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DESIGNING KNOWLEDGE MANAGEMENT MODEL FOR UNIVERSITIES

Master's Thesis

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PhD

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ÜLIKOOLIDE TEADMISTE JUHTIMISE MUDELI VÄLJATÖÖTAMINE

Magiströö

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Author's declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

Knowledge management (KM) is an essential tools to support an organizational sustainability with competitive advantage by managing and adding value and uniqueness to the organizational knowledge resources and processes. Universities inherently are in knowledge-intensive institution where number of interrelated components are working together in a complex manner to create and circulate knowledge. However the difficulty of knowledge management implementation at university level is complicated as most of the knowledge management implementation model has been developed for different sectors as none of the KM model is actually fit for the universities. This research effort develop an appropriate KM model to overcome different problems on KM implementation process for universities to help on managing knowledge. The study adopts Design Science Research (DSR) methodology as we consider design science as a problem solving process thus facilitate to create measurable and effective artifacts. This KM model also evaluated using Framework for Evaluation in Design Science Research (FEDS). This is an Ex-ante evaluation maintaining Summative evaluations process.

This thesis is written in English and is fifty nine pages long, including eight chapters, twelve figures and four tables.

Annotatsioon

ÜLIKOOLIDE TEADMISTE JUHTIMISE MUDELI VÄLJATÖÖTAMINE

See uurimus käsitleb seost ülikooli ja teadmiste juhtimise; ja erineva mudeli teadmiste juhtimine. Töötada välja ülikoolide uus teadmiste juhtimise mudel. Praeguseks ei ole aga ülikooli asutus ning valdkonna eksperdid sobiv mudel arendamisele suuremat tähelepanu pööranud. Käesolev töö uurib teadmiste juhtimise seotud probleeme ning võimalusi kasutamaks uus mudel raamistikku valitseva lõhe ületamiseks.

Lõputöö on kirjutatud Inglise keeles ning sisaldab teksti viiskümmend üheksa leheküljel, kaheksa peatükki, kaksteist joonist, neli tabelit.

List of abbreviations and terms

APQC	American Productivity and Quality Centre
DSR	Design Science Research
FEDS	Framework for Evaluation in Design Science
ICT	Information and Communication Technology
IDEF	Integrated Definition Function Modelling
IMPaKT	Improving Management Performance through Knowledge Transformation
KM	Knowledge Management
KMM	Knowledge Management Model
KMS	Knowledge Management System
SECI	Socialization Combination Externalization Internalization
UN	United Nations

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1 Introduction

In the last 30 years the entire landscape of the knowledge and its relation with society has been transformed dramatically due to enormous progress of ICT which leads to free flow of information. It is a time of deconstruction, where different names such as, Wikipedia to Facebook, iTunes to Pirates Bay, Google to Bitcoin, every single bit of innovation moulded our perceptions and practices as well as contributed to redefine our knowledge paradigm. However this transition was not linear and smoother as different sectors has different context and they faced diversified challenges to transform their policy and practices in an effective and efficient manner.

“It is argued that society has entered a new era, where the epochal shift lies in the turn from stable to turbulent markets and rapid technological change”, “particularly in information technology, and focus on uncontrollability, chaos, flexibility, and disorganization”.
(Alvesson, 2004 p.6)

Knowledge Management (KM) is a methodical practice by which knowledge requirement for an organization to thrive is created, captured, shared and leveraged. In our time, the leap of progression has relocated in a fast motion, and those who unable acquire, adapt, and adjust themselves from moment to moment simply wouldn't survive. Knowledge Management is the ability of harnessing knowledge, involving people, culture, process and the technology. It requires voluntary implementation by the people/academic staff for the benefit of universities in general and for the benefit of the academicians in particular.

In this regards, we are proposing KM as tools to understand the progression of our universities in connection with contemporary society. This research effort expected to present a basic concept of Knowledge Management (KM) to facilitate one to grasp the idea and design processes in a structured way in the institutional level as well as to ensure that significant characteristics are considered in KM projects effectively and efficiently and understanding its necessity to rapid changing environment.

Universities inherently are possessing hegemonic power on knowledge from the beginning. As a knowledge-intensive institution universities has number of interrelated

components are working together in a complex manner to create and circulate knowledge. This is 'The Organization' who believe in "Knowledge for Knowledge sake" – from creation to circulation and preservation to practice, where knowledge itself is a prime mandate for the universities without any loss or gain consideration. At the same time as organization the universities also belongs to social, cultural, economic and geographical context, thus influence its organizational structure, management process, financial obligation, and political interactions.

There are different KM models have been developed to leverage Knowledge Management to initiation to implementation process; but none of the existing KM models are designed for the higher educational institutions specially for the universities. Therefore almost every model are miss fitting in many circumstances and facing different difficulties or, cannot be used efficiently and effectively.

2 Background

This chapter would provide the background of the research. The chapter contains research aim, research problems, expected outcome and significance of the research. Then it focus of research questions and the discussed on research methodology.

2.1 Aim of this Research

This research effort expected to present a basic concept of Knowledge Management (KM) to facilitate one to grasp the idea and design processes in a structured way at the university level as well as and understanding its necessity to rapid changing environment. The paper aims to develop an appropriate KM model to overcome different problems on KM implementation process for universities to guide an effective and efficient way for managing knowledge.

2.2 Expected outcome:

This thesis therefore makes an effort to attract attention of our universities to create an effective KM environment. A comprehensive analysis and evaluation of KM models will be conducted to develop a KM model that fulfill the gaps and overcome the shortcomings of different KM models used for higher educational sectors that enhancing competence on how to manage own knowledge, and flexibility on how to adapt changing conditions.

2.3 Research problem:

Now a days, the core principles of the modern society are moved by the label knowledge society. Knowledge Management has been widespread in response to urges to form a knowledge society.

Considering the facts that the traditional Idea of the classical university system apprehend as hegemony on knowledge within the society. How much its system is flexible enough to apprehend its own created knowledge? In this regards, analysing knowledge

management will be a unique tool to understand the progression of our universities in connection with contemporary society.

However the difficulty of knowledge management implementation at university level is not only complicated, but the fact that the implementation process of KM initiatives has often been unplanned and informal. The reason is, most of the knowledge management implementation model has been developed for different sectors, such as corporate, manufacturing sector, IT industries or international organization like World Bank or UN which is very specific by nature. None of the KM model is actually fit for the universities. Therefore developing an appropriate KM model for the universities is very much needed.

2.4 Significance of the Research

Considering the facts that the traditional Idea of the classical university system apprehend as hegemony knowledge within the society. Universities crowd its places into many world rankings and has been complacent with its authoritarian power as a creator of Knowledge. Either it is private and public, mass and elite, ancient and ivy-covered, contemporary and cutting-edge, it is not hard to see why universities resist simple evaluations. Though it may be started with a very simple quest – how much our universities have been transformed in course of time? How much its system is flexible enough to apprehend its own created knowledge? Are they ready for changes? It is also understood that the changes of any kind have difficulty in their implementation due to the restrictions of the centralized educational system and due to the notion of the existing policy, the habit, the tradition of the academic staff, who are unwilling to lose what they are used to have.

Universities inherently are in knowledge-intensive institution where number of interrelated components are working together in a complex manner. Firstly organizational knowledge in the universities is mostly tacit knowledge and very much based on individuals' experiences and perceptions, which is very difficult to capture and reprocess. At the same time, the complex nature of academic knowledge and diversified context which is explicit by nature also create number of the difficulties to manage, preserve, retrieve that resulted into repetitive nature of work, and create "knowledge wastage".

Considering this facts an appropriate KM will provide a holistic tools that serve not only academics but also university administration to capture, share, reuse, update, to create

new experiences, best practices, solutions on innovation, research problems, institutional planning and decision making; so the total performance and competitiveness of the universities will be enhanced.

2.5 Existing Body of Knowledge

Since early 1980s, there has been numerous academic research books and articles published that discuss the changes in the economy and modern society. The major theme is that society has gone through a paradigmatic shift from the industrial society to the knowledge society.

The transformation from machine age to information age denotes to the massive growth in information technology (Thompson and McHugh, 2002). In the beginning 1990s, the term new economy was widely used to describe the changes in social, political, and economic life due to the development of information technology and the terms Knowledge Society, Knowledge Worker and Knowledge Intensive Firm has been introduced. Regardless of the names for these changes, familiar themes are the replacement of traditional concept of organizations and asset by networks, collaboration and participation instead of hierarchical model of management system.

As history of human civilization evolved from the industrial to the knowledge society, effective use of knowledge is being considered one of the important eminent factors between leading an institutions and also-rans. As the information age supplanted the industrial age, different organization, irrespective their type and nature, stated recognizing that knowledge would be more important than capital in producing wealth.

In the commencement of new millennium, the core principles of the modern society are moved by the label knowledge society. It recognized a highly anticipated consideration where employees having work tasks that comprise producing and transferring knowledge. In this concept the work has been defined as knowledge-intensive that is usually encompasses intellectual and analytical tasks, thus involve an extensive theoretical education and experienced employees to perform successfully (Alvesson, 2004).

As our economic perceptions and considerations progressively turning towards knowledge-based economy, knowledge is becoming the utmost imperative asset for organizational accomplishment among other assets along with capital, intellectual properties, human resources, materials, or brand values (Kelleher and Levene, 2001).

There are growing number of knowledge-intensive companies in the knowledge society where the competence and knowledge of the employees and technical know-how on how to manage are vital. The new approached of management argued that the knowledge belongs to and moves with the personnel rather than residing with the organization. This possession of knowledge will uplift status of the personnel, since the organization are reliant on their constancy to yield their investments. However the problem arises when it comes to deal with data information and knowledge.

Although the terms data, information and knowledge are often used interchangeably and their relationship also exceedingly interrelated, however they not the same (Kakabadse et al., 2001). The term ‘Data’ used to describe raw facts without any processing, organizing or analysis, whereas ‘Information’ refers to data that has been processed and shaped in a meaning way. On the other hand, knowledge encompasses not only meaning but also perspectives, values, judgments, beliefs, and know-how (Blumentritt & Johnston, 1999). Considering this facts the organizations require to adjust and accomplish the information-knowledge balance in order to achieve competitive advantages, through IT-driven environ to improve information management and social-contextual consideration to develop knowledge management.

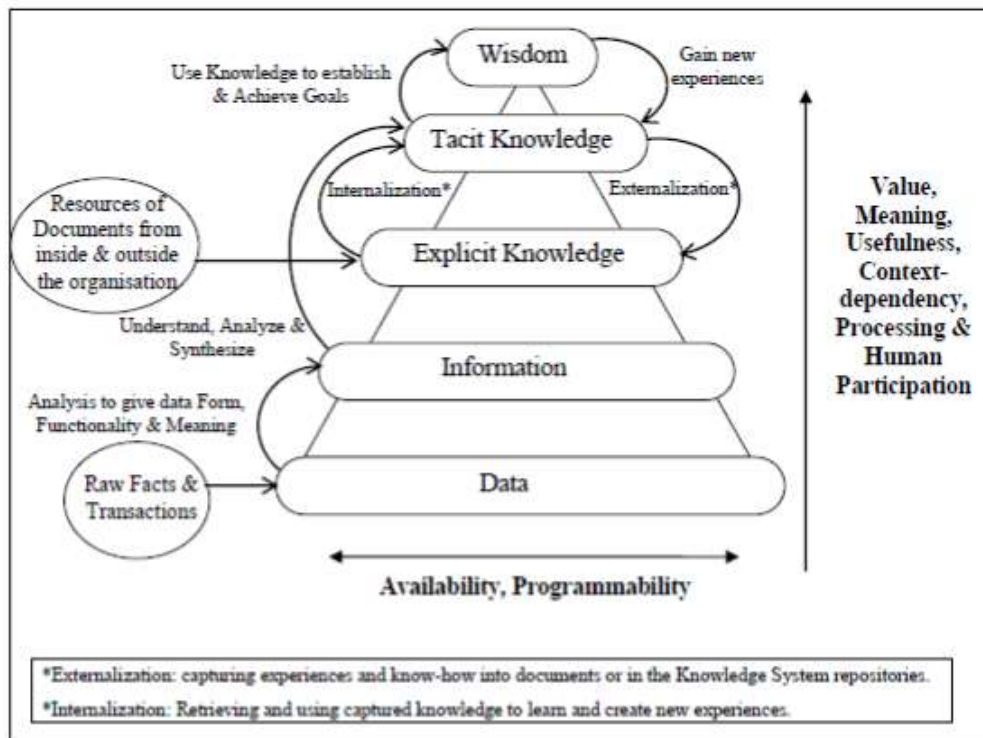


Figure 1 Data, Information, Knowledge, and Wisdom (Davenport et al., 1998; Awad & Ghaziri, 2004; Bierly et al., 2000)

The term Knowledge Management emerged in mid 1990s. The book, *The Knowledge Creating Company* by Nonaka and Takeuchi published in 1994, is by many regarded as the genesis for the mass attention in Knowledge Management as recognized research field. The concepts has been widespread in response to urges to form a knowledge society and the progression of communication technologies that smoothen access to computerized networks system along with real-time interaction. Knowledge Management provides versatile aspect on how to manage and control recourses in form of humans and knowledge. Practitioners and academics from different corners grasp the ideas and started working rigorously to adapt and execrate their theories across a broad range of disciplines (Alavi and Leidner, 2001, Nonaka and Peltokorpi, 2006).

Figure 1 exemplifies a top down structure that has been developed to deliver a convenient way to perceive the differences and relationships among data, information, different types of knowledge and wisdom (Davenport et al., 1998; Awad & Ghaziri, 2004; Bierly et al., 2000). The artifacts guided to realize the different features and consideration of the different types of ingredients and how these ingredients can effect and transform from one type to another.

2.6 Research Questions

The central research questions of this master thesis are the following: What the perception and practices to knowledge management in the institutional level? Why traditional approaches have been fail to apprehend researcher need? What are the factors to improve the value chain?

