

Are We Heading Toward a Knowledge Society?
An Exploratory Case Study of the Higher Education Reform in
Egypt

Abir ElKadi

Doctor of Philosophy

School of Information Studies

McGill University

Montreal, Quebec, Canada

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DEDICATION

This work is dedicated to my late parents, who inspired me by their hard work and equipped me with knowledge, and my cherished children who patiently endured this long journey with me while offering support and love.

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ABSTRACT

Egypt's higher education reform is a sector-wide capacity building initiative that aims at increasing knowledge production and dissemination across various economic sectors. The national initiative is supported by the government to elevate the country's competitiveness. This study uses knowledge theory to explore the change of direction in which higher education policies in Egypt had taken to carry out the reform. The theory highlights how effective use of knowledge resources, in addition to creating a competitive advantage and promoting better quality services, can shape learning policies, contribute to the outcome of the initiative, and reflect the mindset of senior administration.

A qualitative single-case study method was employed to collect the study data. Semi-structured and in-depth interviews were conducted with participants who worked at the strategic level of the administrative unit of the reform, The Project Management Unit (PMU). Data was analyzed using thematic tools.

The study key findings marked the absence of a plan to manage knowledge resources in the second phase of the reform. A decade after the launch of the endeavor, the notion of knowledge management remained unfamiliar. The highly-centralized structure of higher education system together with the alienated organizational structure of the PMU created islands of knowledge and obstructed the modest attempts project managers made to foster knowledge flow. The

uncontrollable dynamics attributed to public higher education context in Egypt which include uncertainty, scarcity of financial resources, and organizational culture made the trial to promote KM practices a challenging task.

Findings discussed set an example as to how the absence of strategic orientation and supportive internal policies can hinder knowledge management progression for institutions in Egypt. Findings have implications for future phases of the project or future reforms in similar contexts, so as to add another perspective to KM literature.

ABRÉGÉ

La réforme de l'enseignement supérieur en Égypte est une initiative de renforcement des capacités qui vise à augmenter la compétitivité du pays. La gestion des connaissances (GC) peut contribuer largement à la bonification des résultats des initiatives qui ont des objectifs similaires. Cette étude utilise la théorie de la connaissance pour explorer le changement de direction que les politiques sur l'enseignement supérieur ont pris pour réaliser la réforme. La théorie fait ressortir comment une utilisation efficace des ressources de connaissances, en plus de la création d'un avantage concurrentiel et de la promotion de services de meilleure qualité, peut façonner les politiques d'apprentissage et refléter l'état d'esprit de l'administration supérieure.

Une méthode qualitative d'étude de cas unique a été utilisée. Les données ont été recueillies au moyen d'entrevues semi-structurées et approfondies, menées auprès de participants travaillant au niveau stratégique de l'unité de gestion de projet responsable de l'exécution de la réforme (PMU). Les données ont été analysées à l'aide d'outils thématiques.

Les résultats de l'étude ont fait ressortir l'absence d'un plan de gestion des ressources de connaissances dans la seconde phase de la réforme. Une décennie après le lancement de la réforme, la notion de gestion des connaissances est demeurée très peu connue. La structure hautement centralisée du système d'éducation supérieure avec l'aliénation organisationnelle de l'unité administrative

du projet de réforme a entraîné la formation d'îlots de connaissance et bloqué les tentatives des chefs de projets faites pour favoriser le flux de connaissances. Les dynamiques incontrôlables inhérentes au contexte de l'éducation supérieure en Égypte, soit: l'incertitude, la précarité des ressources financières et la culture organisationnelle, ont fait de la tentative de promouvoir les pratiques de gestion des connaissances un défi de taille. La discussion des résultats démontre comment l'absence d'une orientation stratégique et de politiques internes facilitatrices peut faire obstacle à l'avancement de la gestion des connaissances dans les institutions en Égypte. Les résultats contribuent à enrichir la littérature sur la gestion des connaissances d'une perspective nouvelle, en présentant des éléments essentiels à considérer pour maximiser l'efficacité des phases futures du projet ou de réformes ultérieures dans des contextes similaires.

CHAPTER 1 INTRODUCTION

At the beginning of the new millennium, the Egyptian government announced intentions to reform public universities. Unlike in the 1990s, the beginning of the move to modernize public universities which was marked by ad hoc, small-scale, selective projects (Kohstall, 2012), the reform then erupted to the surface as a national capacity-building endeavor. Reforms may take different directions, and have different goals which often vary based on the drives of reformers. The sector-wide, sweeping effort in Egypt was intended to improve the country's competitiveness while enabling the transition toward the knowledge society. Comprehensive goals were set to make structural changes in the management of institutions, and this marked the current reform agenda as one of rapid higher education overhauls.

Theoretical arguments suggest that improving competitiveness in the knowledge society necessitates effective management of knowledge resources to take center stage of the work agenda. In other words, for the capacity-building project to succeed in reforming society through reforming higher education in Egypt, the project's strategy should incorporate a clear vision, well-structured operations, and a supporting environment described with regard to knowledge attainment and application. If not thought about in advance, the literature suggests that alternative gains from the course of action would be improved work conditions rather than

fulfilling the ambition of escalating competitiveness. Through a Knowledge Management (KM) framework, this study examines the extent to which organizational knowledge was actively managed to optimize the outcome of the national project. Adhering to the study framework offers a chance to learn about KM enablers and/or inhibitors in the local context.

For the purpose of this study, the terminology used will be defined as follows.

Reform is viewed as a knowledge-driven endeavor intended on two fronts—individual and organizational—to leverage the ability of institutions to function effectively in a dynamic setting. Higher education refers only to public universities. Private universities, technical colleges, and any other educational establishments that are approved by the Egyptian authorities as institutions of higher education at the post-secondary level are excluded from the scope of this study. The two terms, *higher education sector* and *higher education system*, are used interchangeably to refer to the coordinated body of units, methods, and procedures that set up the work environment.

Moving away from the traditional notion of knowledge as an abstract entity (Alavi & Leidner, 2001), *knowledge* is operationally defined as a product of learning that is influenced by personal experience, insight, contextual information, and interpretation (Orange, Burke, & Boam, 2000). While the knowledge which streams in a higher education reform setting can take the form of academic (i.e., programs,

curricula, research, and course content) and organizational (the shared understanding forming the guidelines of operational activities), the study's focus is the latter. Organizational knowledge resources display a framework of explicit or codified knowledge (guidelines and procedures integrated into physical processes) as well as tacit or personal knowledge (individual knowledge in the form of competences and expertise). Information is viewed as a form of explicit knowledge; therefore, the two terms will be used interchangeably throughout the study. In the state of a knowledge society, sustainability goals can only be accomplished through capitalizing on knowledge resources (Zack, 1999).

In addition, *KM* is operationally defined as an integrative framework of strategy, processes, and contextual elements that function collectively to nurture organizational knowledge (O'Leary, 1998). *KM strategy* refers to a written plan that describes how knowledge resources are identified and employed in the operational model, to help position institutions for continuous development. *KM processes* include the creation, transfer, and application of knowledge. *Knowledge creation* is the process in which management devotes resources to the goal of developing individuals' skills, gaining insights, and building relationships. *Knowledge transfer* is the process of planning and supporting activities pertinent to circulating knowledge in the workplace. *Knowledge application* is the process through which new knowledge is assimilated and integrated within procedures and routines to inspire

excellence and improvement (Alavi & Leidner, 2001; Dixon, 2000; Zhang & Sundaresan, 2010). *KM infrastructure* refers to organizational resources that come together to shape knowledge-related policies, support KM activities, and demonstrate the readiness of organizations to change. KM infrastructure illustrates (a) organizational culture that is willing to explore opportunities and try new methods, (b) organizational structure that is less likely to be centralized, and (c) Information Technology (IT) facilities that are adequately provided.

The following sections of this chapter will provide an overview of the increased attention given to KM as an approach to enhancing higher education performance, a summary of the research context (the problem, purpose, and scope), and the main questions explored throughout this work.

1.1 Overview

Due to the pressures generated by the modern global setting, optimizing knowledge resources has been increasingly recognized as a tool for building capacity at state and institutional levels. In this new setting, higher education is expected to advocate for development in society by means of its core functions of teaching, research, and consultation. Indeed, a country's level of socio-economic development is determined by the ability of higher education to generate knowledge and to transform it into better performance (Gillies, 2010; World Bank, 2008). In other words, the sector is anticipated to create new dimensions for development (Sohail & Daud, 2009;

Yizengaw, 2003) by providing a platform to identify and fulfill a society's knowledge needs (Lord, 2008; UNESCO, 2006; World Bank, 2010). For this reason, development aid agencies devote constant attention to enhancing higher education in developing countries as a strategic sector through which development goals are likely to obtain. By means of strategic planning and educational programs, development aid agencies encourage policy makers in developing countries to rethink their information and communication technology strategies in order to effectively access more innovative knowledge resources (World Bank, 2007, 2008). The magnitude of knowledge engagement in development has brought to light the need for a management approach that guides the implementation of knowledge-oriented development policies (Carrillo, 2005; Serrat, 2010).

On an institutional level, the way in which knowledge resources are steered towards local strategic and operational objectives indicates how institutions respond to external pressures and cope with uncertainty. Building on the experience of business organizations, knowledge can be incorporated into higher education routines and practices to solve problems and provide a framework for decision making and planning. Borrowing from organizational studies, findings assert that organizations running effective KM programs to locate, collect, and disseminate knowledge are better able to scale up efficiency, deal practically with unforeseen circumstances, and reflect effectively on complexities such as drastic demand

versus meagre financial resources (Ichijo & Nonaka, 2007). Similarly, earlier research by leading scholars in strategic management, Zack (2003), lists the advantages institutions hold when adopting a KM strategy and ensuring adequate physical and managerial facilities to support the creation and application of knowledge. Such advantages include an institution's ability to further the modernization process, advance the use of technology, and enhance internal operations (Lord, 2008). The advantages extend to elevating institutions' standards of quality (Lim, 2001), and to better adapt to global labor market dynamics (Ichijo & Nonaka, 2007; Zack, 2003). What is left to be investigated in the current context is the readiness of educational institutions to change and support the management of their organizational knowledge resources. The growing attention being paid by scholars to the potential benefits of cultivating knowledge resources in higher education institutions has prompted academics to further study the aspect of applying KM in the domain (Golden, 2009; Jalaldeen, Karim, & Mohamed, 2009; Kidwell, Vander Linde, Johnson, & Bernbom, 2001; Sohail & Daud, 2009). As a result, it has become a matter of great interest in the literature (Carrillo, 2005). The present study aims to develop some additional insights in this area of research.

To conclude, in theory and practice, the higher education sector is in a strong position to qualify as a strategic partner in promoting sustainable development through nurturing a society's knowledge resources. However, the strategic role of

higher education in the knowledge industry has questioned institutions' readiness to take on the mission. This leading position of higher education has incited the academic community to examine a management approach in dealing with its knowledge resources. This knowledge management approach provides the theoretical underpinning for this study.

1.2 Research Context

After several assessments, the largest higher education system in the Arab countries has come under criticism. Assessment results showed that insufficient production and dissemination of knowledge have caused institutions to struggle with substandard quality of academic programs and administrative services (El Baradei & El Baradei, 2004). This condition, which, in turn, has hindered Egypt's quest for social and economic development (El Baradei & El Baradei, 2004), has also resulted in a skill shortage in the labor market of the Arab region. This is because Egypt is characterized by graduate figures that constitute a large segment of the region's employment needs. Information on student enrollment in universities in the Arab countries reached 7.5 million in 2007/08 (Bhandari & El-Amine, 2012). Student enrolment in Egypt's higher education institutions (public and private) alone was about 2.7 million students in 2006/07 (Teferra & Knight, 2008).

Undoubtedly, the challenging environment of the higher education sector, characterized by growing demands on institutions, outdated technological

infrastructure, centralization, meager financial resources, and inadequate public policies (El Badawy & Mousa, 2007; Said, 2001), has rendered the country's knowledge system incapable of creating conditions in which knowledge can be generated, retained, and shared (Fergany, 2000). Since providing know-how to various sectors in the economy becomes substantial for a society to gain a competitive advantage (Lord, 2008; UNESCO, 2006; World Bank, 2001), higher education policy makers in Egypt found themselves compelled to seek opportunities in capacity building. The solution for the dilemma was envisioned in a framework of a sector-wide reform that enforces structural changes in the goals, content, practice, and management of higher education (World Bank, 2007).

The Role of Development Partners

By the late 1990s, a national call for reform raised by various stakeholders and interest groups encouraged the government of Egypt to invite both the Organization for Economic Cooperation and Development (OECD) and the World Bank to carry out an independent review with the aims of (a) assessing the capacity of the higher education system to meet agreed international criteria, (b) identifying opportunities for growth, and (c) formulating options for reform (World Bank, 2010). In response to several study findings and discussions among policymakers and development partners, a joint decision was made and a strategy was subsequently crafted for the initiative (Kohstall, 2012). In support of the reform, Egyptian policy makers have

reviewed allocation policies and granted more subsidies to improving sector operations, thus causing Egypt's public spending on education to increase (Hopper et al., 2008; World Bank, 2005). However, despite government efforts to increase the educational budget, the chronic shortage of public funds and the lack of expertise remain a serious challenge for the reform endeavour. This situation has motivated the OECD and the World Bank to offer additional funding, technical assistance, and training to enable the country's capacity-building initiatives (Ginsburg & Megahed, 2011). The first phase was predominantly co-financed through a loan agreement between the World Bank and the Egyptian government, loan number 4658-EGT, in April 2002 (World Bank, 2005). In addition to the World Bank, other bilateral and multilateral organizations, such as the United Nations Development Programme (UNDP), the U.S. Agency for International Development (USAID), and the United Nations Educational, Scientific and Cultural Organization (UNESCO) enabled this sweeping project to be launched (Ginsburg & Megahed, 2011). Support for this reform can also be credited to the European Union's Tempus program, which has been working on an ad-hoc basis to help modernize the higher education system for over two decades. Tempus provides information and technical support, as well as financial opportunities, to a wide range of projects in Egypt (European Commission, 2010). These development partners are key to the planning and execution of reform strategy at its early phase.

The reform emphasizes capacity building in areas that include quality assurance, professional development, relevance of academic programs, and modernization of laboratory tools and equipment, as well as improving the legislative framework (World Bank, 2009). The sector-wide momentum has three main objectives: a) information and communication technology capacity building, b) transformation of working conditions, and c) elevating graduates' intellectual skills.

For such structural change to take place, higher education policy makers planned the reform effort over three 5-year phases. This design was intended to engage administrators, academics, and students of public universities in a long-standing learning process (European Commission, 2011; Said, 2009). In 2002, the vision was put into practice, and was promoted under the Higher Education Enhancement Project (HEEP) (El Badawy & Mousa, 2007). Ever since then, the sweeping higher education reform has been providing unprecedented opportunities for institutions to dynamically contribute to the enhancement of the academic life.

In the reform strategy, capacity building in the field of information technology has been prioritized over other areas (Gillies, 2010). Policy makers believed that institutions need to improve their ability to communicate electronically and seek new sources to increase knowledge (El Baradei & El Baradei, 2004). That being the case, the reform fund assigned considerable resources to the Information and Communication Technology Project (ICTP), one of the reform's core projects. By

means of carrying out more than 170 subprojects across the higher education system, the ICTP was designed to build a robust, standard-based infrastructure. The latter includes networks (Intranet, Internet), personal computers in every office, an integrated library system, and Management Information Systems (MIS). These large-scale projects were intended to expand access to a broad range of internal and external learning resources and exchange information among heterogeneous interest groups such as students, faculty, researchers, industry, community organizations, public agencies, and international organizations. Therefore, investigating knowledge flow in the pursuit of reform is critical.

In conclusion, development in Egypt has been decelerated by inhibiting factors. One such factor pertained to the modest amount of knowledge higher education system provides to economic sectors. At a microscale, the drastic decline in institutional performance mirrored the scant growth in the system's knowledge production and exploitation. Since it is difficult to ignore the reform's aspect of enhancing the system's ability to deal with knowledge resources, it is, therefore, helpful to identify prospects for efficient knowledge management in the reform strategy.

1.3 Research Problem

In Egypt, higher education reform is a means of passage to the knowledge society (Said, 2007), where sustainability goals can only be accomplished through effective management of knowledge resources. Having said that, the application of KM to the

process of bringing about change in this context is subject matter that appears largely under-researched. Browsing through the project's progress reports and publications provides scanty information about integrating only a few KM tools, such as awareness campaigns, professional development programs, and Management Information System (MIS), without being identified as knowledge dissemination tools. Taking into consideration the "reluctance to change" factor and its remarkable impact on the progress of similar projects, the complete function assumed by knowledge to ensure universal participation in the reform effort, still needs to be clearly understood.

There is very little literature on describing the extent to which reform engineers perceived the significance of knowledge and if their perception has influenced the embrace of a knowledge-oriented approach. Neglected details, related to the ability of the reform strategy to create new patterns of learning, need to be researched and we need to know whether these patterns have affected decision making or results. The interplay between key organizational factors (i.e., institutional autonomy, distribution of power, and recruitment policies) that characterize the higher education system in Egypt and a number of KM aspects (i.e., accessibility to knowledge resources, levels of potential risk accepted in taking on new ideas, and fund availability for KM programs) remains unidentified.

Past studies addressing higher education in Egypt have focused more on the interactivity between political and economic elements influencing the reform decision (Browne, 2012; Cook, 1999; Cook, 2001; Gillies, 2010; Ginsburg & Megahed, 2011; Holmes, 2008; Kamaly, 2006; Toronto, 1992; Zoepf, 2005). Only few research attempts have been initiated to evaluate public policy in educational reform initiatives (European Commission, 2009; Kohstall, 2012), quality control and assurance mechanisms (Abdellah & Taher, 2007), student and academic staff mobility (Teichler, Ferencz, & Wächter, 2011), governance and funding mechanisms (European Commission, 2009), and intellectual property and copyright (Abdellah & Taher, 2007). This gap has created the need to investigate higher education reform using a framework of approaches and models pertinent to managing knowledge resources, which may address the many unanswered questions. Therefore, the subject matter is worthy of investigation.

Knowledge Management in the First Phase of Reform

Development partners played a central role in introducing knowledge management principles and practices to the process during its early phase. Efforts they carried out included intensive research to identify the influential factors that affect service quality and the means to approach it. Various mechanisms were put into practice, such as dialogues, study tours, and joint studies, to facilitate the acquisition of large streams of explicit and tacit knowledge. Said (2001) highlights the contribution of

the study tours arranged by the World Bank for several foreign countries as receiving “valuable first-hand knowledge” (2001, pp.40-41). Best practices and lessons learned, from other countries’ experience, have primarily been used to adapt selected models to suit the local context. Ginsburg and Megahed (2008) identify the transfer of international models, grant-based funding, the credit hours’ system, and quality assurance and accreditation as the driving force of many reforms in the region.

The momentous learning experience that preceded the reform effort and continued actively during its first phase has directly contributed to the building of a cadre of experts who were named to the key positions in the national reform project (Kohstall, 2012). Sharing mass knowledge with the academic community, through awareness campaigns, share fairs, and conferences, was intended to expand the knowledge cycle. The partnership with the OECD and the World Bank was the prime mover for documenting the first phase of the reform experience for potential knowledge seekers.

Notable interest in establishing knowledge sharing grounds was manifested in development partner initiatives. Built on a Tempus pilot project, the Mediterranean Recognition Information Centres Network, (MERIC) was launched to promote information exchange in the Mediterranean Region, and to create synergies with regional networks and with those being developed in the Arab countries (p.44). The

reform experience in Egypt has correspondingly generated critical knowledge for development partners. The TEMPUS (2009) case study of Cairo University pointed to the exceptional adjustment model and to global and institutional change, implemented during developing new curricula in risk assessment, in the Faculty of Engineering at Cairo University.

1.4 Research Questions

A set of three exploratory questions were articulated to examine the role of KM in higher education reform in Egypt. These were used to further develop the central research question, which delineates the scope of inquiry as:

How is knowledge management integrated into the second phase of the higher education reform strategy as executed by the Project Management Unit (PMU) of the Egyptian Ministry of Higher Education?

The three subordinate research questions, intended to develop a more nuanced understanding of the role of knowledge in enhancing higher education operations, are as follows:

1. How does the managerial staff overseeing the reform initiative perceive the value of knowledge and the impact of KM on reform outcomes? To what extent is this perception reflected in the strategic priorities and objectives of the reform?

2. How are the core KM processes of creation, transfer, and application coordinated within the reform's operational model? What policies and practices are used to encourage sector affiliates to obtain and share new knowledge?
3. How do institutional elements of organizational structure, organizational culture, and IT facilities implicate KM application within the unique context of the reform?

1.5 Purpose and Scope of the Study

The purpose of this study is to provide a high-level overview of the application of KM in the implementation process of the reform strategy carried out by the Project Management Unit (PMU) of Egypt's Ministry of Higher Education during its second phase, namely from January 2008 until December 2011. The second phase of the reform strategy was chosen in order to examine the application of KM in its original context (Stake, 1995). In April 2002, the first phase of the reform was launched, funded by a loan agreement with the World Bank: loan number 4658-EGT (World Bank, 2005); this required the operational model of reform to follow the lender's monitoring and accounting rules. However, the succeeding phases are being funded entirely by the government of Egypt; therefore, the reform model must conform to existing tight public-sector financial and administrative guidelines.

The high-level overview is obtained through capturing a wide range of personal views, work experiences, and practices, as well as institutional policies with the objective of identifying KM-related themes and patterns. The latter is further classified into three perspectives, strategic, managerial, and operational, to help describe the role of KM in leading the reform effort toward continuous improvement of pedagogical and administrative services. First, the strategic perspective seeks insights into the reform vision, work policies, and other strategic priorities (such as allocating resources among the various projects; human resources, financial resources, and physical resources of location and equipment) that potentially implicate KM application. Second, the managerial perspective further reviews the modes by which new models, ideas, and techniques, acquired throughout project implementation, are documented and shared across projects and then incorporated into the reform operational model. Exploring the synergy between strategy and processes may also reveal aspects of access to both explicit and tacit knowledge resources. Lastly, the operational perspective examines the extent to which organizational dynamics that characterize the unique context of higher education reform in Egypt are conducive to cultivating knowledge resources.

In this study, the three perspectives, namely, KM strategy, KM core processes, and KM infrastructure, are presented as three constructs. KM infrastructure is regarded as a number of institutional elements identified in the KM literature as

preconditions for successful application. It can be said to include the organizational structure, organizational culture, and IT facilities concerning networks, personal computers, and software solutions. The three constructs reflect the exploratory nature of the study and provide the theoretical framework necessary to answer the research questions.

1.6 Significance of the Study

The strong need of policymakers to increase knowledge production and tighten the gap between knowledge needs and institutions' supply of knowledge through reform makes the strategic case for exploring KM. Moreover, the high level overview intended in the study cuts across different functional areas of KM, thus providing an opportunity to situate the effort with respect to the state of organizational readiness for KM application.

The study contributes to KM theory by putting KM in a unique context of higher education reform in a developing country, which represents a motivating milieu for further research. In regard to higher education, KM is a relatively new area of research; therefore, the different frameworks suggested in the literature are likely to correspond to the reality of Western settings. In other words, models suggested in previous research may fail to address the particulars of other settings. For this reason, conducting the study in an Egyptian setting adds a new dimension to understanding various operational and managerial barriers created by the local

context of a developing country. These particular barriers often arise from typical cultural and financial differences which include long-standing values, traditions, and availability of various resources. These barriers, in turn, are expected to shape the variation in KM application. Therefore, the study is expected to serve as a resource for future researchers.

Greater insight into the KM aspect of higher education reform provides a number of practical advantages. The reform's dynamic plan is implemented within a framework of several phases commencing in 2002 and finishing in 2022 (although it was originally projected to end in 2017). Apart from being an informative tool, this study's analysis and recommendations may serve as valuable references that can influence the planning of strategic areas including Information and Communications Technology (ICT) investment policies, human resources development programs, and rewarding and recruitment policies for the coming phases. Key findings may equally encourage new thought on the level of engagement, which is required to lead efforts toward better results. Embracing a KM perspective allows the study to highlight potential benefits or risks seen on the ground while drawing the attention of administrators and planners to seeking opportunities in KM capacity-building initiatives.

1.7 Dissertation Structure

Excluding the introduction, this dissertation is divided into six chapters: literature review, theoretical framework, methodology, findings, discussion, and conclusions.

Chapter 2 presents a review of the relevant literature in two major sections. The first section looks at KM's strategic aspects: the processes involved in managing organizational knowledge and organizational factors that may foster or inhibit KM processes. This section examines existing research in the field in order to gain insights into the different elements affecting the phenomenon subject to study.

Chapter 3 introduces the theoretical dimensions that guide the study. It provides a particular perspective on key constructs and relationships through which the case is examined.

Chapter 4 describes the research design and the method that was applied. It specifies the tools and procedures used for data collection and analysis. It also discusses their implementation and limitations.

Chapter 5 presents the findings of the study, and focuses on the key constructs as well as the relationships identified in Chapter 3.

Chapter 6, namely the discussion, provides a brief summary and critique of the findings in light of the research questions and literature review. It also addresses the implications of the findings from theoretical and practical perspectives.

Lastly, Chapter 7 concludes the research while presenting the challenges encountered during the progress of the study and the way they were approached.

CHAPTER 2 LITERATURE REVIEW

During the last two decades, higher education researchers have been engaged in a thorough dialogue about the dynamics affecting institutions' ability to manage knowledge resources in systems' operations. Much of the quality management literature suggests that institutions must turn to KM, as a strategic choice, in order to cope with modern business setting and improve the quality of educational and administrative services (Coukos-Semmel, 2002; Materu, 2007). The escalating focus on knowledge management, as a strategic choice, reflects a combination of external pressures and internal pressures. These pressures have compelled institutions to seek development opportunities in their knowledge resources (Lim, 2001).

Studies show that external pressures are often triggered by the public domain which hold higher education institutions accountable to provide educated labor force, that will encourage investment opportunities, thus, increase economic development rates (Rowley, 2000). By educating the youth through modern teaching methods, classroom discussions, published research, as well as the participation of faculty members, who possess critical knowledge, in industry consultations and national policymaking, the sector is catalyzing new knowledge and theoretically capable of creating new dimensions for development. Internal pressures are those coming from within the institution include accountability, increased demand for original programs together with the growing competition, dynamism, and complexity arising from

globalization (Al-Ammal & Al-Bourshaid, 2011; Chen & Edgington, 2005; Cranfield & Taylor, 2008; Golden, 2009; Ramakrishnan & Yasin, 2012; Sohail & Daud, 2009).

The following review examines a wide variety of theoretical frameworks proposed in the literature to explain what makes the success of KM possible in organizations.

The review builds on three major themes: the incorporation of KM into organizational strategy, the implementation of KM in the workplace, and the influence of organizational resources on KM performance. Understanding the reciprocal relations and areas where the three themes intersect is considered fundamental to fulfil the objectives of the study. Past research evaluating potential interaction among elements of the three themes are used as points of reference to develop and validate the conceptual framework of this study. Relevant research findings are discussed in their respective sections. A summary of key points is presented at the end of the review.

2.1 Incorporation of KM into Organizational Strategies

Large body of management theories concerned with strategy foundation advocate for a lucid strategy as a fundamental component of KM application (Haggie & Kingston, 2003). Strategic management theories repeatedly refer to this component as the plan that articulates the cogent role of knowledge in an organization's operational model and describes the interactivity among contextual elements and knowledge processes in accomplishing objectives (Jennex, 2005; Knight & Howes,

2012; Zack, 2009). Grant (1996) notes that when KM strategy emerges from the wider vision and mission of the organization, it provides an evidence for not visualizing KM as an independent activity nor as an end. This emergence gives the opportunity for elucidating what practices to be integrated into the operational model, how often these practices will be exercised, what resources will be provided, and what means for measuring outcomes will be used. In other words, the strategy can be said to give direction to KM activities throughout the phases of developing, implementing, and evaluating. Research found that this direction can lead the organization to align long-term business objectives, such as efficiency and better quality service, with the objectives of sharing and using new knowledge (Barney & Hesterly, 2014; DeTienne, Dyer, Hoopes, & Harris, 2004).

A thorough analysis of the literature implicates that the process of developing a KM strategy conflate the two concepts of vision and flexibility. Whereas the vision defines the direction for knowledge to address business growth and uncertainty (Peszynski, Cooper, & Molla, 2008), flexibility can be said to give managers the liberty needed for reengineering business operations. Indeed, a KM oriented vision often emanates from managers' perception to the value added to operations through optimizing knowledge resources (Knight & Howes, 2012). Grant (1996), adopting an organizational management approach, suggests that KM vision can be evaluated through a framework of three principles: (a) knowledge is treated as a strategic

resource, (b) organizations apply knowledge to achieve business goals and mediate the high uncertainty, and (c) knowledge is created and stored by individuals rather than by organizations. While this approach has many benefits to KM success, these principles come with no practical indication on how they are applied in different contexts. It follows that planners and practitioners who are unaware of where critical knowledge resides in the organization and how to benefit from are unable to set realistic expectations and define an achievable scope of KM initiatives (Geisler & Wickramasinghe, 2015).

Flexibility means that managers have the power to change, or at least compromise, contextual elements, such as financial resources, management style, and organizational culture to align KM to business areas, including human resources, work processes, and technology resources (Jennex, 2005; Steyn & Kahn, 2008; Wong & Aspinwall, 2004). High levels of flexibility in a workplace indicates the willingness of an organization to encourage innovation (Davenport & Glaser, 2002), and undertake transformational initiatives whenever needed.

The conflation of vision and flexibility has been found helpful for transforming knowledge from the physical, tangible, and quantifiable form of documents to the seemingly intangible and nonquantifiable form of routines, and practices (Davenport & Glaser, 2002; Nonaka & Takeuchi, 1995). However, realistically, it is still problematic for managers to precisely describe the goals of a knowledge-based

strategic approach. Therefore, prior to investing in KM programs, senior administrators, for example rectors and deans in higher education institutions, must thoroughly examine three related domains: (a) the initial state, which represents the current condition; (b) the future state, which is the intended destination; and (c) the in-between state, which requires the identification of the critical knowledge needed in order to reach the future state (Ichijo & Nonaka, 2007). By further creating critical knowledge (which is of crucial importance in the success of operations) and transforming it into better performance, management has great opportunity to avoid replicating mistakes and to reduce the waste of resources (Crossan & Hulland, 2002).

The following review, after examining previous work in the field, frames the KM strategy building process within three themes including selecting the appropriate strategy, managing the critical content, and ensuring a satisfying level of human engagement.

2.1.1 Selecting Appropriate Strategy

Research has shown that different forms of knowledge are best organized using different management strategies (Shannak, Masa'deh, & Akour, 2012; Steyn & Kahn, 2008; Wong & Aspinwall, 2004). Therefore, managers must be prepared to select a

proper strategy or combine a group of strategies that conform to various business situations (Chen & Edgington, 2005; Jashapara, 2003). Several management scholars suggest that a KM strategy can be formulated based on elements of the process model, such as the input of knowledge, business procedures, and the outcome (Haggie & Kingston, 2003; Nonaka & Takeuchi, 1995; O'Dell & Grayson, 1998; Pinchot & Pinchot, 1996; Wiig, 1997a). It can also be formulated on groups of actions, including skills development, technology, leadership, governance, communications, and measurement (Knight & Howes, 2012; Zack, 2009).

Hansen, Nohria, and Tierney (1999) have been able to put forward one of the recurrent models of strategy classification. Their two-strategy model succeeded to bring together the two-type model of knowledge, explicit and tacit, suggested by Nonaka and Takeuchi (1995). In studies, codification has been found to involve the reuse of existing reliable and accessible organizational knowledge resources, explicit knowledge, to support business operations (Koenig, 2012; Kumar & Ganesh, 2011). Explicit knowledge may include policies, reports, manuals, and procedural guidelines (Koenig, 2012). Once put into records, an organization's explicit knowledge, can be located and transmitted through traditional filing systems or best accessed electronically through archival systems (Omana, van der Weide, & Lubega, 2010; Sohail & Daud, 2009).

Due to its quantifiable and easy to store attributes, literature shows that codification is more likely to be chosen by managers. These attributes also contribute to an organization's increasing need to establish procedural and operational routines (Chilton & Bloodgood, 2008; Kumar & Ganesh, 2011; Koenig, 2012). When the codification strategy is embraced, managers' prime consideration is to find answers to several questions, such as when and where knowledge must be stored to ensure instant accessibility, in what format it should be stored, how frequently it needs to be shared, and how it will be best used and implemented.

In contrast to the codification strategy, literature shows that the personalization strategy emphasizes the personal dimension in knowledge creation, which is referred to as tacit knowledge (Nonaka & Takeuchi, 1995). Tacit knowledge, as a product of an individual's experience and own insights in a particular context, is presented repeatedly in scholarly works as a significant source of competitiveness (Chen & Edgington, 2005; Jashapara, 2003). Unlike explicit knowledge, tacit knowledge is unstructured, task-specific, and difficult to capture and communicate (Kidwell et al., 2001). That being said, a relatively small number of organizations rely on the tacit form of knowledge due to its attributes. The challenges of designing operations based on tacit knowledge include several factors, such as its unquantifiable property, the high intellectual capacity (cognitive ability to learn and change) required from employees, and the employee commitment needed to achieve

strategy objectives. In order to allow for the transfer of tacit knowledge, management must give space and time to individuals to exercise mental models, use reasoning, and develop contextual skills (Nonaka & Takeuchi, 1995). In other words, prior to any transfer attempt, tacit knowledge must be interpreted and given meaning within the context in which it will be used in (Daft, Murphy, & Willmott, 2010). These prerequisites make the transfer of tacit knowledge difficult and limited, to verbal and person-to-person interactions (Swan & Newell, 2000). Therefore, when applying the personalization strategy, it is imperative for managers to focus their attention on activities that involve direct interpersonal communication and push aggressively to encourage collaboration across departments and units.

Despite their differences, a successful strategy does not discount any of their elements—it builds on them to develop a conducive setting for KM. The literature reviewed implicates that codification and personalization strategies both highlight the importance of content and human engagement in the application of KM, which will be analyzed in the following section.

2.1.2 Content Management

Rumizen (2002) notes that work processes can be improved by sharing only what is relevant. Therefore, research in management concludes that before any attempt is made to implement KM in the workplace, management should first decide on the critical content that needs to be manipulated. This decision will help managers

formulate the ideal strategy, thus enable the success of KM. Recent studies suggest that some elements related to process and technology are worth considering in content planning (Dubois & Wilkerson, 2008; Geisler & Wickramasinghe, 2015). For example, organizations must consider the establishment of clear processes to ensure that (a) valid content is collected from its origin, and (b) the most appropriate applications are used to organize and facilitate access to content (Rumizen, 2002). Therefore, written work procedures and regulations can be valid forms of content. Subsequently, transforming knowledge into rules, in accessible formats, allows organizations to combat the abstraction of knowledge (Geisler & Wickramasinghe, 2015) and integrate critical knowledge into daily work routines (Davenport & Glaser, 2002).

Effective content management has, as its very basis, the need to focus on the time required to input and access knowledge (Choo, 2002). Studies found that lack of sufficient time given to employees to search knowledge repositories or share successful work practices in person correlates to lower levels of KM capacity (Carrillo, Robinson, Al-Ghassani, & Anumba, 2004). Due to time limitation, management should think creatively and consider making opportunities for employees to explore new sources of knowledge. For example, the literature suggests strategic tools, including communication networks and formal learning networks that management can use to reduce the costs that are closely related to

knowledge search (Carrillo et al., 2004; Dyer & Nobeoka, 2000). Organizations can also use reliable and modern information systems to codify, store, and facilitate access to content (Davenport & Glaser, 2002; Hansen et al., 1999).

Literature highlights another important aspect to consider in planning content which is the selection of the organizational unit that will undertake the responsibility of managing content. Research indicates that, commonly, KM is positioned in the IT department, but it could also be located in information management, human resources, research and development, or even integrated into organizational design as a separate unit. Regardless of its location, Dubois and Wilkerson (2008) emphasize the need of positioning the KM unit where two conditions are met. First, access to funding and resources must be available to maintain investment in future initiatives. Second, the location should allow top management to regularly review the overall resource allocation policy and its concordance with the needs of KM programs. The placement of KM is such an important aspect to consider while planning KM since it reveals not only management's commitment to supporting KM, but also defines patterns of knowledge flow.

