A TECHNOLOGY-SUPPORTED FRAMEWORK IN KNOWLEDGE-SHARING FOR HEALTHCARE AMONG SELECTED CARDIOLOGISTS

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ABSTRACT

Knowledge sharing in healthcare industry impacts peoples' lives and wellbeing therefore it ought to happen efficiently and uninterruptedly. The studied literature indicated the lack of comprehensive studies on the categories, assessments and characteristics of knowledge in organizations. Healthcare organizations were selected for the study context due to the crucial role of relevant knowledge in the delivery of quality healthcare services. The study of three models in knowledge management in the healthcare alongside the comprehensive literature on organizational knowledge has aided in realizing six focal themes. These themes and the shortcomings of the gap analysis of previous models assisted in shaping the conceptual Healthcare Knowledge Management Framework. The qualitative approach of in-depth interviews encompassing set of semi-structured questions was followed in this study. Eight specialized physicians were interviewed and their replies were analyzed qualitatively. Subsequently, data analysis produced several descriptive themes and codes. The following phase was the validation of the research design and the validation of the developed framework. A technological platform known as Knowledge Flow Tracer and Growth Analyzer (KFTGA) was implemented based on the developed framework. This platform aims to facilitate the knowledge-sharing activities among the community of physicians. For the purpose of KFTGA implementation, four medical experts participated in utilizing the tools' features. Afterwards, forms with written interview questions were passed to the medical experts to capture their experience on utilizing the tool.

Based on the developed framework, the eight interviewed healthcare specialists indicated their inclination to use technology as the main source of their learning and knowledge sharing. Four of those specialists expressed the relevance of the KFTGA platform for their knowledge-sharing needs and to facilitate top management launch of learning initiatives. Research findings indicated the suitability of the developed framework for knowledge management in its intended environment of operation in healthcare organizations. Additionally, the implementation of the technological platform by healthcare specialists have showed how technology can enable the learning and knowledge-sharing among communities of healthcare workers. Conclusions and recommendations for future studies were indicated at the end of this documentation for researchers who are interested in the same or similar research areas.

APPROVAL PAGE

I certify that I have supervised/read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in quality and scope, as a thesis for the fulfilment of the requirements for the degree of Doctor of Philosophy.

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DECLARATION

I hereby declare that the thesis submitted in fulfilment of the PhD degree is my own work and that all contributions from any other persons or sources are properly and duly cited. I further declare that the material has not been submitted either in whole or in part, for a degree at this or any other university. In making this declaration, I understand and acknowledge any breaches in this declaration constitute academic misconduct, which may result in my expulsion from the programme and/or exclusion from the award of the degree.

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LIST OF ABBREVIATIONS

ALT	**A**ssociation for **L**earning **T**echnology
CoP	**C**ommunity **o**f **P**ractice
CME	**C**ontinuous **M**edical **E**ducation
DBMS	**D**ata**b**ase **M**anagement **S**ystem
DIKW	**D**ata **I**nformation **K**nowledge and **W**isdom
HK	**H**ealthcare **K**nowledge
HKM	**H**ealthcare **K**nowledge **M**anagement
HKMF	**H**ealthcare **K**nowledge **M**anagement **F**ramework
IC	**I**ntellectual **C**apital
IoT	**I**nternet **o**f **T**hings
ICT	**I**nformation and **C**ommunication **T**echnology
IQ	**I**ntelligence **Q**uotient
IT	**I**nformation **T**echnology
ISM	**I**nformation **S**ystem **M**anagement
KFTGA	**K**nowledge **F**low **T**racer and **G**rowth **A**nalyzer
KM	**K**nowledge **M**anagement
KMIH	**K**nowledge **M**anagement **I**nfrastructure in **H**ealthcare
KMS	**K**nowledge **M**anagement **S**ystem