The construction of research question has been aligned with classical Trivium method. The Trivium method: (pertains to mind) – the elementary three. [1] General Grammar, [2] Formal Logic, [3] Classical Rhetoric. (Joseph 2002)

[1] General Grammar	[2] Formal Logic	[3] Classical Rhetoric
Answers the question of the <i>Who, What, Where</i> , and the <i>When</i> of a subject.	Answers the <i>Why</i> of a subject.	Provides the <i>How</i> of a subject.
“Discovering and ordering facts of reality comprises basic, systematic <i>knowledge</i> ”	“Developing the faculty of reason in establishing valid [i.e., non-contradictory] relationships among facts is systematic <i>understanding</i> ”	“Applying knowledge and understanding expressively comprises <i>wisdom</i> ” or, “it is systematically useable <i>knowledge and understanding</i> ”.

Table 1 <http://www.triviumeducation.com/trivium/>

The main research question is - Why does traditional university Knowledge Management model fails to apprehend the researcher need? Why Knowledge Management (KM) matters for the universities?

Considering trivium method this main question leads to classical rhetoric Meta how-to level; that is How to stipulate an effective and efficient Knowledge Management (KM) system to converse universities as a Knowledge Incentive organization?

In order to address this meta-questions the research objective should be divided on sub questions and address them consequently. Hence, this research scope does not extensively covered every aspect of KM theory. It is rather specifically focuses on selective approaches fit for higher educational institutions. Furthermore, the design science based study provide a real-life insight to understand the perceptions and practices and possible area to improve its value chain.

The main research question has been folded into three sub-question level. The first part will be dealt with theoretical understanding of knowledge management (KM), Scope and Purposes of KM, discusses existing models on knowledge management and its general application to the institutional level. Second part will be dealt with the correlation between KM and University. This part also have three sub questions- situation of organizational structure in higher education for KM readiness, organizational context that will influence to design an efficient knowledge management modeling and the Challenges and Factors Affecting KM. The third part will discuss on how to improve KM value chain at the university level that will propose KM model for the Universities, also discussed the approached of knowledge management in higher education environments, and focused on the associated competencies that both individuals and organization need to acquire.

The main research question and sub questions are presented within the trivium framework is as follows

Why (Formal Logic)		
Why does traditional university Knowledge Management model fails to apprehend the researcher need? Why Knowledge Management (KM) matters for the universities?		
<i>Meta How To</i>		
<i>How to develop an effective and efficient Knowledge Management (KM) modeling to converse universities as a Knowledge Incentive organization?</i>		
RQ 1	RQ 2	RQ 3
How does Knowledge Management (KM) enhance organizational competence to the rapid changing environment	How much University system is flexible enough to apprehend its own created knowledge?	How to improve the Knowledge Management (KM) value chain at the University level
Grammar	Grammar	Grammar
Q1.1: What are scope and Purposes of KM	Q2.1: What is the situation of organizational structure in higher education for KM readiness	Q3.1: What is the appropriate KM model for the Universities
Q1.2: What are Existing Models on knowledge management	Q2.2: What is organizational context that will influence to design an efficient knowledge management modeling	Q3.2: What are the approached of knowledge management in higher education environments
Q1.3: What are the tools and techniques to deploy an effective KM modeling	Q2.3: What are the Challenges and Factors Affecting KM	Q3.3: What are the associated competencies that both individuals and organization need to acquire

Figure 2 Trivium representation of the research question

The Design Science approach is proposed due to the flexible boundaries of the research method and additionally, to be able to conduct a study within real-life context. First of all, the purpose is, to analyze current practices within the university system and create a common ground with design science artifacts thus inspire further research. Secondly, to propose a suitable method for data collection that could aid in answering the research question.

2.7 Research Methodology

This chapter deals with research methodology and guidelines in connection with our research questions. In order to understand entire scenario of research methodology, we define coherent principals of design science, elaborate its framework and guidelines thus depicts a correlation on how to apply this methodology to existing body of knowledge.

2.7.1 Rationale for Selecting Design Science as Research Tools

The study adopts Design Science research methodology as we consider design science a problem solving process. “The fundamental principle of design-science research from which our seven guidelines are derived is that knowledge and understanding of a design problem and its solution are acquired in the building and application of an artifact.” (Hevner, March, Park & Ram, 2004)

Design science paradigm strives for outspread the boundaries of human and organizational capabilities by evolving innovative artifacts. “Design science, creates and evaluates IT artifacts intended to solve identified organizational problems”. “Such artifacts are represented in a structured form that may vary from software formal logic and rigorous mathematics to informal natural language descriptions.” (Hevner, March, Park & Ram, 2004)

It encompasses a systematic approach to design artifacts to solve observed problems, leveraging research contributions, appraising the designs, and finally conversing results to the right audiences. Hence the artifacts would comprise versatile constructs, models, methods, and instantiations. This rigorous process also embrace “social innovations or new properties of technical, social, and/or informational resources; in short, this definition includes any designed object with an embedded solution to an understood research problem.” (Hevner, March, Park & Ram, 2004)

Design science research depicted with three cycles. The relevance cycle create a space for the conditional background of the research project for design science activities. The rigor cycle open up a linking path between design science and existing body of knowledge for scientific competence, groundwork, and experience in correspondence with a research field. In between the central design science cycle reprises the accomplishment to enhance the key activities by constructing and evaluating the design artifacts and the workflow of the research itself.

Left side of figure 3 is a circumstance where the business needs are developing. This environment is possessing personnel with their particular roles, capabilities and characteristics. Organizations is meant for with strategies, structure, culture and processes. Lastly it deals with technology which include Infrastructure, Applications, and communications architecture and development capabilities.

Left side of figure 3 is a circumstance where the business needs are developing. This environment is possessing personnel with their particular roles, capabilities and characteristics. Organizations is meant for with strategies, structure, culture and processes. Lastly it deals with technology which include Infrastructure, Applications, and communications architecture and development capabilities.

Right side of this framework have knowledge base where the researchers in the Information Systems (IS) discipline obtained theoretical and methodological support. This part is divided into two broad categories foundations and methodologies.

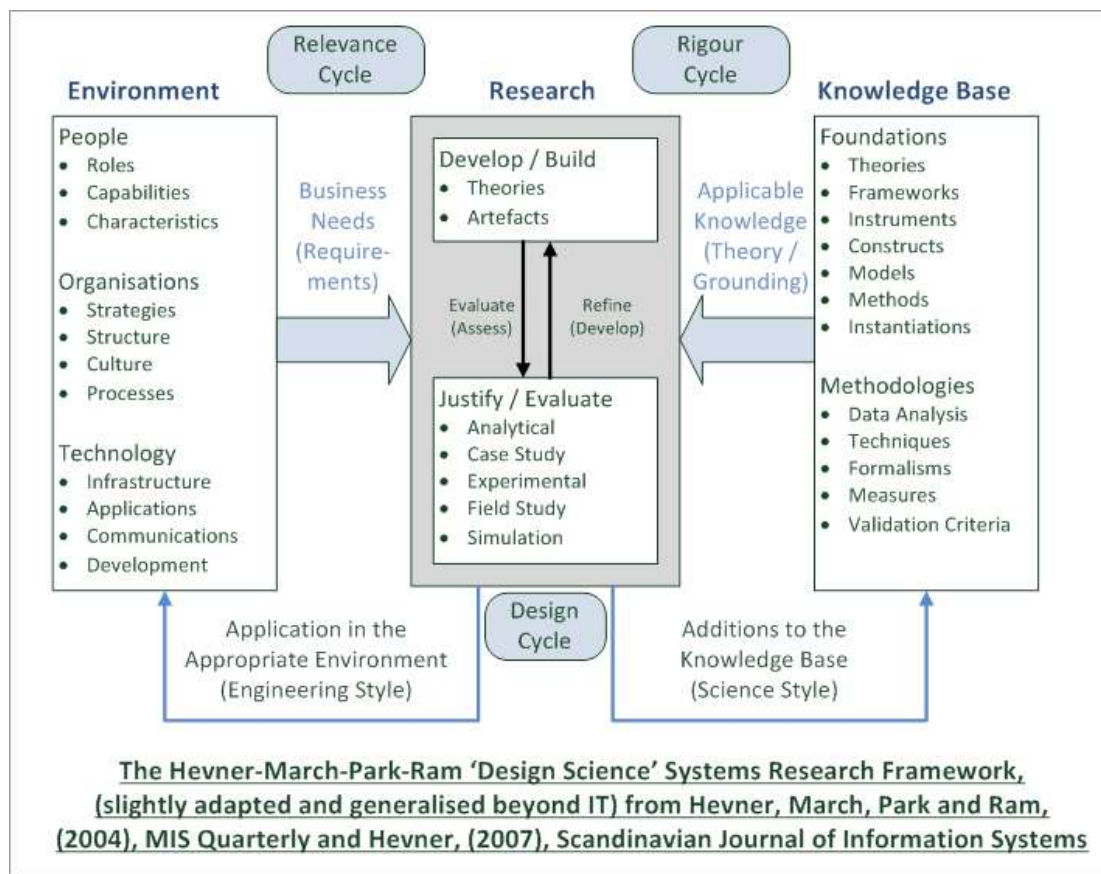


Figure 3 Design Science research framework Hevner, March, Park & Ram, 2004

In the middle there is actual research activities where environment comes as relevance and knowledgebase comes as rigor to design the research either in a form of creating new knowledge (theory artifacts) or evaluating the existing one (case study, simulation etc.).

Henceforth, Design Science incorporated in business and IT considering information systems and organizational infrastructure. Therefore, we understood the design science will be best fit as a research methodology to address our research questions.

2.7.2 Design science research guidelines

The essential norms of design-science research laid upon seven guidelines that stipulated “knowledge and understanding of a design problem and its solution are acquired in the building and application of an artifact.”

This guidelines provide more descriptive and detailed out on how to apply research methodology to existing body of knowledge.

Table 1. Design-Science Research Guidelines	
Guideline	Description
Guideline 1: Design as an Artifact	Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.
Guideline 2: Problem Relevance	The objective of design-science research is to develop technology-based solutions to important and relevant business problems.
Guideline 3: Design Evaluation	The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.
Guideline 4: Research Contributions	Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.
Guideline 5: Research Rigor	Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.
Guideline 6: Design as a Search Process	The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.
Guideline 7: Communication of Research	Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences.

Table 2 Design science research guidelines Hevner, March, Park & Ram, 2004

Based on these guidelines our proposition for this research is as follows-

Guideline 1: Design as an artifact

This is where the building of the artifact starts. This research effort develop an appropriate KM model to overcome different problems on KM implementation process for universities to help on managing knowledge. Through analyzing and compering different models and their elements such as the process (or control flow), the performance, architecture, and organizational perspective will become the de facto standard to determine as this artifact. The artifact will be introduced to show its capabilities of problem-solution features of one or more aspect of the defined problem.

Guideline 2: Problem relevance

Considering the facts that the traditional Idea of the classical university system apprehend as hegemony on knowledge within the society. How much its system is flexible enough to apprehend its own created knowledge? In this regards, we are proposing KM as tools to understand the progression of our universities in connection with contemporary society, where an appropriate KM model will foster implementation process effectively and efficiently.

Guideline 3: Design Evaluation

At this stage observation and measurement, takes place referring the artifacts relationship with the problem-solution approach. It can be used to spontaneously evaluation process fowling DSR evaluation method.

Guideline 4: Research contributors

This research effort expected to present a basic concept of Knowledge Management (KM) to facilitate one to grasp the idea and design a KM model in a structured way at the university level as well as and understanding its necessity to rapid changing environment.

Guideline 5: Research Rigor

This thesis therefore makes an effort to attract attention of our universities to create an effective KM environment. Enhancing competence on how to manage own knowledge, and flexibility on how to adapt changing conditions. Objectives that were set before needs to be correlated to the actual outcomes of artifact demonstration.

Guideline 6: Design as a search processed

This research starts with an overview of approaches and technologies that use event data to support decision making KM process (re)design. Process mining seeks the confrontation between event data (i.e., observed behavior) and process models (hand-made or discovered automatically). Then the research focuses on search process as a bridge between process mining and KM process modeling.

Guideline 7: Communication of research

Thesis considered to be serve as a state-of-the-art of Knowledge Management process by developing methods that really work, by creating an open community, and by providing a stable and easily extensible platform, which optimally supports process mining.

2.8 Structure of the Thesis

The thesis structure will be as follows:

The second chapter provides an introductory overview of this thesis. It presents research background for the investigated topic and serves as a bridge to understanding the remaining chapters. It also presented research question in a logical sequence and elaborate research methodology and reasoning to select specific methodology to conduct this research. All research questions are investigated in Chapters 2 to 5 respectively and answered with a reference to the existing body of knowledge. The current academic literature and articles written by practitioners help to conclude the findings from the empirical data analysis and execute case-study based research

The third chapter gives a review of the academic literature and introduces several models that are closely related to this research. It provides definition of knowledge management, discusses categories of knowledge, and general practices of km at the organizational level.

The fourth chapter gives a strong overview of the tendencies taking place in KM field, identifies significance and the limitation in the area and clearly outlines the importance of bringing KM to the higher educational institutions. Additionally, the theoretical approaches are developed. In this chapter comparison of different KM model has been analyzed. This chapter finds the knowledge gap that exists in KM field.

The fifth chapter discussed and presented all functional requirements deploy and effective KM system into Universities. It discussed situation of organizational structure in higher

education for KM readiness also elaborate organizational context that will influence to design an efficient knowledge management modeling. The chapter also briefly focuses on challenges and factors affecting KM. After this, conceptual modeling and strategic framework of KM is proposed so that policy level adaptation has been addressed.

The Sixth chapter introduces a KM model suitable for the universities. It also discussed different components of the KM model and associated competencies that both individuals and organization need to acquire to adopt this model. It also concentrates on the validation procedures and discusses the limitations of the work.

The seventh chapter evaluated the proposed model discussed its advantages and limitations and summarized the findings.

The final chapter answers the central research question and concludes the master's thesis. It serves as a conclusive remark for the entire thesis, summarized findings. Simultaneously, research implications and future research suggestions are presented.

3 Theoretical background and Literature Overview

The Chapter discusses the concept of Knowledge Management. It give an overview of history and different approaches, and finally present a previous study on Knowledge Management in the institutional level. Knowledge Management is an interdisciplinary research field but belongs primarily to informatics. The last theoretical section presents some pedagogical perspectives on working life learning.

Review of literature guide this research work to relate on the KM paradigm that provide necessary understanding and support to the research topic and bring out several examples of KM models that help the research more credible. Existing KM models in different field will be reviewed and analyzed. The pros and cons of the current KM models will be discussed in order to find out proper solutions. Finally this effort creates a theoretical basis for designing a new KM model that fills gaps of other existing KM models has been used in the higher educational sectors.