2.1.3 Human Engagement

Embracing a strategic perspective for KM requires the action plan to extensively address the level of human engagement necessary to enable the transformation of classic work patterns into new work experiences (Wenger, 1999; Zack, 1999).

Empirical findings ascribe the reason for the failure of many organizations in benefiting from KM to a managerial vision that neglects the human factor and sees KM merely as a technical manipulation of content (Serban & Luan, 2002). Attempts to consider human engagement in strategy building have been made by many scholars who believe that bringing people together is the best means for sharing content and improving work processes in workplace (Grant, 1996; Nonaka & Takeuchi, 1995; Swan & Newell, 2000; Wenger, 1999).

To ensure a high level of human engagement, DeTienne et al. (2004) suggests wide participation in what are called “communities of practice.” This term, which was first coined in cognitive anthropology, refers to an entity of working groups who share common interests in a particular domain (Wenger, 1999). The meaning later evolved in the KM literature to denote human resources–oriented strategy that exemplifies management’s desire to unite practitioners of similar professional background in the goal of building information networks beyond formal boundaries (Lubit, 2001; Soliman & Spooner, 2000). It is also common in KM studies to find the term used interchangeably with knowledge webs, networks of experts (Skyrme, 2007), virtual teams (Gibson & Cohen, 2003), or information networks (Lubit, 2001).

The rationale of using communities of practice is explained by the fact that practitioners are often mentally stimulated when interacting with one another to

discuss topics of mutual interest (Wenger, 1999). When building such a strategy, management must be acquainted with and provided the conditions associated with the successful application of the community of practice strategy. These conditions include (a) domains that create a common focus, (b) relationships that enable collective learning, and (c) practices that allow individuals to retain and apply their knowledge (Wenger, 1999). Members need to know what others know, who knows the most in each domain, who is willing to respond to their inquiries, and how to feel safe asking questions (Levin & Cross, 2004). Through fostering a sense of connectedness, understanding, and collaboration among members, communities of practice is a powerful tool that creates a supportive setting for learning (Levin & Cross, 2004).

An ideal KM strategy needs also to address the factors that may inhibit active engagement in knowledge sharing activities. Borrowing from human psychology, these factors are centred on human fear and lack of trust among participants. Considering that professional knowledge is perceived as a source of power and provides a sense of worth and status, Hibbard and Carrillo (1998) contend that employees tend to exhibit feelings of ownership over their experiences. They may fear that their own value will diminish if they share their knowledge (Hibbard & Carrillo, 1998). Besides fearing loss of power, more recent study findings relate employees' doubtfulness regarding engagement in knowledge sharing activities to

other types of fear, such as fear of criticism from peers, recrimination from management, or legal liability for breaches of confidentiality (Carrillo et al., 2004). To break the fear, employees must take the lead of their learning. They should be contended that learning and experimentation define their working environment, where failures or mistakes are not shameful and will not be used against them. They must believe that failures and mistakes are accepted and respected as a means of creativity and innovation (Davenport & Prusak, 2000). Therefore, organizations should strive to provide space for employees to openly express their vision on any topic and apply promising suggestions when appropriate (Schwartz, 2010).

Lack of trust between employees is an equally significant factor that could adversely affect participation in knowledge sharing activities (Kummerow & Kirby, 2013). By patronizing practices that encourage mutual respect, and recurring direct interpersonal contact, management has high potentiality in creating the desired level of trust among employees (Levin & Cross, 2004). Although that the process of building trust helps generate acquaintances and new-found rapport among organizational units on both the individual and collective levels (Kummerow & Kirby, 2013; Tohidinia & Mosakhani, 2010), it is relatively problematic. In building trust among members of an organization, management must carefully ensure a certain level of privacy and protection to those who exchange their experiences (DeTienne

et al., 2004). It also needs to work on lessening cultural differences among working teams to promote positive expressions of trust (Gibson & Cohen, 2003).

Summary of Incorporation of KM into Organizational Strategy

Reviewing the strategic focus in planning KM has brought light to the varied and distinct ways in which organizations view, manipulate, and rely upon knowledge to achieve business goals. The strategic role of KM must emerge from the organizational vision and be aligned to long term business objectives. Building on a clear vision for KM work agenda, exercising high levels of flexibility becomes central to drive change. Practically, to optimize knowledge resources in a work place, it is crucial for the management to locate where critical knowledge resides and thus concentrate the efforts on selecting the appropriate strategy that optimally manage content, and ensure a satisfying level of human engagement. The two types of strategies, codification and personalization, illustrate the practical application of KM in an organization. Once management decide to favour one strategy over the other or to combine both strategies, content planning must consider elements of process and technology. Clear processes to ensure that valid content is collected and made available through the most appropriate technology applications would contribute to the better outcomes of KM programs. A successful KM strategy must equally address the human element, the concerns, and the means of encouraging active participation in various KM activities.

2.2 The Implementation of KM in the Workplace

Many theories involve KM refer to its capacity for improving long-term performance and competitiveness. Early attempts put forward by Nonaka and Takeuchi (1995) suggest that knowledge acquired through practice, interaction, and learning is accumulated and stored in an organization's collective memory. Upon application, these knowledge stocks optimize the allocation of resources, solve problems, and explore new opportunities, thereby creating a competitive edge (Orange, Burke, & Boam, 2000; Ichijo & Nonaka, 2007; Zack, 2009). Correspondingly, effective KM requires a degree of management commitment to systematically plan, implement, and support activities that promote obtaining, circulating, and retaining knowledge (Davenport, DeLong, & Beers, 1998; Skyrme, 2007; Winter, 1987).

Although attempts have been made from different perspectives to elucidate the application of KM in organizations, this study will focus on two elements encompass sources of new knowledge and means of transferring and applying new knowledge. The two elements provide the framework necessary for thorough exploration of KM in the present study.

2.2.1 Sources of New Knowledge

Borrowing from organizational learning studies, new knowledge can be created by accessing existing organizational knowledge or by acquiring it from external sources

(Crossan & Berdrow, 2003; Sparrow, 2005). The two sources are recurrently categorized in literature as: feed-forward and feedback (Crossan & Hulland, 2002) which can be viewed central to the two strategies suggested by March (1991), namely exploration and exploitation, respectively.

The exploration strategy relies on feed-forward learning, that is, an individual putting in effort to develop new applications or enhance processes. In this case, knowledge originates from the individual and addresses the organization. Focusing on individual learning, the strategy puts extra weight on professional training and experimenting as significant tools to creating knowledge that can be fed forward to the organization. In contrast, the exploitation strategy count on the development of the organization's existing learning patterns and pre-existing knowledge to enhance processes. Creating new knowledge begins from the organization and proceed to affect the individual (March, 1991). Feedback, as the main source of learning in exploitation strategy, provides opportunity to avoid replicating mistakes and, therefore, reduces the waste of resources (Crossan & Hulland, 2002; Crossan & Berdrow, 2003).

Despite the strategy embraced, the formation of new knowledge is highly associated to the effective deployment of organizational resources (Davenport & Prusak, 2000; Smith, 2005; Winter, 1987). In the literature, investigating these organizational

resources is repeatedly presented using two different approaches: the technology approach and the human approach.

Under the technology approach, different terms are introduced to signify the process of transforming data into useful knowledge, including *data mining*, *information discovery*, *data pattern processing*, and *knowledge extraction* (Fayyad, Piatetsky-Shapiro, & Smyth, 1996). The process uses a wide range of tools and technologies that are drawn from several disciplines, such as information systems, machine learning, statistics, and artificial intelligence (Fayyad et al., 1996). A framework of tools and technologies that can support the creation of knowledge electronically can fall into one or more of the following groups: object-oriented databases, artificial intelligence software, semantics networks, document management systems, groupware, and expert systems (Dixon, McGowan, & Cravens, 2009). A study outlined by Wickramasinghe and Lichtenstein (2006) provides an excellent example of how knowledge in different forms can be manipulated and discovered in data pools by tracing relationships from modelling patterns. Those patterns can be interpreted and related to the operational context and then further shared by software agents (Wickramasinghe & Lichtenstein, 2006). The technological perspective of knowledge creation theory is a wide-ranging subject that stays outside the scope of the present study and will not be examined in detail.

A principal concept of the knowledge theory is that knowledge is created and retained by individuals (Grant 1996). To systematically examine the human element as an especially important organizational resource for catalyzing new knowledge, the present review primarily underscores the impact of two pertinent dynamics: intellectual capacities and social interaction. Individuals' intellectualities, namely employees' cognitive traits in terms of absorptive capacity and the ability to understand context, are identified in several studies as the driving force for acquiring new knowledge (Choo, 2002; Takeuchi & Nonaka, 2004). Recruiting creative, highly motivated employees, whose work and educational background add value to the organization's knowledge pool, is a key human resources strategy proven in empirical findings to help introduce new knowledge (Friesl, Sackmann, & Kremser, 2011; Maier, 2007; McDermott & O'Dell, 2001).

In like manner, strong interpersonal skills and the belief in trying new methods are important features in prospective employees to ensure their positive contribution to the knowledge flow (Balthazard, Cooke, & Potter, 2006; Davenport et al., 2002; Dixon, 2000; Holste & Fields, 2010; Ward, House, & Hamer, 2009; Smith, 2001). The details of such a strategy denote what type of tacit knowledge is sought through competent employees and the way it will be assimilated (Crossan & Hlland, 2002) to form coordinated knowledge-sharing networks (McDermott & O'Dell, 2001; Swan & Newell, 2000; Ward et al., 2009). Such networks are suggested to enhance

participation rates and reduce the time required to access various types of critical knowledge (Dyer & Nobeoka, 2000). Thus, they accelerate the knowledge cycle in the workplace. In order to find the best fit between new recruits and the organization's knowledge culture, Ruggles (1998) suggests that the recruitment strategy should find a balance between the goals of enhancing the organization's corporate culture and the candidate's technical abilities. In this situation, scholars suggest that managers need to consider that, in some cases, a lack of experience or knowledge can be compensated by a candidate's innovative ideas and an eagerness to learn and retain knowledge (Huysman & de Wit, 2013).

Should an organization be unable to hire new staff due to financial constraints, the literature suggests transforming the existing workforce into competent and skilled knowledge workers through providing learning opportunities (Dierkes, Antal, Child, & Nonaka, 2003; Takeuchi & Nonaka, 2004). A well-crafted professional development and training policy is a valid alternative strategy that reflects how organizations maintain strong focus on learning and build on knowledge in order to meet their objectives (Dyer & Nobeoka, 2000; Holste & Fields, 2010). Professional development is a wider concept that entails both formal and informal learning opportunities. Formal learning opportunities are often programs guided by certain curricula and arranged by accredited institutions or specialized units in the organization (Davenport & Prusak, 2000). Informal learning emerges during practice and can be

freely arranged or guided by the organization when management provides enough time for the activity to take place or sets up occasional learning opportunities for individuals to gather and exchange experiences (Davenport & Prusak, 2000; Wiig, 1997b). Focusing on learning and performance, workshops, seminars, conferences, consultation, and reflective supervision are mechanisms by which organizations can create and transfer knowledge (Jasper, Rosser, & Mooney, 2006).

The literature also refers to training as a tool to modernize the principles underlying present work practices (Chilton & Bloodgood, 2010; Choi et al., 2010; Davenport et al., 2002; Dixon et al., 2009; Hayes, 2001; Mu et al., 2010). Research in innovation management suggests that in addition to obtaining professional knowledge, employees should be trained in areas such as information seeking, problem solving, and cognitive skills to better handle complex situations in which different influences must be understood and considered (Levin & Cross, 2004). To do this, management can offer voluntary training programs or make it mandatory for individuals to participate as part of their career advancement requirements (Jasper et al., 2006). Training can be offered by units or experts within the organization or through external training providers. Empirical findings substantiate that large-scale training programs that include participants from more than one organization further stimulate the obtaining of new knowledge (Dixon et al., 2009; Markus, Majchrzak, & Gasser, 2002).

Social interaction is identified as a driving force in facilitating the acquisition of knowledge (Ichijo & Nonaka, 2007). Recent findings assert that obtaining knowledge is not limited to employees' own learning experiences or their interpretations of real-life situations; rather, it extends to their social interactions and shared experiences (Botha, Kourie, & Snyman, 2014; Gelard, Emamisaleh, Hassanabadi, & Rad, 2013; Moen, Mørch, & Paavola, 2012; Mu, Tang, & MacLachlan, 2010). The element of social interaction requires organizations to use common language across units, encourage informal dialogues, and motivate employees to exchange ideas and interpretations confidently (Holste & Fields, 2010; Smith, 2001).

Examining how social interaction enables the acquisition of new knowledge suggests the adoption of managerial activities including problem solving, storytelling, hands-on methods, and technical support (Gelard et al., 2013; Moen et al., 2012; Mu, Tang, & MacLachlan, 2010; Smith, 2001; Winter, 1987). Encouraging new problem-solving approaches increases a working team's knowledge when they try to deal with issues that arise (Coakes, 2003; McDermott & O'Dell, 2001). It also allows them to challenge existing routines and patterns of thinking, making room for creative solutions (Takeuchi & Nonaka, 2004). Similarly, storytelling is acknowledged in some studies as being able to transform tacit knowledge into an explicit state through articulation (Moen et al., 2012; Mu, Tang, & MacLachlan, 2010; Smith, 2001; Winter, 1987). Hands-on experience offers an opportunity for

others to learn and experiment with new methods of work processes, generating individuals' tacit knowledge (Holste & Fields, 2010; Liyanage, Elhag, Ballal, & Li, 2009). Research also suggests that technical support is another tool that management can use to provide staff with the knowledge needed to plan and reflect on tasks individually or in groups (Moen et al., 2012). To conclude, emphasizing social interaction in the workplace optimizes learning and promotes the generation of new knowledge.

It is important for management to understand that the retention of human value must be considered in light of a variety of uncontrolled conditions that can result in a loss of tacit knowledge (Friesl, Sackmann, & Kremser, 2011). On an organizational level, examples of these conditions may include outsourcing, downsizing, merging with another organization, and terminations (Smith, 2001). On an individual level, the knowledge cycle is more likely to be interrupted when employees retire or move to another organization for better remuneration or work conditions.

2.2.2 The Transfer and Application of New Knowledge

In the organizational context, the knowledge cycle becomes a part of a complex set of formal and informal relationships and communication channels. Choi and Lee (2000) describe the establishment of the knowledge cycle through the shift of knowledge from one level to another over internal dialogue, beginning at the individual level and transitioning to the group level, then to the organizational level,

and finally reaching the interorganizational level. From a cognitive psychology standpoint, when the experience of one unit shifts to another, knowledge is transferred (Argote & Ingram, 2000; Smith, 2005). This process of transforming individual knowledge into organizational knowledge requires transmitted knowledge to be clearly articulated (whether verbally or in writing) and sufficient for encouraging potential recipients to interpret, understand, and reflect (Choo, 2002; Davenport & Prusak, 2000).

Prior to any transfer attempt, managers need to understand that transferring knowledge at the individual level is never the end goal. Instead, the process should reach out to transform individual knowledge into organizational knowledge and ensure knowledge retention after transfer (March, 1991). Since knowledge is personal, those who possess it typically evaluate the benefits of sharing it with others, and decide to do so based on the outcome of their own judgment, which is relatively subjective and follows unclear norms (Chilton & Bloodgood, 2010). Recent empirical findings identify personal judgment and acceptance from both parties—sender and recipient—as prerequisites for successful knowledge transfer (Liyanage et al., 2009; Mu et al., 2010). While used to support internal and external social contact, management policies, such as incentive policies, can play an important role in stimulating individuals' or groups' readiness to communicate and exchange their

knowledge (Davenport & Prusak, 2000; Davenport, Thomas, & Cantrell, 2002; Dixon, 2000; Goh, 2002; Syed-Ikhsan & Rowland, 2004).

A growing body of literature looking for patterns to interpret the impact of selective managerial tools on engendering better communication reveals that a well-crafted incentive policy may have a notable effect on retaining an organization's knowledge stocks (Argote & Ingram, 2000; Davenport, Thomas, & Cantrell, 2002; Dixon, 2000; Goh, 2002; Moen et al., 2012). In addition to foster the transfer of knowledge, incentives can provide management with a security margin for knowledge retention when staff are more likely to be mobile (Tian, Nakamori, & Wierzbicki, 2009). As it is continually important to recruit high-calibre employees to feed an organization's knowledge cycle, it is equally important for current employees who have technical skills to be rewarded for investing their time in knowledge-sharing activities (Davenport et al., 2002; Hayes, 2001; Patriotta, 2004; Schwartz, 2010). An incentive policy that increases employees' satisfaction and adequately compensates their efforts to use knowledge is a necessary investment to create interest in various KM initiatives (DeTienne et al., 2004).

Taking into consideration financial restraints, research suggests that management can choose from an array of monetary and moral incentives, such as financial rewards, travel incentives, acknowledgements for participation and sharing ideas, and public recognition (Choi et al., 2010; Davenport et al., 2002; Hayes, 2001). In

addition to this broad array, other scholars highlight the effectiveness of other types of stimulus schemes, including mandatory participation in organizational events and submission of written work plans (Balthazard, Cooke, & Potter, 2006). The optimal incentive policy must align both tangible and intangible incentives with performance levels while highlighting performance leaders as good examples for other employees to follow (DeTienne et al., 2004).

In the pursuit of applying knowledge, many scholars emphasize the importance of having a collective mind-set on how knowledge should be used to meet business objectives. This can be built through the tools of a shared vision, common beliefs, and common understandings (Gold et al., 2001; Haghirian, 2010; Moen et al., 2012). Applying new knowledge has as its very basis the need to endorse conventional language and labels among the affiliates of an organization, and to ensure validity and accessibility of knowledge. Validity indicates that knowledge is up to date, while accessibility is the degree to which members of the organization can have timely access (Davenport & Glaser, 2002; Jennex, 2005).

Applying new knowledge can typically take place across various spectra. An early attempt outlined by Alavi and Leidner (2001) provides a significant model that consists of three key mechanisms by which critical knowledge can be assimilated and integrated into organizational work flows: (a) directives, (b) organizational routines, and (c) self-contained teams. Directives - the rules, guidelines,

procedures, and regulations of work processes- are forms of explicit knowledge developed through codifying a specialist's tacit knowledge and embedding it into instructions and standards so it can be communicated effectively to nonspecialists. Organizational routines represent the architecture of organizational activities, coordination patterns, and interaction protocols regularly followed by specialized individuals. Finally, self-contained teams are an effective knowledge internalization mechanism, especially in situations in which directives and organizational routines are inefficient. Self-contained teams are established groups of specialists with technical knowledge whose main purpose is to problem solve when uncertainty and complexity challenge regular operations (Alavi & Leidner, 2001).

Research provides evidence that once learning shifts from the individual to the institutional level where knowledge is put into action, organizations are better able to minimize the cost of activities, reach a state of efficiency, enhance organizational culture, outperform competitors, enforce innovation, create core competences, and thus sustain a competitive advantage (Debowski, 2007; Haghirian, 2010; Moen et al., 2012; Wang & Noe, 2010; Zhang & Sundaresan, 2010).

Summary of the Implementation of KM in the Workplace

For organizations to improve their ability to acquire knowledge, management should internalize activities significant to creating, transferring, and applying knowledge. New knowledge can be obtained via accessing existing organizational knowledge or

acquiring it from external sources. Those trying to establish an environment conducive to KM need to realize how several organizational resources affect the flow of knowledge. The literature emphasizes the importance of individuals' intellectual capacities, social interaction, and work environment among these organizational resources.

In this study, the act of making acquired knowledge available to employees is referred to as knowledge transfer. Through this process, others interpret, understand, and reflect upon knowledge as prerequisites to ensure knowledge retention. The act of contributing one's personal experience and tacit knowledge to an organization's knowledge pool is affected by intrinsic human resources policies such as professional development and training, recruitment, and incentives.

Finally, knowledge application occurs when knowledge is put into action and incorporated into an organization's operational model to be used to create opportunities and overcome obstacles. Knowledge creation, transfer, and application are three core processes that provide the framework necessary for the full exploration of KM in the present study.

2.3 Influence of Organizational Resources on KM Processes

The capacity of a KM program to achieve success depends on the existence of a body of supportive social, managerial, and technical resources that promotes

learning, innovative practices which in turn facilitates the integration of KM into regular work processes (Christopian, 2008; Debowski, 2007; Peter, 2007; Zack, 2003). For better knowledge performance, prior to investing in KM initiatives, research suggests that management should ensure the existence of a framework of necessary resources in a workplace (Becerra-Fernandez & Sabherwal, 2006; Gibson & Cohen, 2003; Goh, 2002; Gold, Malhotra, & Segars, 2001). Giving special prominence to some resources more than others, the literature covers a wide array of such resources that are grouped in past research models under different labels, including KM enablers (Lee & Choi, 2003), organizational infrastructure capabilities, preconditions (Becerra-Fernandez & Sabherwal, 2006; Gold et al., 2001; Schwartz, 2010), and success factors (Skyrme, 2007). In this review, the framework of the supportive organizational resources in the application of KM will be referred to as KM infrastructure.

Building on the model developed by Gold et al. (2001), which identifies three essential organizational resources to support KM: organizational culture, organizational structure, and IT infrastructure, Lee and Lee (2007) and Zaim, Tatoglu, and Zaim (2007) included the human element as a shared component of social capital and intellectual capital. Becerra-Fernandez and Sabherwal (2001; 2006) place more importance on social interaction by adding common knowledge and communities of practice to the Gold et al. (2001) model. Choi and Lee (2000)

identify the enabling organizational resources as a combination of two interacting systems: social systems and technical systems. Social systems encompass relationships, the attributes of people, reward systems, and authority structures. Technical systems consist of processes, tasks, and IT equipment and solutions. Adopting a techno-social perspective, Davenport and Prusak (2000) assert the role of technology and electronic repositories of knowledge, alongside training, culture, and leadership in facilitating knowledge flow. From an organizational viewpoint, Skyrme (2007) combines elements of design, processes, technology, and people to identify vision, leadership, structure, culture, and human resources policies as prerequisites for KM success.

The above review provides only a small sample of the various organizational resources proposed in literature for KM success, which indicates the breadth and depth of this field of thought. The following review will examine the contextual elements that form the setting of an organization in terms of organizational structure, organizational culture, and IT resources in order to understand their integral role in high-functioning KM programs.

2.3.1 Organizational Structure

By its very nature, organizational structure sometimes serves as a catalyst for knowledge sharing. Recent organizational design research suggests that organizational structure defines the line of authority; the way labour is divided into

departments, units, and groups; the coordination of work and reporting relationships, which describes the way knowledge flows in work place (Daft, Murphy, & Willmott, 2010; Willem & Buelens, 2009). Focusing on defining patterns of formal communication and social interaction, research findings assert that organizational structure determines the scope and arrangement of official knowledge exchange intended for an organization to accomplish its objectives (Ajmal, 2009; Cummings, 2004; Gelard et al., 2013; Lee, 2000).

Innovation theory suggests that the ideal organizational structure is the one that offers a variety of communication channels and coordinated sources to empower formal relationships among various units and communities (Coakes, 2003; Ganjinia, 2012; Gelard et al., 2013; Mahmoudsalehi, Moradkhannejad, & Safari, 2012). It is important to consider here that several factors contribute to the model of organizational structure embraced by management, including the type of ownership (private, public), the nature of the organization (for profit, nonprofit), and its size (small, medium, large) (Willem & Buelens, 2009). Thus, any change in organizational design can, in fact, encourage new forms of learning (Hedberg, 1981). For this reason, the relationship between organizational structure and KM performance continues to be a subject of research in KM literature.

The two types of structures commonly identified in organizational management studies—centralized and decentralized—can be evaluated from many perspectives,

including the type of management, decision-making styles, hierarchies of responsibilities, definition of authorities, and employee autonomy (Ajmal, 2009; Pinchot & Pinchot, 1993; Rapert & Wren, 1998; Walczak, 2005). Centralized structures are those in which decision making is carried out by a small group of individuals in upper management, while lower-level managers oversee implementing the decisions. A large degree of certainty characterizes this stable work environment, which is also bureaucratic in nature and governed by tight controls and regulations (Pinchot & Pinchot, 1993; 1996). Therefore, organizations using a centralized approach have low employee autonomy and are relatively small (Pinchot & Pinchot, 1996).

A decentralized organizational structure, which is often seen in large organizations that have geographically dispersed business sites, allows decision making to be delegated to different organizational levels (Pinchot & Pinchot, 1993; Walczak, 2005). In this structure, top management is in charge of corporate decisions, while middle-level managers are in charge of operational decisions. Accordingly, highly qualified, self-motivated, and autonomous employees are hired to deal with uncertainty, complexity, and dynamism that characterize the work environment of decentralized organizations (Walczak, 2005). Thus, centralized and decentralized structures are both favoured in their respective forms of organizations.

Evaluating the two structures from the KM perspective provides additional evidence for the high propensity of centralized structures to inhibit knowledge processes, unlike the decentralized structure. Recent empirical findings assert that the more hierarchical the organizational design, the less likely organizations can generate and internalize new knowledge (Ajmal, 2009; Ganjinia, 2012; Kumar & Ganesh, 2011; Koenig, 2012). The top-down communication lines that characterize centralized designs were found, in a recent study, to greatly limit social interactions between employees of the same unit and across departments (Mahmoudsalehi et al., 2012). Moreover, centralized decision making embraced by bureaucracy restricts employees' ability to try new methods, make decisions and act, which may result in the deterioration of the collective intelligence of the organization (Pinchot & Pinchot, 1996). In addition, the proprietary right to knowledge and cost-oriented strategies, mostly practiced in centralized structures, have also been found to impede KM activities (Barson et al., 2000).

The ongoing discourse over the degree of support that centralized organizations provide to KM has inspired scholars to examine the question further. In a project-based context, some studies find that the weak interunit ties that characterize centralized structures, which can be defined as units in which employees do not routinely interact, can encourage a project team to seek nonredundant knowledge and potentially accelerate project completion (Argote & Ingram, 2000; Levin & Cross,

2004). On the other hand, other studies have identified weak ties as a factor that hinders projects' progress, especially when highly relevant knowledge is needed for performance (Dyer & Nobeoka, 2000; Smith, 2005). The organizations with centralized structures studied in the latter group can be said to have a low propensity for knowledge exchange activities.

In contrast, the dynamism of the decentralized design affords employees adequate freedom to work independently and explore new facets through trial and error unrestrained by bureaucracy or restrictive operating procedures, thus giving room for the wide-scale production of new knowledge (Coakes, 2003; Nonaka & Takeuchi, 2004). Essentially, borderless structures empower informal interaction, and employees strive to create original communication patterns in order to adapting rapidly to the planning and decision-making needs (March, 1991). Indeed, the delegation of decision-making authority to various organizational levels, including the lower levels, as well as the fast-acting teams located in different sites both vastly contribute to the transformation of tacit knowledge into explicit knowledge, thereby allowing its integration into work processes (Takeuchi & Nonaka, 2004).

For organizations to optimize knowledge resources, researchers suggest a hybrid structure, or what is referred to as a matrix design (Steyn & Kahn, 2008). A matrix design combines best practices of centralized and decentralized models (Hedberg, 1981). Operationally integrating the two organizational designs requires

centralization for tasks that need expert knowledge, involve high-risk decision making, and are relevant to nonroutine or strategic business objectives (Steyn & Kahn, 2008). In contrast, operational tasks related to procedural and routine work decisions that are often associated with higher levels of certainty would benefit from a decentralized model (Steyn & Kahn, 2008). In addition, as a means for creating a hybrid structure, management must support social interactivity through a variety of approaches such as building partnerships, encouraging shared meaning making, and formal and informal dialogue (Davenport & Prusak, 2000).

Organizations may also need to make several fundamental shifts that include a transition toward teamwork, project-based tasks, coordination among peers, and toward multiskilled workers (Pinchot & Pinchot, 1993). Management scholars view this type of design as improving structural integration and mitigating vertical functioning, thereby ensuring better communication across units (Pinchot & Pinchot, 1996).

In other words, organizations are encouraged to redesign work environments focusing on internal and external learning sources (Curado, 2006; Hedberg, 1981; Sparrow, 2005). Internal sources are means or activities through which individuals of an organization can acquire either tacit or explicit knowledge from within the organization. These means or activities include performing work tasks, participating in group projects, engaging in program development, and conducting research

studies. External sources exist outside of an organization, and include activities associated with other branches, brother/sister companies, or other organizations, such as overseas training programs and joint research projects (Curado, 2006; Sparrow, 2005).

Research findings regarding the impact of organizational structure on knowledge creation and sharing are not definitive (Quink, 2008). This is one of the reasons that organizational structure deserves to be further studied (Gelard et al., 2013).

2.3.2 Organizational Culture

Scholars advocate for the role of organizational culture in enabling the creation of knowledge, making knowledge transfer possible, and fostering the application of acquired knowledge (Christopian, 2008; Davenport & Prusak, 2000; Skyrme, 2007). Using a knowledge-based theory of the firm, organizational culture is identified as a framework of values and ideologies endorsed by the organization's local context and can be observed through employees' behaviour to encourage learning, sharing, and application of new knowledge (Baltazard, Cooke, & Potter, 2006; Hibbard & Carrillo, 1998; Peszynski, Cooper, & Molla, 2008). Organizational literature lists social norms and decision-making styles underlying organizational functioning among organizational culture identifiers (Kwantes, Arbour, & Boglarsky, 2007; Mayfield, 2008). Recent empirical research associates high levels of workplace openness, respect, and trust with successful KM programs (Carrillo et al., 2004), therefore, it is

important for organizations to align organizational cultural norms with business objectives (DeLong, 1997).

Research on organizations differentiate between culture and climate (Denison, 1996). Studies of culture are more concerned with understanding the functioning of internal elements such as shared values, norms, and traditions. These three internal elements can be seen in the observable attitudes, interactions, and other aspects of life within the organization. Such studies are often carried out through qualitative approaches. On the other hand, climate is limited to employees' perception of organizational practices (Kummerow & Kirby, 2013). Patterson et al. (2005) expand the term *climate* to include members' behaviours, feelings, and beliefs. Studies that assess organizational climate often rely on quantitative surveys to understand employees' perceptions of and feelings toward the external setting in which the department or the organization operates (Denison, 1996). However, a great deal of scholarly work argues that climate and culture refer to the same phenomenon (Kummerow & Kirby, 2013). Therefore, it is now commonly accepted to categorize organizational culture into two components instead: visible and invisible.

The visible component exemplifies the history that shapes the organizational values and norms and comprises the dress codes, architectural design, symbols, slogans, decision-making styles, and performance evaluation practices (Baltazard et al., 2006). The invisible component refers to the set of conscious (Kummerow & Kirby,

2013) and unconscious values and beliefs (Rodsutti & Swierczek, 2002) that form core organizational values, such as the empowerment of employees and risk taking. The division between visible and invisible is reflected throughout much of the literature and guides the discussion of organizational culture in this study.

Seen from KM perspective, organizational cultures can also be characterized as being strong (values are extensively shared among members), weak (values are barely shared among members), or in transition (in a state of progressive change from one culture to another) (Aaltio-Marjosola, 1994). A strong organizational culture promotes norms and practices that enable knowledge exchange among employees and across departmental lines. It is characterized by a clear vision and feasible mission statements that articulate both the purpose of the organization and the values that describe how it deals with stakeholders (Baltazard et al., 2006). A strong organizational culture is attributed to leaders who work to create an environment whereby core values flourish, and employees contribute to building this environment by embracing given values and practices (Kummerow, & Kirby, 2013). Other attributes of a strong organizational culture are less formalized and standardized practices (Mayfield, 2008; Skyrme, 2007), stable networks and structure, a lower turnover rate, a high level of commitment, embedded norms, pride in achievements, uniqueness, and a shared feeling of success (Aaltio-Marjosola, 1994). In contrast, a weak organizational culture is defined by the breakdown of

networks, a high turnover rate, a low level of commitment, formal rules, a sense of being ordinary, persistent feelings of shame related to past failures, and a shared feeling of loss (Aaltio-Marjosola, 1994).

The study thoroughly examines organizational culture and how it might best serve the objectives of knowledge management studies using the Competing Values Framework (CVF) (Cameron & Quinn, 2011). The CVF describes organizational culture based on a set of criteria borrowed from the social sciences and organizational theory that are assumed to affect high performance and organizational effectiveness. The framework emphasizes four domains; employee characteristics, leadership roles, work environments, and strategic objectives. The CVF builds on the affinity for internal versus external focus, as well as on the extent to which organizations strive for flexibility versus control (van Muijen et al., 1999). The framework identifies four distinct organizational cultures: (a) hierarchy, (b) market, (c) adhocracy, and (d) clan (Cameron & Quinn, 2011). Each of these four cultures is further described in Appendix J.

In literature, there is evidence that the type of organizational culture affects the KM strategy management chooses (Kummerow & Kirby, 2013; Nonaka, 1994; Román-Velázquez, 2004). For example, organizations with a hierarchy or market culture are mostly characterized by bureaucratic structures, procedures, a centralized power source, and low employee autonomy. Their environments are more likely to

emphasize the reuse of existing knowledge resources and restrict the creation of new knowledge (Cameron, & Quinn, 2011). Therefore, such organizations appear to have a strong tendency to choose the codification strategy. In contrast, organizations with clan or adhocracy cultures are usually more inclined to use the personalization strategy (Román-Velázquez, 2004). Primarily, this inclination occurs because they operate in a dynamic business environment within which they constantly seek for original ideas and advanced methods so that they can develop unique products and maintain strong relationships with external stakeholders (Nonaka, 1994).

Of the four organizational cultures identified, some are more conducive to knowledge creation and exchange than others (Quink, 2008; Román-Velázquez, 2004). For example, a hierarchical or market organizational culture is assumed to pose a significant challenge for knowledge flow (Kummerow & Kirby, 2013; Nonaka & Takeuchi, 1995). Although the two procedure-oriented contexts often enforce the application of explicit knowledge, doing so hinders the emergence of new knowledge originating from experimentation, innovation, and creativity. In other words, adhering to formal communication channels, bureaucratic systems, policy controls, and vertical structures implies a low propensity for tacit knowledge flow. Hierarchical and market cultures also limit the codification of explicit knowledge, thus affecting

the objectives of achieving core competences and sustainable advantages (Mayfield, 2008; Román-Velázquez, 2004).

On the other hand, the work environment, leadership, strategic objectives, and employee characteristics in clan and adhocracy cultures facilitate the four modes of knowledge creation, namely socialization, externalization, combination, and internationalization (Nonaka & Takeuchi, 1995). In clan or adhocracy organizational cultures, the small specialized teams formed from across the organization to accomplish specific tasks disband and interact with larger groups of their units, sharing tacit knowledge. The specialized teams also create explicit knowledge by articulating their experience, thereby facilitating externalization (Kummerow & Kirby, 2013). Through encouraging risk taking and experimenting with new ideas, these two cultures motivate employees to engage in hands-on learning, thus allowing combination and internalization modes to take place, thereby completing the knowledge cycle (Nonaka & Takeuchi, 1995).

2.3.3 IT Resources

A growing body of literature discuss the great impact of technological tools and information systems on fostering knowledge processes. Markus et al. (2002) argue that organizations without adequate information technology (IT) tools risk higher levels of uncertainty, miscommunication, and alienation experienced by individuals and departments. Beyond the debate over the magnitude of IT in KM projects and

the question of whether humans or technology deliver better results, the evidence that KM is more likely to yield a desired outcome when supported by technology cannot be overlooked (Davenport, 1994). Many scholars suggest that an adequate platform of hardware devices and systems can enable the wide-scale collecting, storing, and accessing of organizational knowledge to enable its application (Alavi & Leidner, 2001; Grant, 1996; Guptill, 2005; Ruggles, 1998; Srikantaiah, Srikantaiah, Koenig, & Science, 2000). The existence of such a platform plays an equally important role in linking people to internal and external knowledge resources necessary to perform their tasks (Alavi & Leidner, 2001; Hansen et al., 1999; Müller-Prothmann, 2006; Riopelle et al., 2003).

