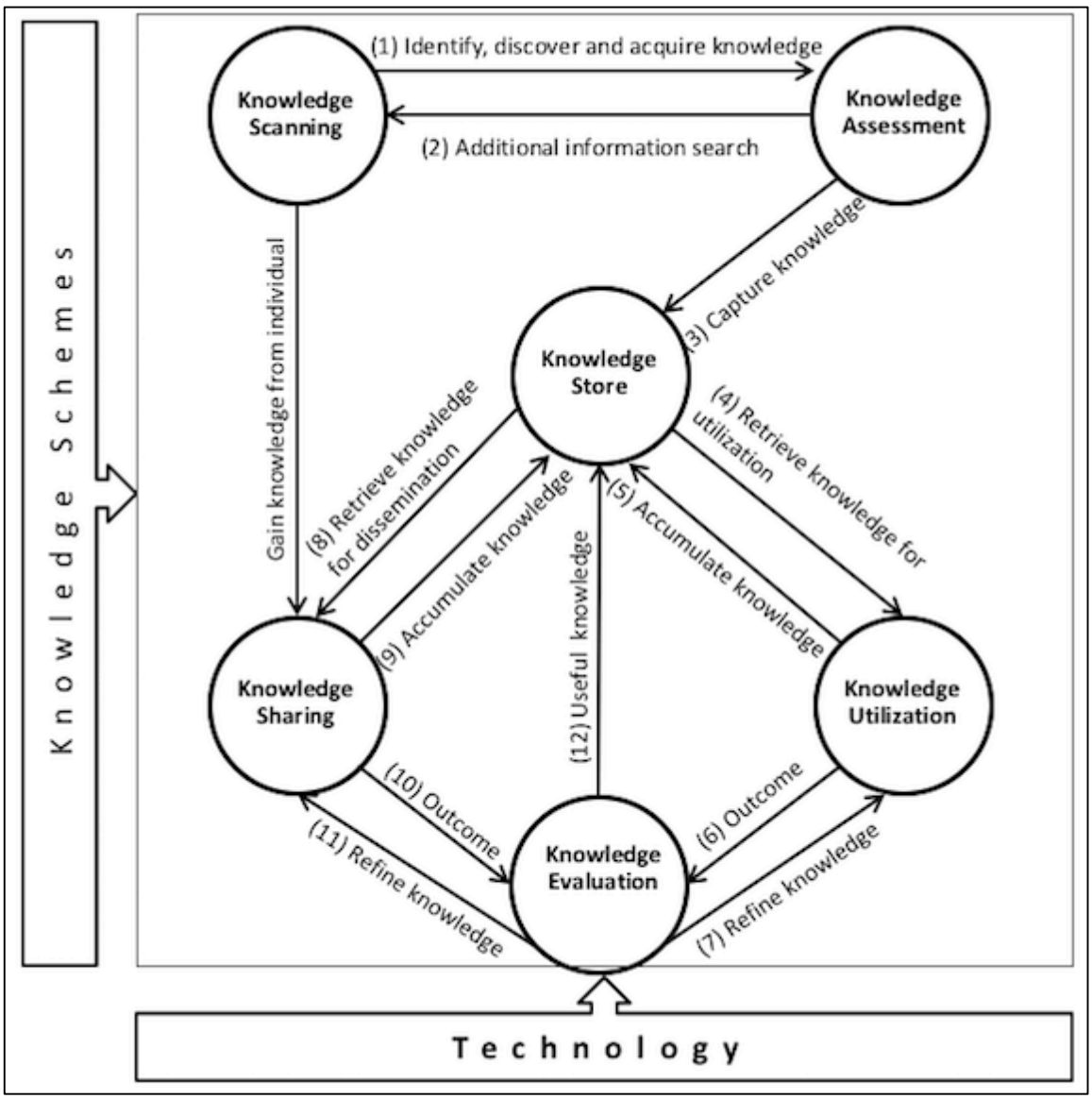



**Figure 5.3:** An Emerging Model of Knowledge Management Process In Healthcare Organization

### 5.1.1 Knowledge Scanning

Knowledge scanning can be referred to as the amount of time and effort the doctors and nurses invest in information seeking and acquiring knowledge. This element is consistent with the initial model adopted from Nag and Gioia (2012). In Nag and Gioia (2012)'s model, they suggested an expansion of the basic scanning notion into two distinct concepts, scanning intensity and scanning proactiveness. However, in my proposed model, knowledge scanning is derived from three activities namely identifying, discovering and acquiring. These activities are more similar with the findings from Abou-Zeid (2002), Robertson (2002), Lai and Chu (2002), Grant (2005), Wang and Ahmed (2005), Karadsheh et al. (2009) and Tuamsuk et al. (2013).

Similar with Tuamsuk et al. (2013)'s model, this study's emerging knowledge management model begins with knowledge identification followed by creation and acquisition. The similarity is that knowledge identification is regarded as the preliminary procedure in knowledge management in which an individual would have to set the objectives of knowledge application. In clinical work environment, doctors and nurses will first identify the knowledge required in providing care to patients before applying the knowledge in clinical process such as diagnosis, monitoring, treatment and prognosis.

The discovering activity reported in this study has many similarities with Karadsheh et al. (2009)'s model. This study's model identifies knowledge discovery as a process of locating precious knowledge that exists within the organization or external sources. The knowledge that is often useful for clinical processes are normally found in individual knowledge base, patient's experience and information, clinical guidelines and procedures as well as technology know-how. For example, doctors and nurses used to excavate the valuable

intellectual capital from database, documentation and the tacit of experts as part of the discovery process.

The acquiring activity also correlates with Davenport and Prusak (1998) and Sun and Hao (2006). In their models, this activity is illustrated as a process of obtaining the needed knowledge from sources such as buying and consulting, Research and Development (R&D), learning, self-creation and database holding indexes of external sources that can be important for the organization. Once the identified knowledge has been located, the doctors and nurses will start to extract the knowledge from the various sources.

However, contrary to Lai and Chu (2002), the scanning activity in this study is separated into three stages; identifying, discovering (locating information) and acquiring (extracting information) whereas in their studies, discovering and acquiring activities were combined as identifying. These activities should be seen as a distinct activity that requires particular action rather than a combination. This is because each activity involves particular action from the knowledge/information seeker.

The mode of identifying knowledge in this study is consistent with Grant (2005) where he claims that knowledge identification can be referred to as the assessment of the competencies and knowledge assets of employees. According to the findings, one of the knowledge involved in clinical setting is personal knowledge and competency. Nevertheless, this study has found three other knowledge that needs to be identified at the beginning of the process which includes a patient's experience and information, guidelines and procedures as well as technological know-how. In order to perform clinical routines, it is important for the doctors and nurses to be able to identify all four knowledge base or resources.

### 5.1.2 Knowledge Assessment

Knowledge assessment can be defined as a process to filter, evaluate and validate the collected data before storing or applying. The main activities in this element are gathering of the relevant information for clinical decision and analyzing the particular knowledge/information. However, few studies were found to include assessment as part of their knowledge management process model (Meyer & Zack, 1996; Dalkir, 2005; Karadsheh et al., 2009, Amirkhani et al., 2012; Chauhan et al., 2015; Sullivan et al., 2015). Moreover, the assessment activity in these models occur towards the end of the process, which means that the models did not suggest to filter the knowledge before it was used and stored. The fact that knowledge comes in many shapes and sizes, therefore it is crucial to assess the content and source of the knowledge.

This process is unacceptable in a healthcare setting. In such setting, the knowledge needs to be assessed for fitness before it is utilized. Once it has been tested, the knowledge will be assessed again. They see the importance of assessing the knowledge before allowing it to pass on to the next processing stage. Especially where the process of acquiring knowledge involves various sources, the acquired knowledge can be inaccurate or has no value (Sun & Hao, 2006). Moreover, this study found that assessing the collected data is important before making clinical decisions that can affect a patient's health outcomes. To do this, doctors and nurses need to keep up-to-date with the evolving body of scientific research and combine this scientific knowledge with their own clinical experience and each individual patient's circumstances and preferences.

In clinical routines, there is typically high volume of simple decisions to be made that requires less assessment such as diagnosing common diseases. On the other hand, there may be complex decisions to be made, where the level of uncertainty is high and an analytical

approach is needed, such as the risk or significant complications, morbidity and/or mortality associated with the patient's presenting problems is high. Doctors and nurses are likely to make collective decisions based on the gathered evidence; they seek support and advice from colleagues and the wider multi-disciplinary team. They will communicate information or possible course of action, filter, evaluate and validate the data collected before applying or storing it.

This is consistent with Amirkhani et al. (2012)'s process model where the authors claim that measuring knowledge for storage and the efficiency of organizational knowledge is included in the knowledge management system. The authors added that these methods used to achieve the specific goals and used their results as feedback to determine or modify the goals. Therefore, it is essential to assess them in terms of quantitative results and the incurred expenses. For this purpose, they propose to start knowledge analysis through data mining (Amirkhani et al., 2012).

### 5.1.3 Knowledge Store

Knowledge store is the act of keeping or accumulating knowledge for future use. This study found that knowledge in healthcare organizations exist in (i) databases, (ii) documents i.e. clinical practice guidelines (CPGs) and standard operating procedures (SOPs), (iii) individual experts and (iv) network of practitioners. This element consists of capturing and organizing activities. Knowledge storage is important to keep the acquired data and to support individuals to access knowledge (Karadsheh et al., 2009). Thus, capturing, organizing and storing knowledge constitutes an important aspect in managing personal and organizational knowledge. This finding is parallel with other literatures (Alavi & Leidner, 2001; Bukowitz & Williams, 2000; Arostegui, 2004; Baptista et al., 2006; Tikhomirova et al., 2008; Huang & Shih, 2009; Tuamsuk et al., 2013; Garcia-Fernandez, 2015).

Karadsheh et al. (2009), however, represented this stage as knowledge filtering. It is a preparation to store knowledge, after going through classification, categorization and organization. Knowledge will also be classified based on the sensitivity of the information and where access is restricted by law or regulation to particular classes of people. Furthermore, knowledge can be categorized to recognize, distinguish and understand the information for exact purposes based on a specific purpose or type. In this case, categorizing can be used to make a practical significant differentiation between dissimilar categories of knowledge (Karadsheh et al., 2009).

