CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Chapter 3 provides detailed descriptions of the research design and the methodology used in for the present study. It justifies the data gathering approaches employed to examine the key research questions. The study employs the explanatory mixed methods. It will obtain statistical, quantitative results from a sample and then follow-up with a few individuals to probe or explore those results in more depth. The goal of this study is to identify how Knowledge Management (KM) approach could be used to support the curriculum review process in Higher Education Institutions (HEIs) using Work System Theory (WST).

The study has the following objectives:

1. To elicit higher education stakeholders, understanding of knowledge management practices, their feedback of ICT programme instruction and the curriculum review process.

2. To explore the higher education stakeholders, perception of the employability of ICT graduates.

3. To capture the requirements of a knowledge management system that can support the employability of ICT graduates and the improvement of curriculum review process.

4. To design and develop a knowledge management system that can support the employability of ICT graduates and the improvement of curriculum review process.

To realize the objectives, the researcher employed a mixed qualitative and quantitative research, which aimed to answer the following research questions:

1. How do Knowledge Management practices influence the ICT programme instruction and curriculum review process?

2. What are the stakeholders' perceptions of the employability of ICT graduates?

3. How could knowledge management system support the employability of ICT graduates and the improvement of curriculum review process?

4. How well does the KM tool support HEIs to support the curriculum review process?

The research method in this study is divided into two (2) stages:

Stage 1: Data collection: Mixed method sequential explanatory design
 (a) Quantitative
 (b) Qualitative

Stage 2: Development of Knowledge Management tool

3.2 Why this is a case study research

This study adopts a case study research. The term case study has multiple meanings. It could describe a unit of analysis or a research method. In this study, the use of the case study is discussed as a research method. Case study research investigates pre-defined phenomena but does not involve explicit control or manipulation of variables. The focus is mainly on in-depth understanding of a phenomenon and its context (Cavaye, 1996).

Merriam (1991) defines a case study as an examination of a specific phenomenon such as a program, an event, a person, a process, an institution, or a social group. The bounded system, or case, might be selected, because it is an instance of

some concern, issue, or hypothesis. Yin (1984) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used. As the quantitative analysis focus the data at the macro level, case studies observe the data at the micro level. A case is a specific, complex, and a functioning thing (Stake, 1995). Distinguished scholars have identified case studies as the preferred research method because it requires an inquiring mind during data collection and it does not follow a formal protocol. This type of research is better used when the researcher has little control of events and when the focus is on a contemporary phenomenon in a real life context (Yin, 1984). In this study, the boundary is the university, alumni, current students and employers.

According to Benbasat, Goldstein & Mead (1987), the case study research method is compatible to IS research, since the study is mainly on information systems in organizations. Besides that, the interest has shifted to organizational rather than technical issues. Yin (1994) further argued that, the case study method is normally used in research related to technology in education. Case study method allows a researcher to narrowly examine the data within a particular event. Case studies are developed to assist in building theory related to poorly understood phenomena (Cepeda & Martin, 2005). According to Stake (1995), KM approach in HEIs is definitely a poorly understood phenomenon at this point of time. These encourage this study to use case study.

There are a number of research methods are available but was not applied in this study, such as action research and action learning. Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in

action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction (Thomas, Jim & Rafael, 1986). A major attraction of action research is that everyone can do it, so it is for 'ordinary' practitioners as well as principals, managers and administrators (McNiff, 2010). On the other hand, action learning is both a concept and a form of action which aims to enhance the capacities of people in everyday situations to investigate, understand and, if they wish, to change those situations in an ongoing fashion, with a minimum of external help. As mentioned by Reason (2008), action research not action learning is not suitable for this study because it draws comparisons, show statistical correlations and it also demonstrate a cause and effect relationship.

There are three main reasons why case study is a viable research strategy used in this study. First, the researcher can study the problem in a natural setting, learn about the state-of-the-art, and generate theories from practice. This study determines the importance of KM approach in HEIs to support the curriculum review process. It also studies the underlying reasons of unemployed graduates. Second, the case method allows the researcher to answer "how" and "why" questions. Besides that, it also helps to understand the nature and complexity of the processes taking place. This study focuses why KM is important in HEIs. Besides that, the study also examines the importance of the collaboration between HEIs and industry. By identifying the importance of HEIs and industry collaboration, it will support the significant role of KM approach in HEIs. It also delves the issues in the current HEIs curriculum review process. This gives a better understanding on the existing curriculum review process before a new process is introduced. The study also addresses the next step, addressing how KM tool could help HEIs to increase the employability rate among the graduates. Third, a case study approach is a right way to investigate areas where research studies are limited (Cepeda & Martin, 2005). Applying Work System theory in Knowledge

Management Tool for graduate employability and ICT Curriculum improvement is a rare area of study as discussed in Chapter 2. As discussed earlier, case studies in this study combine the data collection techniques such as interviews, observation, questionnaires, and document analysis. A major strength of case study is the opportunity to use several different sources of evidence, which make the findings more convincing and accurate (Yin, 1984). This study uses mixed method as discussed in Chapter 1. In this study, Faculty of Computer Science and Information Technology (FCSIT) is selected to discuss the importance of KM approach in HEIs to support the curriculum review process. Besides the HEIs, the study also focuses on the student and industry. This study used questionnaires, interview and document analysis as data collection techniques.

3.3 Sequential Explanatory Design

As discussed earlier, this study employs sequential explanatory design. The Explanatory Design is a two-phase mixed methods design. According to Creswell, et al. (2003), the purpose of qualitative data is to explain or build upon initial quantitative results.

3.3.1 Strengths of the Explanatory Design

The Explanatory Design is considered the most straightforward of the mixed methods designs. The advantages of this design include the following:

✓ Its two-phase structure makes it straightforward to implement. The study conducts the two methods in separate phases and collects only one type of data at a time.

✓ The final report written in two phases. It is straightforward to write and it provides clear explanation for readers.

✓ This design leads to multiphase investigations or single mixed methods studies.

3.4 Conceptual Framework

According to educational researcher Smyth (2004), the conceptual frameworks are structured from a set of broad ideas and theories that help a researcher to properly identify the problem they are looking at, frame their questions and find suitable literature. Conceptual framework also helps the researcher to clarify the research question and aims. The conceptual framework fulfill two roles, viz, providing a theoretical clarification of what researchers intend to investigate, and enabling readers to be clear what the research seeks to achieve, and how that will be achieved. A literature survey explores how the conceptual framework is itself conceptualized and explained (Shosh & Vernon, 2007).

