The Role of Management Practices of Higher Education Institutions in Knowledge Storage and Knowledge Accessibility

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Abstract

This study aims to explore the management practices of Higher Education Institutions (HEIs) with regard to knowledge storage and knowledge accessibility. Data were gathered from public sector HEIs in Peshawar using semi-structured interviews. Based on previous studies, themes and management practices were identified for knowledge storage and knowledge accessibility. Data were analyzed using content analysis, wherein matching themes and emergent themes were identified. The findings of the study revealed that emergent themes in technological perspective for knowledge storage were MOODLE platform, Enterprise Resource Planning (ERP), databases for storage of HEIs' own journals, Campus Management Solution (CMS), faculty members' and students' e-mail groups, and social media. While emergent themes in non-technological perspective for knowledge storage were libraries of HEIs at their central and departmental levels. Similarly, emergent themes in technological perspective of knowledge accessibility were MOODLE, HEC smart university project, Enterprise Resource Planning (ERP), databases for accessibility of HEIs' own journals, firewall deployment for internet, Campus Management Solution (CMS), faculty members' and students' e-mail groups, and social media. While emergent themes in non-technological perspective for knowledge accessibility were libraries of HEIs at their central and departmental levels. Finally, it was found that there are some management practices for knowledge storage and knowledge accessibility

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which need to be followed by the HEIs for effective knowledge storage and accessibility.

Keywords: Higher Education Institutions (HEIs), knowledge accessibility, knowledge management, knowledge storage, management practices.

1. Introduction

Knowledge Management (KM) has existed for more than 30 years as a field of study. It was initially defined as the systematic process to acquire, organize, manage and disseminate knowledge in an organization which can help to pace the work and to reuse the best practices (Nonaka & Takeuchi, 1995). Knowledge management is the clear, visible and systematic management of knowledge which is vital, and it also refers to dealing with the associated processes of creating, organizing, diffusing, using and exploiting knowledge-based resources for achieving business objectives (Skyrme, 2011b). The ability to manage knowledge is gaining importance due to the growth of the knowledge economy. The production and dissemination of knowledge is an important factor in today's competitive environment (Dalkir, 2005).

KM includes activities within an organization such as the use, propagation and acquisition of knowledge (Aguiar, 2009). KM is a strategy of value creation that utilizes the knowledge of an organization which helps in achieving organizational goals (Chan, 2009). The increasing interest in knowledge about organizations has promoted the managing of the problems related to KM for the benefit of the organizations (Alavi & Leidner, 2001). KM is a process in which organizations formulate ways to identify and archive knowledge within the organization that is derived from different departments and facilities and even in some cases from other organizations that have a similar specialization and interests (Laal, 2011).

KM helps to improve an organization's ability to solve problems in a better way. Interest in organizational knowledge and in associated concepts like organizational memory and organizational learning is growing (Cohen & Sproull, 1991). A set of management tools are used in knowledge management techniques for the addition and creation of knowledge (Noruzy, Dalfard, Azhdari, Nazari-Shirkouhi, & Rezazadeh, 2013).

KM is a process which creates, and stores data and it helps to increase the response time of an organization. It also helps in innovation through the gathering, storage and analysis of organizational information (Frappaolo,

2006). In an organization, KM is managing the activities of knowledgeable employees, which is achieved by helping, motivating, leading and backing such employees and the provision of a convenient environment for work (Gao, Li, & Clarke, 2008). Now-a-days businesses have shown increased interest in KM and its applications. The applications of KM lies in in four key areas which include *Business Globalization, Organizational Learning, Corporate Amnesia, and Advancement in Technology* (Dalkir, 2005).

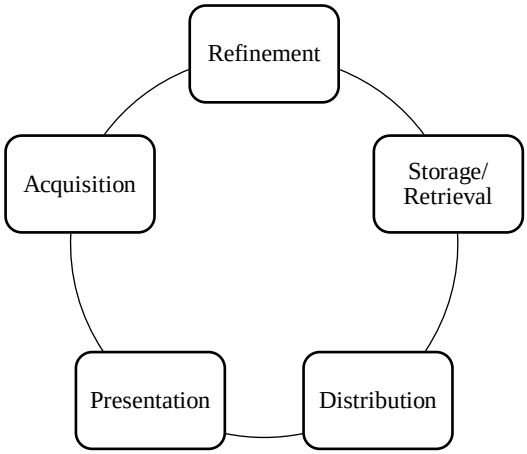

Figure. 1. Knowledge Management Cycle (Mayer & Zack Model, 1996)
Source: (Dalkir, 2005)

1.1 Knowledge Storage and Accessibility

Knowledge storage is defined as an activity which adds knowledge to the existing knowledge repository actively used by individuals, groups and organizations (Carlile & Rebentisch, 2003). The capability of knowledge storage refers to indicates organizational memory and the capacity of storing and providing access to knowledge for people (Lee & Yang, 2000). Routine organizational operations and structures that support employees in better performance are involved in knowledge storage. Organizations own knowledge storage capability which is retained even if employees leave the organization. When people use explicit knowledge for problem solving, then there will be people to document that approach and when employees rely on implicit or tacit knowledge for solving problems, then there will be used a people to people approach (Lee & Yang, 2000).