In healthcare work environment, doctors and nurses store knowledge i.e. clinical know-how in individual memory. An individual memory is developed based on a person's observations, experiences and actions (Argyris & Schön, 1978; Nystrom & Starbuck, 1981). There are only some records in notebooks, for example, a record of clinical formulas as well as patient's information, guidelines and standard operating procedures which are stored digitally. These resources can be categorized as organizational memory (Tan et al., 1998). These findings are consistent with McAdam and Reid (2001) who found that knowledge is recognized as having both scientific and social elements. However, the existing hospital information system is limited to store administrative data such as patient information, billing and accounting. Although healthcare workers have been practicing to store knowledge and apply it in the future, there is limited facility to support this activity. Advanced computer storage technology and sophisticated retrieval techniques, such as query languages, multiple databases and database management systems can be effective tools in enhancing organizational memory (Alavi & Leidner, 2001).

The two healthcare organizations in this study have not been using advanced knowledge classification techniques such as indexing. Indexing is a technique for linking, combining and integrating knowledge. Lai and Chu (2000) emphasized that this stage is concerned with organizing knowledge and representing it into the knowledge repository for future retrieval. Furthermore, knowledge can organize and rearrange the information based on certain rules and map the knowledge into specific requirements. Additionally, knowledge filtering structures the information with indexes, links and catalog for storage (Parikh, 2001). As discussed by Kothari et al. (2011), one of the tools to advance knowledge management in an organization is by introducing the concept of mapping out knowledge, routines, capabilities and inertia. Others have used the mapping concept (e.g. "Capabilities Map" and "Levels of Learning Progression Map") as a process that can capture knowledge-oriented practices (Claver-Cortes et al., 2007).

### 5.1.4 Knowledge Sharing

This study found knowledge sharing as an important element in the knowledge management process model for healthcare organizations. It consists of disseminating and communicating knowledge with peers and team members. Knowledge sharing is especially critical in hospitals because individuals in a team have different backgrounds, perspectives and observations (Dougherty, 1992). This element is consistent with many other studies (van den Hooff & de Ridder, 2004; Karkoulian et al., 2010; Yesil & Dereli, 2013; Noaman & Fouad, 2014).

This study found that doctors and nurses share technical skills, academic knowledge, cultural knowledge, management know-how, administrative skills and intellectual knowledge through social processes to their peers and juniors by storytelling, training and practicing. There are four types of sharing platforms; (i) from individuals to explicit sources, (ii) from

individuals to groups, (iii) between groups and (iv) across groups (Alavi & Leidner 2001; Ferlie et al. 2012). This activity is conducted through face-to-face or via technology such as instant messengers, blogs or social medias (Ou, Davison & Wong, 2016).

Several researchers have noted that the sharing of knowledge among healthcare practitioners is dependent on professional networks and communities of practice. Kothari et al. (2011) identified communities of practice as a useful strategy to capture and share knowledge. Consistent with this study's findings, the doctors and nurses have been practicing to share their professional knowledge during training sessions, mentoring/apprenticeship and clinical practice. Each of them brought their own role, knowledge and expertise to the community in which should be leveraged by healthcare delivery organizations as an important means of diffusing medical evidence and best practices across organizational boundaries (Addicott, McGivern & Ferlie, 2006; Brice & Gray, 2003; Lathlean & Le May, 2002; Tagliaventi & Mattarelli, 2006).

### 5.1.5 Knowledge Utilization

Knowledge utilization refers to modes of applying knowledge in clinical care practice such as assessment, diagnosis, treatment, monitoring and prognosis. Various studies have identified the application and use of knowledge in firms (Argyris & Schön, 1978; Senge, 1990; Leonard-Barton, 1995; Mayo & Lank, 1994; Spender, 1996; Argyris, 2004; Maqsood & Walker, 2007), understood as a process of applying and using knowledge, exploiting and exploring resources, adapting to and changing the environment, learning and developing learning so that it can be used to solve problems, making decisions or transforming into new knowledge.

The findings from this study correlates with Garvin (1993) and Diakoulakis et al. (2004). Doctors and nurses applying and using knowledge as solving problems systematically, experimentation, learning from past experience, learning from others, transfer of knowledge (Garvin, 1993). Generally, knowledge utilization in clinical work environment can be regarded as applying one's knowledge in delivering patient care and at the same time experimenting the solution and treatment used to solve the clinical problems. In order to formulate the solution, the required knowledge is retrieved from personal knowledge and experience, patient's data and information, evidence-based practice as well as communicating with peers for a shared and collective decision.

### 5.1.6 Knowledge Evaluation

Knowledge evaluation refers to assessing the significance or quality of outcome derived from the previous process for future reference and improvement. This element correlates to the research studies by Karadsheh et al. (2009), Sunassee and Sewry (2002), Sun and Gang (2006) and de Rezende and de Souza (2007), who validated and evaluated the accuracy of knowledge for improvement and further development.

In this study, the knowledge is evaluated based on its value to the respective clinical decision (Karadsheh et al., 2009). According to Karadsheh et al. (2009) knowledge evaluation phase used to assess the knowledge based on the value; accuracy and relevance after the knowledge is combined from different sources. Sunassee and Sewry (2002) note that knowledge can be assessed based on the relevance to the organization, management strategy and business strategy. Moreover, knowledge must be evaluated to ensure that knowledge is accurate and valuable before it can be shared in the next phases (Sun & Gang, 2006). Since this acquired knowledge is derived from different sources, it can either be inaccurate, or have no value to the organization and so unrelated to the core business. However, any newly

obtained knowledge can be undeveloped knowledge with many mistakes (Sun & Gang, 2006). Therefore, the evaluation phase is used to assess if the new knowledge is worth for further development (Sun & Gang, 2006). de Rezende and de Souza (2007) stated that evaluation is focused on quality and synthesizing knowledge for future application. The purpose is to determine the relevance and value of information and also, establish the trust degree of knowledge, discard of redundant knowledge. Accordingly, the reduction of the uncertain degree of unproven knowledge, identifying and proposed of solutions for problems related to conflicting knowledge and finally, the use of multiple views in cases of unsolved conflicting knowledge. The output is a deeper and broad understanding of the knowledge in hand.

### 5.1.7 Knowledge Schemes

All the activities in the process are underpinned by knowledge schemes. Scholars have conducted studies on schemas or knowledge structures (Gioia, 1986; Axelrod, 1976; Calori et al., 1994; Thomas et al., 1993) but this component receives very little attention in the literature. Nag and Gioia (2012) emphasized the importance of understanding the relation between managerial schemas and the interpretation, search for and utilization of knowledge as a strategic resource in metal-casting industry. They developed an emergent theoretical model comprising of three core concepts and their relationships namely; (i) executive knowledge schemes (beliefs structure about the nature of valuable knowledge), (ii) executive scanning (knowledge search and/or acquisition patterns) and (iii) knowledge use (modes of using knowledge to create unique advantage). They also found that the executive knowledge schemes had two main themes; (i) knowledge significance (beliefs about the importance of knowledge to the strategic importance of a firm) and (ii) knowledge source (beliefs about the usefulness or quality of the origins and/or locations of knowledge). In summary, knowledge

significance theme represents what domains of knowledge are important and the source theme involves conceptions about where such knowledge comes from.

Likewise, this study attempts to investigate how doctors and nurses build their knowledge scheme related to the interpretation, acquisition and utilization of knowledge in clinical work environment. Consistent with Nag and Gioia (2012)'s findings, doctors and nurses have a strong belief about the importance of knowledge for solving clinical problems and managing disease. However, this study represents knowledge schemes as the domains of important knowledge required by doctors and nurses in performing their day-to-day routines in clinical work environment. This study comprehends knowledge schemes as an embedded element to the knowledge management practice among the doctors and nurses especially in knowledge scanning. In this study, there are four types of knowledge that are deemed important to the doctors and nurses; (i) personal knowledge and competency, (ii) patient information and experience, (iii) clinical guidelines and evidences and (iv) technology know-how. There is a slight difference as compared to Nag and Gioia (2012)'s subthemes for knowledge schemes theme where they identified the subthemes as external accessibility, personal competence and lower-echelon knowledgeability. In addition, in their knowledge schemes theme, criticality (reflects the degree of importance that a given senior manager ascribes to a particular domain i.e. technology or customer service) and distinctiveness (represent executives' beliefs about their foundries' ability to maintain or protect a unique competitive advantage) are the important elements. However, this study found two important elements for this theme which includes criticality (reflects the degree of importance knowledge in providing patient care i.e. drug compendia) and recency (reflects the degree of the knowledge being recent i.e. latest guidelines and evidences) (See Table 5.1).

**Table 5.1:** Knowledge Schemes Themes

| **Nag & Gioia (2012)** | | **Present Study** | |
|---|---|---|---|
| **Subthemes** | **Source of Knowledge** | **Subthemes** | **Source of Knowledge** |
| Criticality<br>Distinctiveness | Personal Competence | Criticality<br>Recency | Personal Knowledge and Competency |
| | External Accessibility | | Patient Information and Experience |
| | Lower-Echelon Knowledgeability | | Clinical Guidelines and Evidences |
| | | | Technology Know-how |

### 5.1.8 Technology Facilitation

This study found that IT/IS plays an important role to facilitate the knowledge management process in healthcare organizations. To recap, IT/IS is used to acquire knowledge from online medical reference sites and databases, gathering and analyzing data/information using tools like Microsoft Excel, storing knowledge/information in database system or personal notes in a computer which are mainly used during disseminating/communicating knowledge/information through email, instant messaging and social media apart from face-to-face communication.