3.1 Definition of Knowledge Management

Definitions of knowledge management vary depending on diversified aspects that includes firstly the perspective on knowledge itself, and the processes and activities accounted, and the anticipated goals (Alavi & Leidner, 2001, Earl, 2001).

It has been typical to differentiate knowledge from data and information, where data is raw numbers, images, and words. Information is data arranged in meaningful patterns. Information is a message with a sender and a receiver. Knowledge is about beliefs, commitment, judgment, intentions and action (Davenport and Prusak, 1998, Nonaka and Peltokorpi, 2006).

Nonaka concludes that “information is a flow of messages, while knowledge is created and organized by the very flow of information, anchored on the commitment and beliefs of its holder” (Nonaka, 1994 p. 15). Davenport and Prusak (1998) offer a definition of knowledge that expresses the characteristics that make knowledge both valuable and difficult to manage: “Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or

repositories but also in organizational routines, processes, practices, and norms”. (Davenport and Prusak, 1998 p. 5)

There are number of definitions and interpretations of KM have been used in the literature due to its versatile nature and diversified applications in different fields. However most of the definitions have a common understanding, which is construction, deconstruction, diffusion, preservation, dissemination and application of either existing or new knowledge (Coombs et al., 1998).

It is worthy to mention that, the terms ‘Knowledge management (KM)’ and ‘Knowledge management Systems (KMS)’ are used interchangeably among the academic and practitioner. Sometimes the system refer to the technological or software components of the KM (Abdullah et al. 2002)

Following are some definitions of knowledge management

References	Definitions
McInerney (2002)	“Knowledge management (KM) is an effort to increase useful knowledge within the organization”. “Ways to do this include encouraging communication, offering opportunities to learn, and promoting the sharing of appropriate knowledge artifacts”.
Carlucci et al. (2004)	“The KM is a managerial paradigm which considers knowledge as a resource at the basis of a company’s competitiveness”. It identifies the capabilities to generate value for a company’s stakeholders with the explicit and systematic implementation of approaches, techniques and tools for the assessment and management of intellectual capital”.
Wiig (1997)	“It is a set of distinct and well-defined approaches and processes. The overall purpose of knowledge management is to maximize the enterprise’s knowledge related effectiveness and returns from its knowledge assets and to renew them constantly”.
Beijerse (2000)	“It is the management of information within an organization by steering the strategy, structure, culture and systems and the capacities and attitudes of people with regard to their knowledge”. “It is the achievement of the organization’s goals by making the factor knowledge productive”.
Davenport and Prusak (1998)	“It consists of processes to capture, distribute, and effectively use knowledge”.
von Krogh, 1998).	“Knowledge management is concerned with identifying and leveraging the collective knowledge in an organization to help the organization compete”.

Table 3 Definitions of Knowledge Management

Information systems and technology and management science—forming a shape to the body on knowledge management theorem. Theory from numerous research streams from diversified sectors has focused on developing comprehensive knowledge management discussion. These discussions have included a number of critical dimensions to the design of a knowledge management model for different organizations. These contain multifaceted scopes of understanding the type of knowledge (explicit and/or tacit), Type of the Knowledge actor (individual, team), the boarder of the organization (organization, and/or inter-organization), the knowledge process (access/accumulate, collect/creation, retention/ retrieval, sharing/storage, transfer/Transform).

3.2 Categories of Knowledge

There are no unique Knowledge classification systems as different user groups have been classified knowledge accordance with their own purposes and interest.

Perusing Knowledge management the librarianship is the first user group who tried to categorize knowledge, where storage and retrieval of the different knowledge products such as books, journals, and documents was the major concern. They used 'Faceted classification' scheme which is a set of semantically cohesive categories, either general or subject-specific, to combine in accordance with the requirement to create an expression of a concept. Hence the classification method is relatively flexible enough to facilitate the resulting expression of complexity subjects as "clearly defined mutually exclusive and collectively exhaustive aspects properties or characteristics of a class or specific subject" (Taylor 1992). Time, place, and form are frequently used as general-purpose facets.

Another approach of knowledge classification is Ontology-based systems which is wide used by Information Technology. Ontology is a categorical description and arrangement that represent formal way to demonstrate what knowledge exists in a knowledge-based, that enriches searching competences, permitting the knowledge categorization and minimizing the topics redundancies of the different knowledge domain (Gruber, 1993). Ontology-based scheme specify an apparatus to organize knowledge domain into inter-related modules that follows a semantic relationship with hierarchical structure. Therefore knowledge can be retrieved in connection with its meaning, thus allowing human and computers to interact within a knowledge framework.

Nonaka and Peltokorpi (2006) have consolidated different perspectives on some of the most basic themes in KM, where one of the most important discussions was the complex nature of knowledge. Examples of taxonomies used to classify different types of knowledge are know-that and know-how, declarative and procedural knowledge; perhaps the most frequently used is tacit and explicit knowledge.

Michael Polyani was initially introduced the concept of tacit and explicit knowledge, however, it was becoming popular through theory of organizational knowledge creation by Nonakas (1994). The proposed taxonomy argues to a hypothesis that most of our knowledge is difficult to articulate because it is grounded in our actions, involvements, and experiences and is more or less unconscious to us. Explicit knowledge is theoretical knowledge and information we can express with our language, but it exemplifies the iceberg tip only comparing to the entire body of possible knowledge (Nonaka, 1994).

Afterward most of the academic literature classified organizational knowledge into two categories - explicit and tacit. It is also widely accepted that explicit knowledge is typically easy to acquire, preserve, retrieve, reuse as it has been codified in words and numbers, so it supposed to be managed more effortlessly, whereas tacit knowledge is very personal and exists only with individuals“ in the form of experiences or know-how which is not easy to capture, manage and transmit. Nevertheless, tacit knowledge also can be captured, accumulated, managed and twisted into explicit knowledge, which become accessible and understandable to others. This effort enhance organizational to competency, rather than reinvesting time and effort to relearn from the same thing again and again and prevent on repeating mistakes, which already have been learnt how to solve and avoid in previous problems (Gore & Gore, 1999).

3.3 General Practices of KM

The four basic processes in knowledge management is creating, storing/retrieving, transferring, and applying knowledge. Either structured or unstructured any kind of knowledge is diffused by different forms of codifying, written or spoken and scientific interest has been aimed at the communication of knowledge in different forms.

As we already discussed that the knowledge exists in two principal forms, explicit and tacit, the critical difference between tacit and explicit knowledge relates to how easy or difficult it is to codify or communicate the knowledge in terms which enable it to be

understood by a broad audience. In the domain of KM implementation the conversion of tacit knowledge to explicit knowledge is crucial because knowledge becomes part of an organization's network (Herschel, Nemati, Steiger, 2001).

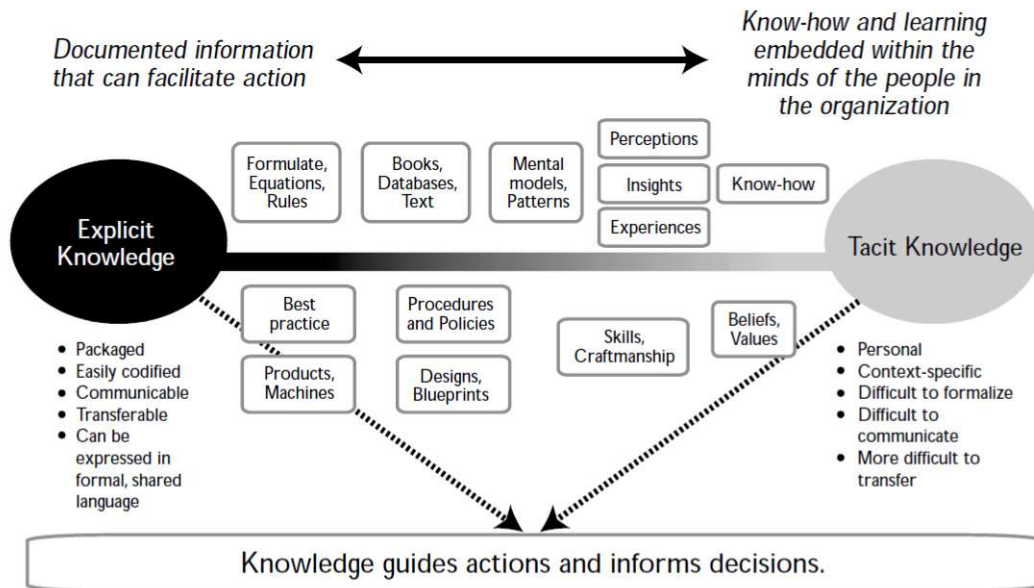


Figure 4 Knowledge management practices (Kidwell et al 2004)

Some researchers argue that the knowledge management is more than the capturing, storing and transferring of information, it also requires interpretation and organization of information from multiple perspectives. The following three steps need to be embedded for knowledge management process in the organization Wolf (2000):

- Determine what kind of knowledge is critical and useful to the business and how it will best support the company strategy
- Identify where this knowledge is to be created, when it is most useful to share it and how this can be done in the context of the organization
- Institutionalize knowledge management processes as an integral part of the organization's business processes

Most of the successful organizations are engaging the "practitioner" learning communities of practice by identifying some groups of people who share a common passion for a specific thing that they know why and how to do, and they are interacting regularly for learning how to do it better (Wenger (2004). Wenger argues that the communities of practice manage their knowledge. "If you had enough knowledge to micro-manage

communities of practice you would not need them”. In this way the communities themselves are becoming recognized as valuable organizational assets.

However one of the major caution is organizational management structure. If the organizations inspire individuals to accomplish individual goals and offer incentive based on individual performance which is a characteristic industrial age management practice the KM initiative will be vain and futile. KM initiative will be operative and proficient if the organizations highlighting collective goals and cooperative work and rewards has been distributed as team collectively.

Knowledge management contains the ability to create, capture, locate, and share an organizational knowledge and expertise, as well as embrace the capacity to crystallize organizational problems and opportunities. Considering a situation when information is limited and more costly to acquire, it should be those organizations have the competitive edge who have most information. On the contrary when an organizations are facing challenged by an explosion of chaotic information—the edge belongs to those that have the right information. If the organization can apply the knowledge at the right time, they become more competence to other. In present situation of quick change and technological discontinuity, even knowledge and expertise quickly became obsolete which has been stored or shared previously. If the organizational knowledge does not managed properly the knowledge has become fragmented, difficult to trace and share, and becoming redundant, inconsistent, and finally will not be used at all.

The management of organizational knowledge is essential to escalate performance. A large number of academic research focuses on organizational learning and promoting learning organization to optimize core competencies and dynamic capabilities.

Knowledge Management is the aptitude of harnessing knowledge that connect people, culture, process and the technology together to maximize competitiveness of the higher educational institutions. However it requires voluntary implementation by the people/academic staff for the benefit of universities in general and for the benefit of the students in particular.

3.4 Studies Regarding Knowledge Management in Educational Institutes

Studies regarding knowledge management in educational institutes has been investigated by systematic reviews and its associated meta-analysis. While systematic reviews heighten the imperative contributions to a specific knowledge domain, where meta-analysis, consecutively, supports a statistical procedure for synthesizing findings of that knowledge paradigm (Jesson et al., 2011).

Generally speaking, there are not adequate number of studies regarding KM in the educational sector. Even though some researchers have considered on this subject matter, however most research mainly focuses on the KM theory and practices in other sectors and compared with the KM status of the higher educational institutions.

Designing an appropriate KM model for the universities to utilize its own generated knowledge to strengthen their organizational competency far from enough.

Piccoli et al (2007) presented a model or framework for the universities, however they main focus was only learning or academic knowledge management. This framework is IT driven and creation, management and transformation of knowledge conducted at web-based virtual environment. The three core components of this framework is search engine, production engine and learning engine.

Wei-Li Wu. Et al. (2013) also focuses on knowledge transfer from teacher to learners. They argued “the tutors (front line teachers) are knowledge workers who need to absorb large amounts of information in order to build up the basis for knowledge creation”. They applied the knowledge spiral of Nonaka and Takeuchi to analyses the knowledge transfer and creation process of an educational organization. The main argument of this study was inner-organizational knowledge circulation can be acquired through the members’ mutual interaction and sharing. However, the most remarkable finding of this study is “identifying the role of different knowledge workers in the educational organizations”.

Eftekharzade and Mohammadi (2011) tried proposed a suitable KM model for the university. This study considerably one the first effort to design a Model for Creating Knowledge Management in Educational Institutes by exploring the state in Islamic Azad University, Tehran, Iran- regarding organizational culture, information technology,

organizational structure and human resources. The researchers used use of descriptive and inferential statistics to determine an exclusive model along with the stages and steps of implementation of that university.

Among others Mac Carthy (2006) Coukossemel (2006) Praba Nair (2009) tried to present framework on knowledge management in higher educational environment. Different perspectives has been stressed in their study such as multidimensional strategic model, innovations in the organizational culture, key elements for implementation - culture, human resources, information technology and leadership and so forth.

Knowledge management does not a radically new idea that may strike the long tradition of universities; conversely, it is a new twist on their *raison d'être*. But implementing knowledge management as a system is a complicated lesson that the corporate sectors already attained in a successful manner. The research is taking account of available study on KM in the University environment, where the focus is will be to abstract concepts or framework or models, along with anecdotes that increases significantly to both the theoretical and practical opening of KM research.

4 Understanding KM

Knowledge management is a rigorous process, Even if knowledge can be codified it may also require interpretation and understanding. Knowledge is acknowledged as a main source of competitive advantage but little is known about how to construct and control it in practice (Wenger cited in Chauvel and Despres 2000, p205). Whenever an organization pursuit for a techniques to gain a competitive advantage, they should leverage their knowledge capital increasingly.

Manipulating any knowledge assets of an organization is more complex and challenging than exploiting its capital assets. Therefore now a day every organization is very keen to identify the niche areas of knowledge opportunity, grasp it and transform it into explicit form, so the knowledge will be usable and offers a competitive advantage among their competitors. The preliminary step for managing knowledge in an organization is to determine its core capabilities, where core competences are grounded on the skills and experience of the personnel who do the work, and may not exist in physical form.