In this study, the conceptual framework is designed based on WST model (Section 1.7). The WST model has further been enhanced to include eight layers that represents details element components that is being investigated in the study as shown in Figure 3.1. It begins from the bottom to the top layer. The layers of the conceptual framework comprise participants, information, technology (KM tool), process and activities; product and services; customers, outcomes and the top most layer is the ultimate goal of the study.
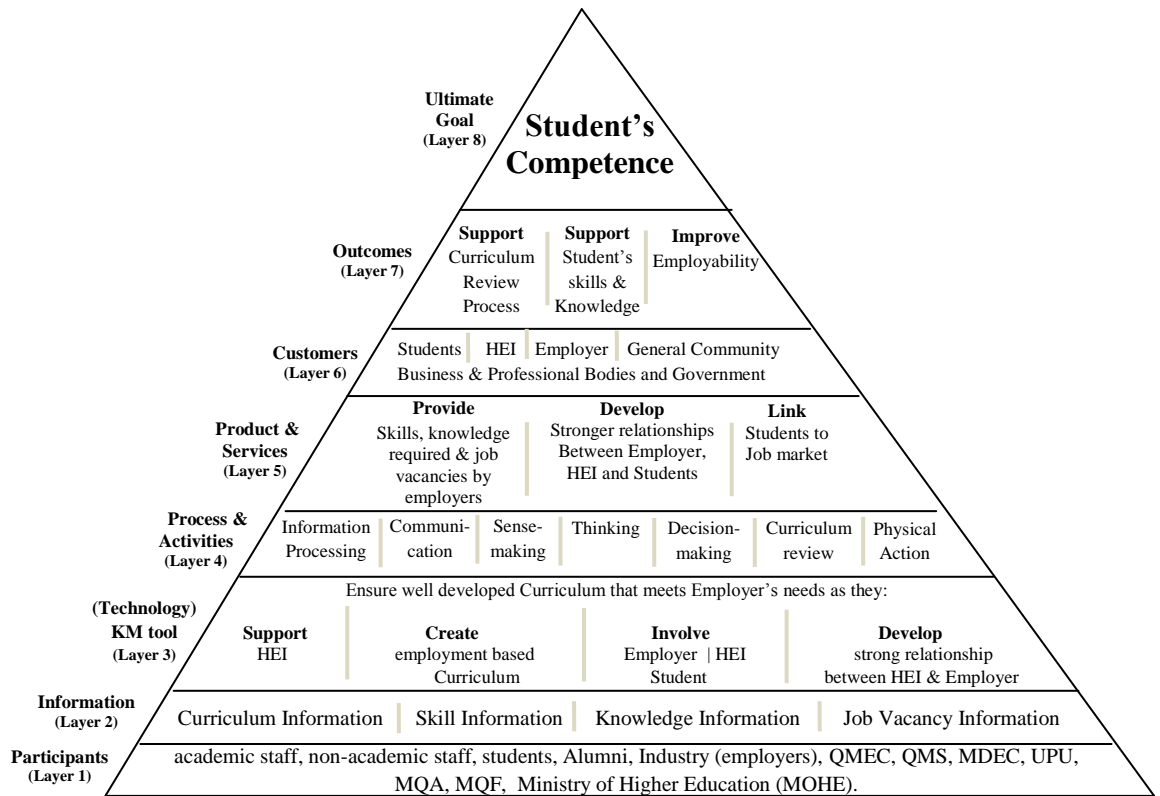
Ultimate Goal (Layer 8) — Student's Competence

Outcomes (Layer 7)
Support Curriculum Review Process | Support Student's skills & Knowledge | Improve Employability

Customers (Layer 6)
Students | HEI | Employer | General Community Business & Professional Bodies and Government

Product & Services (Layer 5)
Provide Skills, knowledge required & job vacancies by employers | Develop Stronger relationships Between Employer, HEI and Students | Link Students to Job market

Process & Activities (Layer 4)
Information Processing | Communi-cation | Sense-making | Thinking | Decision-making | Curriculum review | Physical Action

(Technology) KM tool (Layer 3)
Ensure well developed Curriculum that meets Employer's needs as they:
Support HEI | Create employment based Curriculum | Involve Employer | HEI Student | Develop strong relationship between HEI & Employer

Information (Layer 2)
Curriculum Information | Skill Information | Knowledge Information | Job Vacancy Information

Participants (Layer 1)
academic staff, non-academic staff, students, Alumni, Industry (employers), QMEC, QMS, MDEC, UPU, MQA, MQF, Ministry of Higher Education (MOHE).

Figure 3.1: Conceptual Framework

3.4.1 Layer 1: Participants

The first layer from the bottom of conceptual framework is the participant layer. Participants are people who perform the work. In other word, people who perform at least some of the work in the business process are the work system participants. Some may use computers and IT extensively, whereas others may use little or no technology. When analyzing a work system the more encompassing role of work system participant is more important than the more limited role of technology user (Alter, 2006). The WST contains the term participants and not users because people who are not direct users of relevant technologies may nonetheless perform important roles in a service system.

In this study, the participants are the academic and non-academic staff; student, Alumni, industry (employer), Quality Management and Enhancement Centre (QMEC), Quality Management System (QMS), Multimedia Development Corporation (MDEC),

University Centre Unit (UPU), Malaysian Qualifications Agency (MQA), Malaysian Qualifications Framework (MQF) and Ministry of Higher Education (MOHE).

3.4.2   Layer 2: Information

Once the participants in this study are identified, the next layer is information. Information includes codified and non-codified information used and created as participants perform their work. Information may or may not be computerized. The information in a WST might include computerized databases, documents, shared knowledge, or even unrecorded discussions and commitments. In this study, there are lots of information moving between industry, university and students. In this study, the employer will be giving the information and knowledge on what is required in the job market. Based on the information and knowledge gathered from the industry, the HEIs or faculty could compare the existing curriculum and what is required in the current job market. The HEIs could look at the curriculum information, skill information and knowledge information during the assessment process. By looking at the result of the assessment, the university may support the existing curriculum. This will generate quality graduates who could satisfy the employers' need.

Besides that, the employer also could upload both the part-time and full-time job vacancies information on the KM tool. This will enable the current students and graduated students to apply for the posted job vacancies on the KM tool. The applicants could upload their information and resumes. Once the required information and resume were uploaded on the KM tool, the employers could view the information and resume. The employer could select the qualified applicants and invite them for an interview.