KPI	**K**ey **P**erformance **I**ndicator
KR	**K**nowledge **R**epository
KS	**K**nowledge **S**haring
KSP	**K**nowledge **S**trategy **P**rocess
LO	**L**earning **O**rganization
LT	**L**earning **T**echnology
MCQ	**M**ultiple **C**hoices **Q**uestion
MIMOS	**M**alaysian **I**nstitute of **M**icroelectronic **S**ystems
OJT	**O**n the **J**ob **T**raining
RMIT	**R**oyal **M**elbourne **I**nstitute of **T**echnology
ROI	**R**eturn **O**n **I**nvestment
SMS	**S**hort **M**essage **S**ervice
TKMh	**T**otal **K**nowledge **M**anagement in **h**ealthcare
WHO	**W**orld **H**ealth **O**rganization

CHAPTER ONE

INTRODUCTION

1.1 Overview

Knowledge is an intellectual property that is generated, developed and circulated among workers in knowledge-based organizations primarily to achieve business growth and sustainability. The long-term impact of well-managed knowledge depends on the continuity of the circulation of workers' know-hows. Organizational knowledge is retained and embedded in workers' experiences; this is why organizations are affected when skilled employees leave the organization. The proper aggregation of organizational knowledge requires initially a comprehension for the methods used for knowledge acquisition and partake. Several methods had been suggested to store the organizational knowledge in explicit forms and representations. One of these methods used in the education sector is monitoring the execution and the outcomes of a test as indicated by Gawthrop (2014). This chapter is meant to provide a preamble to the contents of the research documentation. Main concepts and plans will be presented and discussed. Several other methods in various sectors will be presented throughout this chapter.

This starts with review on how knowledge is perceived in various disciplines. History, philosophy and sciences are some of the major disciplines that were discussed. chapter presents preliminary background research conducted in the area of organizational knowledge and the methods for its categorization and assessments. Additionally, this

chapter addresses study's aims, questions, objectives, scope, problem statement, contributions and the rationale. Research operational framework and the outlines of this documentation's chapters are explained at the end of this chapter. The following chapter will be focused more on literature regarding learning, communities of practice and attributes of knowledge in organisations generally and in healthcare context specifically.

1.2 Philosophical Knowledge

The debate over realizing a concise definition to Knowledge was initiated centuries ago and the debate still stands. Most of these philosophical debates are related to the epistemology which refers to the theory of knowledge. Epistemology deals with the methods, validity and scope of knowledge (Tarmo, 2016; Davies, 2015). However, the linguistic aspect of knowledge is referred to as:

"Acts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject" (Oxford Dictionaries, 2018).

The historical aspect of philosophy has discussed knowledge based on the manner it is being understood and used among people. The reviewed literature refers to three broad types of human knowledge:

1.2.1 Knowing by Acquaintance (Knowing What)

The first type of knowledge is personal knowledge, or *knowledge by acquaintance* (Hintikka, 2014; Schmitt, 2014). It refers to the recognition and familiarity with something, for instance in order for a person to know what a car is, that person must have seen it; for a person to know what heat is, that person must have experienced it (Proops, 2014;

Milkowski, 2015). In these examples, the term 'know' is used to refer to *knowledge of what*. Regardless of the things a person tells explaining what a car is, no matter how many facts to know about it, if a person has not seen a car, then it cannot be said that she or he knows it or how it works and moves. Bertrand Russell in Yu (2015) recognized knowledge by depiction which refers to a very specific sort of knowledge that is acquired by acquaintance with the topic or objects.

1.2.2 Knowing That

Knowing That is sometimes called Propositional Knowledge, it refers to the knowledge of facts and convictions (Losee, 2014). Personal knowledge involves knowledge of propositions; in the instance of one having met someone is not enough to acknowledge the fact that one knows him. One must recognize several matters regarding that person in the propositional knowledge sense (Carter and Pritchard, 2015). Knowing of some facts regardless of what kind of actuality or truth, some of these facts have been acquired throughout peoples' lifetime. Some of these facts are known as common sense such as knowing one plus one equals to two or realizing that assaulting people is uncivilized act or learning the existence of Gravity (Gines and Parikh, 2015). Therefore, *knowing that* is a statement of propositional knowledge (or the lack thereof) is usually expressed using "that"-clauses, for instance "she knows that Jakarta is in Indonesia" or "he does not know that Jakarta is the capital of Indonesia".