This chapter will discuss on how Knowledge Management (KM) enhances organizational competence to the rapid changing environment.

4.1 What are scope and Purposes of KM

The scope and purposes of Knowledge management aligned with the process of knowledge creation. Bahrami (1992) highlighted the rise and triumph of a bi-modal organization that encompasses contradictory tensions and but still work as a coherent and cohesive manner. He argues that the organization should dialectical attributes at the same time such as- centralization and decentralization, stability and dynamism, and uniformity and diversity.

Hence, he theorizes a conclusion that each of these dimensions should not be consider as either-or rather as both, and then a serious question for the organization emerges, which is – How to. He recognizes the two contrasting modes that organizations essential to embraces and balance as control and autonomy. Control is considered into focus, minimum redundancy, market timing, global products, and current performance. On the contrary autonomy is considered by quick response, innovation, local methods, future products, with long term vision. This thought have a great influence on the contemporary

knowledge management practices where the organization knowledge most seen within a polarized context.

Since the taxonomies used in knowledge management to categorize different form of knowledge are dealing with - know-that and know-how, declarative and procedural knowledge; perhaps the most often described is tacit and explicit knowledge.

Several studies have shown that tacit knowledge confers the very significant role of KM for any organization (Burgess and Singh, 2006). However, most of the existing KM models and tools can only concentrated on explicit knowledge. Nonacademic knowledge generated in the universities, especially tacit knowledge, deem to be lost from the universities due to very simple reasons, such as the responsible personnel with experiences leave the institutions or the knowledge has been preserved in old fashioned filing systems.

As knowledge is naturally fluid and closely linked to techno-economical paradigm shift, its categories and meanings has been deconstructed frequently. Therefore the structures of knowledge management is not too rigid, it rather flexible enough to resemblance the pattern of knowledge requirement within and beyond the organizational settings.

A key advantage of implementing KMSs in universities is to enable robust businesses process to complete the academic research with reduced cost and time while improving quality of the administrative work. By reusing and improving existing experiences and knowledge, academics can find solutions for their problems without investing additional efforts and time, resources on reinventing solutions that have already been implemented elsewhere.

Knowledge management can increase the adeptness and usefulness of an organization's strategy through its initial information processing layer; it also escalate organizational consideration of the value and utilization of its strategic knowledge capitals through the core sense-making layer; and it can deliver the directions for organizational identity conversion through its top layer of learning.

Therefore Knowledge management initiatives of the universities are directly linked to economic benefit or competitive advantage of the organizations. It can be either in the form of cost saving or income generating, or more indirect in form of other measures like academic superiority or excellence.

4.2 What are Existing Models on Knowledge Management

KM modelling is an artifact constricted with graphical and textual presentations to elaborate the real-life system of KM in order to define the knowledge management topographies, structures, modules, cycles, tools, processes, practices and other factors that can affect the organizational knowledge and/or the knowledge management systems (Davenport & Prusk, 2000; Abdullah et al., 2002). These models are used to deliver a guideline to deploy and implement KM efficiently and effectively. It also stipulate structured planning in connection with procedural steps and that leverage KM efforts in different stages of designing, evaluating, implementing, monitoring and improving the KMSs for organization.

Several KM models have been designed and implemented to foster KM activities. However, most of the KM models currently used only provide either a communication platform or a storehouse for data or a repository of explicit knowledge, where the good example might be the knowledge management approach of an academic library- a knowledge refrigerators. Moreover many KM efforts also have structural limitation and methodic shortcomings to align with organizational objectives and strategies.

These hurdles and challenges broadly affect the fruitful management of knowledge, which is a reason for developing a more comprehensive and coherent approach for utilizing knowledge for the universities. Therefore, it is necessary to design a new KM model which will be implemented to fulfil the requirements of the universities to manage organizational knowledge effectively.

In addition to that KM models has been practiced to evaluate effectiveness of current KMSs in organizations and support to adopt and achieve necessary improvements (Robinson et al., 2004). KM models also guide to harmonize the activities of the different actors and/or stakeholders who work on developing the KMS or striving several actions of the KM processes, by giving details of tasks, work phases and rigor for implementation.

Several methods, tools and techniques have been emerged to capitulate different challenges of knowledge management or minimize the risks. Followings are some KM models those has been widely accepted an implemented in different sectors.

4.2.1 SECI Model

Nonaka's designed an artifact namely SECI model (Nonaka, 1994) gradually that has become an iconic framework to understand knowledge activities of an organization.

With this simple artifact Nonaka (1994) designed a very complex flow of knowledge within an organization, where the knowledge have two major category - Tacit and Explicit, and there are four modes of knowledge conversion. He proclaimed the assumption where knowledge is created through alteration between tacit and explicit and it allows us to postulate four different modes of knowledge conversion:

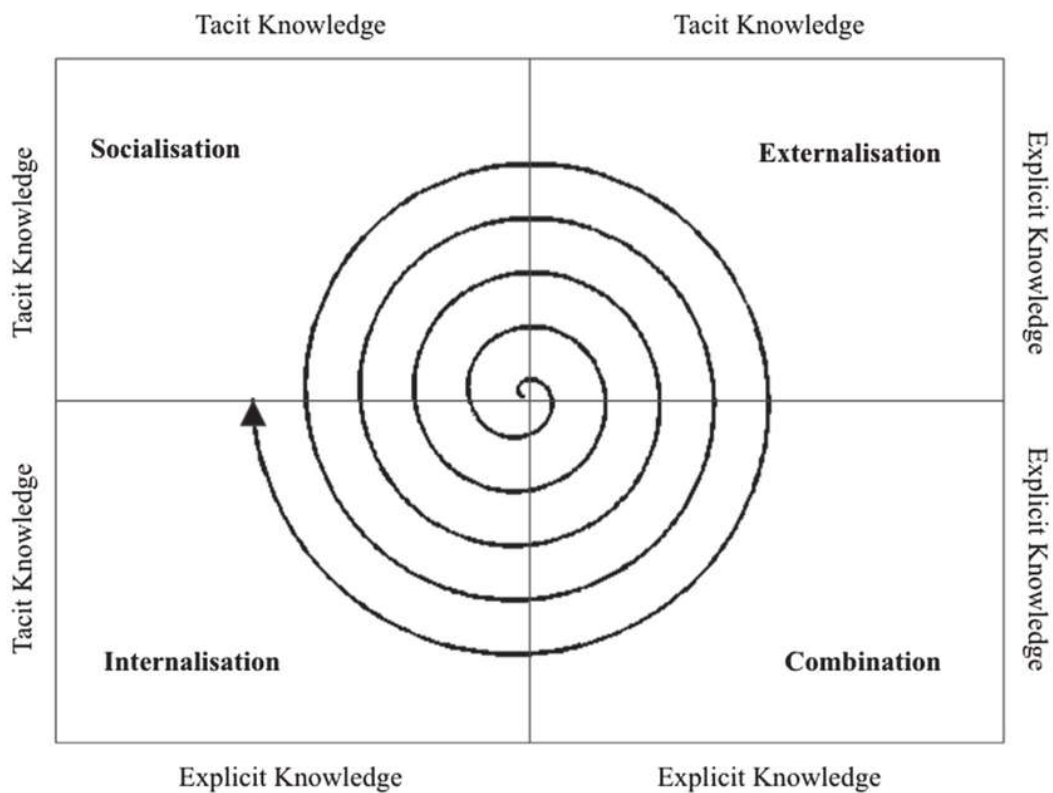


Figure 5 the SECI Model (Nonaka & Takeuchi, 1995)

a. Tacit to Tacit (Socialization). This is the mode of knowledge conversion that enables us to translate tacit knowledge through experiences or interaction between individuals. As tacit knowledge is hard to formalize due to its time and space specific constrain, the tacit knowledge can be acquired only through shared experience. Socialization typically occurs in a traditional apprenticeship through informal social meetings outside of the workplace rather than from written manuals or textbooks (Nonaka, Toyama, Konno, 2000).

b. Explicit to Explicit (Combination) –. This mode of knowledge conversion involves the use of social processes through combining different types of explicit knowledge. In the context of the explicit knowledge is accumulated from inside or outside the organization and subsequently it has combined, revised or managed to form new knowledge. Finally it has been circulated among members of the organization (Nonaka, Toyama, Konno, 2000).

c. Tacit to Explicit (Externalization) – Concepts, Visuals, and written documents belong to this type of conversion. Externalization embed the combined tacit knowledge that allow further communication in convenient way to its recipient. However, the conversion process of Externalization is crucial as it is requires knowledge amplification process, thus makes knowledge crystallized and allowing it to be shared by others. Through this rigorous process it becomes the source of new knowledge (Herschel, Nemati and Steiger, 2001).

d. Explicit to Tacit (Internalization) –. This mode is associated with ‘learning by doing and actualized through action and practice ‘(Nonaka, Toyama, Konno, 2000). Knowledge receiving and application by an individual is connected with theories of organizational culture. Through this process organizational knowledge becomes part of an individual's knowledge

Hence, it is a competence to learn how to manage own knowledge and flexibility on how to adapt changing conditions that will increasingly determine the performance indicator of individuals, institutions, regions and countries.

Nonaka and Takeuchi (1995) proposed that knowledge is generated through non-stop interactions between tacit and explicit knowledge to construct four notions (Socialization, Externalization, Combination and Internalization), those are captured in the SECI model. Nonaka suggested that there should be a continuous process to create new knowledge where every member of an organization considered as a knowledge worker. He also argues that new knowledge always initiated from an individual and that individual’s personal knowledge later has been converted into tangible organizational knowledge.

4.2.2 Hedlund KM model

Hedlund (1994), consider similar dimensions in his knowledge management model- explicit vs tacit knowledge and individual vs social knowledge, where as he differentiates

this dimensions into four separate parts: individual, small group, organization, and the inter-organizational domain.

Hedlund's (1994) KM Framework

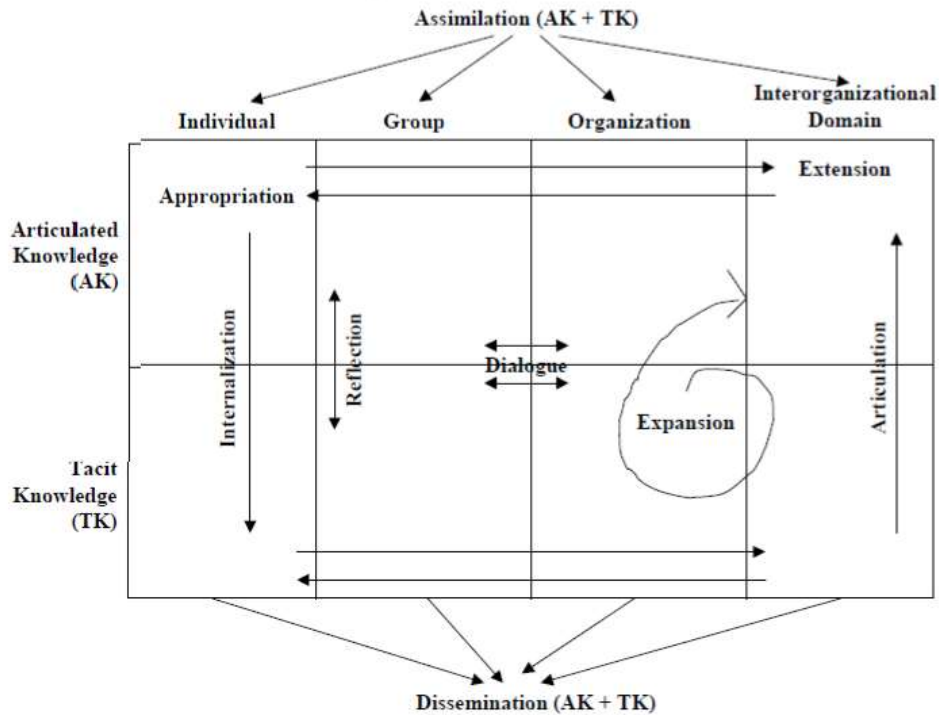


Figure 6 N-form KM model Hedlund (1994)

He tried to define the knowledge transfer and transformation processes that depend on the types of knowledge within organizational levels. He specified three processes that interact within the organization and one that step out knowledge across the organizational periphery.

The first internal process named as reflection, which consisted with the give-and-take processes of internalization and articulation, where the transfer and transformation of explicit knowledge into tacit knowledge called internalization and transfer and transformation of tacit knowledge into explicit knowledge called articulation

The second internal process named as dialogue, encompassed of the also sharing processes of extension and appropriation where transfer and transformation of from the individual level through to the inter-organizational level called extension and transfer and transformation of knowledge from the inter-organizational level through to the individual level called appropriation.

The third internal process named as expansion that comprised of the routing knowledge from its local creation or acquisition point to large global domain of the organization.

The last processes named as assimilation and dissemination. Both are dealing with transferring explicit and tacit knowledge over the organizational territories, where Assimilation processes oversee the transmitting knowledge from the external environment into the organizational level, and dissemination processes manage the transmitting knowledge from organizational level to the external environment.

4.2.3 IMPaKT model

Robinson et al. (2004) developed the IMPaKT model (Improving Management Performance through Knowledge Transformation). This model a three-stage approach on knowledge management. At initial stage the model focused on the strategic aspect of a business that set up targets and benchmarks. The middle stage dealt with KM adaptation of that strategy by identifying existing knowledge and knowledge gap and process. The final stage meant for evaluating impact of KM in connection with business performance.