By their very nature, IT tools can be classified into three groups, according to the objectives they support. Dalkir (2005) has successfully divided the wide array of potential information technologies and systems into three categories of core KM processes. First, knowledge creation, capture, and synthesis require content creation and management solutions such as data mining, blogs, templates, archiving, and classification systems. Second, knowledge sharing and dissemination processes are centred on networking and collaboration technologies, including intranets, portals, browsers, videoconferencing, chat rooms, discussion forums, and email. Finally, knowledge acquisition and application processes are widely

supported through e-learning and artificial intelligence technologies, such as decision support systems, knowledge maps, and intelligent agents (Dalkir, 2005).

It can be argued that achieving the necessary balance between codification and personalization is possible through IT solutions. For example, electronic databases and archival systems regulate the processes of capturing, organizing, and retaining various explicit forms of knowledge (e.g., visual, audio, textual) that can be used later for creating new material (Alavi & Leidner, 2001; Damsgaard & Scheepers, 2001; Guptill, 2005). Similarly, directories, rule-based expert systems, and decision support systems can physically keep track of tacit knowledge for future sharing and application (Dalkir, 2005). These systems, therefore, mediate the risk associated with the loss of knowledge when the turnover factor is reduced. Social networking technologies, blogs, and web meetings facilitate cyber-communication beyond physical boundaries, allowing members of different departments to meet virtually to exchange ideas and obtain know-how, thus creating communities of practice (Damsgaard & Scheepers, 2001; Gibson & Cohen, 2003; Guptill, 2005; Moen, Mørch, & Paavola, 2012; Riopelle et al., 2003; Sparrow, 2005). E-learning applications can also be used to train employees remotely through e-courses or video conferencing, which provides another dimension for continual codification and communication of tacit knowledge (Alavi & Leidner, 2001; Guptill, 2005).

As it can be understood from the above review that different technologies may be used for different KM tasks. Therefore, an organization's IT investment policy should not be constrained by the rule of a one-size-fits-all technology solution (Riopelle et al., 2003). The process of building adequate solutions requires managers to conduct further research to precisely define the scope and requirements of KM initiatives that address future knowledge needs of various stakeholders and resolve present business issues (Dalkir, 2005).

Management effort include evaluating available solutions in the market in terms of their costs and benefits associated with allocating, organizing, and coordinating knowledge resources for operations and objectives (Dalkir, 2005; Guptill, 2005).

However, management may achieve unsatisfying results if, for example, the selected sophisticated technology is challenging for individuals to use. Another common reason for obtaining unsatisfying results is the organization's ignorance of the type of knowledge it has, which prevents them from properly communicating their knowledge to potential users. User-friendly systems and management's awareness of the critical knowledge possessed by the organization are important elements in ensuring successful knowledge management.

The current thinking does not discount the role of IT—it builds on it to emphasize the need for a degree of human interaction. Research findings argue that managers should bear in mind that although the absence of IT tools would be challenging, the

number and the types of tools chosen does not typically affect either negatively or positively or prevent the use of KM (O'Dell, 2001; Wong & Aspinwall, 2004). Recent empirical findings assert that explicit knowledge, best shared through technology, comprises only about 25% of the objectives of a KM strategy (Omana, van der Weide, & Lubega, 2010). This line of thought is supported by O'Dell and Grayson (1998) who wrote that "the more tacit the knowledge, the less high-tech the solution" (p.88).

The extent to which technology can fulfil the strategic objectives of KM is the subject of ongoing debate among scholars. While technology is seen by Ruggles (1997) as restricting the generation, codification, and transfer of tacit knowledge, Dalkir (2005) argues that many technological solutions influence social interactions by providing critical help for achieving the necessary balance between codification and personalization approaches. By the same token, research findings advocate for network computing, including blogs and social networking technologies, as an emergent IT solution in which tacit knowledge can be intensely shared and transferred (López, Peón, & Ordás, 2009). Research findings provide evidence for organizations, that put policies to enforce the integration of new technologies in work processes, such as wireless networking, video conferencing, data mining, or warehousing, found themselves more likely to embrace innovation and improve their

learning curve (Choi, Lee, & Yoo, 2010; Dodgson, Gann, & Salter, 2008; Hayes, 2001; Müller-Prothmann, 2006).

The balance between automated and nonautomated means of acquiring knowledge should be prioritized over large investments in management decisions related to building information systems (Hansen et al., 1999). The ongoing debate on the extent to which information technologies and tools can provide the best or only solution for KM invites further investigation in this area.

Summary of the Influence of Organizational Resources on KM Performance

This section has identified three major areas that affect KM productivity: organizational structure, organizational culture, and IT resources.

Organizational structure has been identified in previous research as affecting an organization's capacity for experimentation and learning. Several studies provide evidence for a correlation between different organizational designs and knowledge exploration patterns. The two diametrically opposed types of organizational structure—centralized and decentralized—are discussed in the light of their ability to support or hinder the core knowledge processes of creation, transfer, and application. The review concluded that structures that are highly formalized with centralized decision-making authority are more likely to inhibit the creation and transfer of new knowledge. In contrast, the less formalized and highly coordinated operations, which characterize decentralized organizational structures, are found to

foster knowledge creation, support the transformation of tacit knowledge into explicit knowledge, and allow for wide-scale knowledge exploitation.

With respect to organizational culture, a significant body of research suggests that cooperative involvement, trust, and incentives must characterize an organizational work environment if the goal is to embrace KM initiatives. In studying organizational culture, the Competing Values Framework (CVF) is widely recognized in literature as the research tool that best serves the objective of a KM study. The CVF model classifies culture into four types, based on criteria that affect performance and organizational effectiveness: hierarchy, market, adhocracy, and clan cultures. Each of these present a variety of leadership styles and structures, communication patterns, strategic objectives, and different employee qualities and levels of autonomy. Therefore, some of these types of cultures are more likely to support knowledge creation and exchange, while others have a low propensity for knowledge processes.

IT facilities operate through a platform of tangible (hardware and equipment) and intangible (systems and applications) components to help optimize the use of knowledge resources. The wide array of potential IT solutions provides an opportunity for organizations to balance codification and personalization in achieving long-term goals. Managers investing in technology for KM purposes should consider the interaction between context and task while choosing adequate

solutions that fulfil present and future stakeholders' needs. Quite importantly, the use of technological advancements in the workplace should enable knowledge seekers to reach beyond geographic borders and obtain the necessary knowledge for planning and decision-making tasks.

Summary of the Literature Review

The key findings of the literature review are introduced in three sections, each of which sets a fundamental perspective for researchers to examine the implementation of KM in organizations. The three perspectives provide legitimacy to this study's conceptual framework and constructs. Section 2.1 reviews the strategic focus of planning KM in organizations. The common classification of KM strategies, codification and personalization, is analyzed in the light of the two types of knowledge: explicit knowledge and tacit knowledge. The review demonstrates how management's decision to favour one strategy over the other, or to combine both, is often affected by many organizational resources. The review focuses on two important factors in strategy planning: content management and human engagement.

In Section 2.2, the literature review addresses various managerial aspects that affect KM implementation. The review concludes that for KM to achieve desired results, managers should internalize activities significant to creating, transferring, and applying knowledge in an organization's operational model. In this section,

knowledge creation theory is used to explain the knowledge cycle through which shifts in knowledge modes occur.

Section 2.3 examines an interactive framework of operational dynamics that shape the way organizations manipulate knowledge resources. A given KM program's success in achieving anticipated results is affected by elements of the operational framework. The framework includes three factors widely recognized in past studies, namely organizational structure, organizational culture, and IT resources. Past research has classified organizational structures based on attributes of management, decision-making styles, hierarchies of responsibilities, definition of authorities, and employees' autonomy into two common categories: centralization and decentralization. These two categories provide widely accepted grounds for KM studies to examine organizational structures. The culture element represents ideologies and values endorsed by an organization and found unique to local contexts. KM research often scans cultural elements of leadership roles, work environment features, employees' attributes, and strategic objectives. These cultural elements are thus grouped into four classes: hierarchy, market, clan, and adhocracy. The last factor to evaluate in the operational dynamics framework that affect KM in the workplace is IT facilities. Information studies indicate that the integration of information-related technologies provides an opportunity for

organizations to foster learning, enhance human communication, and thus nurture knowledge resources.

Table 1: Summary of the Main Findings of the Literature Review

Strategy perspectives	Managerial perspectives	Operational perspectives
Systems versus people approach Codification versus personalization Explicit knowledge versus tacit knowledge Factors influencing the success of KM strategy: Planning phase: - Clear knowledge vision - flexibility - human engagement - Efficient content management - Placement of KM where access to resources is available Implementation phase: - Culture encouraging learning, sharing, and application of new knowledge Organizational design and management practices supporting the flow of knowledge cycle Platform of reliable information technology tools and solutions	<u>Knowledge creation</u> Machine involvement versus human involvement Feedback versus feed forward Factors affecting the acquisition of knowledge: - Individuals' intellectual capacity - Social interaction - Work environment - Information technologies <u>Knowledge transfer</u> Individual versus organizational knowledge Formal versus informal communication channels Management policies affecting the transfer of knowledge: - Professional development and training policy - Recruiting policy - Incentives policy <u>Knowledge application</u> critical knowledge versus common knowledge Management tools to internalize knowledge: - Directives - Organizational routines - self-contained teams Technology role in connectivity and accessibility	<u>Organizational culture</u> Visible versus invisible components Strong versus weak KM culture Characteristics of strong KM culture: - Cooperative involvement - Trust - Motivation Culture model (CVF): - Hierarchy, Market, Clan, and Adhocracy - Contrasts internal vs. external focus/ - Flexibility vs. control Elements shape culture in the model: - Strategic objectives - Work environment - Leadership roles - Employees' characteristics <u>Organizational structure</u> Centralized versus decentralized Top-down versus bottom-up approach Organizational structure can be evaluated in a framework of: - Attributes of management - Decision making styles - Definition of authorities and responsibilities - Employees' autonomy <u>Organizational IT facilities</u> Tangible versus intangible tools Technology solutions between codification and personalization IT has impact on KM core processes (creation, transfer, application)

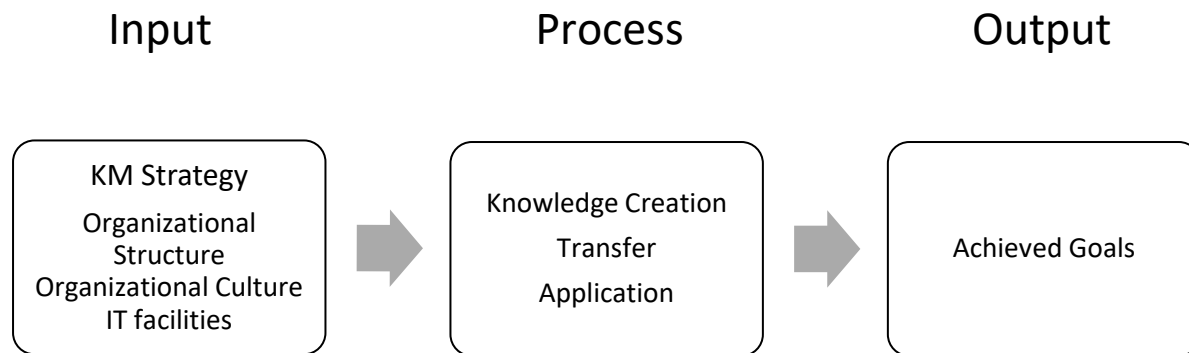
CHAPTER 3 THEORETICAL FRAMEWORK

This study has developed a conceptual framework to guide the systematic exploration of KM in the higher education reform process in Egypt. The conceptual framework builds upon organizational dynamics proven in past research, as discussed in the literature review, to impact the success of KM. Focusing on three major areas of interest (or constructs), namely KM strategy, KM core processes, and a set of KM infrastructural elements as illustrated in Table 2, the framework intends to explore the means through which various organizational resources are mobilized to support KM activities in the reform operational model. This exploratory framework assumes that there is an interaction between the reform strategy and KM infrastructural elements as they both bring the necessary inputs for effective KM processes. As shown in Figure 1, this interaction is presumed to affect the reform's progress positively by helping it achieve its objectives (output). In other words, the key assumption underlying the typical process model of this study is that both KM strategy and infrastructural elements affect reform objectives through the creation, transfer, and application of both explicit and tacit knowledge. The theoretical basis of each construct, along with relevant models and past research findings, is discussed as follows.

Table 2: Research Objectives

Research construct	Research objectives
KM strategy	Analyze reform objectives. Determine top management's perceived value of knowledge resources and KM. Identify potential indicators to assess the benefits of KM. Identify and describe the KM strategy currently in place. Determine which type of knowledge is emphasized. Explore how activities are oriented toward KM processes.
KM processes	Explore how core activities of creation, transfer, and application of knowledge are integrated into the operational model of the higher education reform.
KM infrastructure	Identify the impact of three organizational resources, specifically organizational culture, organizational structure, and information technology facilities, on supporting KM processes. Identify barriers that hinder the knowledge cycle and inhibit knowledge practices in the context of reform.
Achieved goals	Identify the extent to which specialized training is employed to bring about change, reinforce quality, and improve competitiveness. Determine the accessibility to knowledge resources necessary for decision making and planning.

Figure 1: The Research Model



3.1 Developing the Research Model

A great number of researchers explore patterns within existing conceptual models that use strategy or organizational resources as a major component in order to determine the impact of KM initiatives on organizational goals and performance (Dingsøyr, 2002; Lee & Choi, 2003; Lee & Lee, 2007; Quink, 2008). Despite the wide range of quantitative (financial) and qualitative (nonfinancial) measures that can be used to track performance, including return on investment, market share, organizational learning, and customer satisfaction, the examination of any performance measure is excluded from the scope of this study for the following reasons:

- a) It is difficult to measure performance in the context of higher education reform, especially when the feasibility and accuracy of the process is still debated among scholars. This debate is caused by scholars' lack of

consensus on a measure that can successfully correlate effective management of knowledge resources to organizational capacity.

- b) To examine this correlation, performance should be tracked by taking selective measurements both before and after the implementation of a particular KM initiative; this could not be done for this study.
- c) The exploratory nature of this study precludes any attempt to evaluate or assess end results **in relation to** organizational efforts, including performance.

Instead, this study limits the exploration of the impact of KM on reform goals to factors generally recognized as driving efficiency and quality in the workplace; these will be explored in depth in section 3.1.4.

Since no integrated model found in the literature matched the context and objectives of this study, the researcher synthesized a theoretical model by relying on constructs that are widely accepted in KM studies:

1. Organizational KM strategy (Barney & Hesterly, 2014; Davis, Subrahmanian, & Westerberg, 2002; Dingsøyr, 2002).
2. Core KM processes of creation, transfer, and application (DeLong, 1997; Nonaka & Teece, 2001; Skyrme & Amidon, 1998).

3. Organizational KM infrastructure, in particular organizational culture, organizational structure, and IT facilities (Gold et al., 2001; Lee & Lee, 2007; Quink, 2008; Walczak, 2005; Zaim et al., 2007).

The rationale for including these three constructs is explained in the next section.

3.1.1 KM Strategy

Exploring strategy in KM studies helps define typical areas wherein knowledge resides in the operational model as well as the optimal mechanism(s) management should choose/use when making this knowledge available to potential users; therefore, this construct refers to any systematic effort that considers articulating the role of knowledge in reform strategy and planning its activity in the operational model. The KM strategy construct also describes the means through which the inclusion of KM occurs and the interactivity between organizational resources and knowledge processes (Barney & Hesterly, 2014; Jennex, 2005; Knight & Howes, 2012). In other words, the strategy construct reveals how the organizational policies and priorities of the reform can act to favor learning, while depicting the interplay between content, process, and culture within the Egyptian academic context (Davis et al., 2002).

The reform strategy is expected to define how financial and human resources are allocated to serve activities related to acquiring, sharing, and utilizing new

knowledge, while determining the means of measuring the end results relevant to these activities (Dingsøyr, 2002; Haggie & Kingston, 2003; Jennex, 2005; Nonaka & Takeuchi, 1995; Pinchot & Pinchot, 1996; Schiuma, 2010; Wiig, 1997a). Due to the absence of a documented KM plan in reform strategy, the following three methods are used to explore the KM strategy construct:

1. Searching for evidence of any systematic formal effort used to plan or implement KM such as the formation of a team assigned to study and configure knowledge needs.
2. Analyzing the reform's objectives and determining top management's perceived value of knowledge resources and KM.
3. Seeking indications of codification and personalization strategies in action.

The exploratory model assumes that a reform strategy that focuses on deploying organizational knowledge to drive change must support innovative work practices (DeTienne, et al., 2004), elevate workers' skills, and provide evidence of a managerial approach that values KM. This study will examine how reform top management perceive the impact of optimizing acquired knowledge on operations and success. The perceived value of KM is measured by tools and techniques, used by top management, that include rewarding innovation, supporting learning activities and skills development, as well as allocating resources for technology infrastructure

(Barney & Hesterly, 2014). This study also seeks to determine generally agreed upon indicators that can help evaluate the effect of KM on the reform outcomes (Lee & Lee, 2007).

The model used for this study assumes that the codification strategy in place may target the systematic collection of organizational knowledge and make it available to the academic community in various forms such as operational rules, manuals, and guidelines (Nonaka & Takeuchi, 1995). Codification is viewed as a significant strategy, especially when reform approaches the maturity phase. In this phase, academics learn and accumulate stocks of tacit knowledge that need to be transformed into explicit form; therefore, this study seeks to discover the existence of an archival or document management system that tracks explicit knowledge and makes it available for immediate need. Exploring personalization in the reform model involves researching communities of practice and communication channels through which teams working on similar projects are connected to exchange experiences and operational issues (Dingsøyr, 2002). This construct also explores the availability of an expert directory used to locate who knows what in the reform domain and enforce the flow of tacit knowledge among project affiliates and across projects.

3.1.2 Identifying KM Core Processes

This study will also investigate the three core KM processes, specifically creation, transfer, and application, which are embraced as a knowledge process model in a

number of studies (DeLong, 1997; Nonaka & Teece, 2001; Skyrme & Amidon, 1998; Spender, 1996) and are seen in several other conceptual models (Alavi & Leidner, 2001; Bouthillier & Shearer, 2002; Choi & Lee, 2000; Choo, 2002; Tiwana, 2002). This construct seeks to identify the set of activities which are integrated into the reform operational model to facilitate the continuous exchange of knowledge among different functions. KM processes, in this study's model, are assumed to be affected by organizational orientation and resources allocated (Lee & Lee, 2007; Quink, 2008); they are also assumed to have a significant impact on optimizing results (Gold et al., 2001; Lee & Choi, 2003; Quink, 2008; Tiwana, 2000). Acquiring knowledge through activities such as professional development, training, joint research projects, and informal learning opportunities is viewed by the study as making various project affiliates more productive and receptive to new rules and practices (Fergany, 2000; Serrat, 2010; Tashakkori & Teddlie, 2010). For this reason, the model explores how the synergy among common behaviors, such as learning, communicating, and practicing, works to form the processes of obtaining, sharing, and applying knowledge.

To identify the work practices and mechanisms internalized into the reform operational model for communicating and applying new knowledge, the KM core processes construct is studied using Nonaka's SECI model (socialization, externalization, combination, internalization) (Nonaka, 1994). The SECI model is

described in detail in section 2.1.2. This study's model assumes that knowledge creation takes place through socialization when project affiliates gain tacit knowledge from executing their own undertakings, and then share their experience with others during formal and informal occasions. As people articulate and communicate their experiences, which is known as externalization, knowledge becomes explicit at the sender's end and is received as new knowledge by the recipient, thus allowing for proper application (Dalkir, 2005). New knowledge is the product of combining recently acquired tacit knowledge, from, for example, hands-on experiences, with explicit knowledge obtained from other resources such as guidelines, references, and training materials. Before being internalized in the form of procedures and work routines, the model examines how recently acquired knowledge is validated and contextualized, in response to the unique environment that characterizes the reform, to make room for new knowledge to emerge (Dalkir, 2005).

3.1.3 Identifying KM Infrastructure Elements

The third construct of this study's theoretical model is KM infrastructure. The former consists of a set of integral factors that should underpin the effective treatment of knowledge resources if the organization's objective is to create a significantly positive change (Davenport & Völpe, 2001; Tiwana, 2000). Moreover, infrastructure is operationally defined as a set of physical and organizational

facilities that support various KM activities, namely (a) an organizational culture that is more likely to explore new opportunities and is willing to change, (b) an organizational structure that is less likely to be centralized, and (c) an adequate provision of IT facilities. Several studies view these three organizational resources as having the greatest impact in terms of enabling or hindering KM processes in a given workplace (Gold et al., 2001; Lee & Choi, 2003; Lee & Lee, 2007; Quink, 2008; Walczak, 2005; Zaim et al., 2007).

3.1.3.1 Organizational structure

In this study, organizational structure refers to the hierarchical representation of power and lines of authority in the workplace through which members of the organization communicate and perform tasks. These lines of authority frame relations in the workplace, shape the flow of information, and impact the way employees acquire new experiences (Lee & Lee, 2007; O'Dell & Grayson, 1998). The organizational structure component is expected to reveal the approaches, policies, and procedures related to coordination among various units, projects, functions, and individuals within the reform model (Rapert & Wren, 1998).

Organizational structure will be studied by identifying whose insights are considered in the planning and decision-making processes. The model assumes that the more the reform's organizational design feeds these two processes with different views and interpretations, coming from different work groups at different structural levels, the greater its capacity to adapt to change and provide rich alternatives for solving complex problems (Cummings, 2004). This capacity scales up the cycle of knowledge creation and sharing, and also escalates efficiency (Davenport & Prusak, 2000; Levin & Cross, 2004).

In this study, organizational structure is also examined through the means of centralization; since the reform emerged in the public sector context, centralization is a key factor to consider (Lee & Lee, 2007; Lubit, 2001; Román-Velázquez, 2004).

Despite the benefits of centralization, as exemplified in the standardization of practices and procedures as well as in the control over processes that management theory advocates to ensure a degree of knowledge dissemination and implementation (Kummerow & Kirby, 2013), the present study's model assumes that it often adversely affects KM. The nominal advantages of centralization usually cause delays in operations and limit the perspectives involved in decision making, thus hindering the creation and application of new knowledge (Priestley & Samaddar, 2006; Román-Velázquez, 2004).

The model assumes that a less centralized structure is a catalyst that causes knowledge to be treated more effectively. In a centralized structure, decision-making power and planning for organizational activities are concentrated within top management, which gives far less opportunities for a diverse mix of individuals to act (Peters, 2007). Therefore, this study examines the extent to which authority is reserved and exercised by key leaders of reform projects and the structure's ability to accommodate change. This analysis focuses on identifying the subordination of the wide range of reform projects and subprojects, and seeks answers to questions such as the following: What are the mechanisms by which decisions are made? Who is engaged in the process of decision making and planning? And, how does the current organizational structure enable the flow of knowledge and support learning within the process of reform?

3.1.3.2 Organizational culture

The importance of including organizational culture in this study's model stems from the fact that the firmly held beliefs and opinions of members in a workplace affect their capacity to learn, collaborate, and work in teams, and thus influence their readiness to apply new knowledge (Lee & Choi, 2003; Lee & Lee, 2007).

Organizational culture is operationally defined as a set of shared beliefs, values, as well as social behaviours that are integrated in organizational operations and serve to characterize their context.

As such, this model assumes that the organizational culture that best nurtures knowledge creation and sharing is one that gives individuals the opportunity to voice their opinions, initiate action, and try out new ideas. On an individual level, project managers and affiliates should have a positive attitude toward learning and sharing innovative practices, while being less constrained by positions and duties (Davenport, 1994). This attitude is seen in terms of the desire to learn and develop trust between individuals to exchange views and experiences (Choi & Lee, 2000). Formally, such an organizational culture is characterized by policies that mandate learning rather than restricting channels acquiring new knowledge. Considering that knowledge increases when individuals interact freely, unhindered by regulations or codes of conduct, the workplace should focus less on enforcing rules and more on setting objectives that leave room for innovation. Through reform, the academic

community should be encouraged to equally exchange successful and incomplete work experiences without embarrassment or fear of negative judgment. An environment that tends to acknowledge and reward achievements while penalizing or neglecting to discuss inefficient performances is not conducive to nurturing knowledge resources.

In this study's model, organizational culture is assessed using visible and invisible dimensions. The visible dimensions can be found in the managerial philosophy, which is reflected in the reform's mission and objectives; McDermott and O'Dell (2001) suggest that these two elements involve organization's actions. The invisible dimensions refer to the social influence in the workplace caused by the "unspoken values" underlying employees' behaviors and perceptions (McDermott & O'Dell, 2001). The social influence includes assumptions, shared meanings, concerns of people in the workplace, and protocols that are not verbally communicated or documented in an institution's code of conduct, but are still expected to be binding for every member of the academic community.

The present study has examined both visible and invisible facets of organizational culture through the Competing Values Framework (CVF) of Cameron and Quinn (2011). The CVF four-type model (clan, adhocracy, market, hierarchy), as described in section 3.2, is widely used in the literature to examine the impact of organizational culture on KM strategies (Quink, 2008; Román-Velázquez, 2004).

3.1.3.3 Information technology facilities

Investigating the subject of IT helps the study determine what kind of access the academic community and reform stakeholders have to internal and external knowledge resources. The selection of this component is advocated by scholarly consensus on the substantial role that technological advancements and devices play in facilitating knowledge flow and performing knowledge-based activities (Luppicini, 2010; Quink, 2008). IT facilities are defined here as a platform of networks and systems that enhance communication and reinforce the flow of knowledge among the reform's various interest groups. This study's model assumes that the successful creation and application of knowledge, for the most part, relies on the proper selection of an adequate platform of networking technologies and information systems that can help project teams share different types of learning resources and news within formal and informal settings. Connecting projects to knowledge resources can happen through IT-based tools such as expert directories, knowledge fairs, communities of practice, knowledge repositories (databases), interactive social systems (wikis and blogs), and collaborative technologies (groupware). These tools, by ensuring timely access to relevant knowledge (Lee & Lee, 2007), have been proven to improve curriculum development, the introduction of new programs, research originality, enrolment, and other administrative services (

Bhusry, Ranjan, & Nagar, 2012; Kidwell et al., 2001; Omana, Van der Weide, & Lubega, 2010; Serban & Luan, 2002).

The model explores the availability of adequate IT facilities, including personal computers, servers, networks, intranets, video conferencing, archival and record management systems, e-learning programs, and blogs. The systematic effort made to align information analysis tools to planning and decision-making activities is also subject to exploration through the existence of effective management information systems (Luppicini, 2010).

3.1.4 Achieved Goals

Reform's major goal is to generate streams of critical knowledge and give people access to cultivating it. Achieving this goal implies increasing sector competitiveness and outcomes, thus adding to the country's development effort. Therefore, the theoretical framework associates achieved goals to the project's operational capacity to intensely integrate activities pertaining to the creation, transfer, and application of critical knowledge. Through mass knowledge produced, the sector will be able to find solutions for chronic problems that have challenged performance for decades. Achieving reform goals involves mapping areas where improvement is required, incorporating new technologies, establishing infrastructure necessary, and developing intellectual skills needed to deal with the new setting (HEEP, 2007). Linking the cycle of improvement to learning, as suggested by

Muñoz-Seca & Riverola (2004), suggests that improvement imposes change, change entails learning, learning produces knowledge, and knowledge is tied to improvement, if successfully shared and used. The cycle would be interrupted if reform knowledge is poorly managed, an issue that would hinder the national project from fulfilling its mission properly.

This study has limited the exploration of the impact of KM on achieving reform objectives to two factors that are both validated in past research to be drivers of workplace efficiency and quality: a) the extent to which specialized training is integrated into the reform's operational model, and b) the timely access to the knowledge resources necessary for decision making and planning. This emphasis is based on past findings that assert that changes in the amount of knowledge available to individuals affect their perceptions and adaptability to change, and could thus be associated with the quality of their performance (Drucker, 2012; Liautaud & Hammond, 2001; Oluikpe, 2007).

Specialized training builds an individual's competencies and partnerships; this is especially the case when individuals consider the impact of their actions and decisions on the outcome of the process (Oluikpe, 2007). The model assumes that a specialized training strategy used to show academics how to internalize various types of knowledge (know-what, know-how, know-why, and know-when) is an ideal approach to continually provide relevant knowledge in a reform context. This aspect

will be explored by researching collaboration strategies and training initiatives such as simulation training and inter- versus intra-organizational training programs (Liautaud & Hammond, 2001; Oluikpe, 2007).

Timely provision of the knowledge needs of various interest groups is another factor identified in total quality management, organizational behavior, and systems theory studies to improve an organization's ability to deliver quality service and enhance efficiency levels (Luppicini, 2010; Lenka, Suar, & Mohapatra, 2010). The model examines this factor through the availability of adequate information and communication technology tools such as internets, intranets, and an integrated management information system as well as a decision support system (Lenka et al., 2010). Table 3 illustrates the theoretical model used in this study, which is based on three major constructs.

Table 3: Knowledge Management Analysis Framework

Input	Process	Output
<u>KM strategy</u> Codification Personalization <u>KM infrastructure</u> Culture: • Clan • Adhocracy • Market • Hierarchy Structure • Centralization Information technologies • Hardware • Systems and applications	<u>KM core processes</u> Creation Transfer Application	<u>Achieved goals</u> Competitiveness Specialized training Timely access to knowledge resources

CHAPTER 4 METHODOLOGY

The investigation in the present study was carried out using a case study design.

Since the implementation process of the higher education reform strategy was focused, the PMU, the unit responsible of carrying out the implementation of higher education reform strategy, was selected as being the most appropriate strategic unit.

To answer the research questions, study data was gathered through a qualitative method using two types of interview protocols were employed; semi-structure and in-depth with officials of top management of the participating unit. The objective of the qualitative investigation was to map the current state of KM in reform and how factors such as a strategy, organizational culture, structure, and information technology work individually to impact core knowledge processes of creation, transfer, and application and how they are engaged to achieve reform objectives.

4.1 Study Design

A single case study strategy was selected as the basis of the present research design. Yin (2012) signifies selecting the appropriate research design as an important element to enable the study to answer the research questions. The decision of case study design was based on three principal attributes of the study:

nature of study, type of research questions, and high integration of the phenomenon under investigation within its context (Bryman, 2015).

First, the study is exploratory in nature; it aims to systematically explore the KM application integrated in the higher education reform strategy currently underway in Egypt. When the goal of the study is to gain familiarity with the phenomenon whether to learn about different dimensions of a problem or to acquire knowledge that will be helpful in framing hypothesis for more in-depth examination, case studies prove useful (Silverman, 2013).

Second, in investigating the phenomenon, the study seeks answers for a set of “how” and “what” questions for example; how is KM perceived by the executives of the reform and represented in a strategy format? How are knowledge processes coordinated within the reform business model? What are institutional infrastructure elements most conducive to knowledge cultivation and sharing? These types of “how” and “what” inquiries are best resolved through case study strategy (Seale, 2007). Third, it is hard to separate typical reform operations (i.e. the call for project ideas, evaluating proposals, training, and implementing projects, monitoring and providing technical support, reporting progress and problems) from knowledge acquisition and development engaged in these activities. In situations where the differences between the subject of study and its context are unclear, a case study is considered an ideal approach (Yin, 2014). The choice between single or multiple

cases to approach the investigation respected the fact that little is known about how the processes of capturing, transferring, and applying recently created knowledge are effectively used to achieve reform objectives. Similarly, little is also known about how KM is integrated as a part of the reform strategy and the forms on which reform institutional resources are devoted to support attaining and applying new knowledge. In the course of exploring an under-researched phenomenon, the single case study method is the most adequate methodology to consider (Gall, Gall, & Borg, 2007).

Although a case study approach is a well-suited methodology for the present study, this type of research design has its share of limitations. The inability to generalize research findings is considered to be the major inadequacy of the case study design (Seale, 2007; Yin, 2012). A case study can be used to examine assumptions; however, it is not possible for a researcher to generalize study results to other cases. To address this limitation, the researcher restricted the application of the study findings to: provide significant insight into reform context from KM perspective, the creation of a set of suggestions specific to policy makers and reform planners working in reform exercises, and the development of several hypotheses for future research intended to evaluate the role of KM in reform.

4.1.1 Qualitative Research Method

A qualitative research paradigm was employed as the methodological framework of the study. The application of a case study strategy allows the use of quantitative, qualitative, or mixed method research approaches. However, the qualitative approach was selected by the researcher to explore the phenomenon. In practice, three common elements advocated the selection of qualitative method for the present study; a) the goal of providing in-depth understanding of KM application in reform pursuit, b) placing great reliance on key informants to collect study data, and c) examining social topics such as institutional culture (Silverman, 2013). Several scholars observed that when the research goal lies in the generation of information necessary to thoroughly understand a contemporary real-life situation, qualitative method is best considered (Bryman, 2015).

The primary source of study data, qualitative data, was implicated by the limited amount of literature documenting reform pursuit in the second phase of operation. Obtaining information on the phenomenon was only possible through sharing the experience of individuals intimately involved in the strategic planning and execution of the project. In this particular situation, where the investigation requires an analysis of participants work experience and their observations to facts or events, qualitative data is strongly favored as the primary source of study data (Creswell, 2009). Moreover, in investigating institutional KM enablers, the study looked at culture, structure, and information technology as recognized elements to facilitate

knowledge acquisition and diffusion. Yin (2012) asserts that qualitative method is typically the predominant research method for studying social topics such as organizational culture. Therefore, the study relied on collecting qualitative data to learn about the phenomenon.

4.1.2 Case Study Decision

The case study design undertaken by the research was guided by the model shown in Figure 2: THE RESEARCH PROCESS. To begin, the following elements were clearly identified: the study topic, goals, information needed, best means to collect this information and from whom, in order to enhance the validity of the study (Neale, Thapa, & Boyce, 2006).

Figure 2: The Research Process.

takes the arrangement of three independent phases, the first two extended from 2002 to 2007 and 2008 to 2012 respectively were likely to be included in the study yet they demonstrated two distinctive financial and organizational settings. The unit of analysis selected for investigation was the second phase of the implementation of reform strategy. The researcher's decision to pay attention to this period was ideally relevant to examine the reform in its real-life context. According to Stake (1995) the case study researcher may give special prominence to a phase or segment of the process under investigation to explain facts, relate elements to situations, or draw conclusions. Unlike the first phase, in which projects were funded essentially by the World Bank loan agreement and, therefore, operated within a framework of administrative rules promulgated by the funding agency, the succeeding phases of the reform life cycle are entirely subsidized by the government of Egypt. This condition, therefore, contextualizes the reform, financially and administratively, in a framework of regulations that adhere to the operational setting of public sector on which the higher education sector is based. By examining the second phase, key findings of the study can be a pertinent device in planning the third phase and any extendible phases projected to lengthen reform effort in the country.

4.1.3 Study Site Selection Process

The fact that the reform is a sector-wide initiative made it essential to set criteria to choose the most adequate site that answers the research inquiries. Therefore, a set of predetermined criteria were formed to assist in the selection process and describe the site most suitable for data collection. These were:

- Unit located in a distinguished, strategic-level position in the organizational structure of the reform project.
- Strong evidence that KM related tools are embedded in the practices of the unit.
- Willingness on the part of the organizational unit to participate in the study and to make adequate commitment to provide data sources helpful to the completion of the research study.

The position of the Projects Management Unit (PMU), Ministry of Higher Education, in the reform organizational structure made this site the one candidate that best fulfilled the criteria for the case study. The unit is responsible for planning and engineering the sector-wide initiative. What is more important for the study to consider is that the PMU's mission, objectives and working mechanisms are assembled in such a way that it promotes quality standards, good practices devoted to institutional learning, staff development, and the use of information and communication technologies. The PMU is found to play a significant role in optimizing the collection, organization, and dissemination of new knowledge across

state universities, the National Quality Assurance Agency and The Ministry of Higher Education, and various reform stakeholders. The unit is regarded as a knowledge hub and a fundamental source of technical knowledge in the reform implementation process.

Document Review

In case study research, reviewing existing documents is a reliable strategy in qualitative research to develop data collection instruments, and validate data collected. Document review is equally useful for assessing decisions related to the number and ideal participants who possess experience and insight. In this study, due to lack of internal and external publications, soft and hard copies, that document the second phase plan of action and work accomplished, document review included only the first phase material for analysis.