Many scholars have discussed the importance of technology to efficiently manage knowledge management process (Alavi & Leidner, 1999; Wickramasinghe et al., 2002; Liao, 2003; Ragab & Arisha, 2013; Agarwal et al., 2011; Whiddett et al., 2012). However, the level of technology adoption in the healthcare organizations is limited to managing administrative tasks rather than clinical systems/applications that can facilitate or provide input into the care process. Ragab and Arisha (2013) have presented a list of software tools that can be used in managing knowledge including content management, collaborative services, organizational taxonomy, knowledge discovery, knowledge portals, expert networks, CRM, competence management, e-learning management systems and intellectual property management. This study revealed that doctors and nurses utilized only a few tools from the list; content and document management, collaborative services, knowledge discovery and expert networks. Meanwhile, the doctors and nurses have not been using computerized clinical decision support which can enhance healthcare quality and efficiency (Hunt et al., 1998). Furthermore, none of these tools were provided by the organization they work with instead they are the tools that can be used by public as long they find them relevant.

Kothari et al. (2012) claim that healthcare sector is at a pinnacle area, with significant opportunity to construct, implement and assess knowledge management systems. For example, wikis or blogs can be used to share knowledge with others. The authors discussed that these technologies can help support knowledge management and e-learning by enabling users to access content of interest quickly and conveniently. They also claimed that, interactions between individuals can also serve to co-create new and relevant knowledge.

Other authors have stressed that knowledge management and IT progress may have a beneficial effect on the overall quality of health decision-making processes (Goddard et al., 2004). Russell et al. (2004) also argues that, in order to disseminate this learning optimally into the health sector, it is crucial to determine non-hierarchical clusters, including professional disciplines which may readily share best practices among one another.

As an alternative, these strategies might be suitable for multidiscipline care teams who provide general care as a collective unit and possess a similar culture. In this technique, technology, which serves as a standard boundary for professionals, may potentially aid in the formulation and support of virtual communities to help expand the dissemination of learning and knowledge (Kothari et al., 2012).

# CHAPTER 6: CONCLUSION

This chapter concludes this dissertation by first providing a summary of this dissertation. Second, this chapter describes the implications of this study. Third, contributions of this study are discussed. Fourth, it provides recommendations for this study. Finally, this study offers future research directions.

## 6.1 Summary

Knowledge management has received much attention from both practitioners and researchers. Practitioners are interested from the perspective of creating a new business knowledge while researchers are intrigued to investigate strategies, enablers, models, tools and techniques of knowledge management as well as organizational outcomes (Adams & Lamont, 2003; Carneiro, 2000; Chapman & Magnusson, 2006). Studies suggest that effective implementation of knowledge management has proven to be vital for a company to achieve its long-term goals and improve its performance (Andreeva & Kianto, 2012; Soon & Zainol, 2011). Besides private business enterprises, knowledge management approach has also spread into other fields such as education, urban planning and development as well as governance and healthcare. As interest in knowledge management continues to grow, organizations from various fields embrace the concepts associated with knowledge management and leverage on its opportunities to ensure efficiency in carrying out operations and achieve competitiveness (Ergazakis, Metaxiotis & Psarras, 2004).

This study explores knowledge management in healthcare organizations. Healthcare industry involves different levels of diversity in criteria that characterize patients (e.g. physical traits, experience of illness and medical history), professional disciplines (e.g. doctors, nurses, pharmacists, radiologists and administrators), treatment options, delivery process and interests of various stakeholder groups (patients, regulators, health agencies and

civil society organizations) (Fichman et al., 2011; Kothari et al., 2011). Therefore, healthcare organizations often hold together the inter-organizational collaborations and multitude of actors. Through these diverse arrangements, information and practices are shared to support a continuum of care in the community.

In a healthcare setting, knowledge is more well-needed in mission-critical situations where real-time decisions may impact public health outcomes. Consequently, healthcare organizations are knowledge-oriented and their services involve knowledge-intensive process (Hojabri, Borousan & Manafi, 2012). For example, clinicians must have access to numerous information, i.e. more than 10,000 known diseases, thousands of medications in use, about 1,100 laboratory tests, more than 300 radiology procedures (Chen & Chen, 2006). In today's increasingly complex clinical environment, a well-organized and effective strategy for knowledge management in healthcare is important. To achieve health and development goals, there is a need to continually create, identify, capture, synthesize and share knowledge with various counterparts. Therefore, it is important to investigate how knowledge management is being practiced in healthcare organizations.

This study aims to answer the following question: What are the typical knowledge management practices in Malaysian healthcare organizations? To answer the question, this study focuses on the following objectives:

(i) To develop a knowledge management process model for healthcare organizations.
    a. To determine the activities needed for coping with knowledge in healthcare organizations.
    b. To identify the association between the activities and knowledge management process.

c. To determine the steps of knowledge management process in healthcare organizations.

(ii) To identify the types of IT applications that are used to facilitate the knowledge management activities.

This study adopted a qualitative research approach by conducting an in-depth interpretive case studies. This study was conducted in two hospitals; a public hospital – Selayang Hospital and a teaching hospital – University of Malaya Medical Center (UMMC) involving on-site interviews with a total of fifty-nine clinicians. The research method relied primarily on how clinicians from the two organizations described how they practice knowledge management in their day-to-day work.

### 6.1.1 Summary of Findings

This study proposed a knowledge management model for healthcare organizations that consist of ten interrelated activities: identifying, discovering, acquiring, gathering, analyzing, capturing, organizing, applying/experimenting, disseminating/communicating and evaluating. It begins with ***identifying*** the knowledge required in solving clinical problems and decision making which involves four types of knowledge, namely; personal knowledge and competency; patient information and experience; clinical guidelines and evidences; as well as technology know-how. Then, the ***discovering*** activity begins when doctors and nurses attempt to locate and search for the required knowledge from various sources. ***Acquiring*** knowledge from the identified sources by doctors and nurses will lead to enhancing personal knowledge, skill and competency; insights on patient's health condition; ability to manage different clinical problems and situations; as well as obtaining evidence to support judgments and decisions. Once the knowledge and information are acquired, doctors and nurses will systematically ***gather*** the relevant ones before ***analyzing*** them - using software tools to assist

the gathering process – by reviewing personal judgment; communicating and comparing with colleagues' knowledge; studying patient's reports and results; and by referring to procedures and guidelines prior to making diagnosis. Doctors and nurses ***capture*** new knowledge they gained during the clinical practice, as well as through educational and information sharing sessions. They must keep themselves up-to-date with and adhere to latest laws, guidelines and codes of practice relevant to their field of work. That knowledge will then be ***organized*** by restructuring the recorded knowledge/information and store the knowledge in the individual memory, information system i.e. Electronic Medical Record, digital format and personal notes. Doctors and nurses ***disseminate/communicate*** their knowledge to others through informal/formal ways. ***Application/experimentation*** of gained knowledge occurs when doctors and nurses manage patient care and formulate solutions to solve their clinical problems including assessment, diagnosis, treatment, monitoring and prognosis. The final stage of the process is the ***evaluation*** of the knowledge when doctors and nurses assess the significance and quality outcome from previous processes which derives clinical decisions. Table 6.1 provides an extended view of the whole model.

One of the theoretical contributions of this study is the identification of five additional activities that are unique to the healthcare setting: (i) discovering, (ii) gathering, (iii) analyzing, (iv) capturing and (v) organizing. Many studies incorporated discovering in identifying activity. In healthcare setting, discovering should be considered as a distinct action of locating personal knowledge, patient's medical information and clinical guidelines from various sources. The information is crucial for purpose of clinical decision-making and require systematic gathering and analyzing process. After this process, the useful and beneficial knowledge will be captured and organized for future use and reference.

Medical education in global health environment requires individual tailoring for each country. Malaysia has its own professional development for the practitioners. This reflects their practices in managing professional and personal knowledge for clinical processes. In Malaysia, doctors and nurses are required to fulfill a minimum number of credit points under a Continuing Medical/Nurse Education (CME/CNE), take part in clinical research and foster knowledge transfer within and among groups of people. All these are important steps towards improving health delivery quality in this country.

**Table 6.1:** Summaries of Results

| Activities | Identifying | Discovering | Acquiring | Gathering | Analyzing | Capturing | Organizing | Disseminating/ Communicating | Applying/ Experimenting | Evaluating |
|---|---|---|---|---|---|---|---|---|---|---|
| **Description** | Knowing what knowledge is involved | Knowing where to search for knowledge | Extracting knowledge/ information from various sources | Collecting relevant knowledge/ information | Reviewing and examining the collected knowledge/ information | Recording the analyzed knowledge/ information which are deemed to be useful | Restructuring the recorded knowledge/ information | Spreading and sharing knowledge with others | Utilizing knowledge for problem solving and decision making | Assessing the significance and quality of outcomes derived from previous process |
| **Sources / Outcomes** | Personal knowledge and competency | • Medical school<br>• Seminars<br>• Educational sessions<br>• Research and development<br>• Clinical Practice<br>• Online references<br>• Individual experts<br>• Conferences | Acquire additional/new clinical knowledge and enhance personal competency | Personal judgments based on own knowledge base or past experiences | Reviewing personal judgment and comparing with colleague's knowledge. | New knowledge and skills | Storing new knowledge and skills (individual memory) | Formal<br>• Presentation during educational sessions<br>• Problem-based learning<br>• Shared decision making<br>• Sharing documents and references through email<br>• Meetings<br>• Publications<br>Informal<br>• Instant messaging<br>• Casual chat | Assessments<br>Diagnosis<br>Treatments<br>Monitoring<br>Prognosis | Clinical decisions |

| | **Identifying** | **Discovering** | **Acquiring** | **Gathering** | **Analyzing** | **Capturing** | **Organizing** | **Disseminating/ Communicating** | **Applying/ Experimenting** | **Evaluating** |
|---|---|---|---|---|---|---|---|---|---|---|
| | Patient's information and experiences | • Electronic Medical Record<br>• Treatment/appointment book<br>• Storytelling<br>• Examination and assessment<br>• Lab test results | Gain insights on patient's health conditions | • Medical history<br>• Past medical reports<br>• Findings from assessment<br>• Results from lab test. | Studying the reports and results. | New disease or new symptoms for existing disease | Input patient's information into system (EMR) | Discussion at the point of care | Assessments<br><br>Diagnosis<br><br>Treatments<br><br>Monitoring<br><br>Prognosis | Clinical decisions |
| | Clinical guidelines and evidences | • Standard Operating Procedures<br>• Clinical Practice Guidelines<br>• Online medical reference sites<br>• Books | • Know-how to manage clinical problems and situations<br>• Gain evidence to support judgments and decisions | Evidence-based guidelines | Reviewing the guidelines to comprehend whether applicable for particular situations. | Latest guidelines and procedures | Storing the guidelines and procedures in desktop/laptop or smartphone | Upload/download digital format to/from website | | |
| | Technology know-how | • Personal experience<br>• Peers<br>• Product training | Know-how to use IT/IS | Using computer/ smartphone and software tools i.e. Excel, Word to collect data. | Using computer/ smartphone and software tools, calculator app to analyze data. | New ways to use the device | | Using desktop/laptop, smartphone and communication/ collaboration software | | |

## 6.2 Contributions of the Study

This study is of interest from both theoretical and practical perspectives.