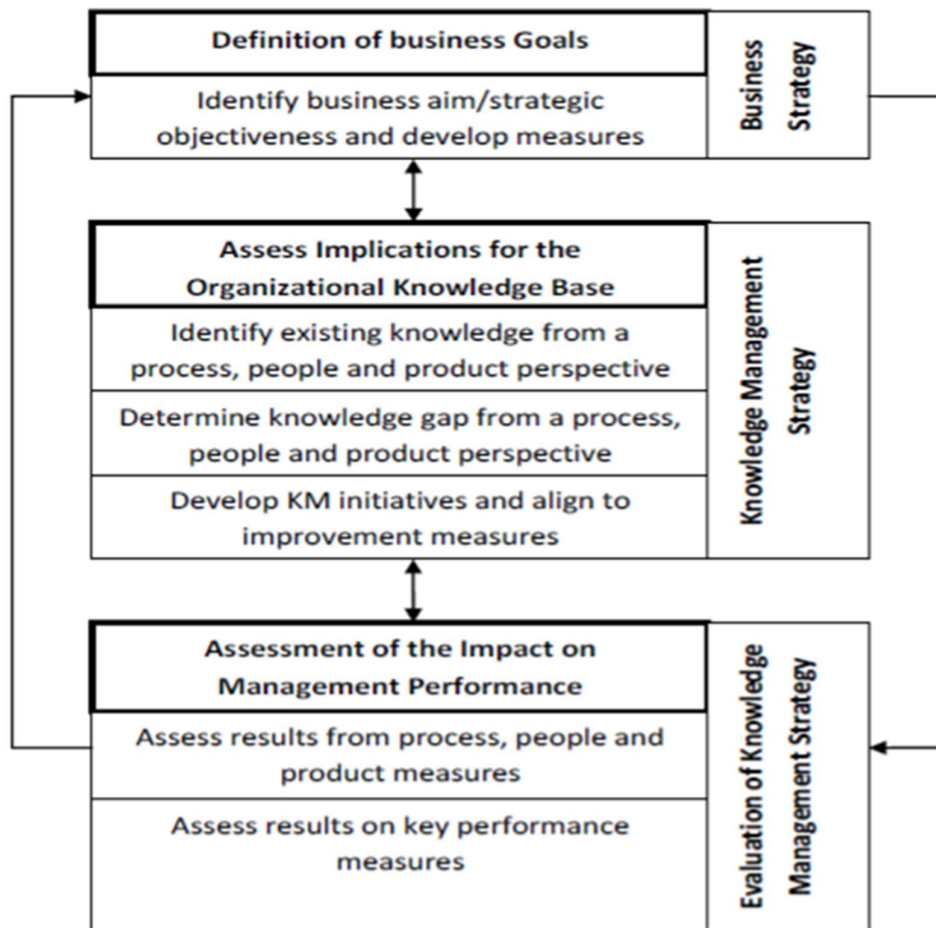


Figure 7 IMPaKT Model (Robinson et al., 2004)

Considering IMPaKT model, the first part enable a provision to formulate a business improvement plan. It started with defining key terms and components of the plan, setting up a framework, target and performance benchmark, measurable indicators and expected benefits. The outcome if this exercise have direct impact on the following stage.

The second part focuses on formulating knowledge management strategy which should be in line with first stage. This part include identifying knowledge base, knowledge gap, knowledge actors, defining their roles, activities. All of these element played vital role to assess performance indicator of an organization. The Readiness Assessment Checklist have key criteria of result monitoring mechanism and indicators that indicates organizational readiness.

The final part evaluate the management performance based on the assessment framework. The performance mature include people, product and the process of an organization

supported by the cause-and-effect map, cost and benefit checklists, and a priority matrix. Through this assessment process the organization identify their business performance.

4.2.4 Activity-based KM model

Tserng and Lin (2004) developed this idea to the apply KM to construction projects. 'Activity-Based' means all information and knowledge generated form each activity from different projects should be categorized and preserved in line with project timeframe. The core objective of this model is to streamlining the mode of gathering and reprocessing knowledge. This model embodies the activities and processes and classified them that are essential for an effective execution and use of KMSs.

This idea adopted the IDEF (Integrated Definition function) modelling method to deliver a prototype for KMSs which initially developed by U.S. Air Force during the 1970s in to increase manufacturing productivity through application of computer technology (IDEF0, 1993).

This model is poised of techniques and steps to capture an organized demonstration of the functions, activities and processes within a system; either focus on the structure and semantics of information or the time-varying behavioural characteristics.

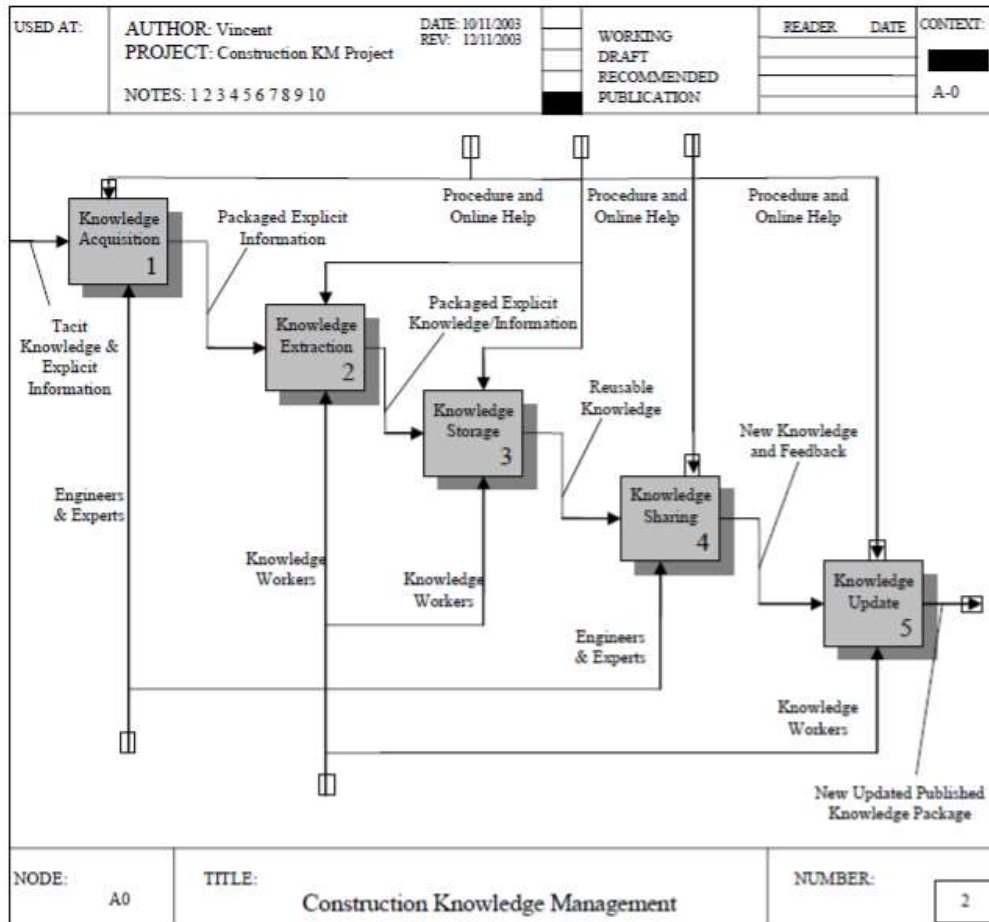


Figure 8 Activity-based KM model used by IDEF0 (Tserng & Lin, 2004)

Tserng and Lin (2004) applied this modelling to characterize several activities and processes that are needed for KMSs implementation in a successful manner. It also indicates the relationships among the various activities along with inputs, controls, outputs. There are five main activities of KM and each main activities also divided into sub-activity level.

Accumulation of knowledge started with collecting data and information include every activities which played vital role for concerning a project. Extraction of knowledge include activities which is required to transform data and information into knowledge. Then the knowledge storage phase where knowledge has been classified and preserved in a centralized condition. Sharing Knowledge stage enabling the actors to disseminate the stored knowledge. The last stage is Knowledge Update, where it gather feedback from different operators to update the existing knowledge.

4.2.5 E-Cognos: ontology-based KM Model

E-Cognos KM model named by its parent organization E-Cognos, which is a European R&D project for electronic consistent KM between enterprises and intuitions aims at promoting consistent KM within collaborative environments (Lima et al., 2005). The E-Cognos provide a platform based on ontology with adequate search and indexing capabilities that allows updating organizational knowledge and formal documentation. This model also widely practiced by different international organizations such as UN or World Banks.

The model followed cyclical approach that consists of eight different phases.

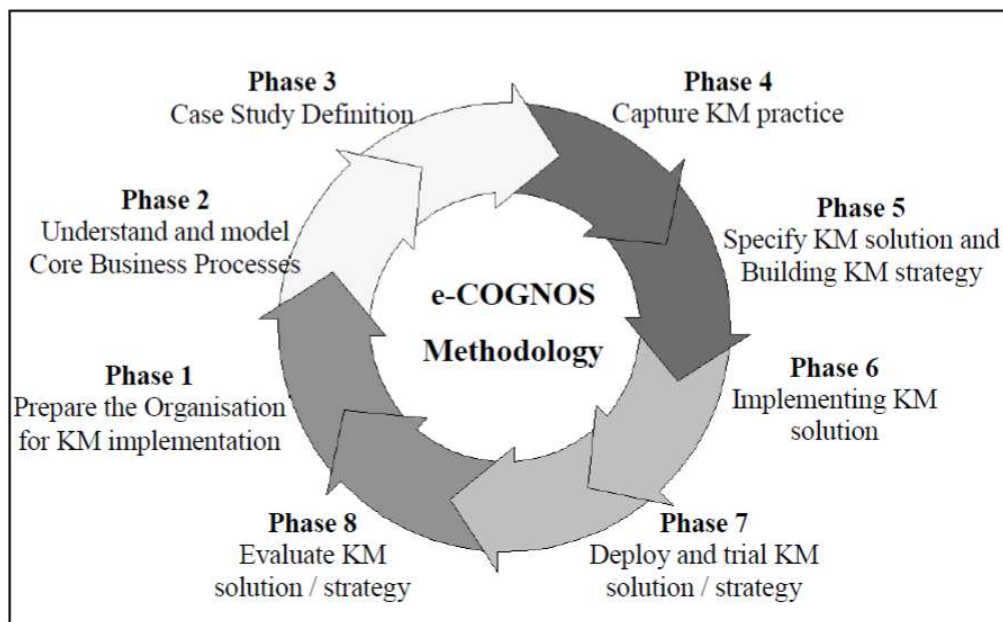


Figure 9 e-Cognos: ontology-based KM Model (Lima et al., 2005)

Phase 1 Preparation of organization for KM implementation: This is a preparatory phase where the organization introduce and clarify the activities and tasks, which is needed for the implementation of KMS. Different risk such as employee resistance, capacity or behavioural problem has been addressed.

Phase 2 Understanding and modelling core business processes: involves reviewing the current and future company strategy, organizational structure, culture and environment, current systems, rules, procedures, guidelines, infrastructure and so forth. This review process followed by “high-level” business processes modelling. In this time the

organization introduced external consultants from academic and research institutions in order to encourage employees to take ownership of the KM process.

Phase 3 Case study definition: This phase aims to focus on a particular process or business unit by determining success factors, identifying KM metrics to evaluate business unit or process and developing comprehensive discussion of the KM-related practices.

Phase 4 Capture KM practice: This stage provide an appropriate method that includes questionnaire design, employee interviews to assess the usefulness of KM practices.

Phase 5 specification of KM solution and building KM strategy: This phase is dedicated to develop a KM solution plan and KM strategy and define suitable milestone for implementation.

Phase 6 implementation of KM solution: In this phase the project implement the KM solution in accordance with their planning and strategy recommended at the previous phase.

Phase 7 KM solution trial: This is a testing a debugging phase where the implemented system has been used by selective organizational user to identify major flaws and drawback of the systems.

Phase 8 Evaluation of KM solution: The impact and usefulness of the KMS has been evaluate in this phase where user feedback has been collected to refining and improving existing KMS.

4.3 Tools for Designing effective KM system

Design science perspective and method tools has been applied to the Knowledge Management field for designing the system in structured manner. Through this Methods and tools, the body of existing knowledge has been designed and constructed collaboratively, and emphasize innovation, continuous learning, and where the collaboration is a process (dePaula and Fischer, 2005). This design science viewpoint suggests that different stakeholders generate new knowledge as they carry out their regular and routine work. The aim is to facilitate innovative practices at an organizational level by promoting collaboration and communication. Within a network of stakeholders and artefacts, the Knowledge is circulated, constructed and accepted during the work process. Learning carve is diligently attached to problem solving process, where the

problems are not imposed from other external bodies, but they are situated and appear and must be solved in a context. According to dePaula and Fischer (2005) the design science perspective has two vital characteristics that differentiate it from other KM perceptions. Firstly, it is the stakeholders, not the specialists, who actually create knowledge. Secondly, knowledge is a collaborative by-product of work within the organization. Knowledge gradually has been incorporated into probable solutions by the stakeholder, rather than being predefined by a subject expert.

Taxonomy and linguistic artefacts also have substantial impact on designing effective KM system. Davenport argued that standard business language provides the impression of being fact based often drawing on social or natural science metaphors, but relationship between text and meaning are often changed due to deconstruction of the knowledge. This requires a cohesive understanding of language to codify knowledge explicitly — which by definition cannot ever be completely known.

“Knowledge management deals with things like complexity, uncertainty, and organic growth that calls for a new vocabulary and managers aren’t used to it” (Davenport et al., 1998 p. 53).

5 KM and University

The situation of knowledge management at the university level is not linear. There are no well accepted model and sometimes couple of the models has been operated at the university. This chapter will discussed the relationship between KM and university and its application. It analysed the Organizational Structure in Higher Education for KM Readiness, Organizational Context That Will Influence to Design an Efficient Knowledge Management Modelling, It also discussed challenges and factors affecting KM.

5.1 Organizational Structure in Higher Education for KM Readiness

The universities as highest level of learning institutions considering research is the basic tools for knowledge creation and circulation. At the same time the universities do not just providing knowledge to the students, but also manage, preserve and share the existing knowledge for future reference. Though all universities do not essentially manage and deliver knowledge in some manner. However it is expected that universities strive up their effort to add value to their knowledge products and services to use effectively of the knowledge capital.

Universities as higher learning institutions distinguish the worth of their intellectual capital to their enduring characteristics within the society. A vital factor in an organizational readiness to apprehend KM is its culture, values, norms, behaviours and practices—that are inherently a unique attributes to an organization. Ideally, it is the unwritten code of conduct to embrace a novel things or how things really get done. Conducting knowledge management effectively and efficiently should require significant change in culture and values, organizational structures and reward systems (Rowley 200).

Therefore, the current higher learning institutions around the world have adapted to their changing role in a knowledge-based society (Singh 2010). Universities have "significant opportunities to apply knowledge management practices to support every part of their mission" [Laal 2011] as it is applied in the corporate sector. It is likely as leisurely as picnic if universities are expecting knowledge development as an institutional inherent qualities conducting by routine academic work like old good days.