3.4.3 Layer 3: Technology

The third layer is technology. Technologies include tools and techniques that WST participants use while doing their work. One view is that technology can help with automation and provide efficiency effects (Sproull & Kiesler, 1991) which may improve existing practices (Hannafin & Kim, 2003). Alternatively, technology is seen as a source of strategic advantage and as an enabler of previously impossible practices (Sproull & Kiesler, 1991) and of significant transformation (Hannafin & Kim, 2003).

In this study, a KM tool has been developed to support the curriculum review process using KM approach. The KM tool could support the HEIs by creating employment based curriculum involving the HEIs, industry and employer. The proposed KM tool could be successful by developing a strong relationship between the industry, HEIs and students.

3.4.4 Layer 4: Business processes and activities

The forth layer is the Processes and activities. Business processes and activities include everything that happens within the WST. The work performed within the WST can be summarized in terms of one or more business processes whose steps may be defined tightly or may be relatively unstructured. Activities within each step include combinations of information processing, communication, decision making, thinking, and physical actions (Hill, Yates & Kogan, 2006).

In this study, the business processes and activities are information processing that occur between HEIs, industry and students, sense making and thinking that involve in decision making and the physical actions that taken place such as inviting for interviews. Besides that, in the KM tool, there is a proper two-way communication between the industry, HEIs and students. The main purpose of the KM tool is to improve the curriculum to satisfy the employers need.

3.4.5 Layer 5: Products & services

The fifth layer is product and services. Products and services are the combination of physical things, information, and services that the work system produces. This may include physical products, information products, services, intangibles such as enjoyment and peace of mind, and social products such as arrangements, agreements, and organizations. The WSF assumes that the work system produces products and services because its actions for its customers might include the creation and transfer of physical things or information as part of the services provided. The teaching products of a university include diverse products such as career counseling, athletic and social facilities, library services, credentialing, curriculum development, instructional delivery and student evaluation. Responsibility for these products is often distributed amongst the organization without a single point of delivery and often with separate information technology (IT) systems (Alter, 2005).

In this study, the WST does not produce any physical things (product) but it helps to produce quality services. The main concern of this study is to improve the curriculum supporting process by providing the required skills, knowledge and job vacancies. This could be achieved by developing stronger relationships between industry, HEIs and students. This could assist the HEIs to better link the students to the job market.

3.4.6 Layer 6: Customers

The sixth layer is the Customer. Customers are people who receive direct benefit from products and services the WST produces. They include external customers who receive the organization's products and/or services and internal customers who are employees or contractors working inside the organization. According to the theory of Total Quality Management (TQM), a work system's customers are typically best able to evaluate its

products and services (Alter, 2005). Customer satisfaction is often linked to the entire customer experience, starting from determining requirements and acquiring the products or services. In this study, the customers for the 'teaching products' of a HEIs can be seen as including students, the general community, government, business and professional bodies.

3.4.7 Layer 7: Outcomes

The seventh layer is the Outcomes. The project outcome can be viewed from several points of view. A project will have a measurable outcome in terms of impacts and benefits towards its strategic objectives. The outcomes forces clarity as to what the project is all about and what is to be achieved. Besides that, the outcomes become the central focal point of the project. The outcome of the study is to support the curriculum review process. This could support the student's skills and knowledge, which assist in improving the employability.

3.4.8 Layer 8: Ultimate goal

The top layer in the conceptual framework is the ultimate goal of the study. The ultimate goal of this study is to produce competent graduates by enhancing the curriculum review process using KM approach as shown in Figure 2.7.

3.5 Research Design

A research design is a plan of action. Its main purpose is to guide the researcher regarding the choice of methods and procedures for gathering, analyzing and interpreting data. It helps the researcher to generate answers for the research questions (Burns, 2000). This study employed a mixed methods sequential explanatory research

design to answer the proposed research questions. The choice of a research design relates to three decisions, viz, the timing of the use of collected data, the relative weight of the quantitative and qualitative approaches; and the approach to mixing the two datasets (Ivankova, Creswell & Stick, 2006).

3.5.1 The Timing Decision

Timing (also referred to as "implementation" or "sequence") refers to the temporal relationship between the quantitative and qualitative components within a study (Greene, Gracelli & Grahar, 1989). Timing is often discussed in relation to the time the data sets are collected. However, most importantly, it describes the order in which the researchers use the data within a study (Morgan, 1998). Therefore, timing relates more to when the data are analyzed and interpreted than to when the data are collected, although these times are often interrelated. Timing within a mixed methods design is classified in one of two ways: concurrent or sequential (Morse, 1991).

This study follows the sequential timing. Firstly, it collects and analyzes the quantitative data. Then, the qualitative data are collected and analyzed in the sequence. This will assist to explain and elaborate on the quantitative results obtained in the first phase. By using sequential timing, the quantitative data and their subsequent analysis provide a general understanding of the research problem of this study. The qualitative data and their analysis refine and explain those statistical results by exploring participants' views in more depth (Tashakkori & Teddlie, 2003; Creswell, et al., 2003).

3.5.2 The Weighting Decision

Weighting refers to the relative importance or priority of the quantitative and qualitative methods to answering the study's questions. This choice has been referred to as the "priority decision" (Morgan, 1998). Here, the researcher may decide whether

both methods have equal priority or one method will have a greater priority than the other.There are two possible weighting options for a mixed methods design. The two methods may be given equal weight so that both play an equally important role in addressing the research problem. On the other hand, the research design may weight them unequally. Morse (1991) suggested that the theoretical drive used to guide a study determines its weighting. That is, a post positivistic worldview calls for a quantitative priority, a naturalistic worldview calls for a qualitative priority, and a pragmatic worldview calls for either equal or unequal weighting, depending on the research question. Morgan (1998) said that the weighting in a study be based on the strength of which data collection method (quantitative or qualitative) is best suited to address the study's goals or purpose. The weighting is influenced by the goals, the research questions, and the use of procedures from research traditions such as quantitative experimental designs or qualitative case study designs.

In this study, it uses unequal weight where it gives greater emphasis on quantitative than qualitative. Firstly, questionnaires are distributed to the employers, HEI s and students to gather information on HEIs stakeholders' understanding of KM practices, their feedback of ICT programme instruction and curriculum review process, their perception on employability among the ICT graduates and to capture requirements of a KMS that could support the employability of ICT graduates and the improvement of curriculum review process.

In order to gather in depth details, interviewing session will be carried out to elaborate the information gathered from questionnaires. The information gathered during the interviewing session will support the data gathered during questionnaires. This is shown in Chapter 5 where the quantitative data is supported by qualitative data.