Table 1
Description of each Stage in the KM Cycle

KM cycle	Description of each stage in the KM cycle
Acquisition	Depth, relevancy, cost control, and the credibility of data is measured in the acquisition stage of KM cycle.
Refinement	It is the value addition stage of the KM cycle. Value can be added physically or logically. Moreover, cleaning up and standardization of data takes place here.
Storage/ Retrieval	Bridge formation between upstream acquisition and the refinement stage takes place in this stage. The bridge feeds the repository and downstream stages for the generation of product. It can be both digital (KM software, database) and physical (printed form, file folder).
Distribution	It includes the process in which knowledge is delivered to the end user. Besides the channel of delivery, it also considers time, frequency, language and form.
Presentation	It shows the combine effect of all stages of the KM cycle. Knowledge is used appropriately if it creates value for the user which shows that the KM cycle has been successful.

Knowledge storage is a process in which knowledge is accumulated whether intentionally or unintentionally (Carlile & Rebentisch, 2003). Stored knowledge can be in the form of a written document; it can be in digital format or in the form of knowledge embedded in tasks; and it can be in the form of individual's experience (Brown & Duguid 1991). People are informed about the importance of knowledge and the way to retrieve, identify, acquire, store and take advantage of knowledge in order to share it without any loss, or in other words managing knowledge (Laal, 2011).

Every individual is a personal repository of knowledge with experiences, learning and interactions with peers and friends, with whom we concern ourselves when we want to sort out a problem or to explore an opportunity (Laal, 2011). Transferring knowledge among organizations is more useful; rather than storing it in human brain. Transferred knowledge needs to be stored and retained in organizational repositories so that other

organizational members can have access to that knowledge for future use (Jasimuddin, 2005).

Activities performed by individuals and groups are the first drivers for knowledge storage as activities lack novelty to provide sufficient avenues for acquiring new knowledge. It is due to routine activities which do not generate new knowledge, while novel activities provide opportunities to transform or increase repository of stored knowledge (Carlile & Rebentisch, 2003). Access and retrieval of knowledge may be through people or it can be through processes (ibid). Knowledge access and retrieval means the identification of knowledge that produces satisfying results in terms of need or problem solution. This involves two iterative efforts. The first effort is the search for knowledge sources that may be useful. The second is the determination of the relevancy of the specific knowledge source for handling tasks and the assessment of the worth of acquired knowledge (Carlile & Rebentisch, 2003). This study aims at exploring the management practices of HEIs regarding knowledge storage and knowledge accessibility. Furthermore, it also aims to identify the gaps in storage and accessibility of knowledge in the light of available management practices extracted from literature review.

1.2 Problem Statement

In order to remain competitive in the business market, organizations must improve their existing knowledge and make knowledge accessible which will help in the creation of new knowledge. HEIs are in a alarming need of appropriate and updated practices for knowledge storage and knowledge accessibility which in turns help in delivering the most relevant knowledge, thus helping researchers in the creation of relevant knowledge. One of reasons that HEIs of Pakistan have a low ranking all over the world is because of their weak, outdated and unstudied management practices of knowledge storage and knowledge accessibility.

1.3 Research Gap

Extant literature concerning the importance of knowledge storage and knowledge accessibility and the management practices adopted for these purposes, it has been observed to the best of researchers knowledge that there are few studies available that explore management practices for knowledge storage and knowledge accessibility in HEIs of Pakistan (Moonaghi, Ahanchian, & Hassanian, 2014; Al-Husseini & Elbeltagi,

2018). Consequently, this study is conducted on the public sector HEIs in Peshawar, Khyber Pakhtunkhwa, listed with the Higher Education Commission (HEC) of Pakistan. Since, nature of the study is qualitative enquiry, findings will be confined to the selected HEIs. Moreover, this study will help the selected HEIs to know and understand the best practices for knowledge storage and knowledge accessibility from literature and from their own practices for these purposes.

2. Literature Review

Literature was reviewed keeping in view the keywords 'knowledge storage' and 'knowledge accessibility in HEIs'. Proper management practices in an organization for the proper operation of KM cycle includes knowledge storage and knowledge accessibility. Also, there are different types of management practices or structures in an organization which can capture tacit knowledge and can convert it to explicit knowledge making it accessible. One way to do it is the codification of knowledge which can keep it accessible and stop it from getting lost.