Since, successful KM relies on the laborious processes that increase individual and organizational capacity, intention, and prospects to gain knowledge, and practices in a

way that delivers positive results. By embracing KM enable organizational structure the universities may reduce knowledge product creation cycle time either for curriculum development or research, improved academic and administrative services, and cut down operational costs.

There are five broad areas where knowledge management applications could benefit a number of university processes and services: the Research Process, the Curriculum Development Process, Student and Alumni Services, Administrative Services, Strategic Planning. Kidwell et al (2000).

- Research Process- The good starting point could a comprehensive knowledge repository of research interests within an institution or at affiliated institutions, where researcher can feely collaborate each other. The repository also contain research results with easy search capabilities to facilitate interdisciplinary opportunities to Commercial funding prospects. The KM also required for optimizing research administration procedures and best practices related to overview of internal services, resources, and staff; Proposal-routing, and grant policies and procedure
- Curriculum Development Process- A robust system should be deployed on pedagogy and assessment techniques, including best practices, outcomes tracking, faculty development opportunities, and research. The system should have content modularizing facilities, best practices, lessons learned, and so forth to improve the speed of curriculum revision, interdisciplinary curriculum design and development facilitated by navigating across departmental boundaries.
- Student and Alumni Services- KM system for student services included policies and procedures related to admissions, financial aid, registration, degree audit, billing, payment process, advising and tutoring, housing, dining, and other services. This system could be personalized for individual schools or student groups to customize service offerings thus minimize redundant effort for both students and for faculty and staff at the institution so that they are well informed to advice students.
- Administrative Services- KM is very useful for improving efficiency and effectiveness and of administrative services. That increase compliance with administrative policies and practices such as procurement, vendor

management, contract administration, budget allocation and monitoring, affirmative action guidelines, and so forth. FAQs, best practices, procedures, templates is required to share information serve as impetus for improved responsiveness and communication capabilities.

- Strategic Planning- KM is highly recommended to facilitate the trend toward decentralized strategic planning and decision making (for example, block budgeting, responsibility center management). A robust system to generate various data related to accountability and outcomes tracking by monitoring assessments, performance indicators, benchmarking, and so forth is a beginning to create a “learning organization” which is responsive to market trends.

“Knowledge is permeable: technology is universal; universities are impermeable; the universities regulator is set in concrete. Something has got to give” (Hague quoted in Goddard, 1998). Universities are in the knowledge business, since they are engaged in not only learning knowledge but also its creation and circulation.

Though a large section of the employees of a University has an academic education and relevant experience, however there some very selective groups are those mainly involve into knowledge venture. Moreover the organizational structure is largely very hierarchal rather robust and open, which is a precondition for reciprocal relationships is across position levels.

Depending on the institutional knowledge of exclusive individuals can diminish the flexibility and responsiveness of any organization. The curtail task is to convert the information that currently exist in in those individuals and make it easily and extensively available to any faculty member, staff person, or other constituent. On the contrary university management and administrative system still follow the industrial age model, whereas participation from every personnel is the key factor to confer individual intellectual skills into organizational knowledge, and both management and other employees need to be dedicated themselves a lot of interest in developing, sharing, and utilizing knowledge.

It has been argued that the knowledge workers generally possess a high degree of autonomy in their working condition. Every single workers often have the broad-spectrum insights into the problem areas and situational know-how and proficiency may

often uphold more authority than a formal position (Leidner, Alavi, and Kayworthe. 2006).

5.2 Organizational Context That Will Influence to Design an Efficient Knowledge Management Modelling

Generally universities have been operated as transfer mechanisms for giving students with a knowledge base that will allow students to purpose and thrive to study (Tippins, 2003).

There are strong but diversified organizational context that will influence to design an efficient knowledge management modelling for the universities. Rowley (2000) discussed socially constructed models of knowledge Management proposed by Demarest (1997) where he identifies four phases of knowledge management within an organization:

1. Knowledge construction;
2. Knowledge dissemination;
3. Knowledge use; and
4. Knowledge embodiment.

The mode stress the social construction of knowledge share mutual understanding with work on learning organizations and organizational learning. The knowledge construction process within an organization depend on both scientific and social contributions; where constructed knowledge is embodied within an organization, either through explicit programs, or through social interchange. After embodiment there is a practice of circulating embraced knowledge throughout the organization and its environments.

On the other hand patents. Davenport et al. (1998) identified four broad types of objectives that influence to deploy a knowledge management system-

1. To create knowledge repositories
2. To improve knowledge access
3. To enhance the knowledge environment,
4. To manage knowledge as an asset,

These four different categories of objectives recognize four different types of perspectives on knowledge management where (a) knowledge repositories intended to store knowledge and information often in documentary form; (b) knowledge access intended

to facilitate its transfer amongst individuals here the emphasis is on connectivity; (c) knowledge environment conducive to more effective knowledge creation, transfer and use (d) knowledge as an asset, recognize the value of knowledge to an organization knowledge that increases revenue and reduces costs.

Liebowitz (2012) proposes three components- people, process and technology- of the organizational context that influence to design an efficient knowledge management. The “people” refers to the personnel who create, control and capitalized a knowledge enable environment and the technology is about tools or techniques and instruments or infrastructure that form a cohesive platform for the organization to create and communicate. Universities also have these three components but the relationship among the components are irreducibly complex, unstable and sometimes isolated.

A robust and flexible organizational structure is first precondition to deeply any KM system to any organization. Because knowledge is fluid by nature and thoroughly linked to the individuals who hold it, moreover its categories, values and meanings has been shifted frequently (Davenport and Prusak, 1998 p. 159). If the organizational structures is not flexible enough to always reflect the pattern of use, or too rigid to appreciate new know, the KM process cannot be successful. Role of the individuals need to be recognized properly as KM competency of an organization has been determine by “who is expected to control what knowledge, as well as who must share it, and who can hoard it” (Delong & Fahey, 2000, cited in Leidner et al., 2006).

If the organizations encourage individuals to achieve individual goals and give reward based on individual performance which is a typical industrial age management practice the KM initiative will be futile. KM initiative will be effective and efficient if the organizations prioritizing collective goals and cooperation and rewards has been shared equally.

Knowledge-friendly culture is second crucial competency for Knowledge management. Because most of the resistance appear to knowledge management initiatives and knowledge sharing if the organizational environment is not friendly enough to welcome knowledge. Pro-knowledge organizational culture only emerge when people have a positive orientation to knowledge and take part in knowledge sharing instead of avoiding it in fear of losing a competitive advantage. This spontaneous participation is one of the most imperative to attain knowledge management system, but also the most difficult one to create.

Technical infrastructure is another important factor for knowledge management. As knowledge management deals with versatile things like complexity, uncertainty, and organic growth, it requires up-to-date technology to ensure smoother operation. Technology infrastructures are consisted with several tools that provide opportunities for learning and gives access to knowledge.

Davenport proposed eight essential factors need to be consider to accomplish knowledge management system (a) Link to economic performance or industry value (b) Technical and organizational infrastructure (c) Standard, flexible knowledge structure (d) Knowledge-friendly culture (e) Clear purpose and language (f) Change in motivational practices (g) Multiple channels for knowledge transfer (h) Senior management support (Davenport et al. 1998).

5.3 Challenges and Factors Affecting KM

Universities by its very nature should be considered as a Knowledge Intensive Firms (KIF). KIF refers to large organization employing substantial numbers of people working with complex tasks that call for autonomy and use of judgments (Alvesson, 2004p.1). He argued that that the core value of Knowledge Intensive Firms surpluses its attention on just knowledge within the organizations. It embraces many other remarkable features of knowledge-intensive work such as multifaceted social and political progressions, identity and motivation, and issues. Similarly Universities are multifaceted organizations that dealt with advanced level of knowledge creation and provide knowledge-based products to the society.

As history of human civilization evolved from the industrial to the knowledge society, effective use of knowledge is being considered one of the important eminent factors between leading an institutions and also-rans. As the information age supplanted the industrial age, different organization, irrespective their type and nature, stated recognizing that knowledge would be more important than capital in producing wealth.

Kidwell et al (2000), proposed to consider following lesson learnt from the corporate sector to introduce KM practices in higher education. Those are-

- Strategy First— Before doing anything else, the initiation should begin with strategy, defining what will be accomplished with KM;

- Organizational infrastructure—an unique combination of technology, human resources and financial measuring tools is required where technology is considered as an enabler;
- Leadership – recognizing leading player for the KM initiative; personnel need to believe in its benefits as well as advocate KM as an organizational culture;
- Pilot project determination for KM—the project having low risk but creating positive impact on the organization thus enhance credibility for knowledge management.
- Plan of Action—preparing a comprehensive action plan for the pilot project that defines the process and the roles of team members and incentives of the organization.
- Results assessment —during project implementation a proper monitoring and evaluation tools and regular results assessment technique need to be in place.

One major limitation of much knowledge management perceptions and practice is to setting the sphere within the realm of information technologies. Though knowledge management system comprised of people, processes, and technologies, but technologies remain a very vital factor as it is rapidly evolving. The organizational information processing structure and capacities works as the nexus of interaction for multifaceted contexts within its knowledge resources.

The challenges for KM emerges with more difficulties when it need to work with tacit knowledge as individuals normally considered tacit knowledge as a source of personal strength rather than as a organizational property (Carlucci et al., 2004). At the same time peoples are also very reluctant or do not prefer at all to share their knowledge with others, while behavioral change or mind shifting of the people attitude is not easy task (Nonaka, 2007). In case of the universities it come out with another dimension as university personnel are segregated into two polarized group namely academic and administrative which causes more difficulties to collect, share and manage their knowledge. People's resistance to knowledge sharing negatively affect knowledge management process (Davenport & Prusak, 1998). There are several reason i.e. lack of trust among employees, inadequate KM awareness, discouraging to new ideas, management intolerance for creative mistakes, and negation of innovative solutions from in others.

The challenges of KM implementation for many organizations is rooted not only by the complicated nature of the business processes, but the reality is most of the KM initiatives

has often been casual and unplanned. KM model just has been adopted from another sector without understanding the organizational context and problems.

Cost management is another challenge that affect KMS implementation. Incremental costs of - capturing and interpreting the data or using an appropriate mix of available legacy systems and newer systems - creates challenges; which is prerequisite for the administration competence along with excellence of teaching and research to ensure maximum benefit for to all parties (faculty, students and stakeholders).

Eventually enabling knowledge management workable in higher education has multi-layered association on a variety of commitments—academic, institutional, commercial, and public policy—as well as on exponential growth of data science. Bringing on this revelation will not come easily, rather constantly influences development and implementation of a KMS for the universities.

6 Improving KM Value Chain at University level

The chapter should proposed a suitable KM model for the Universities. It also discusses organizational context and the impact of the past KMS to adopt new model and offer a generic KMS technological architecture. Then the chapter focused on approached of knowledge management in higher education environments and competencies that both individuals and organization need to acquire.

6.1 KM model for the Universities

The proposed KM model for the universities should include different knowledge attributes and components, also moderated their relation with different consideration - time and contexts. The model should consider knowledge as evolutionary by nature, where the process is dynamic and purpose of knowledge varies depending on the context.

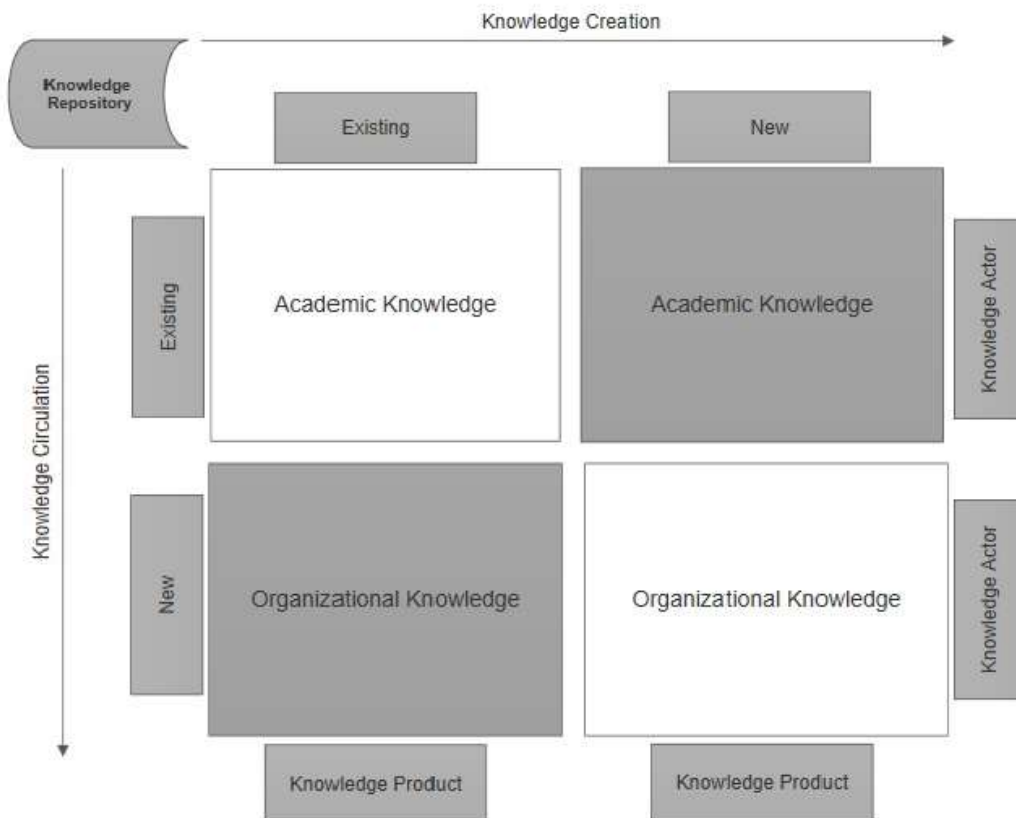


Figure 10 Top level presentation of Proposed KM for universities

At first the model will classified the knowledge of the universities as 'Academic knowledge' and 'Organizational knowledge'. This segregation is very important as university is one and only entity which deal with these two type of knowledge. This is 'The Organization' who believe in "Knowledge for Knowledge sake" – from creation to circulation and preservation to practice, where knowledge itself is a prime mandate for the universities without any loss or gain consideration. At the same time as organization the universities also belongs to social, cultural, economic and geographical context, thus influence its organizational structure, management process, financial obligation, and political interactions. Therefore contemporary universities already maintain two different type of KM model at the same time within their regular operation. Traditionally almost every university library maintain 'Faceted classification model' for academic document management, simultaneously IT driven university administration have 'ontology-based model' to manage their automation systems.