Unlike the first phase, higher education authorities in Egypt paid inadequate attention to the documentation aspect of the reform experience. Therefore, periodic reports, research studies, performance evaluation, newsletters, and marketing materials, published in collaboration with the World Bank and OECD and featured the first phase, were used as a guideline to set the scope of the study, select the case, formulate questions for semi-structured and in-depth interviews, and secure access to information resources before moving forward in the study.

Since the two phases demonstrate entirely different organizational settings, goals, and operational framework, document review was not helpful in validating and triangulating study data collected from interviews. Incorporating information from multiple sources would have helped compare work done during the second phase to project's plans. It would have helped the researcher reveal and clarify the difference between the vision and policy underlie operation of the phase subject to exploration and those of the first phase, if the difference exists.

4.2 Data Collection

Prior to data collection, and after deciding on the unit of analysis and research site, two other important decisions were made by the researcher regarding, first, the means of collecting study data, and second, from whom (criteria to define study informants).

First, regarding the means of collecting study data, interviews were employed as the primary source of data collection in the study. Interviews have been broadly recognized as an interactive means of gathering data in qualitative studies (Tashakkori & Teddlie, 2010). In a case study design, there are other qualitative data collection methods deemed to be well-grounded to support the validity of the study including; a) interviews, b) document review, c) participant observation, and d) non-obtrusive observation (Neale, et al., 2006; Yin, 2014). Practically, participant observation and non-obtrusive observation would not have been an option as they

both required a long stay in Egypt which was not feasible. Given the limited literature documents the second phase of the reform, great reliance was placed on gathering data from two different types of interviews; semi-structured and in-depth (Gillham, 2010; Seidman, 2015). Using interviewing solely could have the potential to decrease the construct validity of the study, therefore, repeated reviews of key informants' transcripts and meanings, during data analysis, was adapted as a strategy to overcome this limitation as suggested in Seale (2007).

The second decision in data collection addressed the "Who" aspect of the process. This included: who are the best participants to provide rich and detailed information to understand the complex setting of the reform (Seidman, 2015). Reviewing the goal of the study indicated the need to learn about how knowledge resources are perceived and mobilized to serve reform objectives. This required collecting information about strategy and empirical activities. Therefore, individuals in key positions of top management of reform projects were deemed rich informants. They are constantly engaged in setting goals and direction for each implementation phase, crafting policies and guidelines to bring about change, and assessing the needs and foreseeing the opportunities to optimize outcomes. Davenport and Prusak (2000) and Nonaka and Takeuchi (1995), highlighted the crucial role that this managerial level plays to support learning at institutional level and to reinforce KM activities within the overall organizational strategy. Analyzing meanings and

descriptions they make of their experience in various processes would allow the study to capture a holistic picture of the mediating role of KM in daily reform operations.

4.2.1 Interviews

The research gave due consideration to gain exhaustive and thorough knowledge about the study subject matter, therefore, two types of interview protocols were regarded necessary for collecting study data: a) semi-structured and b) in-depth interviews. Semi-structured protocol was deemed suitable because the researcher already had some background information from the literature reviewed and decided on a framework of themes to examine (Creswell, 2013). Seidman (2015) explains how the means to access people's experiences range from using an entirely unstructured approach that takes the form of an informal talk to applying a highly structured (rigid) protocol with closed-ended questions that does not allow participants to elaborate their perspectives and experience. In the middle of the range, a semi-structured format that typical involves a set of standardized open-ended questions (DiCicco - Bloom & Crabtree, 2006; Yin, 2014). Semi-structured type questions allow a degree of freedom for participants to interact, bring up their own ideas, and describe work experience in their own words during a more flexible dialogue session (Kvale, 2007).

An in-depth protocol was also considered to enrich the learning about study constructs through capturing more detailed facts, evidences, and opinions from individual(s) most experienced in the pursuit (Creswell, 2013). Senior management level was targeted for this type of interviews for the wide experience they obtained since launching the project.

Face-to-face interviews were used as means to collect the study data. Reading participants' body language and facial expressions during the interviews deemed of importance in encouraging more meanings and opinions to be voiced (Polkinghorne, 2007). The researcher was aware that the extent of information to which an interviewee is willing to share, in an interviewing session, depends on the interviewer's communication skills. Therefore, the researcher has planned to administer the sessions through implementing a group of strategies including active listening, paraphrasing each answer, concluding and asking for verbal confirmation of the participant to prevent any bias, and probing whenever seemed necessary to uncover more information (Creswell, 2009).

4.2.2 Developing Interview Guide

In preparing for the interviews, a standardized open-ended questions guide was created to ensure the consistency among study participants (Creswell, 2013; McNamara, 2009). For the list of interview questions see Appendix B. Literature, previous research studies, and research objectives guided the process of

constructing effective questions (Gold et al., 2001; Hansen, 1999; Lee & Lee, 2007; Quink, 2008). A three-step process was utilized to develop the interview guide. First, a clear distinction was made between research questions and interview questions as suggested by Kvale (2007). Second, the principal research inquiry was broken down into three major themes of evaluation KM strategy, KM processes, and KM infrastructure. Third, a set of exploratory questions were designed and phrased to capture individual experiences, opinions, facts about institutional policies and practices identified in literature to frame the integration of KM within the wider operational model. The investigation also emphasized the objectives of the research; KM processes of creation, transfer and application of critical knowledge (DeLong, 1997; Nonaka & Takeuchi, 1995 ; Nonaka & Teece, 2001; Skyrme & Amidon, 1998; Spender, 1996). In addition, questions were formulated to specifically collect data on the potential roles of KM infrastructure using elements determined in literature such as organizational culture, structure and technology (Gold & Taylor, 2007; Quink, 2008).

The first section of the interview was design to collect participants' demographic data related to educational qualifications, academic background, length of experience in reform pursuit, length of experience in the PMU, work responsibilities, and other relevant professional experience.

Table 4: Mapping of Semi-Structured Interview Questions to Key Research Questions

Research construct	Research question(s)	Interview questions
KM Strategy	How does the managerial staff overseeing the reform initiative perceive the value of knowledge resources and the impact of KM on reform outcomes? To what extent is this perception reflected in the strategic priorities, and objectives of the reform?	*Describe the PMU mission and objectives? *What types of processes or services are running in the unit? *Describe the knowledge/information strategy implemented or adopted by the PMU? *To what extent does the unit knowledge/information strategy support the mission and objectives? *What type of knowledge is emphasized through the information policy since the beginning of the second phase of operation? *How does this emphasis, in your opinion, relate to unit objectives? How do you see the link? *How do you evaluate the effect of information

		management on the unit objectives? *From your experience, what indicators could be used to evaluate information management impact?
KM Processes	How are core KM processes of creation, transfer, and application coordinated within the reform's operational model? What policies and practices are used to encourage project affiliates to obtain and share new knowledge?	*How is the unit knowledge/ information administered, to ensure reliability and validity for application by other stakeholders? *How is the knowledge/information produced through unit operations stored in the unit? *How is the knowledge/information generated through project/program activities made available to stakeholders? *How does the PMU encourage disseminating best practices among other units?

KM Infrastructure	How do institutional elements of organizational structure, organizational culture, and IT facilities implicate KM application within the unique context of the reform?	*To what extent do you think culture, structure and technology advance or hinder unit knowledge/information management activities? *What are some other barriers, if any, encountered during knowledge/ information management process? *In your opinion, what is the way to overcome the barrier(s) or hindrance(s)?
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Interview questions were clearly assembled into a logically coherent sequence where each question followed smoothly from the previous one (Onwuegbuzie & Leech, 2006). Neutral inquiry words such as describe, how, and what were consistently used to increase reliability (Yin, 2014) and reduce potential bias that may occur in the interview questions (McNamara, 2009). Each question was used to express one idea. Explanations and examples were provided throughout the guide to eliminate misunderstandings and to clarify particular jargon terms for participants who are not familiar with the domain of knowledge management (Kvale, 2007).

4.2.3 Pilot Testing of Data Collection Instrument

Prior to actual data collection the study conducted one pilot testing interview with one participant. A pilot study is defined as the pre-testing of a specific research instrument (Baker, 1999). The procedure was meant to develop and test the adequacy of the primary data collection instrument which, in turns, improve the validity in data collection process and increase the likelihood of the study success (Peat, Mellis, Williams, & Xuan, 2002; Teijlingen, Rennie, Hundley, & Graham, 2001, Yin, 2009). The procedure was intended to get feedback on the questions, measure the anticipated response, conduct any necessary refinement on the interview questions and record the time needed for the interview. Moreover, pilot testing has greatly informed the researcher with the unspoken norms and values that characterize the academic community in Egypt prior to the actual implementation of the study (Kvale, 2007). The pilot study procedure suggested by Peat et al. (2002) and described in Table 5 was adapted and applied in the present research.

Table 5: Pilot Study Procedure

Pilot study procedure to improve the validity of data collection instrument
• Chose pilot participant with similar qualification as prospective study participants. • Administer the interview instrument in the same exact way as it will be administered in the main study. • Ask the participant for feedback to identify ambiguities and difficult questions. • Discard all unnecessary, difficult or ambiguous questions.

- Assess whether each question gives an adequate range of responses.
- Re-phrase any questions that are not answered as expected.
- Record the time taken to complete the questionnaire and decide whether it is reasonable for all questions to be answered.
- Revise and shorten if needed.

(Source:Peat et al., 2002, p.123)

A rich informant was qualified to participate in the pilot testing as she had background knowledge and practical experience similar to the prospective participants of the study. The pilot participant had spent quite a while in reform projects undertaken in the same unit subject to data collection at university level (Alexandria University) right before assuming office as the Egyptian Educational and Cultural Consul in Montreal. The pilot interview was conducted in Montreal, Canada. This interview was helpful in offering some indication of the likely responses for each interview question to check whether actual responses would confirm or contradict response expectations. The procedure revealed the need to: a) provide more examples, b) use the term “information” interchangeably with “knowledge” in some questions, and c) slightly modify few questions. Based on the analysis, some elements of KM processes and KM infrastructure were validated as; structure, information technology and culture, and others were eliminated as: human capital, financial resources; to effectively correspond to Egyptian context. The participant of the pilot interview was not part of the actual study nor was the data collected during the interview included in the study data analysis.

4.2.4 Ethical Considerations

To ensure the ethical conduct of research, an ethics approval was obtained from The Ethics Committee of McGill University prior to commencing data collection. Participants were due to receive individual invitation emails to participate in the study attached with three other documents:

- a. A detailed description of the purpose, scope, participant's rights and the procedure of the study. The document fully informed potential participants with the no risk of their participation, how anonymity would be ensured, how interview data would be protected and what their data would be used for;
- b. A consent form to be signed for approving the voluntary nature of participation and for being audio taped;
- c. An interview guide to familiarize themselves with the interview questions(Kvale, 2007).

4.2.5 Recruiting Study Participants

The present study conducted interviews with seven participants. The number of study participants was affected by two uncontrollable factors: the availability of and accessibility to appropriate candidates during data collection timeframe, as well as their willingness to take position in the study. The revolutionary atmosphere dominated Egypt during data collection made access to participants' sites limited

due to the demonstrations and riots taking place and the closing of main roads and districts at the time. These obstacles limited the number of study participants to seven, all work in nearby locations. However, an adequate number of participants for a case study research is three to five according to Creswell (2013). Study participants were chosen from top management level of three programs/projects out of the six undertaken by the unit to enhance university education: An Executive Director, three Program Directors, two Assistant Directors, and a Consultant. The names of the programs/projects were not disclosed to respect the confidentiality as clearly noted in the consent form. Table 6: Study Participants' Background provides a status representation of study participants. Recruiting qualified participants, who are likely to share the richest and credible information of their experience, was extremely important for the study reliability (Onwuegbuzie & Leech, 2006). Since the Executive Director of the PMU was the first point of contact, the initial recruiting process started with his selection of other rich informants of senior staff. Suggested participants were considered to be responsible for planning and executing KM related activities, had the most experience in the reform process, and thought to be willing openly to provide detailed information about their work experience (Neale, et al., 2006). Initial participants then suggested additional members of their projects or other projects to take part in the case study. This technique is recognized in qualitative research as asserted by Babbie (2015) who explained how the number of

interviewees can be expanded by asking the first participant to recommend others who fulfil the same measures.

Table 6: Study Participants' Background

Participant ID	Job Title	Educational Background and Degree	Gender	Years of Experience in field of specialization	Participant's tenure in the PMU(yrs.)	Relevant Experience
1	Executive Director	Engineering Professor	Male	31	9	UNESCO projects & Staff Development Project
2	Director	Engineering Professor	Male	33	9	UNESCO Projects Technology in Education
3	Assistant Director	Engineering Professor	Female	15	6	University projects
4	Director	International Education Professor	Female	18	6	UNESCO
5	Director	Engineering Professor	Male	18	9	University projects
6	Vice Director	Engineering Professor	Male	17	8	UNESCO

						Projects
7	Technical Consultant	Engineering Masters	Male	10	5	University projects

4.2.6 Preparation for Interview

Academics and administrators working in public sector in Egypt are not familiar with disclosing information to independent researchers. This condition has created the need to establish trust with interviewees, through a protocol considerate to the hierarchal nature of Egyptian academic culture, prior to requesting participation. In general, developing trust with study participants proved to influence the richness of information the interviewee is willing to reveal, thus enhance the validity of the study (Shenton, 2004). The study protocol included a formal visit to every prospective participant's office to introduce, the researcher's background and academic experience in Egypt as well as the research topic, scope and objectives. Building social rapport through visiting potential participants was helpful in increasing the likelihood for participation. Eventually, all potential participants accepted to proceed.

During the visits, it was important to clarify and assure participants, in person, that the survey is a legitimate part of a study program and to confirm the study's irrelevance to any critical aspects such as politics, financial information or

budgeting. Upon receiving the verbal acceptance to participate in the study, the interview location and time were set at their convenience so that participants would feel at ease to share information (Creswell, 2009). Majority of interviews were scheduled after working hours to avoid distractions and therefore allow participants to recall the details of their experience in a quiet surrounding (Easton, McComish, & Greenberg, 2000).

Formal visits were usually followed by emails that included a package of research information, a copy of the interview guide, and the consent form. Providing interviewees with a list of the interview questions before the interview gave them the opportunity to be ready and prepare detailed answers. Moreover, some of them brought supporting publications and documents about their programs. Even though publications provided cover only the first phase of the reform plans and results, which is not included in the study scope, publications helped clarifying the global context, policy considerations and challenges involved in the effort.

4.2.7 Actual Implementation of Semi-Structured Interviews

A single semi-structured interview was conducted with each of the seven participants. Interviews took place in the premises of the PMU Cairo, Egypt, between December 6 and 22, 2011. At the beginning of the interview, for every individual session, and to put the participant at ease, he/she was introduced to the purpose of the study and to the format of the interview. The consent form was

presented for their signature, and terms of confidentiality were addressed. Similarly, participants were informed about how the study will proceed, who will get access to the information, and how it will be analyzed. The reason for audio recording and participant's rights were specified in the interview consent form (Appendix C). In the introduction, interviewees were informed about the potential length of the session. Then, the format of the interview and the necessary terminology were explained; particularly, the difference between knowledge and information was clarified with examples. Study participants were encouraged to ask questions in case any ambiguity occurred, or further clarification was needed.

Participants were advised to freely choose between English or Arabic which language they feel more comfortable to describe facts, ideas and experience in detail. This choice was given based on the fact that the Egyptian dialect is rich in figures of speech such as metaphors and similes which bring description to life. Lakoff and Johnson (1980) noted that social reality, as experienced, is unique to one's own language therefore, interviewees were welcome to use Arabic. Six out of seven interviewees felt more at ease to exchange information and ideas in Arabic since Arabic is also the native language of the interviewer (researcher).

During the interview, techniques such as echoing and paraphrasing what the participant would say about each question in English were applied extensively to check and formulate meanings in KM jargon. Just as paraphrasing was important to

inspire participants to remain focused (Creswell, 2009), it helped the researcher to confirm that the information conveyed by the interviewee was the information received by the interviewer.

Interview sessions were recorded using a digital recording device. The recording device was regularly tested to make sure it was working properly (Easton et al., 2000). Interviews were scheduled for 30 – 45 minutes in the study invitation letter, however, participants showed flexibility and enthusiasm enough to extend semi-structured interview sessions to last between 45 and 140 minutes. Variation in interviewing time was subject to ensure data saturation. Interviews were continued until interviewees introduced redundant information or were unable to bring new perspectives on the topic.

At the end of the interview session, participants were advised to contact the researcher for any future inquiries about the study and promised a copy of the transcribed interview. Each recorded interview was saved under a participant identification code given by the study to ensure participant anonymity. The researcher used field notes to record a short summary of the session following every interview. The summary briefed details such as: the setting of the interview, the person interviewed, important incidences, and any missing information or details to

be searched for (Guest, MacQueen, & Namey, 2011). Field notes were critical in developing the in-depth interview guide and framing the sessions (Bryman, 2015).

4.2.8 Developing and Conducting In-depth Interview

Semi-structured interviews were conducted with participants affiliated to only three projects out of the six related to enhancing public universities. To overcome the uneven distribution of study participants, four in-depth interviews with the executive director of the project were conducted to collect information relevant to the other three projects. In-depth interviews, varied in duration between forty to seventy-five (40-75) minutes each. Information collected about other projects shows consistency with that information attained from participant projects.

The primary advantage of in-depth interviews goes beyond providing an opportunity for elaborating and clarifying issues discussed during semi-structured interviews. It extended to facilitate the obtainment of an inclusive picture of the functionality of the entire reform project. The incorporation of the two interview categories has limited potential bias in the study results.

Four in-depth interviews were conducted to complement the semi-structured interview method in gaining greater insight into study constructs (Kvale, 2007). This particular type of interviews provided an opportunity for obtaining better understanding of the techniques, approaches, and behaviours influenced managing know-how within the reform pursuit. In-depth interviews were conducted with a key

member of senior management as the most experienced in the unit and the one capable of elaborating and clarifying the issues discussed during the semi-structured interviews. As was the case in the semi-structured interviews, in-depth interviews took place at the premises of the PMU Cairo, Egypt, December 2011. Interview sessions varied between forty to seventy-five (40-75) minutes according to the participant work schedule.

To maintain consistency across the two types of interviews (semi-structured and in-depth), a brief interview guide was developed to address five major themes to investigate using this method encompassing: a) the management of knowledge resources (how the work is being done from the idea through to this phase of operation), b) reform organizational and social settings in terms of policies, processes, norms and values that rule information exchange activities on formal and informal scales, c) staff attitudes toward transforming institutions, and learning from experiences (failures and successes), d) effective practices adopted to reinforce continuous learning, and e) the use of technology to network the academic community and connect it to various internal and external knowledge sources (see Appendix D for in-depth interview protocol). In-depth interview sessions were characterized by free discussions, natural interaction, follow up questions derived from previous responses, and extensive probing (DiCicco-Bloom & Crabtree, 2006; Gall, Gall, & Borg, 2007; Creswell, 2009).

4.2.9 Data Transcription

All interview audio files (semi-structured and in-depth) were manually transcribed in semi-verbatim manner, by writing out each question and each response, word for word, exactly as they were said by the participant, omitting any stutters, fillers or background sounds. Two transcribers were hired to help the researcher type out and revise all transcriptions alternatively against the audio version. The use of transcribers is integral to the process of transcription in many qualitative research projects (Davidson, 2009). Two preventive measures were taken to increase the reliability of the transcripts against the issues pertinent to the application of this method - such as the possible alteration of words when transcribing, and the ethical matters related to data confidentiality (Tilley & Powick, 2002). First, qualified transcribers, with a research background, and complete understanding of ethical considerations were employed for the task (Dressler & Kreuz, 2000). The hired transcribers were trained in the type of transcription that was required for the study (Davidson, 2009). Second, a verbal approval was acquired from the Executive Director of the PMU to transcribe the data through independent transcribers. In addition, the content of the transcription interview files remained confidential.

To enhance design validity within the process and to create a reliable text version of the audio interviews, a “three check per interview” process was applied to evade transcriptionist errors or corrections. Each tape was listened to three times, by both

the transcribers and the researcher who conducted the interview, against the transcript to check for accuracy. After review, the transcripts were saved in word document format accepted for data analysis.

4.3 Data Analysis

In-depth interview transcripts provided large amounts of contextually descriptive data. At the beginning of data analysis, in-depth and semi-structured interview transcripts were read through and analyzed individually to look for patterns, themes, and possible codes. Attempting to link up major findings of the analysis, categories, patterns, and themes emerged from in-depth interview transcripts were used as reference to triangulate and validate themes and codes emerged from the semi-structured interviews data. After determining final set of themes and codes, both interview transcripts were deliberately put together for further analysis. Given that using interviewing solely could have the potential to decrease the construct validity of the study, repeated reviews of interview transcripts and meanings with study participants, during data analysis, was used as an alternative tool to overcome this limitation.

Although there is no uniform strategy can suit all qualitative investigations, scholars strongly recommend researchers to determine the strategy that mostly promotes the quality of the research against other uncontrollable considerations (Neuendorf, 2011; Onwuegbuzie & Leech, 2006). In preparation for the data analysis procedure,

each of the recorded interviews (the seven semi-structured and the four in-depth) was given a number. The identification numbers were assigned according to when the interview was conducted. For example, “Interview Session 1, semi-structured” refers to the first session of the seven semi-structured interviews; “Interview Session 2, semi-structured” refers to the second participant interviewed and so forth. In-depth interview files were named following the same pattern. “Interview Session 1, in-depth” was the name of the first audio file of the in-depth interview and so on. The two sets of interview data were combined at this stage of the course of the study.

This phase of the study design was concerned with examining and evaluating interview transcripts to learn about the phenomenon, create meanings, and reveal any interrelationships deduced from data collected (Guest, MacQueen, & Namey, 2011). Prior to proceeding to data analysis, there were few aspects for the researcher to think carefully about and choose between several alternatives including: whether to consider translation before data analysis or when presenting findings, what interviews to be contained in the analysis, how to analyze transcribed files, manually or electronically using qualitative data analysis software, and what qualitative tool to be used to analyze data collected for the study.

The researcher made the decision to analyze the data in the same language that the interviews were conducted in (Arabic) to reduce any potential risk of losing meaning

during translation. At the later stages of the analysis process, the data were translated into English for the presentation of the findings. Transcribed interviews, semi-structured and in-depth, were included in the analysis process for all interviewees responded in full to interview questions. To guard against potential bias, or false propositions, all transcribed interviews were analyzed right after the transcription process was completed (Davidson, 2009).

Interview transcripts were analyzed manually. There are many computer software packages available to facilitate qualitative data analysis. However, computerized data analysis was not a possible option for the study, since interview data was in Arabic. Personal computer software for qualitative data analysis does not support Arabic in their language list. Finally, the manageable volume of study data made manual analysis feasible and unproblematic.

The scope of the present study guided data analysis to focus on certain data and ignore others (Neuendorf, 2011). As such, any data that is irrelevant to the implementation of the reform strategy within PMU operations was discarded from the analysis. For example, some participants had referred to experience gained from working in ad-hoc development projects or other reform operational units at departmental or faculty level at state universities. These data were excluded from the analysis.

Template analysis was the thematic tool that seemed to be most adequate for the study design and purpose. Template analysis is described by Miller and Crabtree (2005) as the process of organising and analysing textual data according to predefined themes considered important to lead the evaluation and answer research questions. Guided by previous research and theories, identifying patterns in study data is the key to organizing them (Miller & Crabtree, 2005). In the study, capturing and comparing perspectives of different participants was depicted in a set of themes (categories) sorted as KM strategy, KM processes, and KM infrastructure. Template analysis is a commonly used approach when the researcher intends to examine, extract and assign segments of text, containing alike content, to a list of predetermined distinct categories (Silverman, 2013). As the text is evaluated, this approach is characterized by a great deal of flexibility that allows new themes to emerge or for current themes to be refined or even deleted when they appear to hold unimportant data to be worth consideration by the study (King, 2004). Template analysis often turns out to be an efficient and less time consuming data analysis tool for its capacity to easily organize large sets of text in form of tables or matrices (Miller & Crabtree, 2005).

4.3.1 Developing the Template

As a starting point for organizing study data, an initial template was generated to define the introductory themes and subthemes derived from the literature and the

interview protocol questions (Miller & Crabtree, 2005). The template took the layout of hierarchical arrangement of themes and sub-themes, which is a key feature of this type of thematic analysis. High-level themes were organized to provide an outline for the three central constructs of the study, while low-level themes indexed a number of closely relevant aspects of each construct. The initial template organized themes/sub-themes into two or three levels as illustrated in Appendix E. This structure, as suggested by King (2012), is useful because it allows for the analysis to take place at various levels within and across interview data, therefore, enabled in-depth examination to be made by the researcher.

To facilitate coding of interview data, a short clear description of each theme was created to guide the process and increase credibility. Coding is the process of relating chosen text to a theme (King, 2012). For a successful coding, each interview was read several times. Iterative reading of interview data was helpful to acquaint the researcher with the key words, common expressions and meanings used by the interviewees to communicate their experience and how real life utterance relate to study themes (Symon & Cassell, 2012). Repeated reading of the interviews text was a two-round process with the aim of approaching two goals. During the first occurrence, the objective was to infer more themes while the second aimed at deciding on the final codes. Visiting verbatim content iteratively helped the researcher record a list of potential codes that were mentioned repetitively in the

dialogue (Guest, MacQueen, and Namey, 2011). The development of new codes was largely based on three major factors:

1. Subdivision is helpful to the analysis of the main inquiry of the study.
2. Important facet addressed in the interviews.
3. Feasibility of time and resources to carry out another level of analysis.

In the second round of reading the interview data, both initial and derived codes were refined and compared across text for redundancy and relevance to decide on the final ones. The process has led to continually modifying the codes until a decision was made on the final template that would best address the research questions. The final template is presented in Appendix H.

The process of developing the initial template avoided deriving too many pre-defined codes at the beginning of the analysis. The goal was to refrain from introducing complexity into the analysis and to allow the emergence of new codes (Miller & Crabtree, 2005). To ensure that the message understood by the researcher was the message conveyed by study participants, the template was reviewed and coding decisions were checked - for accuracy - with the Executive Director of the PMU. The procedure was intended to increase the validity of the study (Neuendorf, 2011). Template revision and further explanations with respect to the information provided in the interview transcript were obtained from the participants over scheduled Skype calls, during the analysis phase as needed.

4.3.2 Organizing Study Data

After deciding on the final template version, the data from the seven semi-structured interviews and four in-depth interviews were systematically mapped against the final list of codes. A template file (word document) was created for each participant where the captured text from the original interview transcript file was copied into the template file under the proposed code. For every proposed code, a thorough review of the complete transcript file was conducted prior to extraction of relevant text for a specific theme. Participants' perspectives were captured in words, phrases, and segments of text that appeared to describe a certain coded theme. As noted by Gall et al. (2007), personal evaluation and judgement, through interpretational and reflective analysis, was involved in the process of assigning relevant texts to codes. After assigning collected data from each interview to a corresponding code and putting them into templates or tables, a cross-template analysis was used to distinguish common themes and infrequent (less occurring) themes in text. Common themes were granted significance in the study analysis as shown in the coding results in Appendix G.

In conclusion, the templates were efficient for organizing and retrieving study data according to their specific codes. In addition to summarizing large chunks of qualitative data derived from each transcript, this organization facilitated the

emergence of new codes during the analysis, which turned out to be helpful in interpreting results.

4.4 Validity in the Study Design

The concept of validity indicates the quality of the research findings. This means the extent to which these findings precisely demonstrate the situation on the ground, from the perspective of the participants who are living the experience, supported by sufficient evidence (Yin, 2014). In evaluating the quality of qualitative research, Guba and Lincoln (1994) set four criteria employed in the present study through a number of strategies to enhance the quality and ensure the validity, as follows:

1. Credibility

Credibility refers to evaluating the findings of the research from the perspective of the participants who lived the experience and described it. The exploration nature and qualitative approach of the study entail understanding the research problem, context through participants' experience. Therefore, credibility refers to evaluating the findings of the research from the perspective of the participants who lived the experience and described it. They are the only ones who can legitimately judge the credibility of the results. To ensure that the message understood by the researcher was the message conveyed by study participants, repeated reviews of interview transcripts and meanings was the strategy in use. Corrections were made accordingly. Furthermore, final templates and coding decisions were reviewed - for accuracy - with respective participants and the executive director of the unit. Findings are worded based on the views of study participants. Revisions and further explanations regarding the information provided in interviews were obtained over scheduled Skype calls, as needed.

2. Transferability

This criterion indicates the extent to which the results can be generalized or transferred to another context. Since the goal in qualitative research is not to generalize findings, therefore, transferability is the responsibility of the one doing the generalization to make the decision of how appropriate the transfer is. The role

of the researcher is to ensure this criterion is restricted to describe thoroughly the research context, its constructs and assumptions.

Therefore, the researcher has provided a detailed description of the scope of the study, theoretical framework and the rationale for including its components, methodology, limitations, and challenges of the study to allow for replication in different organizational units or in other countries share similar circumstances. To ensure transferability, more attention was given to thoroughly describe the physical and organizational setting of the research site, and participants' background. The discussion chapter exhaustively elaborates on reform's overall achievements to date, to facilitate the judgement on how the transfer to another context is valid.

3. Dependability

This concept highlights the responsibility of the researcher for describing the dynamic setting of the study and its impact on the study design. To enhance dependability, the following elements were clearly identified; the study topic, goals, information needed, best means to collect this information and from whom. The researcher examined previous research to set a conceptual framework that lead the decision of data collection and analysis methods. Pilot interview strategy was put into place to develop early familiarity with the context of the study, test the adequacy of the primary data collection instrument, and allow for necessary refinement on the interview questions. Pilot testing was intended to inform the

researcher with the unspoken norms and values that characterize the academic community in Egypt.

4. Confirmability

Confirmability refers to the extent of which the results could be validated against any potential bias or distortion. To enhance confirmability, for instance, the researcher has chosen the study design most appropriate for the research context and objectives.

The researcher has extensively relied on measures for checking and rechecking the data throughout various stages of the study. Member check, as an accepted data verification technique, was implemented regularly, during data collection, interview transcription, and after transcripts development. To create a reliable text version of the audio interviews, a “three check per interview” process was applied to evade transcriptionist error and distortion. Each tape was listened to three times, by both the transcribers and the researcher who conducted the interview, against the transcript to check for accuracy. Translation of findings, in different language other than the one used for data collection, is a source of bias in qualitative research. To overcome this issue, the distance between the meanings as described by the participants and the meanings as translated in the findings were made as close as possible (Polkinghorne, 2007).

In doing so, the translation of findings from Arabic into English was given careful consideration to accurately provide exact wording of the voice of the participants. The research design overcame the translation limitation through continual discussions with study participants to ensure the wording of the translation closely matched the meaning of their quotes.

CHAPTER 5 FINDINGS

This chapter presents findings based on the three research questions introduced in Chapter 1. One central-objective-led data analysis is to identify the KM position in improving administrative services within Egypt's higher education reform. The analysis describes KM position through a framework of contextual elements and their functionality. The original set of themes, identified before data analysis, and additional themes derived from participants' input, are revised and aggregated to ultimately arrive at a list that helps answer the research questions. Both sets can be found in Appendix F. Findings reflect the conception of more than fifty percent of study participants.

The background section of the interview asked the study participants to indicate their education and work experience. With respect to educational background, among the seven participants, six were found to be specializing in Engineering. Only one participant held a degree in Educational Studies. About work experience, six participants identified themselves as either professors or assistant professors; only one was a professional and appointed as a consultant in IT projects. Participants were also requested to evaluate the contribution of their past work experience to the success of their current mission in reform. All participants indicated that their past tenure in ad-hoc capacity enhancement initiatives carried out either by UNESCO or state universities rendered them qualified to take a leading position in

the national project. In general, participants' experience in reform efforts undertaken by the Ministry of Higher Education ranged from five to nine years. Notably, all study participants, on many occasions, used the term "information" to indicate the concept of "knowledge"; therefore, both terms are used interchangeably in this chapter.

Table 7: Summary of Major Themes Assigned to Research Questions

Research Question	Themes/ Subthemes
How does the managerial staff overseeing the reform initiative perceive the value of knowledge resources and the impact of KM on reform outcomes? To what extent is this perception reflected in the strategic priorities and objectives of the reform?	KM in the strategic focus of higher education reform 1. Mission and objectives of higher education reform: •developing education and management in public universities •building information management capacity •enhancing institutions' strategic planning •automating institutions' services (e-government) •introducing new concepts to the academic community 2. Perceived significance of knowledge resources: •strategic input for decision making and planning 3. Perceived benefits of KM: •increases operational efficiency 4. Possible measure for KM performance: •stakeholders' satisfaction 5. Description of the KM policy integrated in the reform strategy: •individual projects set their own knowledge needs based on their unique goals and needs •reform projects are not involved in crafting a unified KM plan •absence of a clearly articulated plan to manage knowledge resources •access to knowledge resources is ruled by relevance and need

	•privacy and security are highly focused when dealing with knowledge •the goal is to improve efficiency through enhancing accessibility •privacy policy is subjective
How are core KM processes of creation, transfer, and application coordinated within the reform's operational model? What policies and practices are used to encourage project affiliates to obtain and share new knowledge?	KM cycle in the reform operational model 1. Sources of acquiring knowledge: •professional training •process feedback •performance evaluation •consultation and technical support •trial and error •operational and technical problems 2. Modes of transferring explicit knowledge: •websites and portals •publications, pamphlets, and handouts •periodic and internal reports •e-mails •standard operating procedures and manuals •archiving system 3. Modes of transferring tacit knowledge: •training •meetings •workshops and seminars •one-to-one consultation

	•videoconferencing 4. Means of applying new knowledge •verification process •input for decision making and planning
How do institutional elements of organizational culture, organizational structure, and IT facilities implicate KM application in the unique context of the reform?	KM infrastructure in the reform's operational model 1. Organizational culture characteristics: •great emphasis on performance and smooth operations •facilitation and enforcement of learning activities •individual access to knowledge resources is on a need-to-know basis •staff members envision themselves in "ivory towers" 2. Organizational structure and management style characteristics: •management carefully monitors performance •critical knowledge is retained near the top of the managerial hierarchy 3. The role of information technology: •information systems and database centers are developed to connect planners and decision makers to knowledge resources •portals, websites, and networks are tools to improve accessibility and knowledge sharing •IT initiatives are prioritized based on business needs •IT facilities are coordinated centrally across projects •IT infrastructure is established to automate business processes 5. Barriers to efficient KM: •organizational culture

	•bureaucracy and public sector regulations •uncertainty •insufficient coordination between projects •absence of integrated information system linking universities and projects •underqualified clerical staff in universities •centralization
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5.1 KM in the Strategic Focus of Higher Education Reform

The first research question sets the strategic perspective for understanding KM in the reform setting. To emphasize top management's perception, participants were asked how they value knowledge resources and the benefits associated with their effective management on the overall reform objectives. The question also helps determine the extent to which the reform's mission, strategic priorities, and the means of accomplishing them implicate KM application. With this same goal, participants were asked to explain certain aspects of the reform strategy such as objectives, policy orientation, and processes. If a KM strategy was already in place in their workplace, they were asked what role they expect it to play in the reform operational model. In addition, participants were also required to use their experience to determine indicator(s) through which effective administration of knowledge resources can be quantified and measured.

Five themes were derived from the data analysis and grouped under the strategy construct. These are the mission and objectives of the reform, perceived significance of knowledge resources, perceived benefits of KM, possible measures for KM performance, and a KM policy description.

5.1.1 Mission and objectives of the reform

In exploring the first theme of the research, namely the mission and objectives of higher education reform in Egypt, five subthemes were found: first, developing education and management in public universities; second, building information management capacity;

third, enhancing strategic planning; fourth, automating sector services (e-government); and lastly, introducing new concepts to the academic community.

Developing education and management in public universities

Nearly all participants indicated that the reform was primarily intended to enhance the quality of pedagogical and managerial services in institutions. They realize that a continuous state of development is desired to make institutions more competitive and to qualify them for accreditation. To help institutions find this state, the reform strategy offered a variety of state funding opportunities, especially for suburban universities that often suffer more from meager financial resources that foster modernization.