Tacit knowledge in an organization needs to be articulated through its codification, so people can take advantage of it for the sake of better performance (Zollo & Winter, 2002). The study by Gloet and Terziovski (2004) shows the relationship between knowledge management practices and innovation performance. They argued that organizations have management practices which helps them to choose between processes and systems that are competitive to acquire, store, manage, access and transfer knowledge; since in today's competitive world organizations deal in knowledge to maintain competitive advantage.

Management practices are planned and implemented for these systems and processes as they can be implicit as well as explicit. Management practices are translated in these systems and processes which can be influenced by personal and organizational values and ideologies. Choices are made at various points of best management practices for knowledge management in order to manage the flow of knowledge in an appropriate way (Gloet & Terziovski, 2004).

There are different categories identified for knowledge storage and knowledge accessibility which are sector based, such as corporate sector, health education system.

Corporate Sector: Olivera (2000) conducted a study which aimed to examined the concept of organizational memory. The purpose of the study

was to develop a framework for characterizing and analyzing management practices and systems of organizations used for storage and accessibility of knowledge. Data was collected through interviews and observations with consultants, managers and information system administrators. Managers and consultants discussed the projects they were doing and the situation where they needed information about their organization's experience. Several memory systems were identified because of management practices for knowledge storage and knowledge accessibility including social networks, knowledge centers, knowledge intranet, and electronic bulletin board (ibid).

Social Networks: Social networks help to access and collect knowledge through the experience of other members of an organization. Knowledge is accessed and collected through workshops and seminars at the training center of the organization. How information is accessed in social networks depends on the communication between consultants, which is supported by the management practices of an organization to develop firm wide electronic and voice mail system (Olivera, 2000).

Knowledge Intranet: Knowledge intranet is an organizational internet-based database that contains information relevant to business. This database is used to collect information and knowledge for storage that is previously dispersed in databases, CD-ROMs and paper documents (Olivera, 2000).

Knowledge intranet collects and stores knowledge that firms have developed through research and experience. Knowledge intranet is designed to make the access to knowledge easy for anyone in the organization, when users can be located anywhere in the world (Olivera, 2000). The structure of knowledge intranet is designed in a way that all members of the organization can have access to the contents (ibid).

Electronic Bulletin Board: Electronic bulletin board is set up in the database and is used as a forum where individuals can put forth their queries, resources are shared, and solutions are also shared or are used to engage individuals in discussing specific problems or topics. In two ways, bulletin board serves as a memory system. Firstly, it acts as a medium for storage and accessibility of documents that are helpful for the organization. Secondly, it serves as a medium of broadcasting where individuals put their requests (Olivera, 2000).

Knowledge Centers: Knowledge centers comprise groups of experts that collect, store and provide access to an organization's experience in a

specific domain (Olivera, 2000). Knowledge is collected and stored in knowledge centers from three sources which include (1) members' experience; (2) contributions of the individuals throughout the organization such as documents related to a project; and (3) individuals who are actively contacted to learn about their experiences. The maintenance of knowledge center is kept through active updating of its contents based on new projects and by updating its database. Knowledge centers can be accessed by contacting the its members and through its databases which are part of the organization's intranet system (Olivera, 2000).

Health Education System: Moonaghi et al.(2014) conducted a qualitative study related to knowledge storage in nursing education system. The author identified management practices for storing knowledge in nursing education. Data was collected from the nursing faculty and nursing students through semi-structured interviews. 15 interviews were conducted with individuals among whom 8 were faculty members and the remaining were students of Bachelors, Masters and PhD programs in nursing education (Moonaghi et al.2014). The management practices followed in nursing education included the use of instruments and methods for the storage of knowledge. Instruments used for the storage of knowledge were paper storage and electronic storage, while methods included the general and the individual types of processes used for the storage of knowledge. For paper storage, faculty and students were using notes to store their knowledge. Faculty members stored their knowledge in databases of the organizations in the form of books, articles, case studies and research papers. The stored knowledge can either be accessible only to the one who stored it, or it can be stored for general purpose in which it can be accessible to faculty and students both in paper or electronic form (ibid).

Another study was conducted by Thompson, Mccaughan, Cullum, Sheldon, Mulhall, and Thompson (2001) related to knowledge accessibility used by nurses in the United Kingdom. The units of analysis were hospitals, medical units, wards, nurses and clinical decisions. Data was collected through semi-structured interviews and observations. Interview data was collected from 108 nurses of different scales, expertise, educational levels and experience. Three aspects of management practices were identified for knowledge accessibility which included the humanist, local information for local use, and moving towards technology.

The Humanist: Nurses defined this aspect as human resources that were the most accessible. Their accessibility was tied to routine ways of working which often involved non-routine decisions. In 180 hours of observation, 1080 decisions were taken using this aspect of management practices for knowledge accessibility. In these decisions, only two types of text-based research information were used, that is, local protocols and the British National Formulary (BNF). Nurses' specialization was the most trustful source of knowledge access.

Local Information for Local Need: This aspect of management practices was concerned with relative accessibility of local resources like ward information, ward noticeboards and files.