3.5.3 The Mixing Decision

The third procedural consideration for choosing a mixed method design is how the quantitative and qualitative methods will be mixed. This study chooses the connecting from data analysis to data collection. Here, the study could obtain the quantitative results that lead to the subsequent collection and analysis of qualitative data. Combining the paradigms ensures maximum insight into, and understanding of HEIs, industry and student view on KM approach to support the curriculum review process. Figure 3.2 shows the research structure of this study.

In this study, the researcher employed a case study approach using mixed method to explore the importance of KM approach in HEIs to support the curriculum review process. As shown in the conceptual design in Chapter 2, the participants in this study include the HEIs, senate members, academic staff, non-academic staff, students, alumni, industry, MDEC, UPU, MQA, MQF and MoHE. However, for the purpose of this study, data collections are carried out on the academic staff and non-academic staff from the HEIs; current students and graduated students (alumni) and industry.
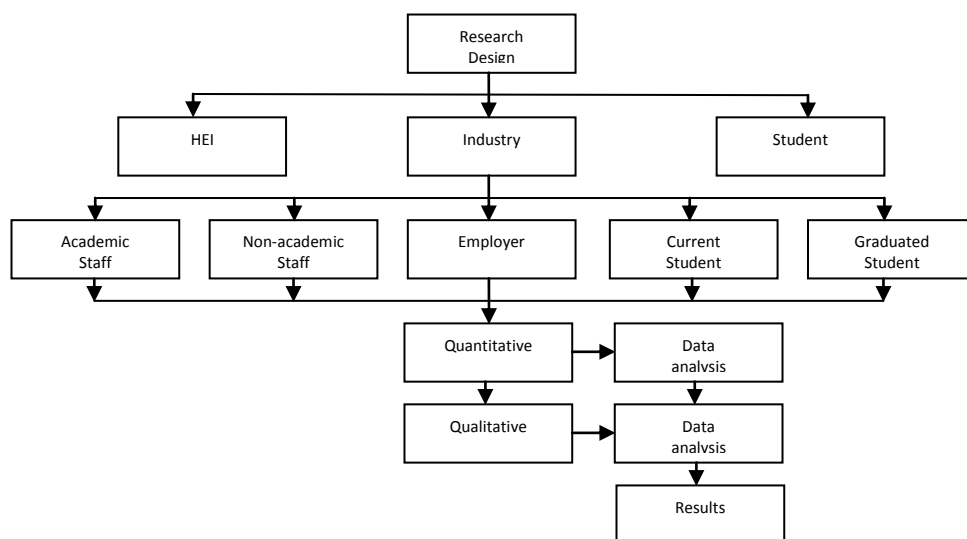

Figure 3.2: The research structure

3.6   Importance of a Mixed Method Approach for this Study

Mixed methods research is a methodology that involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. It focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. The use of quantitative and qualitative approaches presents a better understanding of research problems than using either approach. It also helps to validate the quantitative results with qualitative data. Mixed methods research provides strengths that offset the weaknesses of both quantitative and qualitative research (Jick, 1979). This is supported by Kaplan and Duchon (1998) that mixed methods can lead to new insights and modes of analysis that are unlikely to occur if one method is used alone. A mixed-method approach uses both qualitative and quantitative styles of research and data collection procedures (Neuman, 2000). When more than one method is used, the study will be able to adopt a multidimensional approach (Gorman & Clayton, 1997; Fitzpatrick, Secrist & Wright, 1998). This approach enables the study to address different aspects of the same research questions thus broadening the dimension of the study. This will improve the quality of the research. The mixed-method approach check the validity of the study findings by cross checking them with other sources of data. If a researcher's conclusion is supported by data from multiple sources, then the study can be confident of its validity (Neuman, 2000).

3.7   Research Instruments and Data Collection Procedures

Methodology refers to branch of philosophy that analyses the principles and procedures of an inquiry in a particular discipline (Neuman, 1997). Research methodology is essential as it provides effective research with study results. It can be defined as

procedures, ways, methods and techniques that are applied to capture and gather all relevant information for the research. Various methods can be adopted to retrieve and collect information from a variety of sources such as sampling, research, observation, questionnaires, surveys, interviews, prototyping and joint requirement planning (Whitten et al., 2001). A couple of research methodologies were used to complete this research. These techniques are surveys, interviews, document evaluation, systems review, user testing and evaluation of the developed prototype. The main purpose of the research methodology is to extract the major causes of unemployment among ICT graduates, the employers' requirements towards ICT graduates and how Knowledge Management could be implemented between the employer, faculty and students in order to trim down the unemployment issue and to improve the HEIs curriculum quality. The study employed multiple data collection techniques summarized in Table 3.1 such as survey, interviews, document analysis, system review, user testing and evaluation of the developed prototype.

3.7.1   Handling Missing data in Questionnaire Sample

Missing data refers to "information not available for a subject or case about which other information is available (Hair et al., 1998). Missing data may be due to the respondent's refusal or inability to answer one or more questions. There are various ways of handling

missing data in the sample survey for this research. There are four generic methods of analyzing data in the presence of missing values (Little & Rubin, 1987). The four methods are Complete Case Method, Imputation-Based Method, Re-weighting and Model-Based Method.

For this research, the Complete Case Method was applied. This method involves omitting cases of missing values on any variables used in the analysis. The

Table 3.1: Data Collection Techniques

Technique	Primary method	Information Obtained	Forms of data

1. **Survey (Current students)**	Quantitative	ICT Current students:
		  i. Demographic information
		  ii. Factor(s) involve in choosing right course
		  iii. General understanding on Knowledge Management
		  iv. Importance of KM practices in HEI
		  v. Overall curriculum review
		  vi. Causes of unemployment among ICT graduates
			Numeric data

2. **Interviewing (Current Students)**	Qualitative	i. Overall quality of teaching in university
		  ii. Causes of unemployment
		  iii. The importance of KM which connects the students, HEI and industry.
			Narrative Text

3. **Survey (Graduated students)**	Quantitative	ICT Graduated students:
		  i. Demographic information
		  ii. About Current Job
		  iv. Factor(s) involve in choosing course
		  vii. General understanding on Knowledge Management
		  viii. Importance of KM practices in HEI
		  v. Overall curriculum review
		  vi. Causes of unemployment among ICT graduates
			Numeric data

4. **Interviewing (Graduated Students)**	Qualitative	i. Overall quality of teaching in university
		  ii. Factors involve in finding jobs
		  vii. Causes of unemployment
		  iii. The importance of KM which connects the students, HEI and industry.
			Narrative Text