Implementing the reform strategy comprises the development of pedagogy and administration in public universities. (Project Director)

[The] reform strategic goal is set for organizational capacity to reach a continuous state of development that would fulfil academic excellence, ensure high competitiveness and qualify for accreditation. (Project Director)

Building Information Management Capacity

The information revealed through this subtheme helps depict the implicit orientation of KM in the reform strategy. Considering that aligning sector operations to the knowledge society is the principal goal of reform, planners realize that the gateway is through connecting higher education affiliates with external and internal knowledge resources. Participants asserted that the absence of sufficient technology devices and IT infrastructure that accelerate communication and help effective planning and decision-

making processes has put public universities under criticism from government bodies, research institutes, international development agencies, parents, and the public domain. Individuals' capacity building is enabled through facilitating access to a wide array of learning resources through digital library and e-learning solutions. Institutional capacity building is planned by means of connecting stakeholders to knowledge resources—various information management systems—for better planning and decision making. Therefore, most participants (six out of the seven) indicated that computers, networks, databases, and information systems became a reference point for sustainable change.

Our mission is to provide solid planning background for higher education system in Egypt by background I mean information and data analysis tools ...we build the capacities for the institutions...to form their own plans and form their own studies based on internationally approved methodologies. (Project Director)

Working to reach reform goals focuses on the infrastructure which means that being in the 21st century, it is not correct that a university would exist without a network or include an information system; thus, working in the unit would provide some basic services of networking and MIS to 19 public universities..... IT initiatives started by forming entities that offer IT services like the National E-learning Center that offers hosting services to electronic curricula. (Project Director)

Enhancing institutions' strategic planning

Almost all participants (six out of seven) indicated that enhancing the basis and the methods through which institutions plan their needs and allocate tangible and intangible resources is another important consideration in the reform strategy. To achieve institutions' strategic objectives, planning knowledge resources must consider institutions' economic and demographic needs, their individual strengths and weaknesses,

competitive landscapes, and opportunities for growth. Institutions' strategic plans are formulated in coordination with the ICTP that carries out the responsibility of establishing and executing IT platforms across institutions and in The Supreme Council of Universities.

We helped local authorities at the economic regions to develop their own strategic plans for higher education based on their economic and demographic needs. (Project Director)

Our role is to guide the formulation of strategic plans for information technology and monitor approximately 170 projects within universities and the Supreme Council of Universities, the problems they encounter, offering solutions, facing constraints if any, then try to speed up implementation. We set the plan, develop templates then let each university customize it according to their situation, strengths, weaknesses, opportunities and threats. (Project Director)

Automating institutions' services (e-government)

Participants referred to the automation of the higher education sector as a secondary objective of the reform strategy. Several cooperation agreements were originally carried out between reform management and government agencies including The Ministry of State for Administrative Development, The Ministry of Communication, and The Ministry of Finance to automate the financial and administrative processes in universities. In fact, institutions' automation was a step supported by the cabinet toward improving accessibility of knowledge resources and establishing the e-government. As can be seen, this objective also coheres to the previously explained objective: building information management capacity.

On a state level, the previous government orientation was to establish e-government system where every piece of information is uploaded on intranets and internet to improve accessibility. (Executive Director)

Introducing new concepts to the academic community

The process of implementing higher education reform typically entails introducing modern concepts not only to the academic community but also to the public. Four participants out of seven believed that an essential part of the reform process is centered on developing a common understanding and shared meaning of new concepts such as information technology and the infrastructure that it requires, quality assurance, staff development, and strategic planning.

The whole reform process is built on introducing new concepts so we raise awareness to inform the academic community with notions such as quality assurance, staff development...not only at the staff level but also the process targets administrative and students. (Executive Director)

During the last decade, we were pushing to introduce the concept of information technology and the infrastructure required to enable various educational and administrative applications to the academic community. (Technical Consultant)

5.1.2 Perceived significance of knowledge, KM, and the potential measure of performance

Knowledge is a strategic input for decision making and planning

All participants identified both explicit and tacit knowledge as strategic inputs for reform operations. Among the seven participants, two considered knowledge as an essential resource for accomplishing any work activity. Three participants emphasized the

importance of using integrated database management systems and business intelligence models to allow data analysis to produce relevant information for planners and decision makers.

Because we focus on improving decision making, we developed business intelligence models to show decision makers how far they can reach in analyzing available information and making the best possible and faster decisions. (Vice Director)

Essential part of our effort is concerned with integrating all databases and various tracks to allow decision makers to have access to a wide pool of information. (Project Director)

KM increases operational efficiency

The term “Knowledge Management” seemed to be a newly coined term to the interviewees even to those with an information management background. They were unaware that a great many of the tools and mechanisms employed in the reform operational model are quite relevant to the KM domain. For example, awareness campaigns, which were used as a tool for introducing new concepts to the academic community, are a common knowledge-sharing activity. On the positive side, participants showed a clear understanding and conceptualization of KM and its significance to reform goals. They believed that the value added to reform operations, in forms of operational efficiency and creative performance, is mediated by disseminating projects’ stories, research results, and process feedback. One participant believed that acquired knowledge helps avoid duplicating work or reuse methods that have already been proven inefficient or improved by others.

By exchanging performance stories, we improve the process and avoid waste effort.
(Executive Director)

It is to our benefit to spread out best practices of one university in the other 18 universities to improve the efficiency. (Program Director)

Stakeholders' satisfaction as a possible measure for KM performance

Participants were asked to suggest a possible measure that would indicate how well knowledge resources were being optimized in reform operations. A consensus was reached among study participants (five out of the seven): “Stakeholders’ satisfaction” can be used as a reliable indicator to rate the effectiveness of managing knowledge resources on delivering and fulfilling decision makers’ knowledge needs. Participants indicated that some projects have already conducted a performance evaluation survey to measure stakeholders’ satisfaction.

The criterion to evaluate the functionality of the information system is stakeholders’ satisfaction (Assistant Director)

5.1.3 Description of the KM Policy Integrated into the Reform Strategy

Analyzed data provided evidence of the presence of an unwritten KM policy embraced in reform design. In the absence of a written document that articulates the role of knowledge resources in accomplishing strategic objectives, this theme helped group the unwritten policies and practices that describe the creation, access, and transmission of knowledge within the reform operational model. The following seven subthemes emerged: a) Individual projects set their own knowledge needs based on their unique goals, b) Reform

projects are not involved in crafting a unified KM plan, c) There is an absence of a clearly articulated plan to manage knowledge resources, d) Access to knowledge resources is ruled by relevance and need, e) Privacy and security are highly focused in dealing with knowledge, f) The goal is to improve efficiency through enhancing accessibility, and g) Privacy policy is subjective.

Individual projects set their own knowledge needs based on their unique goals

All participants indicated that reform strategy provides a great deal of liberty to institutions and individual projects to set out their own knowledge needs, to enable the success of their strategic plans. Participants attributed the decentralized approach in planning knowledge resources to the wide divergence in projects' nature and objectives. Planning knowledge needs begins with selecting the technical specifications of software solutions or equipment needed and continues by choosing a service provider other than the ICTP. For example, some projects' directors chose to have their web hosting in Egypt, because they mostly deal with local agencies. Other projects found it ideal to have the web hosting outside Egypt because they primarily communicate with international entities and their portals must be accessed without interruption from the authority.

Universities are free to determine their IT needs considering their own strategic plan.
(Technical Consultant)

Reform projects are not involved in crafting a unified KM plan

Whereas projects' directors widely recognize the substantial need for a collective effort to establish a unified KM plan, doing so was never an option. Nearly all participants (six out of the seven) referred to projects' diverse natures and objectives as a reason for the difficulty in formulating a one-size-fit-all strategy. Typically, individual projects' directors decided how to allocate knowledge resources, what to retain, and whom to distribute this knowledge to. Since the process is not ruled by common directives, knowledge resources were handled differently in each project.

Every project has its own information management system. Consequently, each group deals with information in its own way, different from the others. (Executive Director)

Absence of a clearly articulated plan to manage knowledge resources

Even within individual projects, participants affirmed the absence of a formal policy and plan of action that guides the optimization of knowledge resources in processes. While most participants ascribed the inability to define the role of knowledge resources in the reform strategy to the novelty of the domain, some participants related it to the insufficient capacity building prior to and during the planning process of reform.

There is no consolidated document under the name of information strategy. (Project Director)

Despite all the executed efforts in the field of Strategic Planning, still I cannot say that we have reached and are executing a clear, honest, strategic plan for information management. (Technical Consultant)

I have learned a lot from you, we are not specialized in information management, maybe the situation would have been much stronger today if we have had some

training and capacity building [...] from the beginning we must consider the subject of dissemination and documentation. (Assistant Director)

Access to knowledge resources is ruled by relevance and need

Participants (five out of seven) indicated that both members of the academic community and reform management seek knowledge only if it is relevant to their domain or if it is needed for the completion of another task.

We used to post everything on the website, but people did not visit it very often, the ICTP deals with IT, as a result, they are the only ones who visit the websites.
(Technical Consultant)

For example, the Minister is coming on Tuesday, we should prepare the data for him, so we find ourselves accessing information upon request.” (Vice Director)

Privacy and security are highly focused when dealing with knowledge

Abiding by public sector regulations, projects' managements have firmly restricted the disclosure of any weak points, incomplete projects, results of internal assessments and universities' SWOT analysis, as well as financial data to any interest group other than one that has the legal right to request this information. This protective framework is assumed to ensure high levels of privacy for institutions' information. Participants indicated that the framework under which information is preserved is subjectively set by individual project teams that have the authority and the say in considering information unnecessary to be publicized.

Not everything is accessible to everybody, for example, it would be accessible on the report that would concern a certain university...we can't send the data of a specific university to another one as per the data privacy policy. (Project Director)

The importance and confidentiality of the information does not allow us to post it on the website. (Project Director)

I can't disclose any weak points. (Assistant Director)

The goal is to improve efficiency through enhancing accessibility

Considering the information provided by most participants (five out of seven), it can be concluded that the goal of establishing a sector-wide IT platform is to promote greater efficiency. Efficiency is assumed to be realized through increasing stakeholders' access to various knowledge resources in a timely manner at the least possible cost. Three participants directly attributed efficiency to the availability of information systems such as MIS and library information systems.

It is important for us to ensure accessibility at the right time. Time factor is important indecision making, therefore we focus on adopting new technologies that enhance the capacity to reach the right information at the required time. (Program Director)

Privacy policy is subjective

The privacy policy subtheme captures the basis on which decisions about transferring knowledge are made. Most of participants explained that the project's manager is the one who decides whether to communicate certain content to interest groups. Case by case, the decision is entirely made through personal judgement by considering what is considered significant to prospective users. This subjectivity, and thus inconsistency in the management's decision to disclose or withhold information, occurs due to the absence of a clear framework that regulates the ethical and legal aspects of data privacy. This

condition seems to fail the reform strategy of maintaining realistic expectations for the public and causes the ambiguity surrounding knowledge sharing in the reform operational model.

There is no consistent dissemination policy ... I have complete information cycle but when it comes to dissemination no explicit instruction guides me on what to disseminate? To who? When? And how? (Vice Director)

What type of data can I disclose? This is another important question...I post on the website what I think important for others. (Assistant Director)

5.2 The KM Cycle in the Reform Operational Model

The second research question required the participants to provide a detailed description of the operational cycle of projects while emphasizing knowledge flow in terms of how knowledge is created and circulated within and across projects. Through capturing a range of key work processes and practices, the analysis could identify several themes that depict the managerial dimension of KM in the reform's operational model. Four fundamental themes described that the integration of core KM processes were worth noting under this research question: a) sources of acquiring new knowledge, b) modes of transferring explicit knowledge, c) modes of transferring tacit knowledge, and d) means of applying new knowledge.

5.2.1 Sources of acquiring knowledge

Participants' responses indicated that new knowledge is obtained through formal and informal channels internalized in the reform model. As discovered in the coding results,

these mechanisms can be sequenced based on participant consensus as follows: a) professional training, b) process feedback, c) performance evaluation, d) consultation and technical support, e) trial and error, and lastly f) operational and technical problems.

Professional training

Reform strategy has invested in a separate project called the National Centre for Faculty and Leadership Development (NCFLD) in which professional training has been embraced as the ultimate tool for improving institutional performance. Professional training programs were developed fully in accordance with the shortage of competent and skilled workers. In addition, to provide opportunities for career development, all participants, referring to their own experiences, agreed that professional training worked successfully to communicate recent theoretical and practical advancements in various domains. Either packaged or customized training programs were proposed depending on institutions' human resource development needs. The wide-scale partnerships between the Ministry of Higher Education training unit, the PMU training unit, and specialized training firms continue to support the learning and acquisition of knowledge in the reform model. In the early phase of reform, participation in professional training programs was voluntarily for both academics and administrators. After its benefits were realized, it was integrated as a mandatory measure for career advancement and academic promotion.

We established training entities for staff development. There is a training center at the Universities Supreme Council. (Project Director)

Process feedback

The second agreed-upon source of acquiring knowledge in the reform operational model was process feedback. Nearly all participants (six out of seven) indicated that receiving continual detailed feedback and comments on projects' processes helped project teams obtain greater insight into areas needing improvement. Feedback, as per study participants, is perceived necessary for guiding operations toward corrective practices, consequently it supports implementing sustainable changes.

We depend on feedback to update the processes. (Vice Director)

Performance evaluation

Nearly all participants (six out of seven) determined that performance evaluation data was a primary source for creating knowledge. Especially when integrated into internal studies, the results of the periodic assessment questionnaires were used to improve operations.

We sent questionnaires and asked the stakeholders to evaluate our performance through them. Then, we took their comments, analysed them, and based on them took corrective actions. (Assistant Director)

Performance evaluation questionnaires . . . [produce] internal knowledge to be incorporated in internal studies for the project. (Executive Director)

Consultation and technical support

Participants identified the abundance of consultation and technical support services as another fundamental source of insightful information that enabled project affiliates to succeed in their missions. The open-door policy and the unconditional access to experts embraced by projects is a form of operationalization that emphasizes the absolute priority of technical support in the reform. Special attention was given to identifying the right individuals who should be responsible for providing technical support and consultation for every reform project. Five out of seven participants perceived consultation and technical support as an operational path where tacit knowledge is streamlined from experts across various projects.

Technical support is the most important service we offer. (Assistant Director)

There's a consultation team in every project responsible for providing technical support service. (Vice Director)

Trial and error

Due to the novelty of the reform process, experimentation until achieving success was a systematic problem-solving approach that resulted in the accumulation of common and technical knowledge. For four out of seven participants, trial and error was perceived as a reliable source of obtaining know-how across projects.

We gained knowledge in many subjects by trial and error. (Executive Director)

Part of our role is to look for new technology, implement it in form of pilot projects, evaluate their success, [and] we apply them at the universities. (Vice Director)

Operational and technical problems

Project teams had to constantly search for theories and practices to help deal with emergent operational and technical issues. Most participants (four out of seven) indicated that they obtained good problem solving skills from overcoming the challenges and obstacles they encountered during the implementation of the projects. Acquired knowledge was continually integrated into the operational model through modifying relevant processes. The Executive Director anticipated this:

There is specific knowledge that we acquire during execution. We have changed the process a million times because of the problems that occurred during operation. All available knowledge obtained from this source is stored and used for internal studies. (Executive Director)

5.2.2 Modes of Transferring Knowledge

Modes of transferring explicit knowledge

Data analysis revealed consensus among participants on which tools integrated in the reform operational model distribute explicit knowledge. They are in the following order: a) websites and portals, b) publications, pamphlets, and handouts, c) periodic and internal reports; d) e-mails, e) standard operating procedures and manuals, and f) an archiving system.

Websites and portals

Coding results showed that all participants identified official websites and portals as the most common mode of communicating news, accomplishments, events, and learning materials among projects' interest groups.

We perform the dissemination through our website. We post all our presentations, workshops & reports, which do not contain confidential information. (Project Director)

Publications, pamphlets, handouts

Projects' publications, pamphlets and handouts were categorized as a top-down stream of explicit knowledge to inform internal units and the public with projects' progress and success stories. These types of publications were also recognized by six participants as effective channels to introduce new concepts to the academic community.

We have several means of dissemination, one of which is our own publication. (Project Director)

Periodic and internal reports

Similarly, periodic and internal reports issued by various project units were identified by six participants as among the most reliable modes of transferring explicit knowledge. Because of the constant codification of implementation challenges and the communication of effective practices to overcome them, this mode presents a steady and continuous bottom-up stream of explicit knowledge.

We document and publish projects' experiences in internal reports. (Assistant Director)

E-mails

Nearly all participants (six out of seven) indicated that e-mails were the second most used method to distribute updated procedures, events, and news to institutions and government agencies. Projects' newsletters were distributed periodically (every 2 to 3 months) via e-mail.

E-mail is our major means of communication; it is intensely used to communicate with the universities, the 170 projects there, the Ministry of Communications, and other agencies. (Project Director)

Standard operating procedures and manuals

Five out of seven participants have identified standard operating procedures and manuals as a credible channel through which new knowledge is distributed and integrated into reform processes. Manuals are constantly updated to ensure the inclusion of new

methods and techniques that were optimized during execution.

We always provide manuals for each new system ... we have developed a first copy, an updated copy and a third one. Every time an update would occur, we would distribute a new copy. (Executive Director)

Archiving system

Contrary to what was originally expected, the coding results show that the archiving system in place, Jupiter, was not chosen among the most effective modes of transferring explicit knowledge. Four participants down-rated the system due to its frequent crashes, which made storage and retrieval of important documents, in most cases, unavailable to users. The backlog caused by system dysfunctionality has raised a question about how to make the best use of IT solutions to improve operations in the reform operational model.

We have started to fix the dysfunctionality of the existing archiving system. (Vice Director)

Modes of transferring tacit knowledge

The study participants identified activities through which project experiences are exchanged among reform project teams. Participants identified five tacit knowledge transfer activities that revolve around human interaction and dialogue: a) training, b) meetings, c) workshops and seminars, d) one-to-one consultation, and e) videoconferencing.

Training

Coding results reveal that the reform strategy has developed occasional training sessions that gather project teams across institutions to communicate technical problems and ideal solutions reached to overcome them. Participants pointed out that training sessions were offered in every urban and suburban institution.

We do dissemination through training. (Project Director)

We offer specifically designed training packages for the fields where problems occurred in the faculties and provide trainers to their site and start training them.
(Assistant Director)

Meetings

Meetings provided a good opportunity for project teams to reflect and discuss various topics, trends, and operational challenges. Almost all participants, six out of seven, agreed that the casual environment of meetings was found effective for promoting dialogue among different groups of project teams and institutions' leadership who freely discussed trends and reflected upon operational challenges.

We hold regular meetings to unite project groups and experts together to exchange information and expertise. (Project Director)

Workshops and seminars

Conducting a series of workshops and seminars seemed to give a unique opportunity for project teams to build competences and benefit from the frequent interaction with experts. Participants reported that side discussions and conversations that usually take place during the sessions usually allow various types of organizational and personal

knowledge to be exchanged. Moreover, grouping project teams who share a common field or topic of interest for workshops proved effective for building informal networks and extending learning outside seminar spaces.

We also do disseminate [knowledge] through workshops and seminars. (Project Director)

One- to- one consultation

Four participants out of the seven indicated that one-to-one consultation was another credible service used to fulfill project affiliates' learning needs. In addition to the privacy it offered, it was ideal for answering very technical and specific questions not addressed on the project's website:

People come directly to our office to ask questions through direct contact when their questions are very specific, this gives them a chance to ask the questions from different angles so that they would get a comprehensive and specified understanding of their unique case. The questions that exist on the website do not usually cover that category. (Assistant Director)

Videoconferencing

The platform of the videoconferencing system, established through the ICTP project, enables virtual meetings with project teams located in geographically disparate sites. Meeting more than one project's team simultaneously, whether to train, discuss common issues, or seek technical advice without the hassles of travel, allows experts and consultants to save time and resources. More than half of the study's participants

considered the tool very effective when transferring critical knowledge:

One of the good things we accomplished in dealing with the 170 projects is videoconferencing. If we need to discuss an issue or solve a problem without writing, or going we resort to the video conference network. It is the best thing we achieved in this phase. (Vice Director)

5.2.3 Means of Applying New Knowledge

In the absence of an integrated information system that ensures content consistency across different databases, participants shared concerns about content reliability. Thus, establishing validation rules was regarded as a prerequisite for using any piece of information in planning or decision making.

Verification process

Nearly all participants claimed that, prior to using contents from any database, they must consult many sources to verify that the information collected from the original source is identical to that obtained from other sources. Verification took place manually with the help of technical teams and electronically using specially-developed software that detects logical errors in individual databases. Technical teams in each project were assigned the responsibility of evaluating whether a piece of information was complete, up-to-date, and consequently reliable enough to support reform planning. In fact, existing rules and field visit reports were also used as a point of reference for pinpointing data errors. When errors were detected, a corrective request was sent to advise the institution or the government agency asking to rectify their records for future use.

We can get information but the rate of errors is huge. Reliability is an immense challenge. (Executive Director)

We collect the same piece of information from different resources then we try to find what is more reliable. (Project Director)

We have a team who verifies the data manually and ensures whether it conforms with the existing rules or not; if there is anything wrong we correspond with the universities to correct the mistakes. The team has [also] developed software to validate data quality in databases ... before sending it to decision makers. The team issue reports and send them to the universities for corrections. (Project Director)

Knowledge is used as an input for decision making and planning

Five participants out of the seven indicated that knowledge acquired through various channels is primarily used for planning and decision-making activities at the project, institution, and ministry levels.

Discussions help us gain expertise which in its turn enhances our decision-making process related to the other faculties or similar projects. (Executive Director)

5.3 KM Infrastructure in the Reform Operational Model

The third research question sets the operational perspective by questioning opportunities and threats that would shape KM implementation. Participants were asked to describe organizational resources, workplace values and regulations that impact knowledge flow. The data analysis shows that some organizational resources have notably served the purpose of KM while others have disturbed the knowledge cycle. These organizational

resources fit into the study's three major themes: organizational culture, organizational structure, and IT facilities.

5.3.1 Organizational Culture Characteristics

This element describes the social setting of higher education reform in Egypt. A few subthemes were derived from interview data signifying the emergence of a subculture that developed at the beginning of the reform. The reform organizational culture is characterized by learning, smooth operations, and a less hierarchical and bureaucratic atmosphere. These modern values seemed to conflict with the traditional values that have dominated organizational culture in institutions for decades, such as bureaucracy, seniority, and hierarchy. Describing various attributes of organizational culture helped pinpoint four subthemes: a) great emphasis on performance and smooth operations, b) facilitation and enforcement of learning activities, c) individual access to knowledge resources is on a need-to-know basis, and d) staff members envision themselves as being in "ivory towers."

Great emphasis on performance and smooth operations

Despite the existence of a bureaucratic structure in institutions, efforts to implement the reform promoted certain practices to facilitate operations. According to participants' responses, planning and providing guidelines are common tools used to ensure the realization of smooth work flow.

We have designed templates for everything so that we would facilitate operations for projects and universities, this way they would know precisely what to do and how.
(Technical Consultant)

Facilitation and enforcement of learning activities

In the context of reform, learning was encouraged through intense staff development programs designed for both faculty and administrators. By supporting new ideas, trial and error, and consultation, reform strategy introduces new patterns of acquiring and sharing knowledge in institutions. In addition to the interactive learning opportunities offered through a wide range of seminars and workshops, learning is also endorsed through electronic means such as e-learning and digital library applications.

We provide Information and learning resources for the academic community as well as train and qualify the employees for using Information Technology. We had started MIS network for the universities, E-learning, and digital library training. (Vice Director)

Individual access to knowledge resources is on a need-to-know basis

Despite project directors' efforts in promoting collective learning and introducing modern concepts, the academic community appeared to be less motivated to explore the new sources of knowledge made available for them. Using e-mails and information systems, and navigating the institution's portals for news and events were still low priority.

Members of the academic community will access new sources of knowledge only if they need the content to complete their work. Most participants indicated that some academics are not yet aware of the reform experience itself and what it offers them.

People access information on a need to know basis. ... Nobody visits our website; priorities of the academic community differ from what we do and even in our society itself. (Executive Director)

Staff members envision themselves in “ivory towers”

The set of values that frame the higher education system in Egypt allows academics to define themselves as powerful figures. Participants indicated that this situation explains the academic staff's strong resistance to change; they fear losing their power. Academics are still far from embracing the “service provider” concept that frames them as suppliers of specialized learning services concerned with customer (student) satisfaction.

Participants noted that heads of departments, faculties, and institutions resisted responding to information requests made from other staff members working in the reform management unit because they perceived them as being less qualified than them.

Moreover, it was also noted that academics were against the idea of gathering feedback from students. For them it is a farce to ask students to evaluate teachers.

“The laws govern higher education put the university professors in a better position/over the president. The system itself has a type of lack of control that comes from [the fact that] people are not well paid; regretfully, the system does not help. (Vice Director)

Staff members need a special treatment policy, the person who deals with them should have equal or more academic qualifications for him to be able to ask them for a certain request or comment on a certain attitude without being rejected. (Assistant Director)

A lot of people were against the idea that the student would write a feedback, they say how come a student would evaluate me. (Project Director)

5.3.2 Organizational Structure and Management Style

This theme focused on examining the extent to which the organizational structure and managerial style of the reform's management unit impacted the ability to respond to the stakeholders' knowledge needs. Coding results showed some signs of centralized design depicted by two subthemes: careful monitoring of performance and critical knowledge being retained near the top of the managerial hierarchy.

Management is characterized by intense monitoring of performance

All participants indicated that the PMU has established a careful monitoring system, as a unit emerged from the public system, to ensure the conditions necessary for quality improvement and greater efficiency. A framework of formal policies, procedural manuals, and measurable norms was set to organize the flow of information within and among various entities.

We monitor all projects, employees do not work per their own convenience, we set a certain framework for projects to follow, they must spend in a certain way, write reports at certain times, we perform field visits at certain stages of the project, expect receiving their progress reports at defined stages of development and we send them our feedback at a specific time. (Assistant Director)

To effectively monitor performance, visiting committees are formed from outside of the university and ICTP to check for infrastructure functionality, obstacles to implementation and causes. (Technical Consultant)

Critical knowledge is retained near the top of the managerial hierarchy

Coding results showed that know-how is retained by individuals occupying posts at the top of the organizational ladder. This type of critical knowledge is traditionally made available to staff of equal or higher organizational level. In this case, either the executive director of the PMU or the Minister of Higher Education was expected to solve operational problems and make difficult decisions. Moreover, most participants underscored the negative effect of the high-power distance relationship, which characterizes communication between superior and subordinate across the higher education system, in terms of knowledge flow.

The difference in dealing with knowledge depends on the hierarchical level, for example if a problem occurs in one of the projects at the faculty level and they can solve it with the amount of knowledge they have well and good, if not we try to get up to the higher hierarchical levels of management to solve it, at this point we call for rector's intervention to solve the problem with his own knowledge, every level functions with the amount of knowledge he has. (Assistant Director)

Well because in terms of hierarchy in Egypt I cannot really communicate smoothly with a president of a university but for a minister he can communicate with the president because he is in a higher level and he must respond immediately so whenever I meet something that would need a push and a quick response, I use the minister's authority to push things through. (Project Director)

5.3.3 The Role of Information Technology

For the study to identify the role of IT in supporting KM within the reform setting, participants were asked to describe the proposed coverage and quality of services in

terms of equipment and systems as well as the rules under which resources were allocated and coordinated across projects. Five subthemes emerged during data analysis, namely, a) Information systems and database centers are developed to connect planners and decision makers to knowledge resources, b) Portals, websites, and networks are tools to improve accessibility and knowledge sharing, c) IT initiatives are prioritized based on business needs, d) IT facilities are coordinated centrally across projects, and e) IT infrastructure is established to automate business processes.

Information Systems and database centers are developed to connect planners and decision makers to knowledge resources

Participants indicated that for the first time in Egypt, a wide range of networks and many IT solutions were built to enable planners, decision makers, and knowledge seekers access to accurate, up-to-date content. Central and local database centers were connected to allow the running of various educational and administrative applications such as MIS, e-learning, and the digital library. Connectivity, as a key objective of the information policy, has contributed to the emergence of new patterns of learning such as distance learning and e-learning. It has also offered various interest groups the opportunity to get actively involved in reform operations.

We build data center for universities to allow various administrative and educational applications to run. (Technical Consultant)

For the first time in Egypt we have a data base ... As well as linking the database with our geographic information system so everything would be simulated on maps it

would be for decision makers supported with the visual kind of representation rather than numbers and percentages. (Project Director)

Portals, websites and networks are tools to improve accessibility and knowledge sharing

Participants underscored one key project, the Electronic Portal Project, which is intended to ameliorate the virtual gateway of 19 universities. The project is divided into 22 sub-projects to include faculties' and centers' websites. In their views, the project has remarkably enhanced accessibility to content and communication among various interest groups. Through portals and websites, users could download available content, yet they were restrictedly permitted to upload materials they consider helpful for other users.

We are working to improve our website to enhance accessibility to various interest groups because it is the official gate across the globe. (Project Director)

We have our own portal for communication and people different stakeholders can login using their usernames and passwords and they can download documents that are relevant to their field they can upload documents for other people to look at and so on. (Project Director)

IT initiatives are prioritized based on business needs

Institutions periodically plan their IT needs, and send this plan to the ICTP management which, in turn, review the needs to align them to budgetary restrictions. Due to the scarcity of financial resources, IT-related initiatives were carried out in a series of stages (or what participants called layers) to allow every institution to receive equal benefits in each fiscal period. Since not all institutional leadership were fully convinced and committed to the

idea of reform, this liberty in deciding technology device needs has consequently led to variation in IT performance. The functionality of databases and information systems established at the institution end reflected leaders' reliance on IT solutions to elevate efficiency in work processes.

After universities identify their needs, we form technical committees to set and approve the specifications. (Vice Director)

Because our funding is for a limited annual budget so we set the infrastructure plan in layers to be executed in stages from A to Z. For example, my work plan this year is to be able to allow the communication network into the offices of the staff members. For the second year, I need a data center so I need to set a layer among the different buildings and faculties, then I work on running application. I sometimes need to divide the application or the data itself into layers, consider the security system or the needs of human resources, to decide upon all those matters, I need to set my priorities right so I plan for some training and update sessions through videoconferencing to be able to set links among people. Thus, every year I continue building on my infrastructure based on two factors, funding and need. (Technical Consultant)

IT facilities are coordinated centrally across projects

The responsibility of planning, executing, and monitoring IT services was assigned to the ICTP team. Participants believed that the centralized approach in managing IT procurement and technical support was helpful in ensuring that projects operated relatively smooth. In addition, central coordination provided a basis for supplying equipment and facilities across departments and buildings.

Centralized management allows us to cooperate with external entities as representatives to all Egyptian universities in dealing with collective purchases. This applies to the internal entities as well, like the Ministry of Finance and the Ministry of State for Administrative Development. They usually need to address a single point of contact at the Ministry of Higher Education instead of dealing with 19 universities. (Project Director)

IT infrastructure is established to automate business processes

Participants indicated that one objective of the establishment of networks and IT solutions was to perform a shift from manual to automated operations. This shift was carried out to make processes more efficient. The process of automating sector operations requires testing and verification and has been taking place at a gradual and incremental pace.

I did not shift to automation in one year. Only last year we succeeded in getting the students results from the university's information system. (Technical Consultant)

We build databases to help automate processes. There are still some processes done manually which slow down the overall performance and need to be automated. (Vice Director)

5.3.4 Barriers to Efficient KM

This theme captured several dynamics participants identified as impediments for KM functioning in the reform context. These dynamics work collectively to forcefully hinder the knowledge cycle they put effort in to support. Indeed, interview data revealed that some of the identified dynamics can be defined as facts of the higher education system in Egypt. The barriers to KM fall into the following seven subthemes: a) organizational culture, b)

bureaucracy and public sector regulations and c) uncertainty, d) insufficient coordination between projects, e) absence of integrated information system to connect universities, f) underqualified clerical staff in universities, and g) centralization.

Organizational culture

Interviews revealed the impact of the complex nature of the organizational culture element on running KM activities. After a decade, employees, academics, and officials still lack the vitality and the willingness to accept and accommodate change. For this reason, participants stated that the reform's management tried to present new ideas and methods of working in ways that would generate the least amount of resistance from staff.

Academics were unwilling to read reports and manuals fully. Constructive criticism on staff performance was not easily accepted. Academics' knowledge-hoarding attitude was justified by distrust and fear of the loss of competitiveness and power. Participants best described the organizational culture by the following imperceptible characteristics: low tolerance for constructive criticism, lack of vision and understanding for development, the high-status position of academic staff within the university, lack of interest in reading, and a tendency to hoard knowledge as a reaction to the fear of losing power.

The major problem that we face originated from the culture, especially, academics reluctance to change. (Executive Director)

We try as much as possible to overcome the problem of knowledge hoarding. Academics here are afraid from conferences to share their knowledge and lose their competitiveness. ... Culture in many occasions hindered our progress. For example, operations are designed to yield enormous information yet if I advised him/her to use

different technique instead of the one implemented or commented on performance highlighting weakness or a defect in work, immediately they got offended. Then information flow would be affected. (Assistant Director)

We have problems in the culture. Most universities close at 2 p.m., as a result there are employees who cut the electricity at 4pm on the whole campus. Employees do not know about the existence of a network or its meaning; there is a safety issue and the employees responsible fear fires. The fire-fighting campaign was not included in the design and they do that to prevent fires, which is against the idea that the data would perform all around the clock. (Project Director) Culture in Egypt is very significant factor in the management of information. We find a problem to make people read. Egyptians are not good readers and that is the problem and then whenever we send a report they look at the first page and they form overgeneralized perspective and they respond according to that they do not read the whole document. We have problem making them respond timely to our request. ... not enough people visit our website. People are not frequently using the website. This all has to do with the culture. (Project Director)

Bureaucracy and public sector regulations

Nearly all participants addressed the negative impact of public sector regulations on the reform's knowledge cycle. Although the alignment of rigid regulations with operations has been always the cause for the system's low efficiency, reform policies had to nevertheless comply with the bureaucratic practices of the public system. Public sector policies determine how universities should allocate resources, recruit new staff, and procure equipment. Public sector policies have left little say for institutions' leadership over governing matters. This situation has greatly challenged the progress of reform projects especially when teams try to arrive at prompt solutions in dealing with emergent issues.

We are unable to change because institutions must abide by public legislations that do not grant us autonomy. Procurement is controlled by the Ministry of Finance. We are disentitled to distribute rewards (bonuses), or hire an expert at the market salary. (Assistant Director) _

Rules and regulations exist in higher education public institutions are extremely complicated; as a result, no international solution would comply with these local regulations. The Bank of Investment, the entity that finances the projects, compels that transactions and documents submitted must be originals, signed, stamped and notarized. Another problem is related to the lack of legislation that controls plagiarism. All dissertations from Egyptian universities are registered and stored, but they are not available to the public. (Project Director)

Uncertainty

Uncertainty was another important concern raised by majority of study participants. In their opinions, the ambiguity dominating the current political environment in Egypt poses

critical questions about the ability of the reform management team to sustain what they have learned and to continue functioning. Uncertainty affects the odds of completing the projects since the funds for subsequent phases have not yet been secured.

Reform is a 15-year plan, but if there is no[t] enough fund[s], we will be unable to complete it. (Assistant Director)

Uncertainty is very high I am incapable of putting a five-year plan because I don't know what will happen in the coming years. (Project Director)

Insufficient coordination between projects

Poor coordination across projects has resulted in the absence of a collective vision toward managing knowledge resources. Participants noted that the reform organizational design did not take into consideration organizing projects and units in a way that would enable them to work well together. Instead, individual performance is focused, and competition between projects is fueled. Participants recognized that better coordination would help balance areas such as integrated resource planning, overlapping activities, and the appearance of islands of knowledge.