Both type of knowledge interact with two different components those are knowledge actor and knowledge product where each component with interact each other within a specific timeframe, thus generate dynamism within the system.

In this model the knowledge actor can be either academic or administrative or both parties together, similarly the knowledge product should be formed in either academic or organizational or in a mixed mode. These unique and multi-layered combination of knowledge actors and products strive up two type of leadership excellence - academic and managerial leadership - only for the universities in compere to other organization Yelder and Codling (2004).

Every set of knowledge have different stakeholders, and they should be maintained separately. Academic knowledge goes beyond the organizational boarder, while administrative knowledge is organizational context specific. Teichler (2004) pointed that academic knowledge transfer is often considered as process of globalization. Furthermore it also argued that commercial aspect as a catalyst that influencing knowledge transfer among academic circle. The cooperative as well as competitive environment of academia and the urgency for ongoing publications are the factors in order to be reflect the persistence on transferring knowledge among academics within universities.

There are four process involved in knowledge management, - creation, codification, circulation, preservation. The knowledge creation and circulation is regular process which is active and knowledge codification, preservation is a passive process.

KM implementation activities are should implies to all events which is required to construct a new KMS, or add a new module to an existing system or to improve remaining services of a KMS. There are two main phase on KMS proposed by this model a) Preparatory Phase which is comprised with two parts - analysis, design b) Implementation Phase which also have two parts - deployment and evaluation

The KM model should understand the dynamic nature of knowledge to confirm the continuance of knowledge creation and circulation through interaction between knowledge components, where update, re-validate, or add value to the stored knowledge is the concern of the knowledge repository. It is also agreed that knowledge is input as well as output for universities as they are in the business of both generating and disseminating knowledge that also have sustained a distinctive but typical notions compared to other organizations (Omerzel et al., 2011).

The model also has been taken account four different determinants that directly affect university knowledge management process- a) Individual, b) organizational, c) contextual d) technological.

Individual determinants considered different behavioral and motivational factor such as interrelation, trust and cooperative attitude, innovation, leadership, incentives, technology, commitment, demographic profiles, and job satisfaction and so forth(Bock et al.; 2005; Kanaan and Gharibeh, 2013 Von Krogh et al., 2012; Wickramasinghe and Widyaratne, 2012)

Organizational determinants includes organizational leadership, management structure, and organizational learning policy, organizational climate, strategies and practices, professional groups and financial capacities. (Ardichvili et al., 2006; Chen et al., 2010; Jackson et al., 2012; King, 2008; Magnier-Watanabe and Senoo, 2010).

Contextual determinants includes social, cultural, economic and geographical context, influence of the external factors such as political consideration; stakeholders, all of these implied different impact on knowledge management implementation (Rowley 2000; Davenport et al. 1998; Leidner et al., 2006)

Technology determinants facilitate all types of communication methods was underlined in the academic research and published work (O'Dell and Grayson, 1998; Riege, 2005; Tsai et al., 2013). At the same time it provides a systems or tools or platforms that directly influences on knowledge management (Riege, 2005; Smith and McKeen, 2003).

The implementation of KM might be start with collecting knowledge of existing KMS followed by understanding organizational context. The conventional methods such as interviews, questionnaires or by reviewing existing documents, regulations and related literature can be used to examine the current status and identify the desirable and feasible options for upgrading the system.

6.1.1 Organizational Context and KMS Legacy

This KM model is highly concern on the organizational context of a university and the legacy of the existing system. Sometimes university business process undergoing to continual change as it reconfigures itself to remain aligned with the external environment. This is very imperative condition because as long as the environment keeps changing, the developing a knowledge management system will be never “done”. If the university business process bottlenecked with piggybacking and carried out its activities in ad-hoc basis the KM system will not be effective and efficient to serve its desired goal.

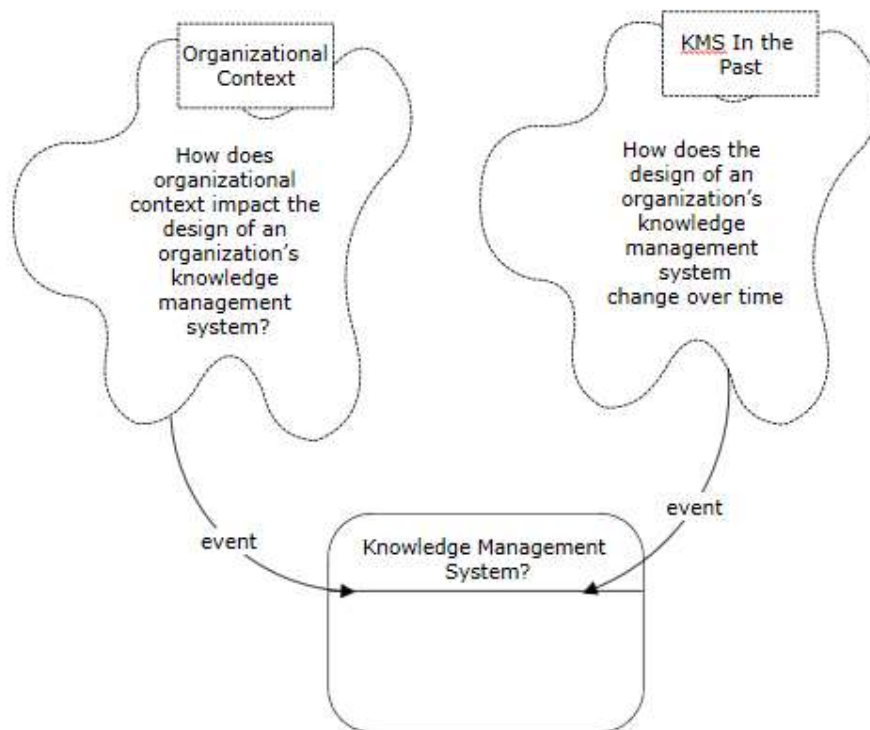


Figure 11 Organizational context and Past KM Impact

Existing KMS have big impact to develop a new KMS as the organizational users always have resistance to adopt new things because of their interim inconvenience. It case of

universities, it is even more important as there are gross demarcation between academic people and administrative personnel. At the same time both are the integrated component of the KMS as a unified knowledge actor, therefore their preference need to be treated equally. If the past KM system did not changes over time, the new KMS need to be tested and refined with subsequent research with a broader audience to offer premises before deployment. It is better to take on user perspective and experiencing the in order to attend to the ways that they themselves understand their context and how they communicate each other. An empirical research may serve as an inception point by conducting initial interview protocols, collecting initial artefacts, and identifying which KM implantation processes would be most relevant to observe greater outcomes.

6.1.2 Gap Analysis

Gap analysis is at the central part to adopt KM model for a university. Gap analysis detects the difference between identified needs of a given model in line with business process and actual user behavior. The analysis process is influenced by Zeithaml et al. (2000), who identify four gaps (information, design, communication and fulfillment) that have to be connected to create a positive knowledge management practice based on service quality metrics. Of these, fulfillment relates to the actual implementation of KM system, and does not directly apply to the context of this KM model.

In principle, this model recommend a continuous loop methodology that identifies subcomponents, provides input to sub-activities design and continuously assesses gaps of the KMS. The gap analysis can result in finding of new subcomponents as well as in the design of new sub-activities. The following section will discuss the information requirement and overview the technological architecture to enable the application of the KMS.

The gap analysis of the KM practices need to be measured by four key KM strategic enablers, namely leadership, culture, ICT, and performance measurement. These parameters initially proposed by Arthur Andersen and the American Productivity and Quality Centre in 1996 (Andersen 1996 APQC).

Leadership- Here the term leadership consider the aptitude of organizational leaders to streamline KM actions in accordance with organizational strategy, ascertain prospects, uphold the significance of KM, communicate with peoples, foster the evolution of the learning, and offer metrics for measuring the impact of knowledge. Yielder and Codling

(2004) acknowledged two unique leadership types that only belongs to universities: academic and managerial leadership, and does not exist to any other organization.

Organizational culture. Culture refers as a usual customary that portray an identity for any organization, that simplify the outlines on how the organization runs day to daily basis. The set of beliefs comprise with the nature of organization, performance criteria, management structure, legitimacy, decision-making process, leadership style, compliance factors, and so forth.

ICT - Information and communication technology is conclusively linked to KM as it supports structural knowledge dissemination by enabling its Searchability and preservation techniques. Many researchers have asserted that effective and efficient KM are almost impossible in absence of ICT backing (Alavi and Leidner, 2001). ICT provided infrastructural tools and environment that enable KM activities, such as databases, platforms, performance integration and evaluation systems, automation process. IT is firmly coupled with KM as it ensure structural knowledge distribution to both vertically and horizontally.

Performance measurement. It has been defined as the set of information about productivity and effectiveness of individuals or groups to access their actions within the organizational structure (Bavon. 1995). From the organizational context, it is may be either routine work or innovation, and productivity or process that is vital to the development organizational competence.

6.1.3 KMS Technological Architecture

The technological architecture of the KMS consider to some key areas i.e. communication, deployment, domain, and the structure, which serves as a blueprint for KMS application systems. The architectural design should consider the multifaceted relationships between KM components, and need to be in line with business processes of the universities. At first it should analyze the functional and nonfunctional requirements of the KMS. Identify design elements and their relationships in accordance with understanding the KM problem. Because many KMS application are considered as unproductive as they did not essentially solve a key KM problem. However a KMS may contain following architectural pattern in general.

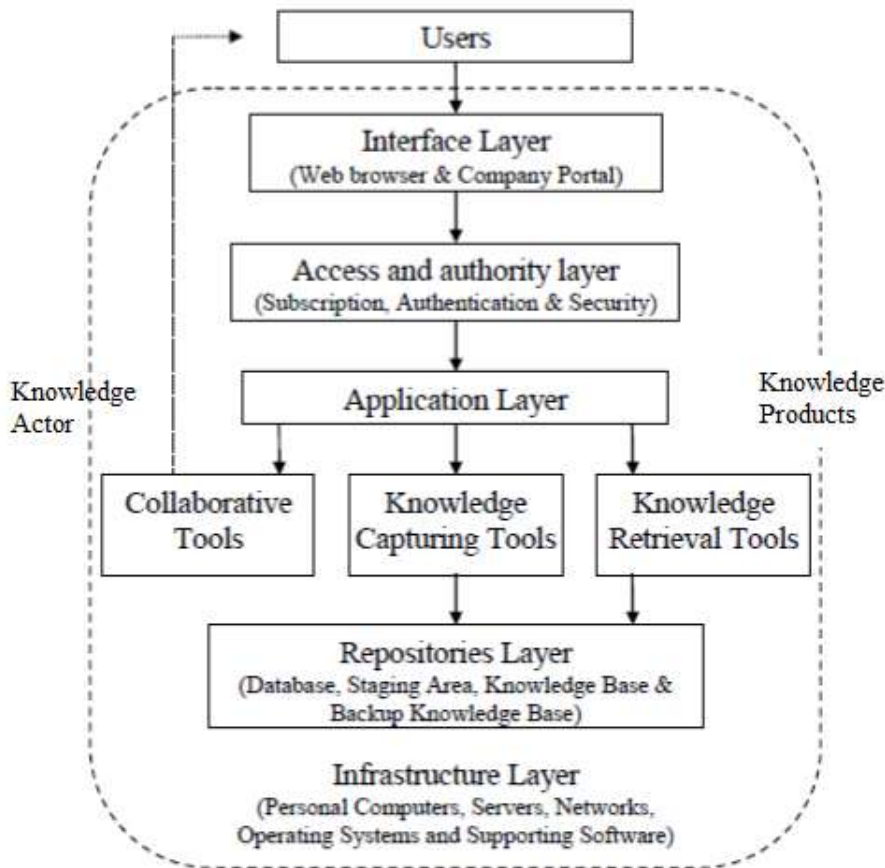


Figure 12 KMS Technological Architecture

At the Top level the technological Architecture of the KMS should be distributed into five main layers, where each layer contains a different sub-layers and components that aims to perform the functions in integrate manner. The main layers are infrastructure layer, repositories layer, application layer, access and authority layer and interface layer.

The interface layer is the starting point where the system users interact with remaining layers of the system. It allows the users to interface different services and tools to access into knowledge contents of system repositories. The access and authority layer defined the user associability through appropriate authentication process, the user level hierarchy help to uphold the security and privacy concern of the KMS.

The application layer allows users to use different services and tools where tools are divided according to their functionality and purposes. The repositories layer deals with repositories for storing data, knowledge preservation and backup copies of the knowledge. Lastly, the infrastructure layer comprised with IT infrastructure such as hardware networking and connectivity and so forth.

It is worthy to mention that the KMS consisted with several module which may require specific technological architecture. For instance the architecture of research collaboration system should be different from Knowledge repository system of the library similarly the student admission system will be different from organizational ERP system. Each component also have several subcomponents which is essentially need to incorporate into technological architecture framework.

6.2 Approached of Knowledge Management in Higher Education Environments to Adopt New Model

Universities by its very nature should be considered as a Knowledge Intensive Firms (KIF). KIF refers to large organization employing substantial numbers of people working with complex tasks that call for autonomy and use of judgments (Alvesson, 2004p.1). He argued that that the core value of Knowledge Intensive Firms surpluses its attention on just knowledge within the organizations. It embraces many other remarkable features of knowledge-intensive work such as multifaceted social and political progressions, identity and motivation, and issues. Similarly Universities are multifaceted organizations that dealt with advanced level of knowledge creation and provide knowledge-based products to the society.

There are two necessary approaches to knowledge management: the process approach and the practice approach. The process approach focuses on knowledge management with IT systems, and the practice approach is more connected with organizational and human relations. The first one involves use and development of information technologies to increase the quality of knowledge creation as well as distribution within the organizations. In this view, knowledge is often considered as an object that can be codified, stored, and accessed or retrieved by processes and technologies. Or else knowledge is captured as a condition of access to information, where information is organized, codified, and made searchable (Alavi and Leidner, 2001). Organizations that adopt the process approach often implement formalized processes to collect and disseminate knowledge throughout the organization. On the other hand, in the practice approach to knowledge management, it is assumed that a great part of organizational knowledge is tacit and impossible to codify, collect, store, and distribute by formalized processes and technology. The focus is on building social environments to facilitate the sharing of knowledge through interaction (Leidner et al., 2006).