5. **Survey (Employer)**	Quantitative	Employer:
		  i. Demographic information
		  ii. General understanding of KM
		  iii. Importance of KM practices in HEI
		  iv. Causes of unemployment among ICT graduates
		  v. Skills required in the workplace
		  vi. How to improve employability.
			Numeric data

6. **Interviewing (Employer)**	Qualitative	i. How to reduce skills gap and increase graduates employment ii. Features to include in KM	Narrative Text

7. **Survey (Academic / Non-academic Staff)**	Quantitative	i. Demographic information
		  ii. KM practices within your faculty
		  iii. Policies and strategies
		  iv. Knowledge capture and acquisition
		  v. Effectiveness of results of using KM practices
		  vi. Causes of unemployment among ICT graduates
			Numeric data

8. **Interviewing (Academic Staff)**	Qualitative	i. Importance of KM practices in HEI
		  ii. The importance of KM which connects the students, HEI and industry.
		  iii. Investigate current curriculum review process
			Narrative Text

9. **Interviewing (Non-Academic Staff)**	Qualitative	i. The importance of KM which connects the students, HEI and industry. iii. Investigate current curriculum review process	Narrative Text

10. **Document Review**	Qualitative	i. Review the current curriculum
		  ii. Analyze the curriculum weightage
		  iii. Focus on competencies
			Narrative Text

11. **Systems Review**	Qualitative	i. Use of KM in HEI ii. Importance / advantage of KM in HEI	Narrative Text
12. **User Testing and evaluation of the developed prototype**	Quantitative & Qualitative	i. User evaluation and acceptance of developed prototype	Numeric data Narrative text

reason why this method is chosen is due to the fact that this method is one of the most popular methods of dealing with incomplete data (Levy & Lemeshow, 1999). Besides that, the missing values are relatively small compared to the sample size of this research, and the sample size did not reduce significantly to cause biasness.

3.7.2 Sample of the Study

The case study is confined to current students, alumni, HEIs and industry as the boundary of the case. As such it involves the current students and graduates students, HEIs and employers from the industry. Careful sampling (Smith, 1988) is not necessary as (a) the population is homogenous; (b) getting participants who are willing to participate requires purposive sampling. A total of two hundred and forty six (246) current students, hundred and forty seven (147) alumni students, one hundred and fifty two (152) employers, twenty (20) academic staff and twelve (12) non-academic staff from the university were involved in the survey as shown in Table 3.2.

Table 3.2: Responders' details

Responders	Questionnaires			Interviews	
	Sent to (n)	Valid Responded	Percentage (%)	Total (n)	Percentage (%)
Current Students	285	246	86.32	48	19.51
Graduated Students	228	147	64.47	31	21.09
Employers	237	152	64.14	24	15.79
Academic Staff	35	20	57.14	15	75.00
Non-academic staff	19	12	63.16	9	75.00

According to Patton (1990), "There are no rules for sample size in qualitative inquiry. Sample size depends on what you know, the purpose of the inquiry, what's at stake, what will be useful, what will have credibility, and what can be done with available

time and resources. Among the participants who participated in survey, forty eight (48) current students, thirty one (31) alumni students, twenty four (24) employers, fifteen (15) academic staff and nine (9) non-academic staff were willing to participate in the interview. The interviews that were conducted for the employers took place from 10th March 2010 until 5th November 2010. The interviews for the academic staff and non-academic staff took place from 7th September 2010 until 24th February 2011. The graduated students' interviews took place from 4th June 2010 until 25th March 2011. Finally for the current students, the interviews took place from 22nd December 2010 until 12th March 2011. To ensure the confidentiality of the information, the university, students and employers under study were given assurance that their personal information would not be revealed.

Using purposive sample technique to identify the participants in this study ensured the specific subset of the population in the sample. Even though the participants from current students, alumni, faculty members and employers were purposefully chosen, participation was voluntary and the recruitment was confidential. The intention to have a clear rationale or criteria for selecting the participants was to have credible and trustworthy data. Purposive sampling enables the researcher to target a particular population and select participants based on affiliation with the group (Patton, 1990). Weiss & Sosulski (2002) stated, "Purposive sampling is a sampling method in which elements are chosen based on purpose of the study. Purposive sampling may involve studying the entire population of some limited group or a subset of a population". Patton (1990) wrote extensively on purposive sampling, noting it helped to inquire intensely rich information. Each of the participant talk about their stories from different perspectives of experience and impartation, thus utilizing purposive sampling resulted in the choice of participants who were most suitable for the particular purpose of the study. Gay, Mills, and Airasian (2006) stated that

purposive sampling "is the process of selecting a sample that is believed to be representative of a given population" (p.113). The use of purposive sampling enables "researchers to handpick the cases to be included in the sample on the basis of their judgment of their typicality" (Weiss & Sosulski, 2002).

The study also made use of the snowballing sampling methods in order to enable participants to identify others who were willing to participate in the study. Snowball sampling depends on referrals from initial participants to acquire new participants. Snowball sampling is a method used where existing participants in a study can recruit prospective participants amongst their acquaintances (Heckathorn, 1997). The decision to include this sampling method was to ensure a robust participation from each subgroup. Patton (1990) confirmed the veracity of this method. According to Patton (1990), snowball sampling assists in categorizing people with specific characteristics needed in a research. Some of the participants were requested to recommend others who met the criteria and would be available for the study.

The researcher contacted the graduated students through phone and requests them the contact details of other graduated students. In this study, the researcher identifies a small group of graduated students and then identifies more graduated students in the desired population. Besides the graduated students, the researcher also used snowball sampling to reach the right university staff to gather information regarding this study. The researcher was aware that assistance was needed in recruiting survey respondents, thus initiating a referral chain was employed using the snowball sampling technique (Bartlett, Kotrlik & Higgins, 2001) to develop an appropriate sample size.