### 6.2.1 Theoretical Contributions

Firstly, this study adds another model to the knowledge management literature. Different from the previous studies, this model is developed exclusively for healthcare organizations. Studies on knowledge management in a healthcare setting is lacking in integrated knowledge management process model. Healthcare processes are knowledge-intensive in nature (Myllärniemi et al., 2012), therefore, this study has helped to uncover a knowledge management process that appropriately suits the clinical process and decision-making. The proposed model aims to achieve greater and better application into healthcare setting that can provide a comprehensive and unified knowledge management views, activities and technologies in healthcare organizations.

Secondly, the proposed model further extends the initial model used in this study by examining the contribution of different healthcare workers, including different knowledge forms and associating some facilitating technologies for each of its activities. The initial model consists of knowledge schemes, scanning and use. This study has created four additional elements (i.e. knowledge assessment, knowledge store, knowledge sharing and knowledge evaluation) and it shows how it can lead to a cycle of continuous improvement. One of the major reasons for processing knowledge is for individuals, groups and the organization itself to learn, to remember what was learned and to leverage the collective expertise in order to perform more efficiently and more effectively (Evans et al., 2015).

### 6.2.2 Practical Contributions

The development of this model can help the healthcare workers and management to evaluate their current knowledge management practices and the potential for improving the process. Solving problems and making optimal decisions in healthcare is heavily dependent on access to knowledge. Thus, healthcare organizations should provide opportunities to incorporate knowledge management practices in order to deliver the best possible healthcare and achieve operational excellence. These goals are achievable if a well-organized and effective strategy for knowledge management in healthcare is implemented.

The informative concepts and relationships derived from this study can be used by practitioners to make deeper and richer assessments of the ways in which they understand, seek and use knowledge to facilitate decision-making capabilities. In this respect, it gives some insights to practitioners, managers and administrators who can enhance the clinical process and decision-making and ultimately adjust the knowledge management process.

Additionally, this study also reports on how IT/IS facilitates the process. Therefore, this study provides basic guidelines to establish a more systematic process i.e. computerized systems for practitioners. Managers shall consider implementing Knowledge Management System (KMS) to facilitate the flow of information and results in better, more-informed decisions. Moreover, KMS can also offer a platform for knowledge sharing among the healthcare workers, administrators and professionals. As a knowledge-intensive industry, healthcare could potentially and greatly benefit from the implementation of the system.

The final stage in the proposed model is about evaluating the outcomes from the process involving benchmarking, best practices and lessons learned. This gives an insight to the importance of healthcare organizations to look into building learning organizations. They should practice to continuously assess their successes and failures as they strive to

continuously improve. This creates a culture that learns from experience based on a data-driven assessment of performance and outcome. Learning from experience builds knowledge that can then be used to improve care and streamline operations over time.

## 6.3 Recommendations

Healthcare involves knowledge-intensive process but fairly modest knowledge management practices. Therefore, this study proposes several recommendations to enhance the knowledge management practice in healthcare organizations.

First, it is necessary for healthcare organizations to set up an authority, namely Chief Knowledge Officer (CKO) to initiate, drive and coordinate knowledge management programs or knowledge management system implementation. CKO is responsible for the unified management of hospital knowledge resources according to the hospital's development plans and strategies to ensure the sustainable development of the hospital. Moreover, implementing knowledge management system that is aligned with the organization's strategy and organizational subunits is rather difficult (Ravishankar, Pan & Leidner, 2011). Appointing a CKO may therefore be a good place to start when embarking on a knowledge management program to safeguard the hospital's intellectual assets and ultimately translate into knowledge products that can bring profits for the hospital.

Secondly, this study has identified social learning strategies in the form of communities of practice among doctors and nurses. Study found that the communities of practice are the key to a successful knowledge management initiative (Raub & Von Wittich, 2004). Enabling knowledge retention and allowing for the dissemination of best practices and lessons learned would facilitate strengthening of the communities of practice. Engaging healthcare workers in communities of practice helps build the collective knowledge base and expand the

knowledge assets, which eventually will help improve the knowledge management practice among them.

Additionally, healthcare workers must examine the knowledge base they already have and identify whether its nature, content and embedded advantages reflect depth and breadth. Then, they should adjust their knowledge integration mechanisms to fit their organizations' existing knowledge base. In order to maximize the outcomes from accumulated knowledge resources and to enhance innovation, it is advisable that a hospital with a broad and deep knowledge base strengthens its knowledge/information sharing processes and should initiate efforts to build and improve the relational learning routines associated with acquiring, absorbing and integrating external knowledge and intelligence.

Thirdly, IT/IS has the potential to improve the quality, safety and efficiency of healthcare organizations by allowing the providers to collect, store, retrieve and transfer information electronically. However, based on the results of this study, the usage of IT/IS in knowledge management practice among the healthcare workers is limited to administrative tasks but not clinical applications. Although hospitals already have the necessary infrastructure and conditions to implement knowledge management, the current infrastructure is limited to supporting administrative systems only. The infrastructure can be further enhanced to support clinical applications and eventually knowledge management practice throughout the entire organization.

In general, IT/IS applications in hospitals focus on administrative and financial systems that facilitate billing, accounting, administrative tasks, electronic medical record and picture archiving and communication systems (PACs) for filmless imaging. However, electronic system for clinical care process, such as clinical decision support systems that facilitates or provides input into the care process is lacking. Like hospitals, clinicians are likely to use IT

for administrative functions (such as billing, claims submission and scheduling) as compared to clinical functions (such as electronic health records, clinical decision support, access to formulae or other references, or computerized provider order entry). Hence, the recommendations for applying knowledge management in healthcare organizations below are based on the role of IT/IS. Table 6.2 displays some sample technologies that can facilitate knowledge management process.

**Table 6.2:** Sample of Technologies to Facilitate Knowledge Management

<table>
<tr><th>Stage</th><th>Scanning</th><th>Assessment</th><th>Store</th><th>Sharing</th><th>Utilization</th><th>Evaluation</th></tr>
<tr><td rowspan="4">Sample of Technologies</td><td rowspan="4">• Hospital Information System<br>• Expertise Location Systems<br>• Meta-search Engines for Clinical Guidelines and Evidences</td><td rowspan="4">Clinical Decision Support System</td><td colspan="2">Document Management System</td><td rowspan="4">Mobile apps</td><td rowspan="4">Learning Management System</td></tr>
<tr><td colspan="2">Blogs and Wikis</td></tr>
<tr><td colspan="2">Social Media</td></tr>
<tr><td>DBMS</td><td>Webinar and Online Conference</td></tr>
<tr><td colspan="5"></td><td>Online Forum</td></tr>
</table>

The raw data of knowledge management resides in the hospital information systems. Therefore, the construction of hospital knowledge management system should not be building a new system. Expanding the existing hospital information system should be the primary focused instead. For example, build a platform in the hospital information system for published opinions to facilitate discussions of the objective and subjective medical knowledge for each other or attempt to make a valuable part of the electronic medical records retrievable to implement knowledge management. This would help the healthcare workers to locate the knowledge/information they need to acquire.

Healthcare practitioners have the need to tap into experts within healthcare enterprise to solve a clinical problem. An electronic system to locate expertise within the enterprise is needed where it can provide a holistic view of experts across the enterprise for a variety of expertise topics. Such a system can aid the process of finding, locating and communicating with potential expert.

Healthcare is in the interest of evidence-based medicine where healthcare workers, especially doctors are actively accessing and referring to clinical practice guidelines, journals and medical research literatures at local or international level. These resources are available from a wide-range of sources. Meta-search engine is a search engine that sends user requests to several other search engines and/or databases in which the results would then be aggregated into a single list or display them according to their source. A meta-search engine for guidelines and other resources could help the healthcare workers to access them in a timely manner.

In the current hospital information system, features for clinical usage is lacking. Therefore, it is advisable to develop a Clinical Decision Support System (CDSS) that provides physicians and nurses with real-time diagnostic and treatment recommendation. The term covers a variety of technologies ranging from simple alerts and prescription of drug interaction warnings to full clinical pathways and protocol.

It is important to note that knowledge store is another essential element in the whole process but still lacking attention towards better implementation in healthcare setting. The healthcare organization is proposed to have an advanced computer storage, sophisticated retrieval technique and operational knowledge store that consolidates shared knowledge from multiple process and source systems. For example, a document management system that used to track, manage and store documents or a Database Management System (DBMS) that can act as the information repositories for the organization. These tools can help to increase the speed at which information and knowledge can be accessed.

Having appropriate systems and tools to store documents and information will promote a better way to retrieve and share them. Knowledge sharing has mostly been applied to informal (through venues such as instant messaging and casual chat) and formal (such as educational sessions, email communication and research presentation) settings. Exploiting the usage of platforms, such as Blogs, Wikis, Social Media, Webinar, online conferences and online forums would be able to enhance knowledge sharing.

Wiki is a collaborative online space (a website) for healthcare workers to view, contribute and edit content. All members of the course or specific groups can view the content. Whereas, blog can be considered as an online shared diary. Healthcare workers can write and post any health related topic of their interest to be shared with the public.