Moving towards Technologies: This aspect of management practices was concerned with online databases containing research based knowledge in online knowledge repositories. Technology based library was relatively accessible as it was perceived that librarians were not a resource for clinical problem solving.

2.1 Corporate Sector and Educational Institutions

HEC Pakistan has started HEC Digital Library (DL) (2017) which aims to provide researchers in public and private HEIs access to international scholarly literature through electronic delivery by providing access to peer-reviewed journals, databases and e-books in a wide range of areas and disciplines. Around 57,000 electronic contents are available through the Digital Library program (HEC Digital Library, 2017).

One of the firms has recently filled the position of chief learning officer for driving and integrating KM initiatives. One of the studied schools has hired a chief technology officer who will coordinate KM and technology efforts at the district level. Another school has initiated a marketing campaign to make the users aware and educate the users about the programs and processes for knowledge storage, accessibility and sharing. Educational institutions are making efforts to convert paper information into intranet facilities. For an organization, it is important to gain assistance in various aspects like learning culture, management support, technical support, financial support, and personnel support for the implementation of KM cycle which includes knowledge storage and knowledge accessibility.

Li, Huang, and Tsai (2009) conducted a qualitative study to explore the management practices of Knowledge Management System (KMS), which can improve knowledge accessibility and knowledge sharing for better

workplace learning. The study aimed to discover how organizations use KMS to improve workplace learning and what specifically they do to increase knowledge accessibility, thus increase knowledge sharing and support workplace learning? A collective case study methodology was used in which in-depth semi-structured interviews, onsite observations and review of company documents were conducted. In the studied organizations, academic organizations lag behind the non-academic ones in initiatives for KMS. Academic organizations have an improper strategy and inadequate funds to support KM initiatives, institution-wide. A corporate organizations have taken many initiatives about management practices for knowledge gathering, storage, accessibility and sharing.

In Iraq, Al-Husseini, and Elbeltagi (2018) conducted a mix-method study about the influence of knowledge sharing on product and process innovation in public and private sector HEIs. They found that knowledge sharing significantly influences product and process innovation in both public and private sectors.

In Pakistan, Hussain, Qurashi, Mujtaba, Waseem, and Iqbal (2019) conducted a study regarding knowledge management and its influence on organizational innovation capacity. They gathered data from SMEs to explore the role of KM in fostering innovative capabilities of SMEs. Findings revealed that various KM dimensions including identification, knowledge collection, knowledge organizing, knowledge dissemination, and knowledge application have a substantial influence on innovation capacity.

Yapa (2011) conducted a study to critically evaluate the management practices for KM including knowledge storage and knowledge accessibility in HEIs of Sri Lanka. Data through interviews were collected from academic staff, deans and HODs. Knowledge was stored in the form of teaching materials like presentation slides and course manuals. Lecture material was also stored on online Learning Management System (LMS), which was related to the interest and IT knowledge of the faculty or HOD. Web based platform was available for the storage of knowledge, but it was not a formal system and it was not used by all faculty members. On the other hand, students accessed knowledge from web-based platforms in and off the campus.

Dhamdhere (2015) conducted a study to identify the processes and management practices of KM including knowledge storage and knowledge

accessibility in HEIs. Knowledge is stored in explicit forms like digital form throughout the databases of HEIs. KM process in HEIs involves the accessibility of knowledge through library resources like journals, reports, books, projects, and thesis which are accessed via internet. HEIs should implement web-based technology and databases because they have been found economical and useful and they can provide easy accessibility to stored knowledge.

The previous studies have identified various themes of management practices for knowledge storage and knowledge accessibility. These themes and their associated management practices are given in the table below.

Table 2
Details of Themes and their Management Practices

Themes	Management Practices for Aspects of Knowledge Storage and Accessibility
Technological	Web platform
	Digital library
	Electronic databases
	E-mail services
	Organizational intranet
	Internet
	Conversion of paper information into intranet facilities
Non-Technological	Paper storage and accessibility
	Social networks
	Libraries
	Teaching materials like slides, notes, presentations, manuals etc.
Human Resources	Hiring of IT and technical staff
	Training and development
Processes	IT systems and databases deployment for electronic storage and accessibility.
	Manual documentation for paper storage and accessibility.

The literature shows numerous management practices and processes for knowledge storage and knowledge accessibility in corporate and educational sectors. Hence, in the light of previous literature, this study is an attempt to explore the management practices of HEIs in Peshawar for effective knowledge storage and knowledge accessibility.

3. Methodology

3.1 Nature of Study

Previous studies related to knowledge storage and knowledge accessibility were qualitative in nature. Similarly, this study explores the current management practices with regard to knowledge storage and knowledge accessibility in HEIs in Peshawar. Hence, it is also qualitative in nature and the research strategy is interviews conducted in order to address the objectives of the study.