3.7.3 Quantitative

3.7.3.1 Survey on Current Students

Data collection through distribution of questionnaires was chosen because it allows a larger sample, as well as a wider geographical distribution of the sample, and the collection of a large amount of data in a relatively short time (Williamson, 2000). It also allows generalization to be made about the demographic of the entire population being studied (Greenfield, 2001). The survey given to the current students aims to obtain:

i. Demographic information

ii. Factor(s) involve in choosing right course

iii. General understanding on Knowledge Management System

iv. Importance of KM practices in HEIs

v. Overall curriculum review

vi. Components required in KM tool

Salant & Dillman (1994) suggested that a long questionnaire may not be the most efficient method of data collection. They stated that the proper design of the instrument, allowing for question items to be selected, and proper testing of the instrument are measures to help target the timing of an instrument. To address those concerns, the content of the questionnaire was targeted for approximately 20-30 minutes. The instrument used in this study is an eight-page questionnaire consisting of seven (7) sections (see Appendix A). The questionnaire used open-ended questions, multiple choice answers and Likert scale answers. The first section of the questionnaire consists of nine (9) questions on respondent's background. The focus is on the respondents' demographics such as their age group, gender, their highest educational attainment, family background and combined income for both parents. This section is used to

confirm that the respondents are from ICT background and their overall background. The second section has five (5) questions on the factor(s) involve in choosing right course in HEIs. The third section of the questionnaire consists of two (2) questions to find out their general understanding on KM. The forth section consist of sixteen (16) questions on the effectiveness of results using KM practices. The fifth section consists of fifty-three (53) questions on the overall curriculum in the HEIs. The sixth section discusses the causes of unemployment among ICT graduates. The seventh section discusses the requirements of KMS that could support the employability of ICT graduates and the improvement of curriculum review process. It consists of six (6) questions. At the end of the section, a question on the respondents' views on KM in HEIs was posed.

Table 3.3 provides a summary on the operationalization of the survey constructs. It also maps with other various studies of which the constructs are based on. These questions were developed by referring to the WST model. The demographic information of the respondents reflect the layer one which is the participants. The factors involve in choosing right course in HEIs determine layer two which is the information. General understanding on KM determined from layer three. The importance of KM practices in HEIs derived from layer three and four which is the technology and process and activities. The questions on the current HEIs curriculum review process derived from layer five, six, seven and eight which is the product and services, customers and outcomes.

Finally, the causes of unemployment among ICT graduates also derived from layer five, six and seven which is the product and services, customers and outcomes and ultimate goal. The details of the layers are discussed in Chapter 2. The questionnaire was submitted for review to the head of Information Science Department, FCSIT and six staff and five employers. Based on their feedback, unnecessary

Table 3.3: Survey constructs for current students

Construct	Definition	Number of Items	Types of responses	WST
Demographic Information	The respondents' demographics such as their age group, gender, their highest educational attainment, family background and combined income for both parents	8 (Question 1 - 8)	Nominal and interval data	Layer 1
Factor(s) involve in choosing right course in HEI.	To know if the students choose the major based on their interest or by other's advice. To know how well the students are getting support from their family to pursue their studies, to know how well HEIs can support / provide useful information to the students. To know the type of information that was provided to student	5 (Question 9-13)	Nominal and interval data open ended answer	Layer 2
General understanding on KM	To know current students' general understanding on KM.	2 (Question 14-15)	Nominal and interval data	Layer 3
Importance of KM practices in HEI	To identify the current students' point of view on the importance of KM practices within HEIs	16 (Question 16-31)	Ordinal data (Likert type five scale)	Layer 3 & 4
Current HEI curriculum review	To check how well the curriculum is testing the student's knowledge To know how well the HEIs manage to provide the accurate information to their students. To know there is a proper communication link between HEIs and students To ensure that they develop the correct curriculum where they focus on both hard skills and soft skills to meet the industry needs. To ensure that the students are prepared with the market needs. To ensure that the courses taught in HEIs are up-to-date To investigate if the workload can be one of the factor that lead to unemployment. It is believed that if it is overloaded, then the student won't be able to absorb that knowledge they learned in their studies.	53 (Question 32-85)	Ordinal data (Likert type five scale)	Layer 5,6,7 & 8
Causes of unemployme-nt among ICT graduates	To know if the student takes effort to know what is required in the job market. To know how well the students know the importance of soft skills To get feedback from students on the importance of soft skills To get feedback from students why there is a gap and if they realize of the gap to get them prepared to overcome the gap. To check how confident the students are with their technical knowledge that they gain in their HEIs. To decide if the HEIs is proving the accurate information to the student. If not why?	19 (Question 86-104)	Nominal and interval data and ordinal data (Likert type five scale)	Layer 5,6,7 & 8
Requirements of KMS	Capture the requirements of KMS that can support the employability of ICT graduates and the improvement of curriculum review process.	6 (Question 105-110)	Nominal and interval data	
Others	To see the major contribution of unemployment from student point of view. Elicit suggestion and comment on KM in HEIs	1 (Question 111)	Open ended answer	

questions were discarded, ambiguities and difficult questions were rephrased and each question was checked if an adequate range of responses were given. A pilot test was conducted to test the questionnaire for validity and reliability using a small convenient sample of thirty (30) current students and thirty (30) graduated students. The questionnaire was then revised to remove various inconsistencies, ambiguities and difficult questions based on the comments given by responds during pilot testing.

3.7.3.2   Survey on Graduated Students

The second survey given to the graduated students aims to obtain:

i.   Demographic information

ii.   About Current Job

iii. Factor(s) involve in choosing course

iv.   General understanding on Knowledge Management

v.   Importance of KM practices in HEIs

vi.   Overall curriculum review

vii. Causes of unemployment among ICT graduates

The instrument is twelve-page questionnaire consisting of seven (7) sections (see Appendix B). The questionnaire used open-ended questions, questions having multiple choice answers and those using Likert scale answers. The first section of the questionnaire consists of ten (10) questions. The focus is on the respondents' demographics such as their age group, gender, family background and combined income for both parents which refer to layer one of WST which is the participants. The second section is about their current job which is the layer two which is the

information. It consists of information on their current work and their working experience. The third section of the questionnaire discuss the factors involve to choosing course in HEIs which derived from information layer. It consists of three questions. The forth section discusses their general understanding on KM which refer to layer three which is technology layer. It consists of two questions. Section five discusses on the importance of KM in HEIs refer to layer three which is technology layer and layer four which is the process and activities layer. It consists of sixteen (16) questions. The following section discusses on the overall review of their current HEIs curriculum which consist of fifty-three (53) questions. . It derived from layer five, six and seven which is the product and services, customers and outcomes. Section seven discusses the causes of unemployment among ICT graduates. It derived from layer five, six, seven and eight which is the product and services, customers and outcomes and ultimate goal. It consists of twenty-two (22) questions. Then, the respondents were asked on the requirements of the KMS. At the end of the section, a question on the respondents' views on KM in HEIs was posed. Table 3.4 provides a summary on the operationalization of the survey constructs. These questions were developed by referring to the WST model.