Kidwell et al (2000), proposed to consider following lesson learnt from the corporate sector to introduce KM practices in higher education. Those are-

- Strategy First— Before doing anything else, the initiation should begin with strategy, defining what will be accomplished with KM;
- Organizational infrastructure—an unique combination of technology, human resources and financial measuring tools is required where technology is considered as an enabler;
- Leadership – recognizing leading player for the KM initiative; personnel need to believe in its benefits as well as advocate KM as an organizational culture;
- Pilot project determination for KM—the project having low risk but creating positive impact on the organization thus enhance credibility for knowledge management.
- Plan of Action—preparing a comprehensive action plan for the pilot project that defines the process and the roles of team members and incentives of the organization.
- Results assessment —during project implementation a proper monitoring and evaluation tools and regular results assessment technique need to take in place.

6.3 Competencies That both Individuals and Organization Need To Acquire

The capacity of the organization on collecting and using knowledge directed organizational learning process that enhance individual skills, improve the organizational performance and competencies and effect on organizational behaviours. Information technology played a pivotal roles for the communicating explicit knowledge on the other hand verbal conversation and face-to-face interaction are more effective way to circulate and reciprocating tacit knowledge. This inadequacy of information technology in capturing and communicating tacit knowledge is a consequence of contextual factors, such as the lack of awareness within the users to grasp the possible paybacks of IT-tools, the informal approaches or casual strategy to apply the KMS. Lastly, it is a general tendency to prefer doing old routine jobs using familiar tools rather learning new means or technologies to use.

Davenport and Prusak (1998) suggested that this individual behaviours and resistances cultural adversely affect the KM process. They proposed a solution bundle to minimize the effect of these factors and inspire knowledge creation and sharing within the organizations by such as building trust among employees, providing motivations incentives, accepting creative errors and rewarding for innovation, offering times and places for learning, and sharing knowledge, and encouraging knowledge base relationships.

Knowledge sharing is needed to be institutionalized as a natural cross-functional and cross-practice manner. There should be a convenient way to capture knowledge as codification of the organizational knowledge has usually been in the shape of formal, overlong reports and papers loaded with different jargons and buzzwords for which the impact is unknown. Considering this fact proper utilization of the social media might be an effective tools to share knowledge in a convenient way.

Teamwork remain necessary and should be better on a day to day basis which needs to do more to tap the goodwill knowledge value of its wider audiences and beneficiaries. There should be multiple tactics on capturing, aggregating, sharing lessons within the network which will be accompanied by evidence-based statistics, including social network analysis, business intelligence and data-driven decision making.

All of these competencies can be summarized into three broad category in accordance to the nature of knowledge management activities, those are a) - knowledge creation b) knowledge codification c) knowledge circulation.

Activities	Competencies
Knowledge Creation	<ul style="list-style-type: none"> • Knowledge gaps are methodically identified • Work process and practices are well-structured to reduce knowledge gaps • A comprehensive knowledge mapping is available indicating where information is located and how to access it • An available knowledge directories of university which consisted with skills, expertise, of the

	<p>academic and administrative personnel and information on how to reach them</p> <ul style="list-style-type: none"> • Knowledge directories of different stakeholders also take in place • A continuous monitoring tools on knowledge creation process to ensure optimum atmosphere
Knowledge Codification	<ul style="list-style-type: none"> • Tacit” knowledge is appreciated within the university environment • “Tacit” knowledge is captured and transferred across the university • The university also has systems for identifying and disseminating explicit knowledge • Older know-how is also available and accessible • Most of the individual knowledge is remains within the when the individual leave the university
Knowledge Circulation	<ul style="list-style-type: none"> • The university has systematic approach on circulating best practice lessons learned with proper documentation. • The university provides place and occasions for individuals to interact and communicate each other informally. • Success stories involving innovation that is extensively talked in the university

Table 4 Competencies of KM Implementation

It is worthy to mentioned that knowledge creation often interchange with the term generation, construction or development of knowledge, while Knowledge codification also used as transformation and finally knowledge circulation uses as knowledge sharing, knowledge transfer.

7 Evaluation of the Results

In this chapter, the evaluation of the proposed KM model will be conducted. To evaluate the model we will follow Framework for Evaluation in Design (FEDS) by evaluating the artefacts we developed within a DSR project to achieve DSR goals and objectives. The evaluation will be conducted in four stage (1) description, (2) characterization using FEDS, (3) analysis, and (4) Summary of findings,

It is also worthy to mention that this is an Ex-ante evaluation. Ex ante evaluation is characterized as the predictive evaluation method that is conducted in order to access and appraise the effect of future situations (Stefanou, 2001, p. 206 quoted by Venable, J. etal 2016). For Information Systems (IS) design, ex-ante evaluation happens before design and construction begins, thus helps the purpose of concluding decision whether or not to obtain or design a technology architecture, or the purpose of determining which of multiple competing tools should be accumulated or embraced.

7.1 Description,

The proposed KM model is developed by following DSR methodologies to bridge the missing link of existing models and to provide a suitable and concrete KM model for the universities. The proposed KM model account the types of knowledge as well as the knowledge resources. The knowledge resources needed for designing and developing the KMS considered as implementation resources and knowledge resources required for processing and using in the KMS considered as application resources. The metamorphoses of data, information and knowledge also been discussed, and the significance of capitulating data and information to generate new knowledge and to upkeep existing one is also emphasized. A reasoning that segregate knowledge type into new classification also discussed to recognize the different dimension of university knowledge possessions, which require different understanding, tools and methods to manage and process.

7.2 Characterization using FEDS

To evaluate KM model we will follow Summative evaluations strategy. “Which are used to produce empirically based interpretations that provide a basis for creating shared

meanings about the evaluand in the face of different contexts”. “Summative evaluations focus on meanings and support the kinds of decisions that intend to influence the selection of the evaluand for an application” (William & Black, 1996 quoted by Venable, J. et al 2016).

The evaluands/artifact in this case were the knowledge management model and KM implementation process. The artefacts/evaluands should be evaluated summatively, after the design artefacts were developed. The developed artefact was not instantiated, but was instead designed for a theoretical model and a matrix diagram. The evaluation process did not involve a real task or involve any real users. The properties under evaluation were potential for further improvements.

7.3 Analysis

7.3.1 Knowledge Dimension

The KM model elaborated the polygonal relationships and knowledge flow among the different stages and components. It facilitates to apprehend how knowledge transforms from one dimension to another in course of time. It also designed different processing phases, roles and conditions and with technological components to adopt this KM Model.

The model considered Knowledge as a social construct thing or being. It can be characterized as both a product and process. At the same time knowledge dichotomy is associated with the nodes and networks that effect KMS.

7.3.2 Implementation Cycle

KM implementation exercise consisted with activities needed to manage and process the several part of KM model discussed earlier. These activities are broadly into two parts a) KM implementation activities and b) KM application activities.

KM implementation activities then step down into the sub-activities level, those are analysis, design, implementation and evaluation of the KMS. It is a recurring process where the implication of stages resulted to accelerating the KMS quality or performance, and broadening the scope of implementation or application. The questionnaire survey, key informant interviews, case study need to take in place to guide implementation process into right direction.

KM application activities also step down into the sub-activities level, those are create, capture, update and share knowledge created by either in the form of academic or organizational. The KM application activities involve processing of data and information, data analysis, applying proper monitoring and evaluation tools, creating feedback loop, so they can validate existing knowledge and generate new knowledge.

7.3.3 Gap Analysis and Advantages

This KM model is specially designed for the universities to overcome the inadequacies of the existing KM models. Furthermore it also has a provision to analyze the existing KMS and its shortcoming. The advantage of this KM model is that it provides a structured, comprehensive and easy to use KM method for higher educational intuitions in line with their business process. The advantages of this KM model comprise with featuring cohesive approaches to deal with knowledge classifications; differentiating KM resources that involve different knowledge processing techniques, providing structured treatment to recognize interrelationship between information and data, providing clear monitoring, presenting activities, procedures, tools, architecture, roles.

7.3.4 Contextual Consideration

Contextual also has been taken into account as it have direct impact on KM implementation and application. There are several context need to be consider such as organizational culture and perception of individuals; technological factors, business process, financial and resources constrain, type of the academic institutions, stakeholders, and so forth. Appropriate strategy and procedures should be maintained to deal successfully with the contextual factors.

7.3.5 Architectural Mapping

A technological architecture mapping for KMSs also has been done, which in line with KM objectives and goes with components and characteristics of university organizational structure. There are five top level layers proposed to symbolize the KMS technological architecture, those are: the interface layer, which allows knowledge actors to interact with multiple service modules and tools of the KMS. The access and authority layer facilitate to defines the permission levels of knowledge actors and ensure the security and privacy concern of the system. The application layer enable user to capture, retrieve and share knowledge. Then the repositories layer allows to preserve knowledge in its different

formats. Finally the infrastructure layer deal with hardware connectivity and networking concern of the system.

7.3.6 Knowledge Preservation

A KMS repositories is proposed in the KM model to store knowledge. It is also a continuous process structured by reviewing, evaluating, editing, adapting, classifying and validating knowledge before making it searchable and accessible for the knowledge actors (academic or administrative). Identifying new formats of important knowledge and capturing feedback from knowledge actors facilitate to recognize opportunities for improvements in the KMS.

7.4 Summary of findings

The KM model has incepted with an exploring of essential KM principles, methods, tools and techniques. Then the model has recognize the unique features within knowledge framework of the universities and discussed the related factors and challenges affecting KM adoption in the knowledge-intensive environment.

- This model contributes to the existing body of knowledge in terms of reducing the gap of other existing models by investigating the degree of importance knowledge actors in the university setting which is significantly different from other organization.
- The model makes extensive use of current technologies for tracking the knowledge actor and their behaviors, and combines elements of data mining and statistical analyses.
- The proposed KM model is fairly cohesive but easy to comprehend. It allows non-technical users to understand required details without the specialized knowledge thus create confidence and encourages policy makers to adopt the model.
- The proposed KM model facilitate to organize different types of knowledge that usually belongs to university knowledge domain. It also propose different procedures to process and manage both academic and non-academic knowledge.

- The model also identify and sorted important types of KM resources, tools, processes and methods that are required for successful use and management KMS.
- Since universities have just begun to institutionalise KM in a holistic manner, therefore, there are no suitable performance measurement tools to access the overall KM impact.
- Knowledge is a social construct and has been developed from information in the context in which it lives, and its meaning reconstructed or changes in different contexts.
- Knowledge has been treated as both a product and process as ‘object and flow’ it is product when it appreciated as a resource, a state of understanding, or a rule and a process when it deals as an expression of a relationship between the knower and the object that is known.
- Another dimension the knowledge dichotomy is associated with the nodes and networks that effect KMS. Knowledge nodes are characterized by the set of explicit knowledge captured and codified into repositories, circulated by learning management systems, and communicated by academic exchanges. On the contrary, knowledge networks are the impulsive channel or dynamic social interactions that create tacit knowledge and accelerate the flow of Knowledge circulation.

8 Summary

Knowledge management (KM) intended to provide a base to support an organization's sustained competitive advantage by developing and sustaining the value and uniqueness of organizational knowledge resources and processes.

Now a day every organization is keen to manage its knowledge and adopted suitable KM model for them. There are number of KM model which has been analysed in this research paper. The findings and models that presented in this research will offer university authorities a new perception to view the paradigm of knowledge management. At the same time it will provide a new tools to the researchers with which they conduct future investigations. As knowledge management in a university is a nonlinear continuous process and comprised with many steps, therefore the proposed model of knowledge management is dynamic and reciprocal by nature.

The proposed model tried to mitigate the shortfall of the existing KM model and provided a solution suitable for the universities. The model consisted with different parts such as: identifying Knowledge Actor and knowledge products and their interaction with academic and organizational knowledge. Availability and usability KM resources; investigating contextual factors and assigning required activities to deal with them successfully; identifying the system architecture and specifications; and finally, a recommendation for further improvements and validations.

This KM model also offer tools that facilitate to KMS with the capacity to acquire people's know-how, experiences and perceptions, thus expedite organisational effort to solve the riddle of missing knowledge and disappeared experience generated of its regular activities and enrich organisational knowledge bases.

The research has accomplished its core objective of designing a cohesive and comprehensive KM model for the universities by following design science research methodologies. The research has showed that the suggested KM model can positively

benefit universities to improve KM implementation. The achievements of this research can be summarised as follows:

- The aim of discussion on required background is to streamline acceptance and designing the KM model and to determine the several consideration of KM that may need more research and study has been attained. This has been achieved through accompanying a wide-ranging analysis of KM literature that depicted KM theories and converses technological, cultural and managerial features of KM application and operation in the context of university.
- The reason of examining limitations of existing KM models has been exposed through a comprehensive review of necessary number of we accepted KM models. This has facilitated the study to explore difficulties of present KM models and recognise prospects for developments. The outcomes have presented that, despite of many KM models have been applied to improve the implementation of KM in organisations, those models still have many shortcomings in the context of universities that hinder from being applied fruitfully. For instance, these KM models have inadequate necessary processes and components of KM or may not reflect the distinct attributes and context of the Universities. None of the KM models fail to offer a systematic method for KM adoption, also non-compatible to deal with the cohesive knowledge structure of the universities.
- An appropriate KM model has been designed on the basis of studying and examining KM literature. The model address the key attributes characteristics required universities in order to redeem the limitations of other models and to deliver a convenient method for KM.

8.1 Future work

The research work stipulated number of unanswered questions, acknowledging aforesaid next step will be to answering this questions by piloting prototype of this KM model. This study requires a real-life demonstration to identify its limitation. A case study finding will facilitate further improvement and modification of the KM model the model can be practiced with more effective and efficient manner. More efforts can also require to attain awareness from the university administration about the importance of KM that uplift implementation and application of the system in this academic sector.

Since there are significant differences in the degree of importance and use of KM practices the model also need to accommodate each different perception and practices. These KM perception and practices are an important enablers both theoretically and empirically, it is required to scientifically evaluate within the university context.

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