3.2 Population and Sampling Technique

The population of the study comprises the public sector HEIs of Khyber Pakhtunkhwa (KPK), Pakistan. The population in this case is homogenous in nature as it has the same functionality, that is, all are public sector HEIs which have academic centers for sharing and creating knowledge.

Since this study is a qualitative enquiry, hence purposive sampling technique is used. A non-probability sampling technique is used in this study because it helps researchers to select a specific portion of population in which they are interested. There is a specific objective behind the selection of a sample; based on this objective purposive sampling technique has been selected for this study. Purposive sampling technique is based on the researcher's belief that the selected sample is best suited for collecting data. The sample is limited to HEIs in Peshawar, Khyber Pakhtunkhwa due to the time constraints. Probing further into the selected sample based on the uniformity of hierarchy and operations, only public sector HEIs of Peshawar have been selected. The sample consists of public sector HEIs of Peshawar listed on HEC's website.

3.3 Data Collection and Participants

Existing literature shows that the data collection method in previous researches for knowledge storage and knowledge accessibility was semi-structured interviews. This study also utilizes the same technique and uses semi-structured interviews as the tool for data collection. The interviewer asked questions about themes derived from literature regarding management practices. Also, freedom was given to the interviewees to express their own view point about the management practices of HEIs regarding knowledge storage and knowledge accessibility (Saunders, Lewis, & Thornhill, 2009). There are seven public sector HEIs in Peshawar listed on the website of HEC. The participants of interviews for this study

included both academic and non-academic employees of the sampled HEIs such as faculty members, IT administrators, library staff and other administrative staff of the respective HEIs.

In each HEI, the focus remained on three types of participants for conducting interviews which included senior staff members of library, senior staff members of information technology and networking department who were looking after the website and other information technology matters and mediums of that HEI, and senior faculty members of that HEI. There were 21 participants in total. The interview questions were designed based on the themes generated from literature. Thus, there was an almost equal role of all types of participants in interviews and data collection. In this regard, questions derived from themes in literature were asked and answers were noted. For interviews, audio recording devices were used with the permission of the interviewees in order to record the interviews while noting the conversation on paper, simultaneously.

3.4 Data Analysis

Content analysis was used in order to explore knowledge storage and knowledge accessibility. In data analysis, themes derived from literature were compared and contrasted with the themes explored from the interview data regarding the phenomenon.

Data analysis revealed that some of the emergent themes and management practices for knowledge storage and knowledge accessibility were not identified in literature. Each emergent theme and management practice for knowledge storage and knowledge accessibility was not followed individually. Therefore, the percentage of these emergent themes and management practices is shown, which depicts the number of HEIs following that specific emergent theme and management practice for knowledge storage and knowledge accessibility.

Furthermore, there are some themes and their respective management practices from literature and data which have the same functionality, but they are made distinctive because these management practices are labelled differently in literature and in the collected data. In the data analysis section, tables were drafted and there was continued drafting, comparison of collected data with themes in literature and summarizing of themes and their respective management practices for drawing the results and conclusion.

4. Analysis and Findings

4.1 Matching Themes for Knowledge Storage

Following are the themes identified for knowledge storage both from the previous literature and the sampled HEIs.

The below table shows the matching management practices for knowledge storage derived from literature review and data collected from sampled HEIs. Table 3 shows the themes and management practices for each theme which have been generated from literature review and then these themes and their respective management practices for knowledge storage from literature and data are compared. The technological theme in sampled HEIs after data collection is labelled as technological deployment or information and technology. The data showed that HEIs have all the management practices in technological theme for knowledge storage except that there is no practice regarding digital library which was a management practice derived from literature.

Besides, there is the practice of conversion of paper information into intranet information in only one HEI, which shows that this management practice for knowledge storage is only 20% in the studied sample. Non-technological theme derived from literature was labelled as administration and academic work by the interviewees.

With regard to the non-technological theme, HEIs have been following the same management practices for knowledge storage as derived from literature, which depicts 100 percentage points in this perspective.

Table 3
Matching Themes between Literature and Sampled HEIs for Knowledge Storage

Literature themes	Management practices derived from literature	Sampled higher education institutions themes	Management practices of Sampled HEIs
Information and technology	Web platform Digital library Electronic databases Organizational intranet E-Mail services Internet Conversion of paper information into intranet facilities	Technological deployment/Information and technology	Web platform (100% of sampled HEIs) Digital library (0% of sampled HEIs) Electronic databases (100% of sampled HEIs) Organizational intranet (100% of sampled HEIs) E-mail services (100% of sampled HEIs) Internet (100% of sampled HEIs) Conversion of paper information into intranet facilities (20% of sampled HEIs)
Non-technological	Paper knowledge storage Social networks Libraries Teaching materials like slides, notes, presentations, manuals etc.	Administration and academic work	Paper storage in traditional office databases (100% of sampled HEIs) Social networks (100% of sampled HEIs) Libraries (100% of sampled HEIs) Teaching materials like slides, notes, presentations, manuals etc. (100% of sampled HEIs)