To ensure the continuity and success of the Unit, all projects must combine under one umbrella. There must be an internal coordination among projects and between universities. The problem is that each project operates as a separate entity. Project directors set their work plans on their own. I don't know what does the project next to my room do in terms of services offered to universities. Similarly, at the university level, each rector sets university development plan individually. (Technical Consultant)

Absence of integrated MIS to connect universities

Most participants noted the problem of the low functioning information systems at universities. These individual systems are still unable to adequately satisfy decision-making needs at unit levels when compared to international standards. Simply, backward compatibility (which refers to the software capability to use data from other systems or databases) is another major challenge facing the task of creating one holistic MIS. Comments referred to insufficient coordination as causing large, scattered databases.

Unfortunately, in every place I worked there was never a solid information system that alone enough to enable decision making process. (Executive Director)

The problem now is how to integrate individual systems, and how to provide the same piece of information in different forms to different users at a certain time. Our information systems lack this type of integration and we are unable to do it. (Vice Director)

Backward compatibility is one of the problems that occurred because of lack of coordination. (Project Director)

Underqualified clerical staff in universities

Underqualified employees were listed among the uncontrollable dynamics that negatively affected the reform knowledge cycle. Participants referred to the fact that the administrative staff at universities are not competent enough since they lack the suitable language and computer skills necessary to undertake change.

The major problems we face is that the capacity of the employees, to which the execution of the project is assigned, is extremely feeble, no language skills, no computer or even academic knowledge. (Executive Director)

Centralization

Participants identified the concentration of power in the Ministry of Higher Education and Supreme Council of Universities as a significant hindrance to the capacity-building efforts. Operations would wait for the minister whether to exert influence on individuals in higher organizational levels to respond to reform management team requests or to decide.

Participants ascertained that this situation slows down activities, especially those regarding planning and decision making.

The system is extremely centralized; the fact that reform is imposed from top proves the theory of centralization. Also, we, as reform top management, are forced to perform micromanagement to universities and monitor their purchases and performance. Matters are not supposed to be handling like. (Executive Director)

The Minister is the one responsible about solving any issue, if nobody informs him when there is a problem, it is never solved. The Ministry is the only body that can propose for anything. (Project Director)

5.4 Summary of Findings

In response to the first research question, the study explored the reform management team's perception of the value of knowledge and the extent through which this perception is reflected in the strategic priorities and objectives of the endeavor. Findings assert that the national initiative was introduced to create a continuous state of development that helps align sector operations to the knowledge society. This state is envisioned through improving efficiency and automating institutions' processes. Efficiency is assumed to be realized through increasing stakeholders' access to various knowledge resources in a timely manner at the least possible cost. For this reason, study participants underscored the establishment of a sector-wide ICT platform of networks and information systems as a reference for sustainable change. Therefore, participants identified stakeholder satisfaction as a potentially reliable indicator for measuring the extent to which knowledge resources were optimized in processes. Building institutions' strategic planning capacity

was another important objective of the reform. Developing a common understanding of the new notions emerging during the process such as quality assurance, staff development, and strategic planning, was assumed to be a secondary objective of the reform.

Participants' responses highlighted knowledge as a strategic input for decision making and planning. They could associate the benefits to operational efficiency from managing knowledge resources, especially, that sharing work experiences, discussions, research results, or process feedback have proven to avoid unnecessary duplication of effort, saving scarce resources. Participants agreed that KM was a newly-coined term even to those with an information studies background. Due to the novelty of the term, participants' dialogue exhibits the use of the two terms 'information' and 'knowledge' interchangeably to indicate the knowledge concept. On many occasions, participants attributed their lack of familiarity with KM to insufficient capacity building during the planning phase.

All participants recognized the substantial need for a collective effort to plan KM activities. Their responses outlined the difficulty of formulating a one-size-fits-all strategy due to the diversity in projects' natures and objectives. In the absence of a formal policy or common directives that guide the optimization of knowledge resources within individual projects, project directors have liberty to allocate knowledge resources and to decide what to retain and to whom to give access. Since they believe that they have been entrusted to ensure high levels of privacy for institutions' information, participants defined "relevance" and a "need-to-know basis" as reference for seeking new knowledge. This degree of liberty has resulted in different patterns in dealing with knowledge resources.

The second research question required the participants to provide a detailed description of knowledge-creation- and transfer-related processes and practices. Participants' responses indicated that new knowledge is obtained through several modes, including professional training, process feedback, performance evaluation, consultation and technical support, trial and error, and lastly, operational and technical problems. Coding results revealed consensus among participants on the many tools integrated into the reform operational model to distribute explicit knowledge, namely, websites and portals, publications, pamphlets, handouts, periodic and internal reports, e-mails, standard operating procedures and manuals, and an archiving system. Human interaction and dialogue were common factors highlighted in participants' answers about tacit knowledge transfer modes. They clearly identified training, meetings, workshops and seminars, one-to-one consultation, and videoconferencing as activities through which work experiences are exchanged among teams. Knowledge acquired is primarily used for planning and decision-making activities. Due to the absence of an integrated information system that connects scattered databases across institutions and units, participants noted the necessity of validating knowledge prior to application.

In response to the third research question, participants described the workplace social, managerial, and operational settings in terms of opportunities and threats that would shape KM implementation. For example, smooth operations and enforcement of learning endorsed by reform ideology were found to facilitate knowledge flow. On the other hand, traditional principles such as access to knowledge on a need-to-know basis and

academics taking pride in their position in the hierarchy were negatively affecting the ability for knowledge to circulate. Coding results also showed some signs of centralization, depicted by the careful monitoring of performance, and the retention of critical knowledge near the top of the managerial hierarchy. While the tight monitoring system has assisted the reinforcement of knowledge application, participants indicated that the retention of critical knowledge within individuals occupying posts at the top of the organizational ladder has hindered knowledge flow, taking into consideration the high-power distance relationship which characterizes communication between superior and subordinate in the higher education system. Participants underlined the major impact of the ICT platform on connectivity and accessibility goals. While information systems and databases were built to connect planners and decision makers to knowledge resources, networks, portals, and websites were constructed with the aim of improving accessibility. Participants pointed out the benefits of centrally coordinating ICT facilities and procurement across projects. This acceptable degree of centralization has helped align institutions' ICT needs to budgetary restrictions.

Participants revealed many dynamics that would notably disturb KM functionality in the reform context. Some of the identified dynamics can be asserted as facts of the higher education system in Egypt. These dynamics include organizational culture, centralization, public sector regulations, uncertainty, insufficient coordination between projects, absence of integrated information system to connect universities, and underqualified clerical staff.

CHAPTER 6 DISCUSSION

This chapter provides insight into the progress accomplished to date in managing knowledge resources within the context of higher education reform in Egypt. Key findings are presented, linked, and discussed according to the three research questions presented in section 1.4. Research questions are placed at the beginning of their respective sections. The text begins with a broad evaluation of reform achievements compared to set goals, section 6.1. Then, the discussion shifts to reflect on practices, beliefs, and procedures that supported the application of KM, on practices that hindered the process, and on describing potential solutions to enhance KM performance, as presented in sections 6.2 and 6.3 respectively. Throughout the analysis, findings are compared to previous work to ascertain the extent to which they confirm or contradict them. Thereafter, implications for theory and practice are derived.

6.1 Reform Accomplishments at Appraisal

This section discusses study findings relevant to Research Question 1:

How does the managerial staff overseeing the reform initiative perceive the value of knowledge resources and the impact of KM on reform outcomes? To what extent is this perception reflected in the strategic priorities and objectives of the reform?

The often-repeated call for enhancing higher education in Egypt has become real. Indeed, there has never been a more sweeping effort intended by higher education policy makers to catch up with the competitive atmosphere of the knowledge society than the one

currently undertaken. Investment in reform reflects the extent to which the government is convinced of the need for change.

The study shows that higher education sector leaders function at a new level of awareness of the need to generate relevant knowledge. Recent literature also provides evidence for the awareness, which has emerged among policy makers, of institutions' ability to gain competitiveness through a sector-wide reform (Ginsburg & Megahed, 2011; Shelbourn, 2006). The overarching goals of reform were devised after the Ministry of Higher Education consulted a consortium of development partners concerned with education. The collaboration between higher education authorities and development partners has contributed to build a cadre trained for carrying out the reform process. Through exposure to a broad range of studies, perspectives, experiences, and models from around the world, reform planners could develop, test, and reproduce their own adaptive models which were best suited to local circumstances.

Notably, the cadre presently leading the reform project mostly consists of academia. As expected, the study found that most of the cadre has backgrounds in engineering. The strong presence of experts with different engineering backgrounds undertake the responsibilities of different ministerial portfolios and lead educational development projects is common in Egypt. This finding conforms to the findings of the previous study conducted by Kohstall (2012). Considering the pedagogical nature of the reform project, narrowing down experts' input and neglecting diversity in capitalizing on knowledge resources in the national project would have challenged the optimization of outcomes. The

more varied the views practitioners exchange, the richer the alternatives they provide throughout the course of planning and executing tasks (Cummings, 2004). If a diversity measure had been proposed to engage a network of experts with diverse academic backgrounds and perspectives, especially education and management experts who are interconnected by their shared pursuit of change, their interaction would have greatly helped accelerate the transformation of traditional work patterns into new experiences fostering capacity building.

A closer look at the reform shows the exceptional effort made during the second phase to reinforce learning and reshape the work environment of public universities. Participants demonstrated that, for the first time, institutions can create detailed strategic plans and set feasible long-term objectives for their enhancement initiatives. By means of what they learned throughout the two phases of reform experience, institutions' senior administrators have continued to develop a compromising mindset to help them adjust institutions' pressing needs for equipment, labs, and professional development to available funds and public sector regulations. The need for effective strategic planning has been triggered by the system's inefficiency, which is marked by the gap between the actual versus the desired levels of graduates' competences and research quality.

The qualitative approach embraced by the reform management reflects the managerial dimension of enhancing the work environment. The transition from the traditional, quantitative evaluation model to a new paradigm that maintains strong focus on quality assurance can be credited to the establishment of an independent governmental agency,

namely the National Authority for Quality Assurance and Accreditation of Education (NAQAAE). In making the transition toward modern ideologies, mechanisms, and benchmarks, the scope of the agency's official activities includes an audit of institutions and programs, accreditation, as well as the preparation of standard guidelines and qualification references. An institution's audit process typically inspects practices relevant to two major domains: institutional strategic planning capacity (such as governance, leadership, ethics, the administrative system, and community participation) and educational effectiveness for students and alumni (such as academic standards, programs, teaching, staff qualifications, and research production).

On an operational scale, the reform has driven institutions steps forward toward the state of operating automatically. Service automation is identified as a primary goal for improving efficiency. Manual operations, for example students' registration and results, were known to slow down performance and challenge productivity for years. The government's prioritization of service automation gives every reason for reform management to use the advancement of the ICT platform as a key measure to ensure satisfactory results on the ground. Providing personal computers in every office, connecting campuses, faculties, and departments over an intranet, and ensuring access to the Internet were intended to improve pedagogical and administrative services. The efforts have tremendously changed the learning experience of students and academics for the better. Applications such as e-courses, a digital library, and videoconferencing have helped to begin a shift from the traditional passive learning to a more interactive learning approach that provides tools for

critical thinking and problem solving. Administratively, by designing networks and management information systems, the reform strategy aims at facilitating access to a wide array of internal and external resources across sectors and institutions which, in turn, has enhanced planning and decision-making capabilities. Staff and students are presently able to retrieve their records online and print confirmation of employment/ enrolment and various other types of important documents without the inconvenience of commuting back and forth to the campus. It is however noted from participants' responses that the functionality of automated processes is comparatively challenged by the slow speed of the service. Otherwise, it can be said that institutions' automation of many administrative and educational services has contributed to improved work conditions.

Although there was a noticeable advancement in work conditions, the national project did not lead the sector toward more competitiveness. Contrary to expectation, after more than a decade of reform work, The Global Competitiveness Report has repeatedly listed the deterioration in Egypt's competitiveness position and quality of higher educational system (López-Claros, Porter, Sala-i-Martin, & Schwab, 2006; Porter & Schwab, 2008, 2012, 2015; Schwab & Sala-i-Martin, 2010). The capacity for competitiveness and the higher educational system quality ranks for five selected years lying within the three phases of the higher education reform strategy implementation are represented in Table 8.

Table 8: Egypt's Competitiveness and Higher Educational System Quality.

Year	2006/2007	2008/2009	2010/2011	2012/2013	2015/2016

Indicator	out of 122 countries	out of 134 countries	out of 139 countries	out of 144 countries	out of 138 countries
Global Competitiveness Index	71	81	81	107	115
Quality of higher educational system	104	126	131	139	135

The ranking for quality of higher educational system is based on an indicator developed to quantify the system's capacity to meet competitiveness requirements. The very low ranking of Egypt's higher education system can be interpreted using the study's theoretical framework, elaborated in section 3.1.4, that advocates for competitiveness as a product of effective management of various knowledge resources. Since the concept and operation of "knowledge management" was still not established during the second phase of the reform, as the study findings assert, the very low ranking of Egypt's higher education can be understood. The terms knowledge creation, transfer, and application, are unfamiliar in the context, especially among those coming from the Information Sciences discipline. Classically, knowledge-related activities are borrowed from strategic management and/or human resources management. They are conducted to fulfill goals other than elevating institutional capacity to generate more knowledge. They often occur without collective planning or coordination among units, giving great opportunity for overlapping to take place. This situation is justified by the absence of a central unit or team that is assigned the task of managing knowledge resources in the reform

organizational structure. In spite of what is often reported in a significant volume of research about how institutions of higher education have recently turned to KM to seek benefits of better quality and competitiveness (Chen & Edgington, 2005; Coukos-Semmel, 2002; Cranfield & Taylor, 2008; Debowski, 2007; Golden, 2009; Sohail & Daud, 2009), study findings showed that institutions in Egypt are not making the anticipated progress in the KM domain and still far behind this stage. The study findings further showed that there was no evidence for a KM initiative, nor did any engagement between projects' directors, in a formal or informal dialogue, on the subject matter.

Reform planners still focus on initiatives that yield measurable outcomes such as institutions' accreditation and ICT infrastructure. These projects can more reliably earn government and public confidence in their leadership. Potential application of KM will create a serious challenge owing to the need to shift operational evaluation from a measurable form to a non-measurable form according to the nature of knowledge. This shift conflicts with the public sector regulatory framework. Previous studies indicate that since it is still problematic to measure the benefits of KM, organizations are staying with traditional investment channels, especially if struggling with insufficient funding (Barson et al., 2000).

The statements study participants made about their awareness of knowledge value implicate that the KM notion was not developed to guide a course of action that prioritizes KM practices. From a positive perspective, it further implies that the reform management team is in a sound position to undertake KM if conditions allow for its application.

To date, the reform strategy failed to draw a clear vision of knowledge as a strategic resource. The strategy neither refers to a broad nor an accurate description of how emerged knowledge, including personal experience, research studies, and successful practices that have proved to enhance work processes, will be used for achieving reform goals. As such, the strategic role of knowledge has continued to be ambiguous. Such ambiguity hinders the existence of what is essential to the successful implementation of KM and results in much of the lack of direction in aligning KM to several functional areas (Zack, 2009). Participants attributed the inability to treat knowledge as a strategic resource and embrace KM to lack of preparation prior to undertaking their missions. This justification suggests the need for a process review which will enable the management team to establish a clear understanding of the KM approach and the potential complexities and benefits of its application in Egyptian academic institutions in the succeeding phases. Lack of reform management understanding of this part of management, concerned with the optimization of what individuals know in the work place, has created a great divide between reality (the present formulation of the strategy) and the ideal (maximum utilization of knowledge for further development goals).

To conclude, higher education reform strategy in Egypt has only offered some solutions that help improve work conditions and modernize operations in institutions. In the absence of KM orientation, the gains from these solutions have neither shown to be thorough nor do they seem to be sustainable in the long run.

6.2 Practices Favoring KM Success

This section discusses study findings relevant to Research Question 2:

How are core KM processes of creation, transfer, and application coordinated within the reform's operational model? What policies and practices are used to encourage project affiliates to obtain and share new knowledge?

The meanings constructed from data analysis indicate that the knowledge cycle in the reform operational model goes back to an early time before the beginning of the first phase of the strategy implementation. The national project has been initiated by the sharing of large streams of both explicit and tacit knowledge. Dialogues, study tours to several foreign countries, and joint research are few of the various events arranged by development partners to facilitate knowledge acquisition for their Egyptian counterparts. The reform planners acknowledged the role of these events in providing “valuable first-hand knowledge” that helped the engineering of Egypt’s higher education reform (Said, 2001, p. 40). A number of studies demonstrate the impact of knowledge-sharing activities on developing a framework for the reform agenda during the pre-reform stage as seen in The National Conference for Higher Education Enhancement, which was held in Cairo in February 2000 (European Commission, 2009, 2010; Ginsburg & Megahed, 2011; Kohstall, 2012). The conference presented an exceptional opportunity for more than 1,500 stakeholders to discuss legislative and operational challenges as well as to communicate perspectives and thoughts about a scheme for adequately developing

important areas of human resources and IT infrastructure (European Commission, 2009; Gillies, 2010; Ginsburg & Megahed, 2011; Said, 2001). In addition to building a cadre of top-level administrators, academics, and consultants that carry out the reform initiative (Kohstall, 2012), these extensive learning opportunities (external and internal) have resulted in the testing and application of modern educational models, particularly quality assurance and grant-based models as well as equivalence tables for student mobility (Ginsburg & Megahed, 2008; Kohstall, 2012). Through identifying courses that are internationally transferable, the use of the equivalence tables contributes to reform efforts by making Egypt's higher education system more transfer-friendly (European Commission, 2010). The new models that were embraced have helped connect Egypt's educational system to the global network of higher learning institutions.

During the second phase, synchronized top-down and bottom-up internal flows characterize the creation and transfer of knowledge in the reform operational model. In line with recent empirical findings of organizational studies (Gelard et al., 2013; Moen, Mørch, & Paavola, 2012; Mu, Tang, & MacLachlan, 2010), awareness campaigns, workshops and seminars, training, consultation and technical support, and meetings are several occasions through which massive streams of critical knowledge were communicated to academics and administrators at various organizational levels. Study participants discerned the importance of social interaction matters when it comes to internalizing learning in institutions. As such, establishing channels for dialogue and promoting higher levels of involvement across departments and units were focused on as

means to reinforce the conditions necessary for enhancing services. Findings appear to be coherent with those from other studies that identified the significant impact of social interaction and informal dialogues on obtaining tacit knowledge in organizations that are typically characterized by a wide range of communication channels (Botha, Kourie, & Snyman, 2014; Holste & Fields, 2010). The various forms of informative publications and constantly updated operating and procedural manuals are more examples of explicit knowledge flows. Most prevalently, these forms of top-down flows are counterbalanced by bottom-up flows of feedback, performance evaluations, and periodic reports issued by various units, which codify obstacles and process outcomes.

Raising awareness is an approach broadly incorporated in the reform operational model to transfer critical knowledge to a large segment of the academic community. New technologies, modern methods and standards to measure performance, and the implications of applying them on service improvement are examples of critical knowledge likely to be streamed through large scale awareness campaigns. Events to raise awareness take place occasionally as per the need of the phase. Through experience, project directors have realized that coaching is needed to support applicants in preparing project proposals. Thus, proposal-writing workshops have become an essential source of new knowledge that assists academics and students in setting a clear vision and objectives for their projects, writing a methodology description, and providing adequate allocation of the budget (Abdellah & Taher, 2007). To foster peer interaction among work teams, workshops and seminars were freely organized at unit scale to correspond to the

knowledge needs of the work teams. While the materials usually focused on problem-solving skills, the events themselves offered informal learning opportunities for attendees who interacted with experts from various fields. Consistent with previous findings, participants acknowledged the role of the knowledge transferred to prospective candidates, through workshops and seminars, in significantly increasing their projects' potential to be funded (Abdellah & Taher, 2007; El Badawy & Mousa, 2007).

Training is another strategic activity through which reform projects strive to reach a state of continuous learning. While workshops and seminars extended learning at unit scale, inter-unit training has partially helped project teams establish community networks across institutions and provided them with a wide range of analyses and interpretations. Devoting substantial resources and following certain training programs, individual projects have developed the intellectual skills necessary for enhancing work practices and accelerating the learning curve. Although an independent unit has been established to carry out the task of professional development and training, namely the National Center for Faculty and Leadership Development, institutions have opted to hire their own training teams or contract with specializing training entities according to their needs. At first, both academics and administrators usually participated in training programs on a voluntary basis. To remain sustainable, reform management has taken the necessary steps to internalize training in institutions by making participation mandatory for career advancement. Jasper et al. (2006) affirm that management can either adopt a voluntary

strategy or can force individuals to participate in training programs by making them an integral part of career development requirements.

Consistent with past findings in business organizations (Choi et al., 2010; Dixon et al., 2009; Holste & Fields, 2010; Markus et al., 2002), training programs in the reform context have played a strategic role in providing know-how to current and potential knowledge seekers. On-site training is deemed effective for groups or universities that have geographic access to professional trainers; however, video conferencing setups ensure accessibility in all its forms and provide a dynamic alternative to reach universities and groups of trainees located in remote regions. Through incorporating simulation models in training materials, training programs are embraced not only as a tool to transfer new knowledge, but also to apply it.

By means of consultation and technical support, reform projects fulfill the emergent needs of knowledge seekers who need to acquire new knowledge to accomplish unfamiliar tasks and satisfy projects' criteria. The correlation between information-seeking patterns and problem-solving activities, especially in complex situations where different influences must be understood and considered, has already been established in a great deal of scholarly work (Coakes, 2003; Levin & Cross, 2004; McDermott & O'Dell, 2001). Individual projects have devoted great attention to forming qualified teams for the task. Team members have been selected from the large pool of academics, combining theoretical and practical backgrounds, to help solve technical problems on occasions in which uncertainty challenged operations. Consultation and technical support teams in

reform are equivalent to the self-contained teams introduced in the literature as a knowledge internalization mechanism, which is useful in situations where directives and organisational routines are inefficient (Alavi & Leidner, 2001; Grant, 1996). Consultation and technical support teams have been encouraged by project directors to embrace an open-door policy where a flexible arrangement is made to provide insightful, yet simplified knowledge for those who seek prompt resolutions to operational problems. Individual projects have designated different work locations for projects' affiliates to meet experts and ask questions openly without embarrassment. Consultation and technical support teams, by making the time necessary for drop-in and phone consultations, provide an exemplary model for effective tacit knowledge transfer. Simple mechanisms such as providing enough time for the activity to take place and setting up occasional learning opportunities for individuals to gather and exchange experiences are better applied by managers who keep a strategic focus on learning and striving to enable change (Davenport & Prusak, 2000; Wiig, 1997b).

Offering meetings is one effective knowledge transfer tool. Regular meetings, which are usually conducted in a casual environment, with university rectors, faculty deans, department heads, and project leaders and teams, have helped all parties to break the ice and challenge existing power relationships. The casual environment merely allows senior management to socialize, discuss diverse views with individuals from middle management, and build on the others' insights regardless their position in the hierarchy. Trial and error is the least strategic knowledge creation tool in the reform operational model. In the

Egyptian public sector context, resources are scarce and work rules are not very accepting of risks or errors; hence, experimenting with the unknown is not a common value. The study findings have reported minimal attention to trial and error as a tool, since it is barely accepted due to the novelty of the process.

Informative pamphlets as well as documented rules and regulations are some common forms of knowledge flows across various structural levels. Operating and procedural manuals were continually updated by each project to ensure the inclusion of new methods that have emerged from execution and have been proven effective.

The role of pre-existing knowledge of process feedback, performance evaluations, and progress reports in generating new knowledge should be highlighted, as much of the improvement in institutions' work processes can be attributed to the knowledge obtained from these three sources. Regular review of the outcomes of the rigorous monitoring system, established to carefully assess and measure progress, gave project directors the opportunity to compare actual results to standards. In most cases when actual performance falls short of standards, project directors inquire about and analyze the cause of the problem to gain a broader understanding of factors that occasioned the deviation. In parallel to the exploitation strategy suggested by March (1991), materials collected from the three reliable sources were used as an input to decide which modifications and tasks needed to be done. In addition, the three internal sources of knowledge: feedback, performance evaluations, and progress reports also served as control measures for projects to stay focused on deadlines; they provided a great opportunity to projects' teams

to incorporate new ideas; and they simplified processes, avoided the replication of mistakes, and reduced the waste of time and resources.

Inspired by service automation, reform management are striving to create a technological platform for institutions and units to remain connected. E-mails, portals, and websites, an archiving system, and videoconferencing are examples of the technological platform established to reinforce the attainment and transfer of knowledge. E-mails were eventually accepted as a reliable mode to circulate reports, newsletters, and important documents. Institutional portals and unit websites are primary sources for academics and students to browse news, accomplishments, and events, and access learning materials. Disappointingly, Jupiter, the archiving system, obtained to store, retrieve, and share the content of explicit knowledge across projects and units, was identified as the least reliable technological tool. Frequent technical crashes experienced by the system have caused a backlog in the input of documents, made it difficult for users to access content, and forced them to rely on a manual filing system and typical communication means of phone and fax. The delay in operations associated with the archiving system's low functionality calls into question whether the quality of ICT resources is suitable to fulfill timely knowledge needs in the reform setting. This question has been raised in past research, such as that of Hansen et al. (1999) who emphasize the importance of using reliable and fast technological information systems to codify and distribute existing knowledge to create new knowledge. Markus et al. (2002) discuss the higher levels of uncertainty,

miscommunication, and the alienation of individuals and departments when managers risk operating under inadequate information technology tools.

Video conferencing technology was another tool that projects used to shorten the spatial and temporal distance between knowledge seekers and knowledge resources. The platform of video conferencing is among the top accomplishments of the second phase of the reform strategy implementation. The marked satisfaction of the functionality of the tool is attributed to the scattered nature of public universities in Egypt. In other words, the video conferencing system has enabled the reform management team located in Cairo to virtually reach institutions in Upper Egypt. Since project teams have become less likely to waste time and efforts in reaching tacit knowledge resources, the tool is recognized to significantly add value to reform goals. In addition to facilitating communication and sharing insights about application issues, some projects have relied intensely on video conferencing for training purposes. According to an empirical study by Choi, Lee, and Yoo (2010), evidence shows that management teams that are willing to embrace modern communication technologies, such as wireless networking and video conferencing, are more likely to improve their learning curve.

Consistent with the KM literature reviewed in section 2.1.2.3, the study findings indicate that common activities through which knowledge is put into action in the reform operational model are those such as solving technical problems, planning, and decision making. The three intellectual activities involve analysis and personal judgement; therefore, participants associate activity outcomes with the individuals' own experience

and the amount of knowledge they possess. In the public sector, where rigid bureaucracy shapes the work environment, solving problems and making decisions are certainly demanding processes. Several inputs need to be considered to address a range of system legislative and financial constraints. Especially during change, an individual's ability to explore new prospects and set available courses of action that optimize the allocation of resources will certainly influence the making of better choices at all structural levels.

6.3 Practices That Hinder KM Application

This section discusses study findings relevant to Research Question 3:

How do institutional elements of organizational culture, organizational structure, and IT facilities implicate KM application within the unique context of the reform?

The study analysis identifies different factors that potentially render KM unable to function optimally. As such, a great divide should be established between controllable and uncontrollable factors that challenge management's ability to create an environment likely to embrace KM. Controllable factors are the ones whose impact can be reversed by corrective measures of the reform management. Uncontrollable factors are elementary facts that define the functionality and the broader context of higher education in Egypt. The controllable factors include the lack of coordination, confidentiality of information, and codification emphasis. The uncountable group was found to include uncertainty, insufficient financial resources, centralization, and culture. The following discussion will elaborate upon each group.

6.3.1 Lack of Coordination

In the KM literature, coordination facilitates common knowledge including language, labels, and shared meanings among the affiliates of an organization (Davenport & Glaser, 2002). In the reform, lack of coordination is marked by the absence of a consolidated plan that describes and regulates the way documentation and dissemination of knowledge is dealt with across projects. Other evidence of the lack of coordination can be seen, not only in the physical setting of reform project offices, which are in isolated wings and different sites, but also in the absence of an integrated information system that, at the bare minimum, connects projects, the Ministry of Higher Education, the Supreme Council of Universities, and the faculty databases of institutions. Lack of coordination is manifested in the overlap that occurs when different projects offer similar training programs to the same units, in many cases, for same beneficiaries.

This level of poor coordination characterizing the work environment has led to unfavorable variance in the way projects and institutions treat knowledge. For example, some projects fall far short of others in integrating ICT tools, networks, and computers into work processes. The variance marked off two kinds of institutions. The ones in the first category show interest, prioritize knowledge related decisions, and thus allocate adequate budgetary resources to activities or tools that serve better communication and access to knowledge. The leaders of the other institutions abandon the idea of reform. The unfavorable variance in treating knowledge is triggered by individual differences in

institution leaders' commitment to the reform idea, as well as the way they perceive the impact of new technology on productivity and stakeholder needs.

The project-based organizational structure and the embrace of a competitive spirit came at the cost of knowledge creation and benefit sharing. Participant responses indicate that because some work teams are simply trying to be better than others, they became unable to work together effectively. While the competitiveness mechanism, the desire to achieve better success than competitors, is found to potentially prompt an individual project team to seek new knowledge to accelerate project completion, in this case, it has contributed to the creation of different patterns of treating knowledge resources across units. In accordance with Hansen (1999), in this type of alienated organizational structure, competitiveness hinders a project's progress, especially when highly relevant knowledge is needed from a rival team to solve a problem or perform an uncommon task. Study participants affirmed the existence of different work patterns, islands of knowledge, and an issue for future KM programs when compiling large isolated pools of content into one holistic system, because of the poor coordination. After observing the duplication of activities across projects and the wasting of scarce resources, those who promoted the benefits of competitiveness need to consider how competition can impede progress on sustainable goals.

It clearly appears that study participants have agreed to the need to coordinate knowledge-related activities across projects to reach sustainable progress. Yet, they did not reach a strong consensus on how to address this need. The Asian Development Bank

(2011) asserts that it is important for dedicated actors to coordinate and agree on a fundamental framework for capacity building in higher education to yield desired outcomes. Operationally, fundamental shifts are required to improve organizational integration and alleviate the project-based isolated structure. To make these shifts, we must consider building more communication channels among the various units, and stimulating teamwork across projects and institutions. Better coordination among reform projects would lessen the variation in performance and balance areas such as collective resource planning and backward software/hardware compatibility.

6.3.2 Confidentiality of Information

The study participants have identified confidentiality of information as one respected policy among reform project teams. Confidentiality of information implies that projects' "internal affairs" are not allowed to be shared with individuals of other units without the permission of the owner institution or project team. This is particularly the case with financial data which is restricted from being shared by law. However, "internal affairs" is such a vague term that it may be extended to include work stories and report results. Borrowing from the public system dictionary, study participants have found comfort in choosing the term "disclosure," which means the revelation of protected information, over the term "sharing," which refers to telling about individual experience. Triggered by public liability, the study participants believe that they are entrusted with knowledge especially because of the adoption of a competitiveness mechanism and individual performance evaluation system. In the absence of a reference or a framework that describes the

content that should be protected and the criteria on which the content could be shared across institutions, the policy raises questions about the reason for protecting work experiences.

Based on personal judgement, project directors intuitively decide on who needs to know what in order to accomplish their tasks. This principle boldly neglects prospective knowledge seekers. Thus, the same content could be posted online for one project, while restricted for another. Chilton and Bloodgood (2010) proclaim that those who possess knowledge typically evaluate the likelihood of it being beneficial to present stakeholders and distribute it based on the outcome of their personal judgement. At this point of the analysis, it can be concluded that transferring knowledge across projects and institutions is governed by subjectivity. While subjectivity alone is enough to undermine the goal of accessibility, the disclosure of information using ill-defined measures such as “relevance” and a “need-to-know” basis set by projects’ directors also worked to slow down the knowledge cycle, create islands of knowledge, and increase the gap between knowledge seekers and knowledge resources.

In a work environment that favors individual effort over collective achievements, where individuals fear public liability when sharing information, and performance evaluation measures acknowledge the attainment of personal knowledge yet neglect any endeavours for its dissemination, projects give priority to hoarding organizational knowledge over its

transference. The transference of knowledge is merely practiced at a considerably small scale. This dilemma cannot be solved by distinguishing between individual and organizational knowledge as March (1991) suggests. Rather, it calls for structural modification in the regulatory framework to build trust in work relationships and espouse team evaluation systems; doing so would trigger change in a variety of circumstances such as individuals' perception toward their management and peers as being untrustworthy. To build a workplace conducive to effective KM, employees need to trust that management will provide them with protection if they share information and that this information will not be used against them in the future (DeTienne et al., 2004).

6.3.3 Codification Emphasis

In the reform's operational model, codification signs continue to surpass those of personalization. A careful monitoring system is established to guide projects' affiliates to follow a certain framework of formal policies. Directives, forms, and procedural manuals are used as benchmarks to facilitate projects' missions and as reference to apply new knowledge. They are constantly validated to include recent feedback. Information systems (GIS, MIS), archiving system, and digital libraries are built for no other reason than linking scattered databases and facilitating access to electronically stored content. Internet access is provided for the first time, in offices, labs, and study halls, to allow both academics and students to download available content and, in limited situations, upload helpful materials to share with the academic community. Portals and websites are other tools used to enhance remote access to administrative services, and fulfill the knowledge

needs of planners, decision makers, and/or knowledge seekers. This pattern can be a clear indication of codification emphasis, especially when participants' responses showed no orientation toward a personalization approach, where personal knowledge exchange is optimized, nor toward a balanced approach which equally emphasizes codified (explicit) and personal (tacit) knowledge exchange.

In a work environment where personal knowledge is protected, it is anticipated that management's strategic choice of knowledge is more likely to be narrowed down to a codified format. Participants indicated that the need to establish and evaluate procedural and operational routines stimulated reform management to embrace a codification approach. They recognize the great impact of giving the employees easy access to reliable knowledge on organizing information flow and, more importantly, on saving time and effort. This analysis is consistent with that offered by Chilton and Bloodgood (2008), Sohail and Daud (2009), and Kumar and Ganesh (2011).

Although that the reform management took measures to ensure the two elements Rumizen (2002) addressed in content planning: a) collection of valid content from its origin, and b) the use of proper applications to organize and facilitate access for content, it is however noted that content is not yet perceived to be of acceptable standards. Portals and websites display limited features. They may browse out-of-date information or fail to redirect users to other links. Logical errors, discrepancies, and incomplete records are typical errors detected in the output from information systems. Also, errors resulting from the absence of an integrated information system and lack of regular updates to data, have

added to the common errors that are most likely occurring during the data entry process. Data entry is carried out by underqualified employees who lack the suitable language and computer skills necessary to undertake the task. With little control over hiring skilled workers, planners and decision makers found themselves obliged to consult more than one source for the same piece of information, using triangulation as a common practice to verify the quality of information prior to its use. Triangulation is assigned to qualified teams to validate content either manually or electronically. Notifying respective units to instantly update content is one effective rule applied to rectify discovered errors. After a decade of reform work, institutions are still at a great disadvantage due to the absence of integrated MIS and the scarcity of reliable, up-to-date, and comparable sector-wide data (Fergany, 2000). This analysis addresses the need to connect the individual databases and repositories of institutions and frequently update them for effective knowledge cycles.

In the case of Egypt, where the reform strategy has been initiated to increase the production and dissemination of knowledge, the codification approach alone is insufficient to sustain capacity building and long term competitiveness. Considering the human element as an especially important component of KM, practices that equally promote the creation, transfer, and application of personal knowledge must be adopted to yield favorable results. Social thematic events that gather individuals across institutions in an orderly way would be good occasions to openly discuss work experiences and bridge the sources of internal expertise. Especially when struggling with insufficient funding and being challenged with rigorous budgetary rules that discourage any attempt to reward the

transfer of personal knowledge, institutions can find in social events opportunities not only to build informal rapports and promote mutual learning, but also to build trust and overcome the fear of losing power. To promote personal knowledge exchange, this type of event should be integrated into the work agenda of institutions.