The demographic information of the respondents reflect the layer one which is the participants. Data collection about their current job derived from layer two, which is the information. The factors involve in choosing right course in HEIs determine layer two which is the information. General understanding on KM determined from layer three. The importance of KM practices in HEIs derived from layer three and four which is the technology and process and activities. The questions on the current HEIs curriculum review process derived from layer five, six and seven which is the product and services, customers and outcomes. Finally, the causes of unemployment among

ICT graduates also derived from layer five, six and seven which is the product and services, customers and outcomes.

Table 3.4: Survey constructs for Graduated students

Construct	Definition	Number of Items	Types of responses	WST
Demographic Information	The respondents' demographics such as their age group, gender, their highest educational attainment, family background and combined income for both parents	10 (Question 1 - 10)	Nominal and interval data	Layer 1
About their Current Job	To check their employability status To check our student's level in getting a job in developed organization To verify how well their studies suit their job To check their satisfaction level with their job based on their qualification To identify how early the students plan their future To check the area the student's are getting job To check if the students choose the job based on their interest or to satisfy others. To check if the student take extra initiative to improve their skills To check the students' point of view on unemployment	7 (Question 11 -17)	Nominal and interval data	Layer 2
Factor(s) involve in choosing right course in HEI.	To know if the students choose the major based on their interest or by other's advice. To know how well the students are getting support from their family to pursue their studies, to know how well HEI can support / provide useful information to the students. To know the type of information that was provided to student	3 (Question 18-20)	Nominal and interval data open ended answer	Layer 2
General understanding on KM	To know current students' general understanding on KM.	2 (Question 21-22)	Nominal and interval data	Layer 3
Importance of KM practices in HEI	To identify the current students' point of view on the importance of KM practices within HEI	16 (Question 23-38)	Ordinal data (Likert type five scale)	Layer 3 & 4
Current HEI curriculum review	To check how well the curriculum is testing the student's knowledge To know how well the HEI manage to provide the accurate information to their students. To know there is a proper communication link between HEI and students To ensure that they develop the correct curriculum where they focus on both hard skills and soft skills to meet the industry needs. To ensure that the students are prepared with the market needs. To ensure that the courses taught in HEI are up-to-date To investigate if the workload can be one of the factor that lead to unemployment. It is believed that if it is overloaded, then the student won't be able to absorb that knowledge they learned in their studies.	53 (Question 39-92)	Ordinal data (Likert type five scale)	Layer 5,6 & 7
Causes of unemploy-ment among ICT graduates	To know if student takes effort to know what is required in job mkt. To know how well the students know the importance of soft skills To get feedback from students on the importance of soft skills To get feedback from students why there is a gap and if they realize of the gap to get them prepared to overcome the gap. To check how confident the students are with their technical knowledge that they gain in their HEI. To decide if the HEI is proving the accurate information to the student. If not why?	22 (Question 93-115)	Nominal and interval data and ordinal data (Likert type five scale)	Layer 5,6 7 & 8
Requirements of KMS	Capture the requirements of KMS that can support the employability of ICT graduates and the improvement of curriculum review process. To see the major contribution of unemployment from student point of view.	6 (Question 116-121)	Nominal and interval data	
Others	Elicit suggestion and comment on KM in HEI	1 (Question 122)	Open ended answer	

3.7.3.3   Survey on HEIs

There is a need to understand the KM practices within the organization. The survey given to the HEI aims to obtain:

i.   Demographic information

ii.   KM practices within the faculty

iii.   Impact of using KM practices

iv.   Causes of unemployment among ICT graduates

v.   Skills required in the workplace

The instrument is a five-page questionnaire consisting of six (6) sections (see Appendix C). The questionnaire used open-ended questions, questions having multiple choice answers and those using Likert scale answers. The first section of the questionnaire consists of one (1) major question with six (6) sub-questions. The focus is on the respondents' demographics such as the age group, gender, highest education, job position, and years of working experience in HEIs which reflect the layer one which is the participants. The second section of the questionnaire discusses their general understanding on KM which is from layer two which is the information. The third section explains the KM practices in their HEIs which is layer three, four and five which is technology, process and activities and product and services. It is followed by causes of unemployment among ICT graduates which derived from layer four, five and six which is the process and activities, product and services and customers. The fifth section discusses the respondents' views on KM in HEIs refer to outcomes which is layer seven and eight. The sixth section discusses the requirements of KMS that can support the employability of ICT graduates and the improvement of curriculum review process.

Table 3.5 provides a summary on the operationalization of the survey constructs. It also maps with other various studies of which the constructs are based on.

Table 3.5: Survey constructs for HEI

Construct	Definition	Number of Items	Types of responses	WST
Demographic Information	The respondents' demographics such as their age group, gender, their highest education, job position and years of working.	5 (Question 1-5)	Nominal and interval data	Layer 1
General understanding on KM	To know HEI's general understanding on KM.	2 (Question 6-7)	Nominal and interval data	Layer 2
Impact of using KM practices within the HEI	To identify how well KM are practiced in HEIs	23 (Question 8-30)	Ordinal data (Likert type five scale)	Layer 3,4 & 5
Causes of unemployment among ICT graduates	To know if the student takes effort to know what is required in the job market. To know how well the students know the importance of soft skills To get feedback from students on the importance of soft skills To get feedback from students why there is a gap and if they realize of the gap to get them prepared to overcome the gap. To check how confident the students are with their technical knowledge that they gain in their HEIs. To decide if the HEIs is proving the accurate information to the student. If not why? To see the major contribution of unemployment from student point of view.	11 (Question 31-41)	Nominal and interval data and ordinal data (Likert type five scale)	Layer 4, 5 & 6
Requirements of KMS Other	Capture the requirements of KMS that can support the employability of ICT graduates and the improvement of curriculum review process. To identify the employer opinion on how soft skills can be improved Elicit suggestion and comment on KM in HEIs	8 (Question 42-49) 1 (Question 50)	Nominal and interval data Open ended answer	Layer 7 & 8

3.7.3.4   Survey on Employers

Knowing what the employer wants is a key factor to reduce the unemployment issues among ICT graduates. This means, the HEIs need to get a clear picture on what exactly the employer looking for on a graduate. The best way to find this information is to conduct a survey. Survey research is one of the most important areas of measurement in applied social research. In this study, the survey given to the Employers aims to obtain:

vi.   Demographic information
vii.   General understanding of KM
viii.   Importance of KM practices in HEIs
ix.   Causes of unemployment among ICT graduates
x.   Skills required in the workplace
xi.   How to improve employability.