Table 3 (Cont.)
Matching Themes between Literature and Sampled HEIs for Knowledge Storage

Literature themes	Management practices derived from literature	Sampled higher education institutions themes	Management practices of Sampled HEIs
Human resources	Hiring of IT and technical staff Training and development	IT department, library and administration	Hiring of IT and technical staff (100% of sampled HEIs) Training and development
Processes	IT systems and databases deployment for electronic knowledge storage Manual documentations for paper knowledge storage	Administrative and management processes	IT systems and databases deployment for electronic knowledge storage (100% of sampled HEIs) Manual and traditional documentations for paper knowledge storage (100% of sampled HEIs)

With reference to human resources theme, management practices for it were the same as derived from literature and as fetched from the data collected from the sampled HEIs but there is one difference.

This theme was addressed in literature as human resources but the interviewees of sampled HEIs addressed it as the IT department, library and administration. The processes theme was addressed as administrative and management processes by the respondents of interviews, although management practices remain same in literature and data of sampled HEIs.

4.2 Emergent Themes for Knowledge Storage

Table 4

Emergent Themes for Knowledge Storage from Sampled HEIs

Themes	Management practices
Technological	MOODLE platform (14.2% of sampled HEIs). Enterprise Resource Planning (ERP) (14.2% of sampled HEIs). Databases for storage of HEI's own journal (100% of sampled HEIs). Campus Management Solution (CMS) (14.2% of sampled HEIs). Faculty member and students e-mail groups (28.5% of sampled HEIs). Social media (100% of sampled HEIs).
Non-technological	Libraries at central and departmental level of HEIs (85.7% of Sampled HEIs)

There are some emergent management practices for themes of knowledge storage in the studied sample. 14.2% of sampled HEIs have deployed MOODLE platform over their official website. The purpose of MOODLE is to enable both faculty members and students to interact virtually 24/7.

Moreover, ERP is the organizational process management software that allows an organization to use a system of integrated applications to manage the organizational processes and automate many back-office functions related to technology, services and human resources. Additional management practices for the storage of knowledge in the sampled HEIs include their own database for institutional journals like Sarhad journal, Business and economics, UET journal etc.

One of the studied HEI implemented the Campus Management Solution (CMS). CMS helps students and faculty members to create their own logins. Using CMS account, students can access all their academic record. Faculty can store and share information relevant to students and administration using the platform of CMS. 28.5% of the studied HEIs were using the platform of e-mail groups which was an interactive knowledge storage and sharing platform between faculty members and students.

Students of all studied HEIs are using social media platforms, mostly Facebook groups, in which students can store knowledge relevant to their studies. Even faculty members are also able to store knowledge using the platform of social media. In the non-technological theme, 85.7% of studied HEIs not only have central libraries but they also have departmental libraries where most relevant and latest knowledge can be stored by the librarians on their own or due to the request of faculty members and students.

4.3 Distinctive Features for Knowledge Storage

Table 5
Distinctive Features of Literature and Sampled HEIs for Knowledge Storage

Theme	Literature Perspective	Sampled HEIs Perspective
Technological	E-mail service Virtual Private Network (VPN) Electronic bulletin board and online Learning Management System (LMS)	E-mail and traditional mail services ERP, CMS MOODLE platform
Non-Technological	Marketing campaign	Trainings, workshops

There are some management practices from literature and sampled HEIs which have the same functionality; however, they are labelled differently and depict a different approach towards knowledge storage. Literature shows email service as a management practice for

knowledge storage, while the studied HEIs were using email and traditional mail services.

Similarly, literature highlighted VPN as a management practice for knowledge storage, while this functionality is achieved by ERP and CMS which is implemented in the studied HEIs. Literature shows electronic bulletin board and online LMS, while the same functionality is achieved in one of the studied HEI through MOODLE.

4.4 Matching Themes for Knowledge Accessibility

Literature and HEIs' themes and management practices for knowledge accessibility are presented in the above table. The management practices of technological theme for knowledge accessibility between literature and studied HEIs are the same. As in technological theme, HEIs have access to different electronic databases of journals worldwide through HEC Digital Library (2017) platform. Knowledge accessibility and management practices for non-technological theme derived from literature and data of studied HEIs are the same. There is also similarity in the management practices for knowledge accessibility in human resources and processes in literature and studied HEIs.