Webinar is a presentation, lecture, workshop or seminar that is transmitted over the Web using video conferencing software. The main key feature of a Webinar is its interactive elements: the ability to give, receive and discuss information in real-time. Whereas, an online forum is an Internet forum, or message board that allow online discussion. Healthcare workers can utilize an online forum to have conversations in the form of posted messages.

Healthcare organizations should also consider providing the systems and tools discussed earlier in a mobile platform. For example, a clinical assistance app to allow doctors and nurses to check electronic medical record and lab results from their mobile phone or tablet. Thus, a doctor can use them during an appointment to illustrate the information he/she is giving to the patient.

Finally, for evaluation activity, a Learning Management System could help clinicians share experiences in the system and which can be viewed and reviewed by others. This system can also be used to record and report successful and unsuccessful stories, thus, evaluation on the outcomes from clinical practice can be shared as best practices and/or lesson learned among clinicians and administrators.

## 6.4 Future research directions

Based on current findings, this study indicates the following avenues for further research. Firstly, future studies may want to replicate the proposed model in different settings. These settings may include other clinical or non-clinical departments within the hospital, other public or teaching hospitals or private hospitals. Future research can also benefit from collecting data from multiple sources (e.g. pharmacists, radiologists and other hospital staff).

Secondly, this study primarily focuses on clinical delivery process and patient care. Further research would be beneficial in understanding the application of knowledge management in healthcare organizations. Having a deeper understanding of how healthcare organizations employ knowledge management would be helpful in demonstrating the impact of strengthening coordination, capacity and learning and application.

Thirdly, this study's model focuses on the existing IT/IS used by the clinicians to facilitate the knowledge management process. Future research should identify and evaluate more ICT competencies that foster knowledge management practice for healthcare organizations. In addition, more focus should be put on the design and implementation of ICT as a knowledge management tool.

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## LIST OF PUBLICATIONS AND PAPERS PRESENTED

| No. | Year | Title | Conference/Journal |
|---|---|---|---|
| 1. | 2016 | Knowledge Management Process Model for Healthcare Organization- A Case of Public Hospital. | International Journal of Knowledge Management Studies |
| 2. | 2015 | Developing Process Model for Management of Knowledge-Intensive Organization – A Case Study of A Hospital. (See Appendix I) | The 19th Pacific Asia Conference on Information Systems (PACIS 2015) |
| 3. | 2014 | Information Management In Healthcare Organization: Developing Knowledge Management Framework – A Case Study Of Public Hospital | Global Conference on Business and Social Sciences 2014 |
| 4. | 2013 | The Use Of Knowledge As A Strategic Resource In Healthcare Organizations Towards Innovative Outcomes: A Research Agenda. | The 14th Annual Global Information Technology Management Association (GITMA) World Conference 2013 |

## Appendix A: Cover Letter

Nurhidayah Bahar
Graduate School of Business
Level 4, Block C City Campus,
University of Malaya,
Jalan Tun Ismail,
50480 Kuala Lumpur. 27 JUN 2013

Dr Hajah Siti Zaleha Mohd Salleh
Pengarah,
Hospital Selayang.

Melalui;

Puan Bariah
Pembantu Peribadi,
Hospital Selayang.

Y.Bhg Dr,

**Permohonan Kebenaran Mengadakan Penyelidikan**

Adalah saya dengan hormatnya merujuk kepada perkara di atas.

2. Dimaklumkan bahawa, saya Nurhidayah Binti Bahar (No Matrik: CHA110004), pelajar peringkat kedoktoran dari Universiti Malaya ingin memohon jasa baik Y.Bhg Dr untuk memberikan kelulusan bagi mengadakan penyelidikan di Hospital Selayang.

3. Penyelidikan ini bertujuan untuk mengkaji bagaimana kakitangan hospital seperti doktor dan jururawat menguruskan serta mengaplikasikan pengetahuan didalam aktiviti mereka di hospital.

4. Hasil akhir daripada penyelidikan ini akan dikongsi bersama dengan pihak Y.Bhg Dr agar dapat dipraktikkan didalam organisasi. Diharapkan juga perkongsian ini akan menjadikan organisasi Y.Bhg Dr menjadi lebih efisien dan mengubah perlaksanaan dalam penjagaan kesihatan untuk menjadi lebih kolaboratif, lebih telus dan lebih proaktif.

Kerjasama daripada pihak Y.Bhg Dr didahulukan dengan ucapan ribuan terima kasih.

Sekian, terima kasih.

Yang benar,

.....
(NURHIDAYAH BT BAHAR)

Diselia oleh,

.....
(DR. SHAMSHUL BAHRI B. ZAKARIA)

# Appendix B: Approval Letter for Case I

**JAWATANKUASA ETIKA & PENYELIDIKAN PERUBATAN**
***(Medical Research & Ethics Committee)***
**KEMENTERIAN KESIHATAN MALAYSIA**
**d/a Institut Pengurusan Kesihatan**
**Jalan Rumah Sakit, Bangsar**
**59000 Kuala Lumpur**

**Tel. : 03 2282 9082/03 2282 9085**
**03 2287 4032/03 2282 0491**
**Faks : 03 2287 4030**

Ruj. Kami : (f) dlm.KKM/NIHSEC/Jld 2/P13-1189
Tarikh : 25 April 2014

Nurhidayah Bahar
Graduate School of Business
Level 4, Block C City Campus
University of Malaya

Puan,

**NMRR-13-1211-17182**
**THE USE OF KNOWLEDGE AS A STRATEGIC RESOURCE IN HEALTHCARE ORGANIZATIONS**

**Lokasi Projek : Hospital Selayang**

Dengan hormatnya perkara di atas adalah dirujuk.

2. Jawatankuasa Etika & Penyelidikan Perubatan (JEPP), Kementerian Kesihatan Malaysia (KKM) tiada halangan, dari segi etika, ke atas pelaksanaan kajian tersebut. JEPP mengambil maklum bahawa kajian tersebut tidak mempunyai intervensi klinikal ke atas subjek dan hanya melibatkan temuramah dalam mengumpul data kajian.

3. Segala rekod dan data subjek adalah SULIT dan hanya digunakan untuk tujuan kajian dan semua isu serta prosedur mengenai *data confidentiality* mesti dipatuhi. Kebenaran daripada Pengarah Hospital di mana kajian akan dijalankan mesti diperolehi terlebih dahulu sebelum kajian dijalankan. Puan perlu akur dan mematuhi keputusan tersebut.

4. JEPP mengambil maklum bahawa permohonan pembiayaan projek melalui geran penyelidikan KKM akan diuruskan oleh pihak Urusetia NIH dan kelulusan permohonan geran adalah tertakluk kepada keputusan Panel Penilai Geran Penyelidikan KKM-NIH.

6. Adalah dimaklumkan bahawa kelulusan ini adalah sah sehingga **25 April 2015**. Puan perlu menghantar *'Continuing Review Form'* selewat-lewatnya 2 bulan sebelum tamat tempoh kelulusan ini bagi memperbaharui kelulusan etika. Pihak Puan juga perlu mengemukakan laporan tamat kajian dan juga laporan mengenai "*All adverse events, both serious and unexpected*" kepada Jawatankuasa Etika & Penyelidikan Perubatan, KKM jika berkenaan. Borang-borang berkaitan boleh dimuat turun daripada laman web MREC (http://www.nih.gov.my/mrec)

Sekian terima kasih.

**BERKHIDMAT UNTUK NEGARA**

Saya yang menurut perintah,

**(DATO' DR CHANG KIAN MENG)**
Pengerusi
Jawatankuasa Etika & Penyelidikan Perubatan
Kementerian Kesihatan Malaysia

# Appendix C: Study Final Report Form

MEDICAL RESEARCH & ETHICS COMMITTEE
SOP 2.10 REVIEW OF FINAL REPORT
Version 2.0; Date: 01 March 2011

**STUDY FINAL REPORT FORM**

| | | | |
|---|---|---|---|
| Protocol number: | 17182 | NMRR number: | 13-1211-17182 |
| Study Title: | The Use of Knowledge As Strategic Resource in Healthcare Organization | | |
| Name of Principal Investigator: | Nurhidayah Binti Bahar | | |
| Telephone number: | 017 3990400 | E-mail: | hidayah_bahar@yahoo.com |
| Name of Sponsor: | NA | | |
| Address: | | | |
| Telephone number: | | E-mail: | |
| MREC approved study site(s): | Hospital Selayang | | |
| Total number of subjects in MREC approved study site(s): | 35 respondents | *Number of study arms: | |
| *Number of subjects who received investigational product(s): | NA | | |
| *Description of Investigational product(s): NA | | | |
| *How is investigational product delivered to subjects?: NA | | | |
| * Study dose(s): NA | | | |
| Duration of study: | 3 months | | |
| Objectives of study: | To develop knowledge management model and propose how technology can facilitate knowledge management practice in hospital. | | |
| Results:<br>*Knowledge Management Process Model* | | | |

# Appendix D: Study Termination Memorandum

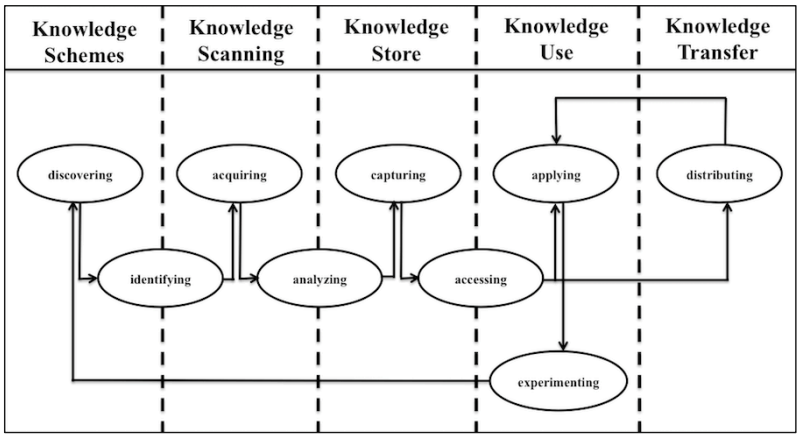


**Study Termination Memorandum**

| | | | |
|---|---|---|---|
| PROTOCOL NUMBER: 17182 | | NMRR NUMBER: 13-1211-17182 | |
| STUDY TITLE:<br>The Use of Knowledge As Strategic Resource in Healthcare Organization | | | |
| NAME OF PRINCIPAL INVESTIGATOR: Nurhidayah Binti Bahar | | | |
| TELEPHONE: | 017 3990400 | E-MAIL: | hidayah_bahar@yahoo.com |
| INSTITUTION: | Universiti Malaya | | |
| SPONSOR: | NA | | |
| MREC APPROVAL DATE: | 05-05-2014 | DATE OF LAST CONTINUING REVIEW REPORT: | NA |
| STARTING DATE: | 1 Jun 2014 | TERMINATION DATE: | 1 Sep 2015 |
| APPROVED NUMBER OF SUBJECTS: | NA | NUMBER OF SUBJECTS ENROLLED: | 35 respondents |

SUMMARY OF RESULTS:

A knowledge management process model is developed.