1.2.3 Knowing How

This type of knowledge is also known as Procedural Knowledge, referring to the knowledge of how to do something (Harmon, 2014). For instance, the claim of knowing

how to swim and how to ride a bicycle are claims to have procedural knowledge. Procedural knowledge differs from propositional knowledge since it is used to

"solve a specific problem through application of specific processes or procedures"

(Anderson and Taraban, 2015).

It is possible to learn theories behind swimming and to possess relevant propositional knowledge without actually knowing how to swim. A person can learn which hand to swing and when to swing it when swimming. The same person can know the idea of floating in the water. Yet, until that person actually jumps into the water and start actually moving his arms and legs to create the swimming motion, that person cannot be said to know how to swim.

Knowing how to swim requires the possession of specific skill, since the knowledge of doing a certain action is different to knowing the facts about that action. (Johnson, Schneider and Star, 2015; Khashan, 2014). It is the sort of knowledge a person has when it is positively said of that a person knows how to do something say, riding a bicycle or swimming.

1.3 Scientific Knowledge

The continuous progress of scientific innovations and discoveries are primarily based on the methods of observing, testing and documenting of knowledge in various scientific domains. Most, if not all, of the pure sciences' theories in physics, chemistry or biology depend greatly on conducting experiments with clear aims, inputs, processes and outputs. These experiments are expressed in quantifiable representations which ease the process of analyzing and interpreting them (Carpi and Egger, 2015; Malt, 2015; Renn and

Hyman 2012). Since those types of experiments were based on logical quantifiable measures, knowledge in science has been mostly viewed as a subject of Philosophy (Greenleaf et al, 2013). In some cases, scientific knowledge may have not reached to the level of conviction or certainty, keeping up suspicion of the researcher not being totally sure when they are right and when they are most certainly not (Hiwasaki et al. 2014). The traceable and detectable nature of scientific knowledge enables other researchers to reproduced the steps and experiments followed in the research projects.

1.4 Classifications of Organizational Knowledge

The enormous volume of academic and industrial publications in research area on classifying the types of workers' know-hows in various industries made the analysis of this big volume of articles a rather challenging one. To facilitate the comprehension of this phenomenon, there is a need to initially categorize organizational knowledge and clarify the aspects for different classifications in different industries. In this regard, it is essential to address the approaches indicated previously by researchers and practitioners in the field of organizational knowledge, as discussed in the following subsections.

1.4.1 Formal Organizational Knowledge

Formal knowledge is the sort of organizational knowledge that is can be found documented in writings or publications which can easily be imparted and learnt as indicated by Hamunen et al. (2014). In other words, it is a knowledge that is made explicit and associated with a representations method for expressing this knowledge. According to Caroline (2015) has also indicated this nature of organizational knowledge which is possible to be documented and codified. This type of knowledge can be transferred to other people. According to Costa and Lima (2014), this type of know-hows in organizations can

be expressed and recorded in the forms of text or numerical symbols with explicit representations

Knowledge representation fuses hypotheses and researches that look into how people tackle issues using their knowledge and skills. The expressions of human knowledge have been perceived primarily by the spoken languages among humans. Early brain research specialists did not have faith in a semantic premise for knowledge. Later speculations on semantics aspects of human knowledge help a dialect-based development of research directions, such as the use of numerals encourage bigger and more perplexing mathematical representations, hence impacting future knowledge representation. One of the works in automated knowledge representation was centered around general issue solver. General Problem Solver (GPS) framework created by Allen Newell and Herbert A. Simon in 1959 (Dubois and Prade, 2018). These frameworks emphasized knowledge structures for arranging and disintegration of information acquired by humans. It was the weakness of these endeavors that prompted the cognitive transformation in knowledge research and start to focus more on knowledge representation that brought about master frameworks in the 1970s and 80s (Giovannini, 2018). Besides these frameworks, different analysts created the idea of the classification of information depicting objects on the planet and arrangements related to that notion. The end goal to make a genuine computerized reasoning by specialized programs that can chat with people utilizing regular dialect and can prepare essential explanations and inquiries as a base for knowledge generation and acquisition.