Table 6
Matching Themes between Literature and Sampled HEIs for Knowledge Accessibility

Literature themes	Management practices derived from literature	Sampled higher education institutions	Management practices of HEIs
Technological	Web platform Digital library Electronic databases E-Mail services Organizational intranet Internet Paper knowledge accessibility	Technological deployment/Information and technology	Web platform (100% of sampled HEIs) Digital library (0% of sampled HEIs) Digital library (100% of sampled HEIs) Electronic databases (100% of sampled HEIs) E-Mail services (100% of sampled HEIs) Organizational intranet (100% of sampled HEIs) Internet (100% of sampled HEIs) Paper knowledge accessibility (100% of sampled HEIs)
Non-technological	Social networks Libraries Teaching materials like slides, notes, presentations, manuals etc.	Administration and academic work	Social networks (100% of sampled HEIs) Libraries (100% of sampled HEIs) Teaching materials like slides, notes, presentations, manuals etc. (100% of sampled HEIs)

Table 6 (Cont.)
Matching Themes between Literature and Sampled HEIs for Knowledge Accessibility

Literature themes	Management practices derived from literature	Sampled higher education institutions	Management practices of HEIs
Human resources	Hiring of IT and technical staff	IT department, library and administration	Hiring of IT and technical staff (100% of sampled HEIs)
	Training and development		Training and development (100% of sampled HEIs)
Processes	IT systems and databases deployment for electronic knowledge accessibility	Administrative and management processes	IT systems and databases deployment for electronic knowledge accessibility (100% of sampled HEIs)
	Manual documentations for paper knowledge accessibility		Manual and traditional documentations for paper knowledge accessibility (100% of sampled HEIs)

4.5 Emergent Area of Knowledge Accessibility

Table 7
Emergent Themes for Knowledge Accessibility from Sampled HEIs

Themes	Management Practices
Technological	MOODLE platform (14.2% of sampled HEIs)
	HEC Smart University Project (14.2% of sampled HEIs)
	Enterprise Resource Planning (ERP) (14.2% of sampled HEIs)
	Databases for accessibility of HEI's own journal (100% of sampled HEIs)
	Firewall deployment in internet system for accessibility of relevant knowledge and internet surfing security (100% of sampled HEIs)
	Campus Management Solution (CMS) (14.2% of Sampled HEIs)
	Faculty member and students e-mail groups (28.5% of sampled HEIs)
	Social media (100% of sampled HEIs)
Non-technological	Libraries at central and departmental level of HEIs (85.7% of Sampled HEIs)

There are some emergent management practices for the themes of knowledge accessibility in the studied sample. 14.2% of studied HEIs have implemented MOODLE platform for knowledge accessibility. Using this platform, faculty members and students have their own logins through which they can access knowledge of the specific subject and topic. Students can access their queries asked from faculty members. In return, faculty can access feedback from students after answering their query.

The studied HEIs do not have their own digital libraries for knowledge but HEC smart university project is providing them with access to different databases of journals, books, articles and other literature for students, faculty members and administration for free. ERP can provide an opportunity to faculty and administration to access all the administrative information and the information of students. Since the studied HEIs have databases of their own journals; faculty members, students and administration have access to these databases.

The studied HEIs have firewalls over their internet deployment which puts restrictions on surfing which helps students and faculty members to access relevant knowledge while using the internet. 14.2% of the studied HEIs have deployed CMS which helps faculty members, students and administration to access academic and administrative information in their predefined domain. 28.5% of the studied HEIs are using email service which helps students to access knowledge stored and shared by the faculty. Social media is another management practice followed by these HEIs in which students who are the members of social media sites like Facebook groups have access to the knowledge stored on it. In the non-technological theme, 85.7% studied HEIs have not only central libraries but they also have departmental libraries from where the most relevant knowledge can be accessed by faculty members and students.

4.6 Distinctive features for knowledge accessibility

Table 8
Distinctive Features of Literature and Sampled HEIs for Knowledge Accessibility

Theme	Literature Perspective	Sampled HEIs Perspective
Technological	E-mail service	E-mail and traditional mail
	Virtual Private Network (VPN)	ERP, CMS
	Organization's own digital library	Access through HEC digital library
	Electronic bulletin board and online Learning Management System (LMS)	MOODLE platform
Non-technological	Marketing campaign	Trainings, workshops

Even there are some management practices derived from literature and sampled HEIs which are similar, but they are performed with different labels and have a different approach for knowledge accessibility. Literature shows email service as a management practice for knowledge accessibility, while the studied HEIs are using e-mail and traditional mail services. Similarly, literature shows VPN as a management practice for knowledge accessibility, while this functionality is achieved by ERP and CMS which are implemented in the studied HEIs. Literature shows electronic bulletin

board and online LMS, while the same functionality is being achieved in one of the studied HEI with the label of MOODLE.

5. Discussion and Conclusion

5.1 Discussion

The study aimed at exploring the role of management practices in knowledge storage and knowledge accessibility in public sector HEIs of Peshawar, KPK. Findings revealed that HEIs are following different management practices for knowledge storage and knowledge accessibility which were explored by conducting interviews with the faculty and staff of the sampled HEIs. These HEIs have management practices grouped into various themes derived from literature such as technological theme, non-technological theme, human resources theme and processes theme.