# Appendix E: Termination Letter

Nurhidayah Bahar
Graduate School of Business
Faculty Business and Accountancy,
Jalan Universiti,
50603 Kuala Lumpur. 26 AUG 2015

Dato' Dr Chang Kian Meng
Pengerusi,
Medical Research Ethics Committee (MREC)
NIH Secretariat
Ministry of Health Malaysia,
c/o Institute for Health Management,
Jalan Rumah Sakit, Bangsar,
59000 Kuala Lumpur.

Y.Bhg Dato',

**Permohonan Penamatan Penyelidikan**

Adalah saya dengan hormatnya merujuk kepada perkara di atas.

2. Dimaklumkan bahawa, saya Nurhidayah Binti Bahar (No Matrik: CHA110004), pelajar peringkat kedoktoran dari Universiti Malaya ingin memohon jasa baik Y.Bhg Dato' untuk memberikan kelulusan bagi penamatan penyelidikan di Hospital Selayang.

3. Berikut adalah maklumat berkenaan penyelidikan yang telah saya jalankan:

| | | |
|---|---|---|
| Nombor protocol | : | 17182 |
| Tajuk | : | The Use of Knowledge As Strategic Resource in Healthcare Organization |
| Penyelidik Utama | : | Nurhidayah Bahar |
| Tempat Kajian | : | Hospital Selayang |
| Bilangan Responded | : | 35 orang |

4. Penyelidikan ini bertujuan untuk mengkaji bagaimana kakitangan hospital seperti doktor dan jururawat menguruskan serta mengaplikasikan pengetahuan didalam aktiviti mereka di hospital dan menghasilkan model untuk proses pengurusan pengetahuan (knowledge management).

5. Hasil akhir daripada penyelidikan ini dapat dipraktikkan untuk memastikan pengurusan pengetahuan dikalangan doktor dan jururawat khususnya menjadi lebih efisien dan mengubah perlaksanaan dalam penjagaan kesihatan untuk menjadi lebih kolaboratif, lebih telus dan lebih proaktif.

6. Kerjasama daripada pihak Y.Bhg Dato' didahulukan dengan ucapan ribuan terima kasih.

Sekian, terima kasih.

# Appendix F: Approval Letter for Case II



UNIVERSITI MALAYA
PUSAT PERUBATAN UM
MEDICAL ETHICS COMMITTEE
UNIVERSITY MALAYA MEDICAL CENTER
ADDRESS : LEMBAH PANTAI, 59100 KUALA LUMPUR, MALAYSIA
TELEPHONE : 03-79493209 FAXIMILE : 03-79492030

| | |
|---|---|
| **NAME OF ETHICS COMMITTEE/IRB**<br>Medical Ethics Committee, University Malaya Medical Center | **MECID.NO**: 20145-279 |
| **ADDRESS** : LEMBAH PANTAI, 59100 KUALA LUMPUR | |
| **PROTOCOL.NO**(if applicable) : | |
| **TITLE:**<br>The use of knowledge in healthcare organizations | |
| **PRINCIPAL INVESTIGATOR :** Assoc Prof Dr Sajaratulnisah Othman | **SPONSOR**<br>- |

The following item [✓] have been received and reviewed in connection with the above study to conducted by the above investigator.

| | | | |
|---|---|---|---|
| [✓] | Application to Conduct Research Project(form) | Ver.No : | Ver.Date : 30-05-2014 |
| [✓] | Study Protocol | Ver.No : | Ver.Date : |
| [✓] | Patient Information Sheet | Ver.No : 2.0 | Ver.Date : 28-10-2014 |
| [✓] | Consent Form | Ver.No : 1 | Ver.Date : 30-05-2014 |
| [ ] | Questionnaire | Ver.No : 1 | Ver.Date : 30-05-2014 |
| [✓] | Investigator's CV / GCP ( Assoc Prof Dr Sajaratulnisah Othman,Nurhidayah Bt Bahar, Dr Shamsul Bahri Bin Zakaria, ) | Ver.No : | Ver.Date : |
| [ ] | Insurance certificate | Ver.No : 1 | Ver.Date : 30-05-2014 |
| [✓] | Other Attachments | | |
| | 1) Interview topic guide | Ver.No : 1 | Ver.Date : 30-05-2014 |

and the decision is [✓]

[✓] Approved

[ ] Rejected(reasons specified below or in accompanying letter)

Comments:

Modification done.

*Investigator are required to:*

1) *follow instructions, guidelines and requirements of the Medical Ethics Committee.*
2) *report any protocol deviations/violations to Medical Ethics Committee.*
3) *provide annual and closure report to the Medical Ethics Committee.*
4) *comply with International Conference on Harmonization – Guidelines for Good Clinical Practice (ICH-GCP) and Declaration of Helsinki.*
5) *obtain a permission from the Director of UMMC to start research that involves recruitment of UMMC patient.*
6) *ensure that if the research is sponsored, the usage of consumable items and laboratory tests from UMMC services are not charged in the patient's hospital bills but are borne by research grant.*
7) *note that he/she can appeal to the Chairman of MEC for studies that are rejected.*
8) *note that Medical Ethics Committee may audit the approved study.*
9) *Ensure that the study does not take precedence over ths safety of subjects.*

Date of approval : 18-11-2014

*This is a computer generated letter. No signature required.*

## Appendix G: Information Sheet and Consent Form

### Information Sheet

**Purpose of the Study.** As part of the requirements for Ph.D programme at University of Malaya, I have to carry out a research study. The study is concerned with Knowledge Management practices among doctors, nurses and assistant medical officers in healthcare organizations.

**What will the study involve?** The study will involve interviews with hospital workers i.e doctors, nurses and assistant medical officers. The interview will be conducted with the said informants from two different units managing different chronic disease namely Diabetes and Hypertension. The interviews will be held at suitable times for informants, with the duration ranging 45–60 min. Each informant will be given an overview the research, and detailing the informant's rights and responsibilities. Each informant will then be asked a series of questions, with both the researcher and informant seeking clarification or more information wherever required. The proceedings of each interview will be recorded electronically.

**Why have you been asked to take part?** You have been asked because you are specifically suitable to provide data for this study based on your designation (doctors / nurses / assistant medical officers) and experience in managing the diseases (Diabetes / Hypertension).

**Do you have to take part?** Participation is voluntary. You will get to keep the information sheet and a copy of the consent form. You have the option of withdrawing before the study commences.

**Will your participation in the study be kept confidential?** Yes. I will ensure that no clues to your identity appear in the thesis. Any extracts from what you say that are quoted in the thesis will be entirely anonymous.

**What will happen to the information that you give?** The data will be kept confidential for the duration of the study. On completion of the thesis, they will be retained for a further six months and then will be destroyed or archived (if permission given).

**What will happen to the results?** The results will be presented in the thesis and will be seen by my supervisor, a second marker and the external examiner. The study may be published in a research journal.

**Who has reviewed this study?** Approval must be given at different level from the Hospital Director, National Institutes of Health and Clinical Research Centre before studies like this can take place.

**Any further queries?** If you need any further information, you can contact me: Nurhidayah Bahar @ hidayah_bahar@yahoo.com Or +6017 3990400

If you agree to take part in the study, please sign the consent form overleaf.

**Consent Form**

1. I agree to take part in the research study named above.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves interview with the duration ranging 45–60 min and the proceedings of each interview will be recorded electronically.
5. I understand that all research data will be securely stored by the researcher for five years from the publication of the study results, and will then be destroyed unless I give permission for my data to be stored in an archive.
    i. I agree to have my study data archived.
    ii. Yes ☐ No ☐
6. Any questions that I have asked have been answered to my satisfaction.
7. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.
8. I understand that the results of the study will be published so that I cannot be identified as a participant unless I agree to be identified as a participant in the publication of the study results.
    iii. Yes ☐ No ☐
9. I understand that my participation is voluntary and that I may withdraw at any time without any effect.

Participant's name:
_____

Participant's signature:
_____

Date: _____

## Appendix H: Interview Questions

**Part 1 – General information**

**1. About the research**

Knowledge Management (KM) is the process of capturing, developing, sharing, and effectively using organizational knowledge. KM has the potential to address a number of significant challenges in the clinical setting, including:

(1) Reducing the problem of information overload by facilitating access to relevant knowledge and information,

(2) Improving efficiency and clinical outcome through the integration of evidence-based standardized clinical practices and guidelines,

(3) Improving patient safety and reducing medical error through clinical process standardization,

(4) Supporting individual and organizational growth through technology and KM practices by enhancing learning through collaboration, efficient knowledge creation, and improved diffusion and utilization.

Given the current state of Knowledge Management in healthcare setting, there is an opportunity to contribute our knowledge and expertise to effect substantive change in the clinical domain. Accordingly, the objectives of this paper include the evaluation of the current state of Knowledge Management practices in the clinical setting, assessment of the present status, and ultimately to develop knowledge-in-practice framework in chronic disease management.