6.3.4 Uncertainty

The unstable political ambience, due to the revolution, in which Egypt lived during the second half of the reform phase subject to study (2011- 2012), has drastically disturbed the decelerated knowledge cycle. The revolution has caused frequent changes in the prime minister, the cabinet, and the way government functions. Participants affirmed that uncertainty has radically escalated to challenge their ability to function and sustain results. Political uncertainty characterizing this period of modern Egypt's history posed a threat over the continuity of the national project, considering two facts. First, the reform idea was imposed, in a top-down fashion, by the former minister of Higher Education and Scientific Research, Mr. Hani Hilal, and figures of the fallen regime who exhibited commitment to driving change. During Mr. Hani Hilal's term of office, reform was perceived as strategic to the country's economic development effort. However, associating development projects with the strong ties established between politicians and businessmen during this era put government projects under criticism. Successor minister(s) feared being held accountable for projects originally initiated and carried out by a former regime that was marked by abuse of office and corruption. Successor minister(s) seemed skeptical and less enthusiastic to the idea. Reverting to the traditional school of

measuring progress, successor minister(s) required satisfactory quantitative results for them to support the effort.

Secondly, a great many academics themselves, particularly rectors, deans, and unit heads, were lacking consensus on the reform idea. During nearly a decade of operation of the reform plan, despite the determination of the reform management to create partnerships with institutions, strong voices from within the sector were being raised for ceasing the project. Opposing views envisioned reform as a nominal effort of minimal gains inherited from the defunct era. These voices are a connotation of a weak internal drive for change. They put individual willingness to learn at stake. Individual willingness to learn and retain knowledge was identified in earlier research as a crucial prerequisite for KM initiatives to drive anticipated change (Huysman & De Wit, 2013). Empirical findings, grounded on the Chinese business context, reveal that relying on organizational commitment, solely, to ensure participation is insufficient for KM to flourish (Yang, 2011).

Uncertainty is also tied to another prime factor which is the scarcity of financial resources which can be instantly observed in the modest setting of the unit offices. Most study participants highlighted the persistent lack of financial resources as a factor that affected the odds of retaining skilled staff as well as challenged the level of accomplishment to date. Due to financial scarcity, operations were ruled by the “availability of funds” rule. Therefore, for example, the ICTP management used to prioritize services and established infrastructure over phases, or “layers” as described by participants. Each phase, which represents a fiscal year, has incremental sub-goals so that institutions have a fair

opportunity to receive relatively equal subsidies. The work plan of a certain year would potentially select building database centers as a first layer. The next phase would include running various applications as the second layer. The following phase would emphasize security or human resources development to take on the responsibility of running the system, and so forth.

Reform project funding depends on government's expenditure on higher education, which varies annually. The reform executive director mentioned that some KM-related expenses, for example to advance professional development and to communicate the reform experience on a wide scale, were likely unaffordable, typically distinguished as luxurious, and unidentifiable in the budget.

The necessary resources needed to carry out subsequent phases have not been secured. The Minister of Higher Education must advocate for increased funds during budgetary discussions. This is how things work in Egypt. The alternate scenario puts the PMU at risk of getting eliminated from the organizational structure of the higher education system due to insufficient funds. In accordance with previous findings (Loveluck, 2012), the shortage of government funding allocated to higher education continues to hinder the sector's endeavors to nurture knowledge resources and establish suitable information technology infrastructure. Having little control over planning financial resources, the issue of uncertainty should be considered when evaluating how KM may be implemented in the future.

6.3.5 Centralization

A closer look at KM-hindering factors in the reform operational model brought centralization to the lead. The highly-centralized administration, which has been always a recurring challenge for institutional performance, still defines higher education in Egypt. The concentration of decision making in the two governing bodies, the Ministry of Higher Education and the Supreme Council of Universities, remains problematic for managing reform units as innovation centres that exploit new knowledge to deliver improvements. The Minister is the source of critical knowledge through which change can be proposed and problems can be solved. The concentration of power in the figure of the Minister of Higher Education confines the chances of the two bodies working together to find solutions and defines the intensity of external control over institutions. It clearly addresses the need to obtain more insights and opinions from various managerial levels in planning and decision making. In getting things done, the Minister, using his authority, can easily exert pressure on rectors who will in turn exert their influence on lower managerial levels such as deans and head of departments to respond properly to stakeholders' knowledge needs. Since critical knowledge is typically retained at the top of the managerial hierarchy, the reform executive director and/or the Minister of Higher Education are expected to make the difficult decisions and resolve issues.

The evidence presented in the study findings shows that the tight framework of rigid routines and strict regulations that characterize the public sector in Egypt has visibly suppressed projects' autonomy and flexibility to undertake prompt action. If nothing else,

this regulatory framework acts severely against projects' efforts to explore new solutions and initiate action. Outdated administrative regulations have always had control over strategic matters, some of which are: the terms of resource allocation, recruitment, the policy of rewarding employees, and procurement. The little autonomy that defines the work environment of reform projects has disabled the projects' capacity to hire high caliber staff and shift toward rewarding practices that motivate knowledge exchange and application. Therefore, knowledge is still created and stored in the form of directives rather than individuals' expertise. The outdated legislative framework supporting centralization remains at odds with any quest for change or development (World Bank, 2009).

The long-standing centralization is attributed to the hierarchical organizational structure which, in turn, shapes formal communication and social interaction in the workplace. The hierarchical structure is found unfavorable, for it implicates a low propensity for tacit knowledge flow, particularly between individuals of different academic ranks and/or managerial positions. In the hierarchy, tacit knowledge is found to circulate relatively smoothly among individuals of the same unit. The circulation pattern becomes complex within individuals across different units and turns out to be noticeably difficult toward the top where the critical knowledge is retained. In other words, the high-power distance relationship that describes communication patterns between superior and subordinate in the hierarchy has resulted in less knowledge mobility. When dealing with continual requests for information required to advance work, communication with rectors and

administrators is found onerous. Project directors overcame the communication dilemma by establishing direct links with the Minister or members of the Supreme Council of Universities to exert influence on institutions to provide information. Evidence from several empirical studies, in addition to the present study, underscore the fact that typical hierarchical designs that are highly formalized with centralized decision-making are more likely to inhibit knowledge processes (Ajmal, 2009; Kurczewska, Kyrö, & Abbas, 2012; Walczak, 2005). The top-down communication characterizing these structures therefore limits potential interaction and communication between units and thus the transfer of tacit knowledge between employees across different departments as suggested by Mahmoudsalehi et al. (2012). Since knowledge increases when individuals in the workplace interact freely unhindered by the formal code of conduct, reform management should focus less on enforcing rules and more on experimentation and innovation.

On the other hand, the centralized approach of managing IT procurement and technical support resources in the reform operational model has helped various units operate efficiently, and obtain up-to-date, high-specification equipment. External vendors have only to communicate with a single point of reference. Institutions benefitted from financial savings when purchasing as a group, allocating savings to other needs. The degree of flexibility exercised in managing IT resources respected the unique needs of some projects and institutions by providing them with the option of whether to access the service offered by the ICTP project or to choose a different provider. In the latter case, consultation and

technical support services extended to reviewing purchase plans and equipment specifications prior to completing the procurement transaction.

6.3.6 Organizational Culture

Central to the reform effort is embracing continuous learning, which requires structural modification to current organizational culture. Participants indicated that the endeavor to persuade institutional leaders to take appropriate actions and support sustainable effort was full of disappointments. Analysis of findings distinguished culture as the most complex factor hindering the success of KM-related practices in Egypt's higher education context. Evidence of this implication was seen among participants' responses which fully agreed with previous empirical findings that extensively addressed the decisive role of organizational culture in fulfilling the requirements of the appropriate social sphere of KM activities (Christopian, 2008), especially in higher education (Czerniewicz & Brown, 2009).

Findings indicate that academics seek job security in the principles of the hierarchical system that respect the possession of knowledge and reward individual achievement, restrict the disclosure of information, afford priority of service, penalize individuals for not being able to persist with tasks, and promote the staff member as a qualified figure incapable of faulty judgement. These principles describe the invisible dimension of organizational culture that shapes academics' perceptions and work habits in institutions. In such a culture, a large segment of academics takes pride in their position in the hierarchy which brings higher status and power. They identify themselves as guardians of knowledge that shouldn't be doubted. They excel individually and hoard their knowledge, fearing loss of power. The ivory towers they live in do not allow them to embrace a market-oriented approach, in which institutions provide learning services and seek to

satisfy various groups in society. As a result, they are rarely concerned with student satisfaction. They have a low tolerance for constructive criticism; therefore, it is farcical for them to gather feedback from interest groups to evaluate their performance. This vision of academics as knowledge experts allows them, in turn, to view themselves as the most highly qualified individuals to identify and judge the methods to be used for knowledge sharing (Cranfield & Taylor, 2008).

Screening and analyzing the element of shared values and norms shows seniority to be among the most firmly held values that impede the increase of knowledge in the reform context. Seniority is the sole criterion identified in the system for granting privileges. It is the rule of preference in office. Seniority, defined by position and responsibilities, typifies the centralized vertical structure of institutions. Adhering to seniority restricts the attainment of new knowledge emergent from discussions when young academics refrain from voicing their opinions or suggesting new ideas during formal meetings and occasions, fearing negative judgment or embarrassment. For this reason, seniority can be said to affect young academics' positive attitude toward learning, if seen in a framework of concerns, trust, and capacity to learn. Furthermore, forcing other criteria such as competitiveness and continuous learning to replace seniority has raised insecurity in the workplace and provoked remarkable levels of resistance to change. To conclude, the hierarchical environment and political authority of institutions impose a significant challenge for knowledge management processes (Czerniewicz & Brown, 2009).

In Egypt's weak reading culture, academics explore knowledge on a need-to-know basis; they are driven to gain knowledge if there is an opportunity for advancement in their profession. Over time, as academics reach the top of the career ladder, knowledge acquisition becomes less of a priority. They appear to be less motivated to acquaint themselves with what is taking place in the domain or even around them in the workplace. They gradually become accustomed to traditional work practices and old-fashioned teaching techniques and are less interested in seeking new methods or technologies.

It is misleading to think that only a minority of academics refuse to change. Participants indicated that academics still support traditional values and hold bigoted views against the reform endeavor. Academics resisted change by limiting access to knowledge resources and hoarding more knowledge. In a culture that lacks the vision for development, it is common to find institutions turn off power to all equipment and internet data center facilities after work hours, at 3 p.m., as an electrical safety measure to avoid public liability. Academics displayed much hesitation, a low level of commitment, and defensive attitudes toward the modern practices imposed by the reform which could be seen in staff development, transparency, smooth work flow, and competitive grant funding. These new values are intended to defeat bureaucracy and hierarchical distribution of power in institutions. The potential course of reform that suggests a different assessment approach and entails amendments to the methods academics use to perform their tasks, was more likely to be a threat to the hierarchical power gained through the system.

6.4 Implications for Theory and Practice

Key findings of the study provide great insight into the extent to which the reform model operates within a KM vision and incorporates many of its practices. Such an insight can implicate the identification of new objectives and rearrangement of priorities to serve the planning of KM in reform initiative phases ahead.

The amount of knowledge individuals receives prior to planning and during the early phases of capacity-building programs affect the way they manipulate knowledge resources throughout the course of implementation. Development programs, concerned with enhancing higher education, have a contributing role in informing planners in areas such as establishing a strategic vision for KM, and in locating critical knowledge so that the idea of optimizing knowledge resources and KM practices can be aligned to the wider scope of their development goals. Given the crucial role played by international development organizations that work in more countries across the developing world, the study findings and conclusions emphasize the importance of identifying the knowledge needs of societies and prompt the establishment of a framework for knowledge-based collaboration that guides policy implementation accordingly prior to creating development programs.

Public sector regulatory framework has a fundamental role in the functionality of knowledge-related practices over and above other hindering factors, especially the dynamics related to knowledge accessibility and usability. The findings obtained from the

study suggest that similar dynamics to those that control the management of knowledge resources in higher education are likely to be found in other public sector contexts. More attention must be given to thoroughly investigating the structural and functional settings of institutions that obstruct knowledge flow within and across organizational levels and then researching reliable policies that ensure efficient access (unrestricted and quick) to knowledge resources for current and potential knowledge seekers. The findings also indicate the importance of developing effective measurement system to quantify the gains in knowledge as applied to learning, planning, and decision-making.

Marking what information is confidential and the reason for confidentiality may underline the need for reviewing the information-sharing policy currently in place. Because individuals in the workplace have serious concerns about public liability, understanding the basis through which information should be protected may lead to reducing subjectivity, building more trust, promoting flexibility, and encouraging individuals to take the liberty of giving unconditional access to what seems to be of great value to enhance work processes without hesitation. If articulated based on solid criteria to distinguish what information is considered public domain, the reviewed information-sharing policy should have an impact on increasing individuals' engagement in knowledge-related activities, accelerating knowledge flow. The reviewed information-sharing policy could also contribute to the creation of different patterns of knowledge sharing other than the traditional ones triggered by the existing hierarchical top-down power structure.

The modest pressure exercised on academics and project affiliates to share their experiences has led to insignificant progress. Understanding why individuals are unmotivated to exchange views, ideas, and work stories may hold hope for reconsidering the criteria for reward schemes and training policies. Academics are rewarded for their individual effort rather than communicating their work experience. Also, they are obliged to accept training at its full cost as a condition to grow. These practices are not ideal to internalize learning in a sector characterized by low remuneration. The effective application of KM requires a work environment that promotes teamwork, shares successful practices, and induces active participation from all managerial levels. This can be achieved through a well-focused reward strategy whereby individuals are granted time to discover and experiment with new sources of knowledge. Meanwhile, different forms of recognition prioritize those who are widely engaged in knowledge transfer. Similarly, training programs should emphasize areas of ascertained weaknesses to help trainees excel in their domains. Training should also offer strategies to empower creativity and risk taking without fear from accountability. For individuals to demonstrate a positive attitude toward learning, training should not be perceived as a compulsory sacrifice of money and time to qualify for a promotion. Training must be fully subsidized by institutions and come at no additional cost for the trainees. Over time, the staff will gradually be able to discover the opportunities for improving the functionality of their units through KM.

Understanding the factors affecting upper management's perception of the benefits of IT involvement in operations can help in reducing the remarkable variation in IT application.

This is partially because leaders of institutions have such a major impact on the procurement decisions for communication technology equipment. Such an understanding can help in setting up programs to seek to influence perception.

Technical focus on content management together with the absence of clear goals of the verbally-agreed-upon information management policy is problematic for building a shared vision and meaning for KM. The capacity of the current IT platform in facilitating access to tacit knowledge resources needs to be evaluated. In the case of Egypt, where the reform strategy has been initiated to increase the production and dissemination of knowledge, the codification approach alone is insufficient to obtain superior results. The human element must be underscored as an especially important component of the information management strategy. Technology facilities need to be coordinated to bring people together and engage them dynamically in seeking new knowledge. In other words, the coordination should be considered prior to developing an investment policy for information technology and should aim at ensuring a certain level of synergy between codification and personalization. Especially when struggling with insufficient funding and being challenged with rigorous budgetary rules that discourage any attempt to reward the transfer of knowledge, institutions can find in social events an opportunity to build informal rapports and promote mutual learning. Social thematic events, where individuals across institutions are gathered, would be good occasions to bridge the sources of internal expertise, build trust, and overcome the fear of losing power. To promote a wide-scale tacit knowledge exchange, this type of events should be internalized in institutions' work agendas.

CHAPTER 7 CONCLUSIONS

This chapter provides a review of the context of the research, the definition of the problem, the purpose of the study, the theoretical framework, and the research methodology that was used. The conclusions that have been drawn from the study are then described through a framework of strategic, managerial, and operational elements that are fundamental for a sustainable KM effort. The study's limitations are also discussed and suggestions are given for future research. Lastly, the challenges that are pertinent and helpful for researchers to learn before conducting research in Egypt are discussed.

7.1 Summary of the Study

Research context and problem definition

The challenging environment of higher education in Egypt has led to institutions that are incapable of creating conditions in which knowledge can be nurtured. A sector-wide reform was envisioned as a means of modernization. Capacity building was also discussed since it would enable institutions to better deal with knowledge resources. To achieve goals that are related to professional development, service automation, and increasing graduates' intellectual skills, reform planners have assigned a considerable amount of resources to build robust, standards-based IT infrastructure. An integral part of the latter includes building networks (intranet and internet), providing computer labs in each campus and personal computers in academics' and administrators' offices, and operating

various information systems. In addition to facilitating communication among higher education interest groups, these large-scale projects are intended to increase access to a range of internal and external knowledge resources.

Although the drive for reform in Egypt revolves around building institutions' information and knowledge management capacity, by the end of the second phase, as the process approaches maturity, identifying prospects for efficient KM in this unique context is subject matter that remains largely unstudied. The literature is lacking answers for important questions relating to KM application in the context of Egypt's higher education system. Little is known about how the reform strategy has rendered its operational model capable of creating conditions in which knowledge can be generated, retained, and shared within and across projects to drive change. Knowledge is limited about the nature and form of KM related activities that are integrated into operations and the extent to which reform management encourages learning and carrying out new ideas. There are still major gaps in what we know about the role and impact of key organizational factors that are identified in the literature to shape KM performance. As such, this study explores KM functionality and its contributing role in achieving reform objectives to address these unanswered questions.

Purpose of the study

This study sets out to provide a high-level overview of how KM, as a concept and practice, was coordinated within the strategic objectives and operations of the reform. The study's

timeframe includes the first four years of the second phase of reform, from January 2008 to December 2011. The study also seeks insight into whether potential KM programs can result in adding value to reform objectives by examining the type and extent of organizational resources devoted to KM and the impact of contextual factors on the effectiveness of KM operations. This high-level overview is obtained by examining personal views and work experiences of individuals affiliated to the Project Management Unit (PMU) at the Ministry of Higher Education. Institutional policies and practices that identify KM-related themes and learning patterns were investigated within the study framework. A group of “how” and “what” research inquiries were addressed to set the scope of this study and define the central research question as follows:

How is knowledge management integrated into the implementation of the second phase of the higher education reform strategy as executed by the Project Management Unit (PMU) of the Egyptian Ministry of Higher Education?

The three subordinate research questions, used to develop a more nuanced understanding, are as follows:

1. How does the managerial staff overseeing the reform initiative perceive the value of knowledge resources and the impact of KM on reform outcomes? To what extent is this perception reflected in the strategic priorities and objectives of the reform?
2. How are core KM processes of creation, transfer, and application coordinated within the reform’s operational model? What policies and practices are used to encourage project affiliates to obtain and share new knowledge?

3. How do institutional elements of organizational culture, organizational structure, and IT facilities implicate KM application within the unique context of the reform?

Theoretical framework

A hybrid input-process-output model is used to develop a high-level overview of how KM was applied in the context of reform. The model was established with the three constructs, or areas of exploration that constitute the management of knowledge resources, used in this study: KM strategy, KM infrastructure, and KM core processes. The model shows KM strategy and three KM infrastructure elements, organizational culture, organizational structure, and IT facilities, as organizational conditions that work collectively in favor of enabling efficient KM processes. Based on existing literature, the model has suggested that core KM processes such as knowledge creation, transfer, and application have a particularly strong effect on reform objectives. The fundamental premise of the model suggests that changes in the amount of knowledge available to individuals positively affect their adaptability to change and the quality of their performance. The model has limited the exploration of the impact of KM on reform objectives to two factors: the extent to which specialized training is integrated into the reform's operational model, and b) timely access to the knowledge resources necessary for decision making and planning. These two factors are generally recognized as drivers of efficiency and quality in the workplace.

Methodology

A single case study design was used to lead the investigation. The unit of analysis was the implementation process of higher education reform strategy. The PMU was selected as the research site since it is the most strategy-oriented unit in the reform project's organizational structure. A qualitative approach was used to collect study data through interviews. Semi-structured and in-depth interview protocols were used to speak with seven top management officials from the PMU. Through interviews, the study captured a range of reform processes and activities, work experiences, and personal views that helped identify patterns of KM implementation in the operational model of the reform. Study data were analyzed manually using a thematic analysis tool: template analysis.

7.2 Conclusions

Unsurprisingly, study findings associate reform's capacity to raise a sector's competitiveness with knowledge management dynamics. These findings confirm previous findings of many studies carried out by development organizations such as The World Bank, The European Union, USAID, OECD, and UNDP, which oriented policymakers to rethink their economic development approach and explore options to incorporate higher education in the process (Kozma, 2005; OEDC, 2000; Alissa, 2007; Said, 2001; El Baradei & El Baradei, 2004). The studies spotted fundamental factors that lie at the core of the dilemma which include the insufficient critical knowledge generated and shared to support economic activities, as well as the limited capacity to efficiently manage it (Vigilante, 2003). Corresponding to these findings, development organizations urged a paradigm shift that promotes knowledge-based development strategies and calls on the role of higher

education to tighten the gap as the principal knowledge producer and distributor in a society (OECD, 2010).

The case study strongly demonstrates that reform management needs to take aggressive actions toward embracing KM as a strategic choice. The reform managerial priority should be to capitalize on knowledge resources to enable goals of efficiency and better quality service. Realizing these goals requires devising three-level programs that consider nurturing personal knowledge, unit knowledge, and institutional knowledge. As much as a continuous effort is required to modernize public institutions, sustaining results is only possible through allowing academics and employees to pursue learning opportunities and providing liberty for them to incorporate what they have learned into their daily tasks. In this capacity, the reform strategy is missing three prerequisites to reach a state of competitiveness in knowledge society: a collective vision, a consensus on long term objectives, and a balanced approach to deal with explicit and tacit knowledge.

Reform management must, first, strive to develop a knowledge vision. Unless project directors truly perceive the significance of a collective vision for optimizing knowledge resources, reform projects will continue to have fewer propensities to internalize new knowledge, thus realizing its benefits for capacity building. The process to establish a knowledge vision must examine three important states. These states are the initial state, which is the picture where the reform started; the expected-to-reach state, which is the new picture after the reform succeeds in achieving its goals; and the in-between state, which describes the critical knowledge needed to enable the realization of the future

state. The collective vision would increase the likelihood of articulating a detailed KM strategy that identifies where critical knowledge resides in institutions. The strategy, then, should set channels through which this knowledge can be easily accessed by academics and employees, as well as indicating how new knowledge can be used to improve public system conditions.

Systemic planning of KM requires the management to embrace realistic policies to propel the academic community toward communicating their experience in various capacities. Thus, suggested KM initiatives can focus on a variety of objectives such as active participation from all managerial levels. Practically, this objective may encompass identifying, validating and openly sharing successful experiences and work hurdles without shame or fear. Other objectives can include increasing the effectiveness of collaborative effort, improving access to expert knowledge, and helping institutions to learn from the significant amount of knowledge they have at their disposal.

To tighten the still-expanding knowledge exchange gap resulting from the alienated organizational structure, institutions can take more advantage of the ICT infrastructure available, both networks and systems. Optimizing the use of technology should be one of the primary goals of coming phases. In addition to improving service coordination, optimizing the use of technology can help connect more users, and build communities of practice. Optimization may take the form of integrating institutions' individual information systems, and increasing access to more Internet-based services. Optimization is closely tied to institutions' capacity to update internal databases frequently, post the latest

relevant materials on their portals, offer more discussion and workshop links, and provide access to external databases.

7.3 Recommendations

Study findings urge the alignment of knowledge management into reform strategy and the operation phases ahead. Connecting people to knowledge resources must be a strategic objective to enhance productivity and avoid exhausting scarce resources. The shift would facilitate real-time learning which, in turn, would greatly benefit decision-making and planning processes. To reach this objective, learning before activities, learning during activities, and learning after activities must be encouraged. Means to support learning at the least possible cost may include adopting policies to help build networks, support communities of practice, and improve communication across organizational levels. Social media could be used through which the goal is brought about.

The reform strategic guide needs review to help create conditions that leverage knowledge sharing. This is only possible through adopting a regulatory framework that properly focuses on restraining information confidentially instead of creating boundaries to challenge knowledge seekers.

Policies must equally allow for sharing best practices and for sharing lessons learned without shame to give a room for creativity and new knowledge to emerge. Stimulating creativity requires offering more opportunity for engaging in novel activities, and accepting

trial and error; therefore, the goal should be centered on removing obstacles in this context.

Reform strategy must undertake a strong, rewarding system established on knowledge-sharing premises to foster intellectual capital and prevent the temptation to hoard knowledge.

Government must devote more resources to fill the infrastructure deficit, and scale up basic physical and organizational facilities needed for closing the distance between knowledge seekers and knowledge resources.

Proposed policies need to be put into effect and reviewed periodically after implementation to evaluate their effectiveness.

7.4 Limitations of the Study

The study has introduced a case of a national development project operating within public higher education sector in Egypt. Consequently, the study has encountered four major limitations. The first limitation concerns the research design adopted for the study. Typical limitations of the case study approach are its likelihood for potential bias, subjectivity, and inability to generalize findings (Yin, 2012). The second limitation is associated with lack of even representation among participants in reform projects. Six out of the seven study participants' work for only three projects out of the six carried out by the reform strategy to enhance university education. Since the researcher was unable to interview individuals from the three other projects, the data analyzed lacks some opinions, beliefs, or

experiences pertinent to the latter. This uneven distribution of participants limits the generalizability of study findings to other reform projects. Due to this, neither the data collected nor the study findings are entirely conclusive.

The third limitation stems from the lack of publications that describe the work accomplished during the second phase of the reform. This is unlike the first phase which featured comprehensive periodic publications and studies. This condition created an obstacle to validating and triangulating the study data collected from interviews, the only source of primary information available to the study. The overall validity and reliability of this study may be affected negatively due to an inability to confirm self-reported data.

Lastly, the study is further limited because it lacks a reliable grounding in past qualitative studies in the field. In addition to helping the researcher set forth a clear scope for the research, prior studies and already-tested models guide the researcher to building a strong case to investigate. The absence of sufficient research on the topic of study imposed the idea of collecting initial information to help define the problem and explore the context. This situation has resulted in an untested research model, synthesized from parts of research models coming from different fields.

7.5 Suggestions for Future Research

This research is the first qualitative study that describes and maps the status quo of knowledge management in reform vision, policy, and operation. The exploratory nature of the present study makes the phenomenon an interesting area for further study. To attain

the desirable objectives of the reform strategy regarding competitiveness and knowledge production, there is a vital need for more case studies at the local level to allow for further assessment of the context and thorough understanding of the challenges.

The limitations of the study can form the grounds for future research strategies that can facilitate the achievement of this goal. Since the case study has provided sufficient information about the context of higher education in Egypt and each case is different and the conditions are never the same from one country to another, future research can consider replicating the study in another country and/or make comparisons to other contexts.

Taking into consideration that study participants represent a small segment of the reform project's population, a possible continuation of the present study considering the inclusion of more participants across additional reform areas and projects could be a good suggestion for future research. The present study underscored the views of top management using only the qualitative method. Using quantitative or a mixed research method to collect more data from individuals of middle and operational management levels could be another potential domain for thoroughly and quantifiably validating top management's perception and helping to establish a valid base for understanding KM implementation.

The study did not intend to evaluate the context of higher education reform in Egypt, but rather showed how the contextual factors affect the functionality of potential KM

initiatives. Future research could think carefully about asking questions such as how changing one or more of the contextual variables would affect the findings. For example, the KM infrastructure in the study model comprises three organizational factors assumed to significantly affect the use of knowledge resources: organizational culture, organizational structure, and IT facilities. Further research might provide an opportunity to substitute these factors with others, such as attributes of leadership, resources provision, and the human capital required to sustain a desirable level of KM.

The present research model limited the exploration of the impact of KM on reform objectives to two elements: a) the extent to which specialized training and teamwork are integrated into the reform operational model, and b) timely access to the knowledge resources necessary for decision making and planning. Further research can seek reliable measures to quantify the gains of knowledge as applied to learning, planning, and decision making or include more elements to examine the value added to reform goals through knowledge transfer activities.

The present research model did not attempt to determine the value added to operations through knowledge-based activities nor did it measure any possible inter-play among the organizational elements of the KM infrastructure and their potential influence on KM processes or business goals. This knowledge gap could be addressed through further research intended to examine the prospective association between organizational factors as a function of KM performance.

Building on the Egyptian experience, more focused research to closely identify the knowledge needs of capacity building initiatives could be of interest to researchers in development aid agencies. Further studies may survey effective knowledge transferring mechanisms through which leadership of development programs can drive sustainable change. Furthermore, documenting lessons learned and rules of thumb concluded from Egypt's reform experience would be helpful in providing a framework for knowledge-based collaboration and guiding future development projects.

Another potential study to consider for information systems researchers includes examining aspects of IT functionality and establishing a measurement model (or models) necessary to evaluate the pros and cons of centralizing IT services and technical assistance in the reform operational model.

7.6 Challenges of the Study

In general, carrying out research that requires collecting data from public sector institutions is a challenging process in Egypt. Public sector data is a national security issue. Although collecting data from a public-sector agency is most likely restricted to Egyptian researchers, all researchers, whether Egyptian or of another nationality, must obtain a security clearance issued by the state's security services prior to conducting research. Obtaining a security clearance is uncommon and usually problematic as the process is long enough to indefinitely prolong the study's timeframe, especially considering that additional security clearances are often requested (Fulbright, 2013).

However, obtaining a security clearance may be less challenging if the researcher is affiliated with a public institution mandated to conduct research or if the researcher works for a joint project in partnership with the Egyptian government or if he/she is affiliated with an international organization that has an agreement to work with local research institutions. It is important to mention here that, in either case, not all fieldwork is permitted and projects on subjects that are socially, culturally, or politically sensitive may not receive acceptance for research in Egypt (Fulbright, 2013).

Gaining acceptance from higher education authorities and the Egyptian revolution were two significant hurdles that hindered the progress of this study. Discussing these two challenges contributes to the description of the study environment. Prospective researchers can benefit from the strategies applied by the researcher to overcome these hurdles.

Gaining acceptance

Obtaining permission to conduct the research was the most challenging aspect of developing the study. Initially, the researcher had attempted to communicate directly with several higher education officials through traditional channels such as e-mails and faxes in the hope of creating interest in the research topic. This approach did not yield a positive reply and officials seldom responded. This lack of response could be explained by the fact that the study was initiated through personal interest rather than an affiliation with a trusted organization with experience negotiating research arrangements with authorities in

Egypt. As such, the researcher had to use strategies that would help build trust, assuring authorities of the clean objectives of the study. The research used the “culture broker or mediator” strategy, adopted from the field of anthropology, to connect with prospective institutions. The culture broker is a middleperson who acts in bridging or mediating between groups or people of different cultural backgrounds for the purpose of building trust or driving change (Michie, 2003). Two Egyptian Educational and Cultural Consuls who worked in Montreal from 2009-2012 served as the cultural brokers for this study. They were instrumental in suggesting research sites that were in line with the criteria of the study, initiated communication with reliable contacts at each site, and advocated for the credibility of the researcher prior to establishing direct communication. After almost two years of communication with prospective sites, the study received permission to proceed in November 2011.

The reluctance of higher education institutions in Egypt to share details, facts, and data for research purposes was reported by Bhandari and El-Amine (2012) in their pilot study to develop a system for classifying higher education institutions in the Middle East and North Africa. Bhandari and El-Amine stated that institutions’ unwillingness to provide information for their research slowed the progress of their study and in the end they were unable to collect the data for Egypt (Bhandari & El-Amine, 2012). According to research in social psychology, generalized fear of negative evaluation or judgement is identified as a recurring reason for not participating in research studies. Egyptian authorities seemed to share this concern that research data will be used to expose or critique institutional

performance in comparing them with higher quality institutions elsewhere (Bhandari & El-Amine, 2012). Study participants pointed to additional barriers to conducting research in Egypt that prospective researchers should be aware of:

- 1) Rigid bureaucracy when it comes to identifying the authority mandated to approve the collaboration;
- 2) Absence of a clear definition of what is considered public domain, and what is not, in data confidentiality policy in Egypt;
- 3) Foreign researchers are less likely to understand the complexity of the context in Egypt. Native challenges greatly restrict the application of external models that are widely used by researchers as a benchmark for evaluating fieldwork.

The Egyptian Revolution

The typically slow pace of work in Egypt became even slower due to the dominating revolutionary atmosphere that began in January 2011 and continues to shape Egypt's current social and political climate. The Egyptian revolution has created a condition of instability in state organizations that resulted in a high turnover among leadership in public sector institutions followed the frequent change in political regimes. In addition to the potential harmful impact on institutional productivity, this level of insecurity has caused many higher education institutions' leadership to become overly cautious even when it comes to simple daily operational decisions. As a result, any potential research

collaboration with external parties, which usually necessitates approval from the National Security Agency in stable conditions, did not seem to be a valid option to risk or even discuss. The revolutionary atmosphere also affected the number of study participants. It is important to mention that the process of selecting study participants was ruled by the availability, accessibility, and willingness of rich informants to engage in the study during the data collection period. The request to participate in the study was never denied. However, access to participants' sites was limited due to the demonstrations and riots taking place and the closing of main roads and districts at the time. These obstacles limited the number of study participants to seven.

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Appendix A: Summary of Past Studies Analyzed

	Study	Sample	Research Method	Key Factors	Major Finding
1	Cranfield and Taylor (2008)	18 participants most involved in KM activities, from 7 higher education institutions (modern and traditional) within the UK.	Multi-case Qualitative study.	Characteristics of academic staff The context and characteristics of universities: • Culture • Difficulties experienced • Management structure and style	Universities do have notable level of KM activities. Leadership was found to slowly prioritizing KM management tools. The perceptions of academic staff and nature of the academic job have a direct impact on the culture of the institution and play a pivotal role in how KM activities are carried out as a management tool. The management structure of the university (centralized or decentralized) has a great impact on institutions ability to respond adequately to external pressures. Institutions that plan and allocate their resources through decentralized budgets are more likely to introduce systemic, wide-scale change, while those that tend to be more centralized (traditional) are less likely to show capacity to change.
2	Bhusry, Ranjan and Nagar (2012)	167 faculty and staff of a sample of reputable engineering and business schools in India.	Survey questionnaire	A framework for KM intervention include organizational factors: • Culture • Decision Making Authority • Structure	There is a pressing need for integrating KM in higher education institutions. IT in academic context can be a great facilitator of KM within institutions and

				• Goals	directly associated with enhancing and improving performance. Through improving the quality of the knowledge sharing process within and across departments, institutions have great potential to advance the application of KM within their units. Knowledge repositories need to be considered for more efficient availability of knowledge.
3	Golden (2009)	108 administrators, faculty, and staff of Historically Black Colleges and Universities HBCU	Survey questionnaire	The extent to which KM practices are used to capture institutional knowledge and their effectiveness: • Perceived KM Effectiveness • KM strategies • KM practices in public versus private HBCU • KM impact on decision making	KM practices have effect on improving communication and interaction with government, parents, and community leaders who are pressing universities for more accountability and efficiency. Findings indicated that the perceived level of KM effectiveness affect the implementation level of KM. There were significantly more KM practices used in public HBCU than in private HBCU, and this paralleled public/private HBCU differences in perceived KM effectiveness.

4	Coukos-Semmel (2002)	300 participants from 161 public and private U.S. research universities	Survey questionnaire	KM strategies: • Technology as a strategy • Measurement as a strategy • Leadership strategy KM processes: • Generating • Codifying • Transferring	Universities demonstrated an above moderate level "use" of strategies and a below moderate level "use" of processes. Effective KM is positively related to technology and measurement strategies, while technology was the most implemented strategy, measurement was the least notable. Measurement and culture are the most critical factors for effective KM. Public and private universities demonstrate variance regarding the use of leadership strategy and transfer process.
5	Danish, Munir, and Butt (2012)	325 Employees and managers of 26 leading service organizations including food, hospitals, telecommunications, and education in Gujranwala Division, Pakistan.	Survey questionnaire	Factors affecting the effectiveness of the organization: KM practices Organizational culture	Knowledge management practices have a strong positive association with organizational effectiveness while this relationship is positively moderated by the conducive organizational culture.