It was found that HEIs are following most of the management practices for knowledge storage and knowledge accessibility, still there are few practices identified in literature which in reality are not practiced by the HEIs including knowledge centers, RACiNET, web-based reporting, business data/intelligence warehouse, Sarbanes-Oxley regulatory compliance, and e-discovery/content management. Knowledge centers comprise groups of experts that collect, store and provide access to the organization's experience in a specific domain (Olivera, 2000). RACiNET is implemented which is intranet infrastructure. RACiNET functions via collection of tacit knowledge and distribution of explicit knowledge. Web based reporting is a centralized repository. This centralized system collects information and provides access to members of this centralized system.

Business data/intelligence warehouse is a process which allows for storage, analysis, accessibility and distribution of tacit knowledge. Sarbanes-Oxley regulatory compliance is an initiative for documentation processes and procedures. E-Discovery/content management is designed to store unstructured tacit knowledge and it can manage it in a way that it may be utilized as explicit knowledge. By adopting these management practices, knowledge storage and knowledge accessibility can be more effective. Alongside them are effective management practices like MOODLE, CMS, ERP and conversion of paper knowledge to intranet facility, which are not adopted and implemented in the HEIs. If they adopt and implement these management practices they will have more effective management practices for knowledge storage and knowledge accessibility.

For knowledge storage, the HEIs are following all the management practices of themes that are information and technology, non-technological, human resources and processes, except one practice of information and technology, that is, conversion of paper information into intranet facilities which are followed by 20 percent of the studied sample. Based on data collection method providing leverage to interviewees to share management practices for knowledge storage, there are themes both in technological and non-technological perspectives, which were not identified in literature such as MOODLE platform, ERP, databases for storage of HEIs' own journals, CMS, social media and libraries at central and departmental level of HEIs. But these emergent themes are not followed by all studied HEIs; their details have been mentioned in Tables 3 and 4. Some distinctive management practices of knowledge storage are also identified in which HEIs have the same management practices functionality wise as in literature but are labelled with different names which are mentioned in Table 5.

For knowledge accessibility, the studied HEIs are following all the management practices of themes that are information and technology, non-technological, human resources and processes. For knowledge accessibility, there are themes both in technological and non-technological perspectives, which are not identified in literature such as MOODLE platform, HEC smart university project, ERP, firewall deployment, CMS, social media, email groups pf faculty members and students and libraries at central and departmental levels of HEIs. But these emergent themes are not followed by all studied HEIs; their detail has been mentioned in Tables 6 and 7. Some distinctive management practices of knowledge accessibility are also identified in which HEIs have the same management practices functionality wise as in literature but are labelled with different names which are mentioned in Table 8.

5.2 Significance and Limitations of the Study

This study assists the HEIs to know and understand the current practices for storage and accessibility of knowledge which is an important part of the KM cycle. This study helps to identify matching themes and emergent themes based on the literature and data collected from the HEIs, which will help them to know their current practices and best practices followed, extracted from literature, for knowledge storage and accessibility. Additionally, this study helps HEIs to identify the loop holes or barriers they are confronting

in their practices for knowledge storage and accessibility, and so that they may addresses such loopholes in future.

The study can also help regulatory authorizes in Pakistan such as the Higher Education Commission (HEC), Pakistan Engineering Council (PEC), Pakistan Medical and Dental council (PMDC), National Business Education Accreditation Council (NBEAC) and many more to study the significance of existing and emergent themes and management practices for knowledge storage and knowledge accessibility, thus redesign and refine their policies for these practices.

Besides its significance, there are few limitations of the study as well. This was a qualitative study with a small sample size. Hence, results cannot be generalized for all HEIs in Pakistan and across the globe. This gives a signal for further research in this area and both public and private sector HEIs in the whole country. Moreover, access to each and every HEI and the willingness and availability of interviewees of each HEI was another limitation.

5.3 Conclusion

Successful knowledge storage and knowledge accessibility depend on the practices which help in the enhancement of individual and organizational ability and ultimately opportunities to spread and gain knowledge, thus helping individuals and organizations to remain competitive in the market. This study has helped us to identify the different existing management practices for knowledge storage and knowledge accessibility. The importance and advantages of each and every management practice for knowledge storage and knowledge accessibility has been described in this study. This study will assist HEIs to analyze the effectiveness of their management practices for knowledge storage and accessibility and will also assist them in bringing additional enhancement and efficiency in their practices. Alongside studying the management practices in these HEIs, which were derived from literature, new management practices for knowledge storage and knowledge accessibility emerged which can help not only the studied HEIs but all other HEIs in the country, by implementing them to bring effectiveness and efficiency. There is a requirement to improve the technical infrastructure in HEIs for effective knowledge storage and knowledge accessibility which requires availability of portals connected to intranet, knowledge databanks and management system for documents.

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