2. **The interview duration.**

Time allocation: 45-60 mins

**Bahagian 1**

**1. Maklumat tentang kajian**

Knowledge Management (KM) / Pengurusan pengetahun adalah proses untuk merekodkan, membangunkan, perkongsian dan menggunakan maklumat organisasi dengan efektif. KM berpotensi untuk membantu mengatasi beberapa masalah yang sering timbul dalam persekitaran klinikal, termasuk:

(1) Memberi akses yang tepat kepada maklumat dan maklumat yang relevan sekaligus membantu mengurangkan masalah maklumat yang berlebihan/maklumat yang tidak diperlukan,

(2) Membantu meningkatkan keputusan klinikal yang lebih efisyen melalui integrasi praktis klinikal berdasarkan maklumat yang mengikut standard/piawai,

(3) Meningkatkan keselamatan pesakit dan mengurangkan kesilapan dalam diagnosis perubatan melalui standard proses klinikal,

(4) Menyokong perkembangan individu dan organisasi melalui teknologi dan praktis KM dengan meningkatkan pembelajaran melalui kolaborasi, mencipta pengetahuan secara efisyen dan meningkatkan penyebaran dan penggunaan.

Berdasarkan tahap semasa Knowledge Managememement di dalam sector kesihatan, terdapat peluang untuk menyumbang pengetahuan dan kepakaran kami untuk memberi perubahan substantif dalam domain klinikal. Dengan itu, objektif kajian ini juga termasuk penilaian tahap semasa Knowledge Management di dalam persekitaran klinikal, penaksiran tahap semasa dan membangunkan praktis berpengetahuan dalam bidang pengurusan penyakit kronik.

**2. Durasi temubual**

Masa diperuntukkan: 45 – 60 minit

**Part 2 - Interview Questions**

**Demographic profile:** Working experience (years), Job Position / Pengalaman bekerja (tahun), Jawatan

1. **Knowledge Schemes (beliefs structures about the nature of valuable knowledge)**
   **Skema Pengetahuan (Struktur kepercayaan tentang pengetahuan yang berharga)**

| No | Question | Remarks |
|---|---|---|
| **KSM01** | Please describe how does knowledge assist you in performing your clinical tasks.<br><br>Pada pandangan anda, bagaimana pengetahuan membantu anda dalam tugasan klinikal? | How executives understood and evaluated the role of knowledge in managing their organization. |
| **KSM02** | How importance a particular knowledge domain (i.e., technology, customer service, disease diagnosis) in terms of its effects on the success of your organization?<br><br>Bagaimana kepentingan pengetahuan dalam satu-satu domain (contoh: teknologi, khidmat pelanggan, diagnosis penyakit) memberi kesan kepada kejayaan organisasi anda? | To describe the importance level for each domain. |
| **KSM03** | Given the external and internal sources of retrieving knowledge, which knowledge source is more important in your unit?<br><br>How easy to get access to source of useful information?<br><br>Berdasarkan sumber dalam dan luar untuk mendapatkan pengetahuan, sumber yang manakah lebih penting di dalam unit anda?<br><br>Adakah mudah untuk mendapatkan akses kepada maklumat yang berguna? | |
| **KSM04** | Are you really concern about where such knowledge comes from?<br><br>Adakah anda begitu prihatin tentang dari mana | |

| | | |
|---|---|---|
| | datangnya sumber maklumat? | |
| **KSM05** | How confident are you with your own personal know-how as a source of valid and useful knowledge?<br><br>Bagaimana tahap keyakinan anda terhadap pengetahuan anda sebagai sumber yang sah dan maklumat yang berguna. | E.g. from experiential expertise and trust in personal skills<br><br>Contoh: pengalaman berdasarkan kepakaran sendiri dan kepercayaan terhadap skil peribadi |
| **KSM06** | How confident are you about the value of knowledge coming from lower-level members of your organizations?<br><br>Bagaimanakah tahap keyakinan anda terhadap nilai maklumat yang datang daripada pekerja yang jawatannya lebih rendah daripada anda? | E.g. information given by a nurse to a doctor Or information given by an assistant medical officer to a doctor/nurse<br><br>Contoh: maklumat yang datangnya daripada jururawat kepada doktor; atau maklumat daripada pembantu perubatan kepada doktor/jururawat |
| **KSM07** | Is there any documentation created for all medical expertise in medical delivery processes? What are they?<br><br>Adakah terdapat sebarang dokumen yang dibuat untuk pakar perubatan dalam penyampaian proses perubatan? Sila nyatakan document tersebut. | E.g. doctor's practice experience<br><br>Contoh: pengalaman daripada praktikal kedoktoran |
| **KSM08** | How do you describe the mutual support among personnel within the same specialty? Do you usually | |

| | | |
|---|---|---|
| | share knowledge?<br><br>Please state the example of a knowledge-sharing situation.<br><br>Apakah pendapat anda berkenaan kerjasama antara pekerja di dalam bidang yang sama dengan anda? Adakah anda selalu berkongsi maklumat? Bagaimana? | |
| **KSM09** | Are you expected to remain up-to-date with new knowledge in your expertise?<br><br>Adakah perlu untuk anda sentiasa mendapat maklumat terkini berkenaan dengan kepakaran anda? | |

**2. Knowledge Scanning (knowledge search and/or acquisition patterns) Pencarian/Imbasan Maklumat (pencarian maklumat dan/atau corak pemerolehan)**

| No | Question | Remarks |
|---|---|---|
| **KSN01** | How much time do you spend searching for work related knowledge?<br><br>Berapa lama masa yang anda peruntukan untuk mencari maklumat yang berkaitan dengan tugas anda? | Explain on its frequency as well. |
| **KSN02** | How do you go about doing that and what are the sources that are considered during searching?<br><br>Bagaimanakah anda melakukan pencarian maklumat tersebut dan apakah sumber yang bakal digunapakai semasa pencarian? | |
| **KSN03** | What is the scope of the regular search for disease management?<br><br>Apakah skop yang biasa digunakan untuk pencarian maklumat tentang pengurusan penyakit? | Scope of search and search strategies. |
| **KSN04** | What are the standard search strategies or guidelines that are employed?<br><br>Apakah piawai untuk strategi pencarian atau | |

| | | |
|---|---|---|
| | panduan yang digunakan? | |
| **KSN05** | Under what conditions are searches broadened or extended beyond the standard procedures?<br><br>Di bawah kondisi apakah pencarian akan diperluas melampaui prosedur piawai/standard? | |

**3. Knowledge use (modes of using knowledge)**
**Pengaplikasian makmulat (kaedah/cara pengaplikasian maklumat)**

| No | Question | Remarks |
|---|---|---|
| **KUS01** | How do you usually find solutions to your clinical related problems?<br><br>Bagaimana anda mendapatkan penyelesaian untuk masalah yang dihadapi dalam tugasan klinikal? | |
| **KUS02** | How easy to solve a particular problem resourcefully and using the organization's existing expertise and skills?<br><br>Adakah menyelesaikan satu-satu masalah itu menjadi lebih mudah dengan menggunakan sumber daripada kepakaran dan kemahiran yang terdapat dalam organisasi? | |
| **KUS03** | How do you make decisions and take actions pertaining to daily work in the hospital?<br><br>Bagaimanakah anda membuat keputusan dan juga mengambil tindakan tentang hal berkaitan tugas seharian di hospital? | Based on personal experience or collective decision. |
| **KUS04** | What are the roles that know-how and expertise played in these decisions and actions? Can you please provide examples?<br><br>Apakah peranan para pakar dalam keputusan dan juga tindakan yang diambil? Berikan contoh yang sesuai. | |
| **KUS05** | How do you share your professional expertise with others?<br><br>Bagaimana anda berkongsi kepakaran profesional anda dengan rakan sekerja? | |

**Suggestions for guidelines / Cadangan untuk panduan**

**GUD01.** Based on the practical experience, or based on other experiences and cases, do you have any suggestions for possible guidelines or practical recommendations for search and examination procedures concerning chronic disease management?

**GUD01.** Berdasarkan pengalaman praktikal, atau berdasarkan pengalaman dan kes lain, apakah cadangan anda untuk panduan yang munasabah atau cadangan praktikal untuk pencarian dan prosedur pemeriksaan yang berkaitan dengan pengurusan penyakit kronik?

## Appendix I: Sample Interview Transcript

**Respondent: D001**

1. **Knowledge Schemes (beliefs structures about the nature of valuable knowledge)**
   **Skema Pengetahuan (Struktur kepercayaan tentang pengetahuan yang berharga)**

| No | Question |
|---|---|
| **KSM01** | **How does knowledge assist you in performing your daily tasks?**<br><br>**Pada pandangan anda, bagaimana pengetahuan membantu anda dalam tugas-tugas seharian?**<br><br>Knowledge is essential. Without knowledge, there's no application. It's just personal opinion. For me in this profession (doctor), we need a strong basic knowledge. Then we can apply on daily practice. Because the diagnosis was made by a doctor, from the diagnosis we can plan and carry out treatment. |
| **KSM02** | **How importance a particular knowledge domain (i.e., technology, customer service, disease diagnosis) in terms of its effects on the success of your organization?**<br><br>**Bagaimana kepentingan pengetahuan dalam satu-satu domain (contoh: teknologi, khidmat pelanggan, diagnosis penyakit) memberi kesan kepada kejayaan organisasi anda?**<br><br>It's very important. It's important that we learn the latest guideline and the management recommended by evidence-based lesson so that we can manage our patients properly.<br><br>**I: How about technology? Do you need to keep updated to the latest technology being used in the medicine practice or what not?**<br><br>If it is essential in the workplace, then we need to know.<br><br>**I: Does it involve a doctor to learn how to use any specific machine?**<br><br>I think as long as we can perform our job well with the essential knowledge, it will be enough.<br><br>**I: And how about the customer service?**<br><br>It's important to have good communication skill with the patients.<br><br>**I: How do you think your knowledge into this particular domain will also affect the success of your organization? Is it related or not related?**<br><br>Of course it's affecting. For example, smartphone usage at work. Phone is |