6	Gan, Ryan and Gururajan (2006)	12 executives and managers of IT and human resources in Multimedia Super Corridor (MSC) companies in Malaysia.	Qualitative multiple case study method.	Important cultural factors affecting current levels of practicing knowledge management: Collaboration Mutual trust Learning Leadership Incentives/rewards	Cultural factors affect the outcome of knowledge management efforts. Collaboration and mutual trust are positively related to the success of KM initiatives, yet this success is moderated by culture and organizational size. Small size organizations with a close-knit culture, experience a high level of collaboration and mutual trust whilst larger organizations demonstrate Kiasu-ism (afraid to lose) culture and have lower levels of collaboration and mutual trust which found to inhibit knowledge management. Learning, leadership, incentives and rewards are significant facilitators to KM activities.
7	Leidner, Alavi, and Kayworth (2006)	12 managers and professional employees from two large global corporations located in US	Multiple (two) qualitative case studies	The implications of organizational culture on two approaches of KM: Process approach: creation, sharing, and distribution Practice-based/ social approach: tools, events, and organization	Findings suggest that organizational culture influences the evolution of KM initiatives and the migration of knowledge through its impact on the values of organizational members' attribute to individual and cooperate behaviour. Dominantly bureaucratic and hierarchical cultures tend to deploy an initial process-based KM approach focusing on codification and explicit knowledge while innovative cultures seem to enable subgroups to experiment further with KM. Individualistic cultures believe in knowledge hoarding as a source of power which inhibit sharing, ownership

					and reuse, while cooperative cultures enable the creation of virtual communities and facilitate sharing or use of information
8	Alavi, Kayworth, and Leidner (2006)	20 professional employees from a large consulting and information services company.	Qualitative Case study method Semi-structured interviews	Cultural values impact on KM outcomes: Organizational level values: Expertise (expertise in subject matter), formalization (adherence to procedures), and innovativeness (sense of progress) Local level values: Collaboration (cooperation, support, and caring), autonomy (self-direction) Patterns of KM tools use: Making connections to others Developing and accumulating intellectual capital Collaboration and learning	Organizational culture has a complex relationship to KM. Cultural values have been found not only to influence such individuals' behaviors as knowledge sharing and seeking, but also influence users' selections of technology features in KM systems, the migration of knowledge within an organization, appropriation, the evolution of KM, the role of leadership in managing knowledge resources, which, in turn, lead KM use towards specific outcomes. The potential coexistence of both formalized (top-down) and organic (bottom-up) approaches to KM may result in the emergence of multiple cultures within an organization.

9	McDermott and O'Dell (2001)	5 large American corporations	Mixed methods Survey questionnaire and interviews	Identified culture dimensions: Visible: space, structure, and stories Invisible: philosophy and individual behaviour	Overcoming cultural barriers is modeled in balancing the visible and invisible dimensions of culture. Linking sharing knowledge to practical business goals, problems or results renders the consistency of the practice, enhances human networking, and helps create the synergy between core values and the overall style of the organization.
10	Gelard et al. (2013)	150 top and middle managers of 15 firms of Kaveh Industrial City in Iran	Survey questionnaire	Factors affecting structure type: • Appropriate conditions • Distribution of tasks • Locating of knowledge • Communication between members of concern • Structure of control, authority and communication Types of organizational structure: • Mechanistic • Organic KM processes: • Sharing • Creation • utilization	Organizational structure affects knowledge sharing and knowledge creation, but there is no significant difference between organic and mechanistic structure in knowledge utilization. In organic structure, communication, lateral interaction, and resembling consultation stimulate good condition for knowledge creation and sharing.

11	Willem and Buelens (2009)	408 employees from the management and senior levels in two companies: Energy company and Finance company	Survey questionnaire	Identified organizational structure factors that affect knowledge sharing: • Coordination • Centralization • Formalization • Specialization	Less knowledge complexity, decentralized horizontal coordination and low formalization positively affect the quality of knowledge sharing across units the organization. High levels of formal systemic coordination were directly correlated to less time devoted for knowledge sharing activities.
12	López, Peón, and Ordás (2009)	162 CEO's from 162 Spanish IT intensive firms	Survey questionnaires	Main KM processes: • Knowledge generation • Knowledge transfer • Knowledge codification & storage Dimensions of IT competency: • IT knowledge • IT operations • IT infrastructure Organizational structure: • Degree of centralization • Complexity • Vertical differentiation	IT competency has a significant effect on knowledge processes of: generation, transfer, and storage through moderating organizational structure. More flatter and flexible organizational design is positively correlated to organizational capacity to manage knowledge resources.

13	Chang and Chuang (2009)	4 senior managers from 4 manufacturing firms 135 samples from larger Manufacturing firms in Taiwan	Mixed method In-depth interviews Survey questionnaire	Factors determining the activity of knowledge management: • The characteristics of corporate management: organizational culture, organizational structure, and information technology • Competitive strategy: low-cost strategy, differentiation strategy, and focus strategy • KM Activity: selection, access, storage, and sharing of knowledge • Corporate Performance: effectiveness, efficiency and adaptation.	In corporate organizations, management traits have a positive influence towards knowledge management activity and knowledge management activity variables are positively correlated with corporate performance. While corporate culture recorded a significantly strong and positive influence on knowledge choice, corporate structure recorded a significantly strong and positive influence on knowledge access. Information technology has a significantly strong and positive influence on knowledge storage. Low-cost strategy has a significant effect on knowledge choice and knowledge sharing. Focus strategy has a significantly strong and positive influence on knowledge choice, knowledge access, and knowledge sharing.
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14	Peszynski et al. (2008)	21 employees of Mid-sized supply chain solution provider in Australia (CPM)	Mixed method action research and interviews	KM success factors: Organizational based factors: • vision and structure • clear purpose and language • cultural issues • organisational adjustments • leadership and top management support Process-based factors: • Continuous learning • knowledge creation • knowledge transfer Technology-based factors: • Well-developed IT infrastructure • KM systems and tool People-based factors: • Incentives for knowledge sharing • Training programs for employees	Comprehensive understanding to the implications of the business KM strategy, supportive culture, leadership and senior management support are critical factors to ensure the success of KM initiatives.
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Appendix B: Semi-structured Interview Protocol

Background Information

- Major experience in academic domain and/or specialization.
- Years of experience in PMU
- What roles/responsibilities do you have in the unit?
- What inspires/motivates you to work with the PMU despite the fact that you may have come from different discipline or background other than education or management? For example, privileges (recognition), incentives, promotion, or other.

Q1. Please briefly describe the PMU mission and objectives?

Q2. What types of processes or services are running in the unit?

Q3. Describe the information strategy implemented or adopted by the PMU?

Elaborate. Is it clearly stated? What is the focus, what is implemented and what is not implemented?

Information strategy is recognized as a framework within which more detailed policies relating to knowledge creation, use and management can be developed)

The term “ knowledge” includes:

- internally-generated knowledge (unit owns and/or creates) and
- externally-generated knowledge (owned or created by third parties)

Q4. To what extent does the unit information/knowledge strategy support mission and objectives? Explain.

For example: makes information/knowledge more accessible.

reduces the cost and effort of managing and using information/knowledge,

improves the availability and use of information/knowledge,

improves the quality and reliability of information/knowledge,

ensures that the information/knowledge provided comply with the needs.

- Q5. How is the unit knowledge/information administered to ensure reliability and validity for application by other stakeholders?
- Q6. How is information/knowledge produced through unit operations, whether in form of standards, manuals, reports, study results, presentations, workshop reports, stored physically in storage devices? For example, in personal laptops, central database, posted on the official website or stored on storage device? And in which format e.g. pdf, documents, database, or other?
- Q7. How is knowledge generated through project/program activities made available to stakeholders (other units, researchers, international donors, accrediting bodies, etc.? “Explore complete knowledge cycle”
- Q8. How does the PMU encourage disseminating best practices among other units?
- Q9. What type of knowledge is emphasized through the PMU information policy since the beginning of the second phase of operation 2007-2012? Explicit knowledge in form of standards and manuals or tacit knowledge as best practices, individual success stories and lessons learned?
- Q10. How does this emphasis, in your opinion, relate to unit objectives? How do you see the link?
- Q11. To what extent do you think technology, culture and structure advance or hinder unit information/knowledge management activities? Please explain.
- Q12. What are some other barriers, if any, encountered during information/knowledge management process? For example; staff capacity, lack of financial support, lack of technical assistance?
- Q13. In your opinion, how to overcome the barrier(s) or hindrance?
- Q14. How do you evaluate the effect of information/knowledge management on the unit objectives?
- Q15. From your experience, what indicator(s) could be used to evaluate information/knowledge management impact?
- Q16. What recommendation do you have for future efforts in information/knowledge management within the unit operations?

Q17. Is there anything more you would like to add?

Appendix C: Interview Consent Form

Project Title: Knowledge Management in Higher Education Quality Initiatives. An Exploratory Case Study

Researcher: Abir ElKadi

Supervisor: Prof. Kimiz Dalkir

Department: School of Information Studies

Institution: McGill University

Student Contact:

Abir ElKadi

3661 Peel

Montreal, QC. H3A 1X1 Canada

abir.elkadi@mail.mcgill.ca

Supervisor Contact:

Prof. Kimiz Dalkir

kimiz.dalkir@mcgill.ca

514-398-3368

Purpose of research:

This qualitative, single case study seeks to explore how knowledge management practices, strategies and processes are implemented in higher education enhancement projects, and how acquiring and applying new knowledge have affected projects' progress and objectives. The study attempts to gain insight into what organizational factors have escalated KM performance and what hindered the circulation of knowledge in projects' operational model.

Procedures: Data will be gathered by conducting in-depth interviews with participants from Projects Management Unit- Ministry of Higher Education, Egypt. Interviews will be approximately one hour and a half in length and will be scheduled upon participants' convenience. In agreeing to this interview, the data you provide will be audio taped by the researcher for data analysis and verification. Confidentiality will be maintained throughout the study course. Your responses during the interview are considered highly confidential and any direct quotes from your participation will be subject for your review. Results will be shared in a published dissertation and research paper. Once the research protocol is completed a copy of final results will be available to you upon request.

Right of participants: Your participation in this study is voluntarily and no incentives will be rewarded for it. You may discontinue participation at any moment if you feel discomfort with the content of the discussion during the interview. As well as, you have the right to decline answering any question during the interview. If you have questions about your rights of participation please contact Lynda McNeil, Research Ethics Officer, McGill University at: lynda.mcneil@mcgill.ca or by phone/fax: 514-398-6831/514-398-4644.

Consent: I AGREE to participate in this study.

Participant's Name: _____

Signature _____ Date _____

Appendix D: In-depth Interview Guide

In-depth interview questions

- How is the reform work plan developed from the idea through implementation?
- In your opinion how knowledge resource is perceived by reform engineers?
- How do you evaluate the extent of which the reform work environment is favorable to nurture the generation and diffusion of new knowledge?
- What are the policies and practices framing the integration of know-how in projects operational settings?
- How does the process ensure that adequate know-how is provided to project executors at the beginning of the projects before acting?
- How is the implementation process of reform strategy good at learning before, during, and after the completion of project activities?
- What policies, techniques, or approaches are used to avoid unanticipated pause for projects under progress to reflect and learn?
- What tools does the process use to ensure that key lessons are learned and widely shared among reform interest groups?
- How can you identify and map the networks in higher education context? Who talks to who and who trusts who and how to optimize this communication?
- How does reform strategy establish an expert network to ensure that the right contacts are made available for prospect project?
- How this network is supported to grow and how members of the academic community are encouraged to connect through networks?
- How do you assess academic community willingness to develop their skills and collaborate in joint projects?
- How key lessons captured from projects implementation are documented in meaningful and detailed fashion to drive useful action in prospect projects?

- What policies incentives are used to reinforce continuous learning in the academic community?
- How are insights captured and presented in such a way that people show interest to get in contact with the person who had the experience?
- What techniques and policies are used to support sharing both failures as well as successes across projects?
- On the road to change, what culture does the reform aim to establish within higher education institutions?
- How do you evaluate the impact of information technology facilities in the progress of reform objectives?

Appendix E: Initial Template

Construct	Theme	Subthemes
KM strategy	Strategic focus of reform	development of education and management in public universities
	Perceived Significance of Knowledge resources	add value at individual level
		add value at institutional level
	Perceived significance of KM	increase operational efficiency
		enhance service quality
	KM performance metrics	stakeholders' satisfaction
		number of complaints
	Information and knowledge policy focus	codification of new knowledge in rules and procedures - Explicit knowledge focused
		Activities of sharing personal experience- tacit knowledge focused
KM processes	Knowledge creation	joint collaboration
		studies and reports
		hands-on experience
		consultation and technical support
		process feedback
	Knowledge transfer tools	communities of practice (consortium)

KM infrastructure		conferences
		publications, pamphlets, handouts
		websites and portals
		training
	Knowledge application	input for decision making and planning
	Culture attributes	Individuals are reluctant to learn and change
		knowledge hoarding attitude
		seniority is greatly respected (i.e. as a basis for promotion and acquiring other rights)
	Structure Characteristics	bureaucratic procedures organize the flow of information
	Information technologies	reform management supports IT development initiatives
		Management Information Systems are developed to enhance decision making
	Barriers for efficient KM	Centralization
		Academic culture
		Lack of financial resources

Appendix F: Complete Coding Record of Predetermined and Emergent Themes

Strategic Aspects of KM ID: 1 ID: 1-1 Code: STEM Definition: Defining Strategic Emphasis Description: Participants description of the overall emphasis of the reform process and what does it attempt to do. Subtheme(s): (1.1.1) development of education and management in public universities (1.1.2) introduce new concepts to the academic community (1.1.3) enhance strategic planning capacity (1.1.4) staff /professional development (1.1.5) improving sector culture and driving change (1.1.6) automating institutions' services (e-government) (1.1.7) build sector information management capacity
ID: 1-2 Code: PSKL Definition: Perceived Significance of Knowledge Resources Description: Top management perception to knowledge resources role in reform process Subtheme(s): (1.2.1) add value at individual level (1.2.2) add value at institutional level (1.2.3) strategic input for change (1.2.4) strategic input for decision making and planning (1.2.5) important to avoid reinventing the wheel (1.2.6) important element to change sector's culture
ID: 1-3 Code: PKMB Definition: Perceived Benefits of Knowledge Management

Description: Top management perception to the value added through KM to reform operations and processes. Subtheme(s): (1.3.1) improve performance (1.3.2) help improve sector outcome (1.3.3) increase operational efficiency (1.3.4) enhance service quality
ID: 1-4 Code: PMKMP Definition: Possible Measure for KM Performance Description: Measure perceived effective to evaluate KM performance Subtheme(s): (1.4.1) stakeholders' satisfaction (1.4.2) number of complaints (1.4.3) the capacity of providing reliable information at the right time
ID: 1-5 Code: DIKP Definition: Description of the KM policy Description: the set of said or unsaid plan or rules that regulate the creation, storage, access, and transmission of knowledge resources within the reform operational model. Subtheme(s): (1.5.1) absence of a clearly articulated plan to manage knowledge resources (1.5.2) reform projects are not involved in crafting a unified KM plan (1.5.3) individual projects set their own knowledge needs based on their unique goals and needs (1.5.4) access to knowledge resources is ruled by relevance and need (1.5.5) codification is emphasized (1.5.6) privacy and security are highly focused (1.5.7) the goal is to improve efficiency (1.5.8) the goal is to enhance accessibility (1.5.9) privacy policy is subjective

ID: 1-6

Code: TKEO

Definition: Type of Knowledge Emphasized in Operations

Description: Explicit versus tacit knowledge. Explicit is formal/codified type of knowledge that comes in the form of instructions, rules and procedural manuals, regulations, documents, databases, publications, and periodical reports. Tacit is informal, experimental, know-how that individuals gain through learning by doing, trial and error, and imitating.

Subtheme(s):

(1.6.1) explicit knowledge

(1.6.2) tacit knowledge

Managerial Aspects of KM: 2

ID: 2-1

Code: SANK

Definition: Sources of Acquiring Knowledge

Description: Activities associated with the entry of new knowledge into reform process, through acquisition, dedicated resources, adaptation and networking.

Subtheme(s):

(2.1.1) trial and error

(2.1.2) operational and technical problems

(2.1.3) imitating external models

(2.1.4) modifying external models to correspond to local context

(2.1.5) joint collaboration

(2.1.6) studies and reports

(2.1.7) professional training

(2.1.8) hands-on experience

(2.1.9) consultation and technical support

(2.1.10) process feedback

(2.1.11) informal and ad-hoc dialogue

(2.1.12) performance evaluation

(2.1.13) discussion sessions

ID: 2-2

Code: MTEK Definition: Modes of Transferring Explicit Knowledge Description: Ways or methods in which explicit knowledge is transmitted or circulated across academic community and units. Subtheme(s): (2.2.1) standard operating procedures and manuals (2.2.2) periodic and internal reports (2.2.3) publications, pamphlets, handouts (2.2.4) websites and portals (2.2.5) archiving system (2.2.6) e-mails
ID: 2-3 Code: MTTK Definition: Modes of Transferring Tacit Knowledge Description: Ways or methods in which tacit knowledge is shared among academic community members. Subtheme(s): (2.3.1) one-to-one consultation (2.3.2) meetings (2.3.3) share fairs (2.3.4) consortium (communities of practice) (2.3.5) conferences (2.3.6) workshops and seminars (2.3.7) training (2.3.8) videoconferencing
ID: 2-4 Code: VIPA Definition: Validating Information Prior to Application Description: Means or methods of checking the validity or accuracy of information before using. Subtheme(s): (2.4.1) comparative reasoning

(2.4.2) verification process (2.4.3) external review (2.4.4) updated records
ID: 2-5 Code: MANK Definition: Means of Applying New Knowledge Description: Activities and events connected with the application of knowledge to reform processes. Subtheme(s): (2.5.1) updating procedures and operating rules (2.5.2) input for change (2.5.3) input for decision making and planning
Operational Aspects of KM: 3 ID: 3-1 Code: RCCH Definition: Reform Culture Characteristics Description: The set of values, visions, norms, working habits and beliefs that characterize reform context and interpret individual behaviours of reform management. Subtheme(s): (3.1.1) sector affiliates are widely encouraged to participate in reform projects 3.1.2) project proposals have equal opportunities to receive fund (3.1.3) reform staff and clericals are highly skilled workers (3.1.4) creativity and innovation are encouraged and rewarded (3.1.5) performance and smooth operations are emphasized (3.1.6) learning is viewed as a reliable approach to drive change (3.1.7) learning activities are facilitated and enforced 3.1.8) incentives are used to stimulate learning (3.1.9) partnership and ownership are largely emphasized
ID: 3-2 Code: ACCH Definition: Academic Culture Characteristics

Description: The set of values, visions, norms, working habits and beliefs that characterize the academic context in general and interpret individual's behaviours of community members.

Subtheme(s):

- (3.2.1) individuals are reluctant to learn and change
- (3.2.2) individuals are criticized for new ideas
- (3.2.3) individuals are criticized upon failure to accomplish goals
- (3.2.4) individuals access to knowledge resources is on a need-to-know basis
- (3.2.5) knowledge hoarding attitude
- (3.2.6) seniority is greatly respected (i.e. as a basis for promotion and acquiring other rights)
- (3.2.7) academic staff envision themselves in ivory towers

ID: 3-3

Code: OSCH

Definition: Organizational Structure Characteristics

Description: The order and arrangement of lines of authority and communication channels within reform process

Subtheme(s):

- (3.3.1) critical knowledge is retained near the top of the managerial hierarchy
- (3.3.2) information source is authoritative
- (3.3.3) current organizational structure weakens communication between different projects
- (3.3.4) communication is encouraged within same project teams across various sites.
- (3.3.5) bureaucratic procedures organize the flow of information
- (3.3.6) management is characterized by careful monitoring of performance
- (3.3.7) project is the unit of evaluation

ID: 3-4

Code: RLIT

Definition: Role of Information Technology

Description: The extent to which technology devices and applications are viewed and used in reform process.

Subtheme(s):

- (3.4.1) top management supports IT development initiatives
- (3.4.2) IT infrastructure is established to automate business processes
- (3.4.3) IT initiatives are prioritized based on business needs
- (3.4.4) special attention is paid to enhance documentation
- (3.4.5) establishment of digital library to connect academics to technical knowledge resources
- (3.4.6) archiving system is developed to connect reform staff to internal knowledge resources
- (3.4.7) Information Systems are developed to connect planners and decision makers to knowledge resources
- (3.4.8) IT facilities are coordinated centrally across projects
- (3.4.9) portals, websites, and networks are tools used to improve accessibility and knowledge sharing
- (3.4.10) develop employees' IT capacity
- (3.4.11) special attention is paid to enhance connectivity
- (3.4.12) database centers are built to allow various applications

ID: 3-5

Code: BEKM

Definition: Barriers for Efficient Knowledge Management

Description: Factors causing obstruction in enabling KM activities and hindering the smooth flow of knowledge cycle within reform operations.

Subtheme(s):

- (3.5.1) organizational structure
- (3.5.2) bureaucracy and public sector regulations
- (3.5.3) data and information reliability is a major challenge
- (3.5.4) constant need for information source triangulation
- (3.5.5) regular and intense meetings and dissemination events are less frequent than needed
- (3.5.6) turnover rates
- (3.5.7) insufficient coordination between projects
- (3.5.8) lack of proper documentation to projects strategies and policies

- (3.5.9) under qualified clerical staff in universities
- (3.5.10) absence of integrated information system linking universities and projects
- (3.5.11) lack of financial resources at universities level to enable adequate IT capacity building
- (3.5.12) centralization
- (3.5.13) lack of documenting new knowledge
- (3.5.14) uncertainty
- (3.5.15) organizational culture

Appendix G: Coding Results

Code/ Id.	Themes	P (1)	P (2)	P (3)	P (4)	P (5)	P (6)	P (7)	TP ¹
STEM (1.1.1)	developing education and management in public universities	✓	✓	✓		✓	✓	✓	85.7
STEM (1.1.2)	introducing new concepts to the academic community	✓			✓		✓	✓	57.1
STEM (1.1.3)	enhancing institutions' strategic planning capacity	✓		✓	✓	✓	✓	✓	85.7
STEM (1.1.4)	Staff/professional development	✓					✓		
STEM (1.1.5)	improving sector culture and driving change			✓			✓	✓	
STEM (1.1.6)	automating institutions' services (e-government)	✓	✓			✓	✓		57.1
STEM (1.1.7)	building information management capacity	✓	✓		✓	✓	✓	✓	85.7
PSKL (1.2.1)	add value at individual level								
PSKL (1.2.2)	add value at institutional level								

PSKL (1.2.3)	strategic input for any process	√			√				
PSKL (1.2.4)	strategic input for decision making and planning	√			√	√	√		57.1
PSKL (1.2.5)	important to avoid reinventing the wheel		√						
PSKL (1.2.6)	important element to change sector's culture								
PKMB (1.3.1)	improves performance			√					
PKMB (1.3.2)	helps improve sector outcome			√					
PKMB (1.3.3)	increases operational efficiency		√	√			√	√	57.1
PKMB (1.3.4)	enhances service quality							√	
PMKMP (1.4.1)	Stakeholders' satisfaction			√	√	√	√	√	71.4
PMKMP (1.4.2)	number of complaints	√							
PMKMP (1.4.3)	the capacity of providing reliable information at the right time							√	

DIKP (1.5.1)	absence of a clearly articulated plan to manage knowledge resources	√		√		√	√	√	71.4
DIKP (1.5.2)	reform projects are not involved in crafting a unified KM plan	√		√	√	√	√	√	85.7
DIKP (1.5.3)	individual projects set their own knowledge needs based on their unique goals and business need	√	√	√	√	√	√	√	100
DIKP (1.5.4)	access to knowledge resources is ruled by relevance and need	√	√	√			√	√	71.4
DIKP (1.5.5)	codification is emphasized in information and knowledge activities				√				
DIKP (1.5.6)	privacy and security are highly focused when dealing with knowledge	√	√	√		√	√		71.4
DIKP (1.5.7)	the goal is to improve efficiency			√	√	√	√	√	71.4
DIKP (1.5.8)	the goal is to enhance accessibility		√	√	√	√	√		71.4

DIKP (.5.9)	privacy policy is subjective	√	√	√			√		57.1
TKEO (1.6.1)	explicit knowledge								
TKEO (1.6.2)	tacit knowledge								
SANK (2.1.1)	trial and error	√	√	√			√		57.1
SANK (2.1.2)	operational and technical problems	√	√	√				√	57.1
SANK (2.1.3)	imitating external models				√				
SANK (2.1.4)	modifying external models to correspond to local context				√				
SANK (2.1.5)	joint collaboration				√				
SANK (2.1.6)	studies and reports	√			√		√		
SANK (2.1.7)	professional training	√	√	√	√	√	√	√	100
SANK (2.1.8)	hands-on experience		√		√				
SANK (2.1.9)	consultation and technical support		√	√		√	√	√	71.4
SANK (2.1.10)	process feedback	√	√	√	√		√	√	85.7
SANK (2.1.11)	informal and ad-hoc dialogue	√							
SANK (2.1.12)	performance evaluation	√	√	√		√	√	√	85.7
SANK (2.1.13)	discussion sessions	√					√	√	

MTEK (2.2.1)	standard operating procedures and manuals	√		√	√		√	√	71.4
MTEK (2.2.2)	periodic and internal reports	√		√	√	√	√	√	85.7
MTEK (2.2.3)	Publications, pamphlets, and handouts	√	√	√	√	√	√		85.7
MTEK (2.2.4)	websites and portals	√	√	√	√	√	√	√	100
MTEK (2.2.5)	archiving system	√		√		√	√		57.1
MTEK (2.2.6)	e-mails	√	√	√		√	√	√	85.7
MTTK (2.3.1)	One-to-one consultation	√		√			√	√	57.1
MTTK (2.3.2)	Meetings	√	√		√	√	√	√	85.7
MTTK (2.3.3)	share fairs								
MTTK (2.3.4)	consortium (communities of practice)	√	√			√			
MTTK (2.3.5)	Conferences		√					√	
MTTK (2.3.6)	workshops and seminars	√	√	√	√	√		√	85.7
MTTK (2.3.7)	Training	√	√	√	√	√	√	√	100
MTTK (2.3.8)	Videoconferencing		√			√	√	√	57.1
VIPA (2.4.1)	comparative reasoning		√	√	√				
VIPA (2.4.2)	verification process	√	√	√	√	√	√		85.7
VIPA (2.4.3)	external review				√			√	
VIPA (2.4.4)	updated records								

MANK (2.5.1)	updating operating rules and procedures	√					√		
MANK (2.5.2)	input for change	√			√				
MANK (2.5.3)	input for decision making and planning	√		√	√	√			71.4
RCCH (3.1.1)	sector affiliates are widely encouraged to participate in reform projects	√	√		√				
RCCH (3.1.2)	project proposals have equal opportunities to receive fund and technical support		√		√				
RCCH (3.1.3)	reform staff and clericals are highly skilled workers	√					√		
RCCH (3.1.4)	creativity and innovation are encouraged and rewarded							√	
RCCH (3.1.5)	great emphasis on performance and smooth operations			√	√	√	√	√	71.4
RCCH (3.1.6)	learning is viewed as a reliable approach to drive change	√					√		

RCCH (3.1.7)	facilitation and enforcement of learning activities			√	√	√	√		57.1
RCCH (3.1.8)	incentives are used to stimulate learning						√		
RCCH (3.1.9)	partnership and ownership are largely emphasized	√			√				
ACCH (3.2.1)	individuals are reluctant to learn and change	√					√		
ACCH (3.2.2)	individuals are criticized for new ideas	√							
ACCH (3.2.3)	individuals are criticized upon failure to accomplish goals	√							
ACCH (3.2.4)	individuals access to knowledge on a need-to-know basis	√	√	√		√	√	√	85.7
ACCH (3.2.5)	knowledge hoarding attitude	√							
ACCH (3.2.6)	seniority is greatly respected (i.e. as a basis for promotion and acquiring other rights)								
ACCH (3.2.7)	academic staff envision themselves in ivory towers	√	√	√			√		57.1

ACCH (3.2.8)	information privacy is highly respected	√	√				√		
OSCH (3.3.1)	critical knowledge is retained near the top of the managerial hierarchy	√		√	√		√		57.1
OSCH (3.3.2)	information source is authoritative	√			√				
OSCH (3.3.3)	current organizational structure weakens communication between different projects	√					√		
OSCH (3.3.4)	communication is encouraged within same project teams across various sites	√	√		√				
OSCH (3.3.5)	bureaucratic procedures organize the flow of information					√	√		
OSCH (3.3.6)	management is characterized by careful monitoring of performance	√	√	√	√	√	√	√	100
OSCH (3.3.7)	project is the unit of evaluation							√	

RLIT (3.4.1)	top management supports IT development initiatives					√	√		
RLIT (3.4.2)	IT infrastructure is established to automate business processes		√			√	√	√	57.1
RLIT (3.4.3)	IT initiatives are prioritized based on business needs		√	√		√	√	√	71.4
RLIT (3.4.4)	special attention to enhance documentation		√				√		
RLIT (3.4.5)	establishment of digital library to connect academics to technical knowledge resources					√	√		
RLIT (3.4.6)	archiving system is developed to connect reform staff to internal knowledge resources		√			√			
RLIT (3.4.7)	information systems are developed to connect planners and decision makers to knowledge resources	√		√	√	√	√	√	85.7

RLIT (3.4.8)	IT facilities are coordinated centrally across projects		√	√		√	√	√	71.4
RLIT (3.4.9)	portals, websites, and networks are tools used to improve accessibility and knowledge sharing	√	√	√	√	√	√		85.7
RLIT (3.4.10)	developing employees' IT capacity					√	√	√	
RLIT (3.4.11)	special attention is paid to enhance connectivity			√	√	√	√	√	71.4
RLIT (3.4.12)	database centers are built to allow various applications			√	√	√	√	√	71.4
BEKM (3.5.1)	organizational structure			√			√	√	
BEKM (3.5.2)	bureaucracy and public sector regulations	√		√	√	√	√	√	85.7
BEKM (3.5.3)	data and information reliability is a major challenge				√	√			
BEKM (3.5.4)	constant need for information source triangulation	√			√				
BEKM (3.5.5)	regular and intense meetings and dissemination			√	√	√			

	events are less frequent than needed								
BEKM (3.5.6)	turnover rates					√	√		
BEKM (3.5.7)	Insufficient coordination between projects	√		√		√	√	√	71.4
BEKM (3.5.8)	lack of proper documentation to projects strategies, policies and experience	√		√		√			
BEKM (3.5.9)	Under qualified clerical staff in universities	√		√	√			√	57.1
BEKM (3.5.10)	Absence of integrated information system linking universities and projects	√			√	√	√	√	71.4
BEKM (3.5.11)	lack of financial resources at universities level to enable adequate IT capacity building	√						√	
BEKM (3.5.12)	Centralization	√		√	√	√			57.1
BEKM (3.5.13)	lack of documenting new and tacit knowledge		√				√		
BEKM (3.5.14)	uncertainty	√	√	√	√	√	√		85.7
BEKM (3.5.15)	organizational culture	√	√	√	√	√	√	√	100

1: TP represents theme percentage which refers to the number of participants identified the theme to the total number of study participants. Highlighted themes represent the codes most happening in coding results. A code of more than 50% happening among study participants signifies a notable importance for the study analysis and qualifies for the final themes template.

Appendix H: Final Template Developed after Coding Results

Construct	Theme	Subthemes
KM strategy	Strategic focus of higher education reform	Developing education and management in public universities
		Introducing new concepts to the academic community
		Enhancing institutions' strategic planning capacity
		Automating institutions' services (e-government)
		Building information management capacity
	Perceived significance of knowledge resources	Strategic input for decision making and planning
	Perceived benefits of KM	Increases operational efficiency
	Possible measure for KM performance	Stakeholders' satisfaction
	Description of the KM policy	Absence of a clearly articulated plan to manage knowledge resources
		Reform projects are not involved in crafting a unified KM plan
		Individual projects set their own knowledge needs based on their unique goals and business needs
		Access to knowledge resources is ruled by relevance and need
		Privacy and security are highly focused

		The goal is to improve efficiency through enhancing accessibility
		Privacy policy is subjective
KM processes	Sources of acquiring knowledge	trial and error
		operational and technical problems
		professional training
		consultation and technical support
		process feedback
		performance evaluation
	Modes of transferring explicit knowledge	Standard operating procedures and manuals
		Periodic and internal reports
		Publications, pamphlets, and handouts
		Websites and portals
		Archiving system
		E-mails
	Modes of transferring tacit knowledge	One-to-one consultation
		Meetings
		Workshops and seminars
		Training
		Videoconferencing
	Means of applying new knowledge	Verification process
		Input for decision making and planning
KM infrastructure	Organizational culture characteristics	facilitation and enforcement of learning activities
		individuals access to knowledge resources is on a need-to-know basis great emphasis on performance and smooth operations

		staff members envision themselves in ivory towers
	Organizational Structure Characteristics	Knowledge is retained in a managerial hierarchy
		Management carefully monitors performance
	Role of Information Technology	Information systems and database centers are developed to connect planners and decision makers to knowledge resources
		portals, websites, and networks are tools used to improve accessibility to internal and external information and knowledge resources
		IT initiatives are prioritized based on business needs
		IT facilities are coordinated centrally across projects
		IT infrastructure is established to automate business processes
	Barriers to efficient KM	Organizational culture
		Bureaucracy and public sector regulations
		Uncertainty
		Insufficient coordination between projects
		Absence of integrated information system linking universities and projects
		Under qualified clerical staff in universities
		Centralization

Appendix I: Study Invitation Letter

Date

Dear Sir/ Madame

You are cordially invited to participate in a research study on Knowledge Management (KM) in Higher Education Quality Initiatives: An Exploratory Case Study. The study is being conducted

by Abir ElKadi, a PhD candidate, and supervised by Prof. Kimiz Dalkir from the School of Information Studies at McGill University. The study is a part of Doctor of Philosophy degree requirements.

The study seeks to explore how knowledge management practices, strategies and processes are implemented in higher education enhancement projects, and how acquiring and applying new knowledge have affected projects' progress and objectives. By capturing personal experiences from the management team who are in a unique position to assess KM impact, the study attempts to gain insight into what organizational factors have escalated KM performance and what hindered the circulation of knowledge in projects' operational model.

Your participation will be very beneficial to the development of the study. Participation will require a personal interview, which questions will be sent to you earlier to the session. The interview is expected to take approximately one hour of your time to complete. Upon your written approval, the interview will be tape recorded for accuracy and data analysis purposes. A brief follow up interview may be required for verification if indicated.

There are no known risks or costs if you decide to participate in this research study. Rather, the information you provide in this study should provide more general benefits to the academic community. This study is anonymous, that means no personal identifiers will be collected. No one will be able to identify you or your answers. Only the research team and individuals from the Institutional Review Board may inspect these records. Should the data be published, no individual information will be disclosed.

Your participation in this study is voluntary. By signing the consent form you are voluntarily agreeing to participate. You are free to decline to answer any question you do not wish to answer for any reason.

I sincerely appreciate your consideration of my request as your participation will be significant to the success of the project.

A copy of a study brief is attached for your review. If you have any questions about the study, please contact me, Abir ElKadi, at abir.elkadi@mail.mcgill.ca

I'll contact you within the next two weeks to request your decision on participation and to schedule an interview, if appropriate.

Sincerely,
Abir ElKadi
Doctoral Student
McGill University

Appendix J: Competing Values Framework

Hierarchical culture • Work environment is formalized and structured characterized by rules, bureaucracy and regulations. • Employees seek stability, predictability, and are highly dependent on procedures. • Leadership exercise control to ensure employees' adherence to the established rules, procedures and policies. It is characterized by power, position and status. • Strategic objectives are centred on ensuring operational efficiency.	Market culture • Work environment emphasis on tight controls and organization yet it is results-oriented and very competitive. • Employees are goal orientated, innovative and self-driven. • Leadership support and facilitate the successful execution of the organization's objectives. • Strategic objectives are centred on the creation of strong relationships with external stakeholders to attaining a competitive position in marketplace.
Adhocracy culture • Work environment is dynamic and entrepreneurial. • Employees are innovators, autonomous, self-motivated, and risk takers. • Leadership's role is to create a work environment that supports, motivates and facilitates innovation and creativity. • Strategic objectives are centred on the development and distribution of high quality innovative products and	Clan culture • Work environment puts strong emphasis on teamwork. • Employees are characterized by friendliness and are highly motivated and committed. • Leaders play a paternalistic and mentoring role in providing guidance. • Strategic objectives emphasize establishing strong employee loyalty and commitment to the organization's vision, mission and objectives.

services to achieve a predominant position in the market.	
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