The main attribute of the formal knowledge is its ease of communication, storage and distribution. Alternatively, this type of organizational knowledge is often referred to

as explicit knowledge since it deals with the type of knowledge that can be made clear. This knowledge can be easily documented, socially built, and stored in a systematic manner using comprehensible data structures. Organizations have realized the importance of proper acquisition, retention, classification and reuse of organizational knowledge as indicated by Kristensen and Vianello (2015). Therefore, the comprehension of organizational knowledge can assist in achieving efficiency throughout organizations and their segments.

1.4.2 Informal Organizational Knowledge

This sort of organizational knowledge is referred to as *informal knowledge* which is defined as *"the experience developed in every stage of life, often before the children are entering the school age"* (Nikiforidou, Pange and Chadjipadelis, 2013). Likewise, Polanyi in Crhova, Kolman, Pavelkova (2015) referred to the term the *informal knowledge* as the type of knowledge that is not easy to be taught in formal structures. Recent publications from academia and research on informal knowledge refer to this sort of knowledge as being the bigger portion of peoples' information base as indicated by Kosir (2014). This personal informal knowledge is usually accumulated throughout years of experience, insights, and intuitions. This type of knowledge can be seen represented in unstructured forms such as SMS, emails, social media posts, blogs, forum discussions and multimedia files.

This type of knowledge is referred to as *implicit knowledge* since it represents the knowledge that is not verbalized and cannot be documented easily or in direct forms. According to Fruehauf, Kohun and Skovira (2014), the difficulty in documenting this type of the knowledge is associated with the fact that humans can express much less than the amount of knowledge they hold. Tacit knowledge imparting procedures concentrate on the personalization approach in which knowledge is imparted through immediate person to

person communication and through socialization activities and connections, this notion of knowledge was indicated by a research conducted by Compomizzi and D'Aurora (2014). The need for expressing this type of knowledge is vital, however there had been only few studies suggesting the presence of any clear codification methodology as concluded by Taylor (2015). This scarcity in research in this field is probably due to the complexity and manifold of this topic. Other recent research efforts have been dedicated to the attempt of categorizing various types of organizational knowledge as shown in Table 1.1.

Table 1.1: Categorization of Organizational Knowledge in Recent Literature

Author	Year	Highlights
Giudice, Peruta and Carayannis	2011	Studied organizational knowledge from the perspective of organizations managed as family businesses. They addressed the three categories of knowledge in these organizations as tacit, rule-based and background knowledge.
Tongo	2012	This study considered knowledge based on the perspective of assets in organizations. Tongo pointed out three types of organizational knowledge: structural, human and relational knowledge.
De Angelis and Despres	2013	Categorized knowledge in the public administration sector into two broad types: complementary and interdependent knowledge.
Popsa and Nicula	2014	Classified knowledge in organizations based on two main capacities: knowledge capacity to absorb and knowledge capacity to stick in one's mind.
Lin, Ho and Lu	2014	Based on a survey of manufacturing organizations in Taiwan, these researchers classified organizational knowledge into systematic, implicit, explicit, tacit, and interpersonal knowledge.
Sokhanvar, Matthews, and Yarlagadda	2014	Investigated knowledge in research organization, they categorized two main knowledge types: knowledge about clients and project management knowledge.

In addition to the studies indicated in the above table, other researchers adopted different approaches in categorizing organizational knowledge. Some of this research indicated two main perspectives in classifying the organizational knowledge which are the possession-based and practice-based perspectives as indicated by Souto (2013). Such