| | |
|---|---|
| | very important because we have received referrals from all including the emergency department for admission by phone. Record data of the image, like X - ray , CT scan or for the heart , ECG , sometimes we want to further discuss with senior / superior or want to refer the case to the outside. We use Whatsapp to communicate. |
| **KSM03** | **Given the external and internal sources of retrieving knowledge, which knowledge source is more important in your unit?**<br><br>**How easy to get access to source of useful information?**<br><br>**Berdasarkan sumber dalam dan luar untuk mendapatkan pengetahuan, sumber yang manakah lebih penting di dalam unit anda?**<br><br>**Adakah mudah untuk mendapatkan akses kepada maklumat yang berguna?**<br><br>Both are similarly important. Example for external – normally we consult experts from another hospital (experts that are not available in our own hospital), also we consult journals, like up-to-date websites. For common cases that occur in our region, internal sources are sufficient, for example we have CPG as guideline. Uncommon disease that originated from other regions, then we need to expand our search for relevant guidelines.<br><br>**I: For internal – CPG is considered as internal sources. Are the tasks of doctors and nurses mainly based on CPG?**<br><br>Yes.<br><br>**I: Is CPG alone enough for you?**<br><br>Sometimes it is not enough. There are many patients from other countries in our ward. Especially from Myanmar, Nepal and Bangladesh. Sometimes there are infected with the disease that originated from their country like dengue or malaria. In addition, they live with any people in one place, therefore, they can easily get infection from others. |
| **KSM04** | **Are you really concern about where such knowledge comes from?**<br><br>**Adakah anda begitu prihatin tentang dari mana datangnya sumber maklumat?**<br><br>Of course the knowledge has to be evidenced-based; and for every evidence we need critical appraisal of the research.<br><br>**I: So in this case you are really concern of where the knowledge come from?**<br><br>Yes. |

| | |
|---|---|
| **KSM05** | **How confident are you with your own personal know-how as a source of valid and useful knowledge?**<br><br>**E.g., from experiential expertise and trust in personal skills**<br><br>**Bagaimana tahap keyakinan anda terhadap pengetahuan anda sebagai sumber yang sah dan maklumat yang berguna.**<br><br>**Contoh: pengalaman berdasarkan kepakaran sendiri dan kepercayaan terhadap skil peribadi**<br><br>Depends on what type of knowledge. Of course I don't know everything, but if I have already referred to reliable sources for a particular field, then I have confidence to share. |
| **KSM06** | **How confident are you about the value of knowledge coming from lower-level members of your organizations?**<br><br>**E.g., information given by a nurse to a doctor Or information given by an assistant medical officer to a doctor/nurse**<br><br>**Bagaimanakah tahap keyakinan anda terhadap nilai maklumat yang datang daripada pekerja yang jawatannya lebih rendah daripada anda?**<br><br>**Contoh: maklumat yang datangnya daripada jururawat kepada doktor; atau maklumat daripada pembantu perubatan kepada doktor/jururawat**<br><br>Just moderate. I normally double check to confirm. |
| **KSM07** | **Is there any documentation created for all medical expertise in medical delivery processes?**<br><br>**E.g. doctor's practice experience**<br><br>**Adakah terdapat sebarang dokumen yang dibuat untuk pakar perubatan dalam penyampaian proses perubatan?**<br><br>Yes.<br><br>**I: Can you give some examples?**<br><br>The medical reports. We record down everything. |
| **KSM08** | **How do you describe the mutual support among personnel within the same specialty?**<br><br>**Apakah pendapat anda berkenaan kerjasama antara pekerja di dalam bidang yang sama dengan anda?**<br><br>I won't say it's perfect, but we need improvement. |
| **KSM09** | **Are you expected to remain up-to-date with new knowledge in your** |

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| | **expertise?**<br><br>**Adakah perlu untuk anda sentiasa mendapat maklumat terkini berkenaan dengan kepakaran anda?**<br><br>**Y**es.<br><br>I**: Does doctor need to go for courses?**<br><br>Yes. We need to go for certain days in a year, to continue medical education. |

**2. Knowledge Scanning (knowledge search and/or acquisition patterns)**
**Pencarian/Imbasan Maklumat (pencarian maklumat dan/atau corak pemerolehan)**

| No | Question |
|---|---|
| **KSN01** | **How much time do you spend searching for work related knowledge?**<br><br>**Berapa lama masa yang anda peruntukan untuk mencari maklumat yang berkaitan dengan tugas anda?**<br><br>Maybe in a week, average. Depends on whether I'm sitting for exam. Recently I just completed my exam and I spent an average of maybe 1 – 2 hours per day. |
| **KSN02** | **How do you go about doing that and what are the sources that are considered during searching?**<br><br>**Bagaimanakah anda melakukan pencarian maklumat tersebut dan apakah sumber yang bakal digunapakai semasa pencarian?**<br><br>One reliable source that we always use is 'UptoDate' (a website), it has the latest evidence-based medicine, and the latest journal depending on topic. |
| **KSN03** | **What is the scope of the regular search for disease management?**<br><br>**Apakah skop yang biasa digunakan untuk pencarian maklumat tentang pengurusan penyakit?**<br><br>CPG, national or international. And also uptodate.com. |
| **KSN04** | **What are the standard search strategies or guidelines that are employed?**<br><br>**Apakah piawai untuk strategi pencarian atau panduan yang digunakan?**<br><br>No it's not provided. |

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| | **I: It's more of self-initiated, right?**<br><br>Yes. |
| **KSN05** | **Under what conditions are searches broadened or extended beyond the standard procedures?**<br><br>*Not discussed*. |

**3. Knowledge use (modes of using knowledge)**
**Pengaplikasian makmulat (kaedah/cara pengaplikasian maklumat)**

| No | Question |
|---|---|
| **KUS01** | **How do you usually find solutions to your day-to-day work-related problems?**<br><br>**Bagaimana anda mendapatkan penyelesaian untuk masalah yang dihadapi dalam tugas seharian?**<br><br>I will consult my senior, my boss, consultant, and also I will do my own search. |
| **KUS02** | **How easy to solve a particular problem resourcefully and using the organization's existing expertise and skills?**<br><br>**Adakah menyelesaikan satu-satu masalah itu menjadi lebih mudah dengan menggunakan sumber daripada kepakaran dan kemahiran yang terdapat dalam organisasi?**<br><br>Yes, it's easy. |
| **KUS03** | **How do you make decisions and take actions pertaining to daily work in the hospital?**<br><br>**Bagaimanakah anda membuat keputusan dan juga mengambil tindakan tentang hal berkaitan tugas seharian di hospital?**<br><br>I will supervise and it will be moderated by the seniors. |
| **KUS04** | **What are the roles that know-how and expertise played in these decisions and actions? Can you please provide examples?**<br><br>**Apakah peranan para pakar dalam keputusan dan juga tindakan yang diambil? Berikan contoh yang sesuai.**<br><br>The seniors will provide a final decision.<br><br>**I: At what level they actually interfere in making the decisions?**<br><br>Every day, the seniors/specialist will oversee all the medical decisions. |
| **KUS05** | **How do you share your professional expertise with others?**<br><br>**Bagaimana anda berkongsi kepakaran profesional anda dengan** |

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| | **rakan sekerja?**<br><br>Small group discussions day to day in the work room and also formal teachings or presentations. We also have Continuous Medical Education (CME). We will take turn to present and guided by specialist.<br><br>**I: Can you give some example of topics?**<br><br>Most of the topics that we learnt from medical school. We refresh and update the latest development related to the topic. For example, Ramadan is just around the corner, so we prepare a topic related to treating diabetes during Ramadan. Every year we will update the content.<br><br>**I: Who will attend?**<br><br>Medical officer and specialist.<br><br>**I: Who will conduct Continuous Nurse Education (CNE)?**<br><br>Sister will guide the session.<br><br>**I: How do doctors pass information to Sister (nurse)?**<br><br>CME will be conducted for all roles to be involved. |

# Appendix J: Published Article in IJKMS



## Knowledge management process model for healthcare organisation: a case of a public hospital

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**Abstract:** This study explores knowledge management (KM) practices in a public hospital in Malaysia. Healthcare practitioners are a knowledge-based community that depend on KM activities. However, little study has explored the KM process in a clinical environment. This paper focuses on KM practices among clinicians particularly on how they build their knowledge schemes, scan for knowledge and use knowledge in their organisation. The paper's primary goal is to examine how clinicians use KM process and to develop a KM model. This study aims to provide a model that will add to the existing models on KM process; extend the initial model used in this study; examine the contribution of different clinicians to the model as well as guide practitioners in understanding and applying knowledge effectively. By adopting an interpretive case study approach, two distinct roles of clinicians were selected to reflect how KM process is being practiced in their organisation.

**Keywords:** healthcare knowledge management; knowledge management; knowledge management model; organisational knowledge.

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# Appendix K: PACIS 2015 Proceeding





PACIS 2015 PROCEEDINGS (HTTP://AISEL.AISNET.ORG/PACIS2015)

### Title

Developing Process Model for Management of Knowledge-Intensive Organization – A Case Study of a Hospital (http://elibrary.aisnet.org/Default.aspx?url=http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1176&context=pacis2015)

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### Abstract

This study explores knowledge management practices in a Malaysian public healthcare organization. Knowledge management has gained much attention not only from business enterprises but also in other fields such as education, urban planning and development, governance as well as healthcare and has allowed for an enterprise-wide structure to be put in place to promote efficient and effective decision-making process. As a result, many organizations are now more serious about managing knowledge and embracing the concepts associated with knowledge management to remain competitive, or even to survive. Healthcare practitioners are a knowledge-based community that depend heavily on knowledge management activities. However, little study has explored the processes used by practitioners in managing knowledge as one of the intellectual assets of the business. Hence, this paper focuses on knowledge management practices among medical staffs particularly on how they build their knowledge schemes, scan for knowledge and use knowledge in their organizations. The paper's primary goal is to examine how medical staffs employ knowledge management processes to the benefit of their clinical routines and ultimately to develop a knowledge management model for disease management. Theoretically, this study aims to provide a model that will add to the existing models on knowledge management processes; extend the initial model used in this study; examine the contribution of different knowledge workers to the model as well as guide practitioners in understanding, acquiring and applying knowledge effectively. By adopting an interpretive case study approach, two distinct roles of medical staffs were selected to reflect how knowledge management process is being practiced in their organization.

### Recommended Citation