The instrument is an eight-page questionnaire consisting of seven (7) sections (see Appendix D). The questionnaire used open-ended questions, questions having multiple choice answers and those using Likert scale answers. The first section of the questionnaire consists of one (1) major question with eight (8) sub-questions. The focus is on the respondents' demographics such as what industry they are related to, industry size, the respondent's position in the company and their experiences which reflect the layer one which is the participants.

The second section of the questionnaire discusses their general understanding on KM. This refers to layer two and three which consist of information and technology. The third section explains the KM practices in HEIs. This derived from layer three and four which is the technology and process and activities. It followed by causes of unemployment among ICT graduates. This derived from layer five, six and seven which is the product and services, customers and outcomes. The sixth section discusses on how to improve employability and reduce the skill gaps between the students' skills and skills required by industry. This derived from layer four, five and six which is the process and activities, product and services and customers. Then it collects information on the requirements of KMS that could support the employability of ICT graduates and the improvement of curriculum review process.

The last section discusses the respondents' views on KM in HEIs which derived from layer seven and eight which is the outcome and ultimate goal. Table 3.6 provides a summary on the operationalization of the survey constructs. It also maps with other various studies of which the constructs are based on.

3.7.4   Qualitative Data

According to Gall, Borg & Gall (2002), interviews are used extensively in educational research to collect data about phenomena that are not directly observable. The survey

Table 3.6: Survey constructs for Employers

Construct	Definition	Number of Items	Types of responses	WST
Demographic Information	The respondents' and company demographics such as organization name (optional), industry type (What industry they are related to), interviewee's position (To know the person's position in the company. To find out how quality the information can be, optional), years of working (To ensure that they person know well about the company), contact details (optional), organization origin (To know if it is a local company or International company) and number of employees working in the organization (to measure the size of the company and to know their requirements to employ an worker in their organization).	1 (Question 1)	Nominal and interval data	Layer 1
General understanding on KM	To know current students' general understanding on KM.	2 (Question 2-3)	Nominal and interval data	Layer 2 & 3
Importance of KM practices in HEI	To identify the current students' point of view on the importance of KM practices within HEIs	16 (Question 4-19)	Ordinal data	Layer 3 & 4
Causes of unemployment among ICT graduates	To know if the student takes effort to know what is required in the job market. To know how well the students know the importance of soft skills To get feedback from students on the importance of soft skills To get feedback from students why there is a gap and if they realize of the gap to get them prepared to overcome the gap. To check how confident the students are with their technical knowledge that they gain in their HEIs. To decide if the HEI is proving the accurate information to the student. If not why? To see the major contribution of unemployment from student point of view.	11 (Question 20-31)	Nominal and interval data and ordinal data (Likert type five scale)	Layer 5,6 & 7 & 8
Skills required in the industry	To know the type of position available in their organization To know the education level required for certain position To know if they need working experience for that position To know if the organization is providing opportunities for students to work in their organization and to know the reason for not providing (if any) To know if the organization having relationship with a specific HEIs To know if the student have the skills that employer looking for To get the employer's feedback on the skill that is important for students to have. To identify the skills or qualities that employer look for when hiring new employees To identify the major skills or qualities are lacking when hiring new employees To get the feedback from the employer on other skills that are lacking among fresh graduates To identify which area most of the students facing problem.	6 (Question 32-37)	Nominal and interval data	Layer 4, 5 & 6
How to improve employability	To get the employer's feedback about the importance for HEIs to have communication link with employer to keep their curriculum up-to-date To identify if the employers are willing to work together with HEIs To know the importance of internship programme To get feedback from employer the type of advice they would give to fresh graduates to help them find a good job? To get the employer feedback on the unemployment issue To get their feedback on the Government's action that can be taken To identify the total vacancies available for graduates To know their willingness to cooperate with HEI and students To get the employer feedback To identify how the employer short list the candidates	11 (Question 38-48)	Nominal and interval data	Layer 7
Requirements of KMS	To identify the employer opinion on how soft skills can be improved Capture the requirements of KMS that can support the employability of ICT graduates and the improvement of curriculum review process.	9 (Question 49-57)	Open ended answer	
Other	Elicit suggestion and comment on KM in HEIs	1 (Question 58)		

was initially distributed followed with the interviews. Interviews were conducted to probe further opinions and gather in-depth information on the KM in HEIs. In-depth interviews may allow for a wide range of exploration on a specific topic. Semi-structured interviews were conducted with a fairly open framework, which allows for two-way conversation. The interviews provided opportunities to interpret the meaning of central themes from the leadership's perspective as well as to confirm or refute data gathered from the questionnaire.

Interviews were coordinated based on the interviewees' schedules. The usage of the interview script allowed the responses to follow a protocol for consistent comparisons between interviewees (Yin, 1994). A group of current students, graduated students, HEIs and employers were willing to participate in the interview. Probing questions were also introduced to draw more information from them, especially when it was felt that further elaboration was necessary. The questions were geared towards obtaining a better understanding on KM in HEIs and its effect on enhancing the curriculum review process.

Explanations of terms or interview questions were given whenever necessary throughout the interviews. Interviews were documented on paper and transcribed as extended field notes. The extended field notes were then verified with the educators in the process of "member checking" to check on the correct interpretations of the researcher. "Member checking" is viewed as a technique used for establishing the validity of an account. Lincoln and Guba (1985) regarded that this is the most crucial technique for establishing credibility. The process is necessary to ensure that the research has remained true to the ideas of the primary source. All errors, inaccuracies and omissions in the extended field notes were corrected. The interviews were conducted individually in order to solicit facts, opinions, and unexpected insights about the knowledge-building experience. For the purpose of interviewing, fifteen (15)

academic staff, nine (9) non academic staff, twenty four (24) employers, forty eight (48) current students and thirty one graduated students (31) involved in this study. The individuals who could dramatically make a point about the KM program were considered as critical case samples (Gall, Borg & Gall, 2002). This approach is used to address research objective one, two and three.

3.7.4.1 Mail survey

The study also uses mail survey to get feedback from the graduated students and employers. Mail survey is used in the cases where the researcher only has the names and addresses of the target population, but not their telephone numbers. Mail surveys also allow the respondents to answer the survey at their leisure.

3.7.4.2 Interviews

The researcher uses personal interview as one of the methods to collect the data from the current students, graduated students, HEI members and employers. One of the main advantages of interviewing is that, people may be willing to talk longer face-to-face than to someone on the phone. The disadvantage of this method is that, it usually cost more than other methods. This is particularly true where travel time is a major factor.

3.7.4.3 Document Analysis

The study included documentary evidence that would supplement the data gained from the interviews and the questionnaire. The documents described the organizational perspectives and ultimately provided the study with alternate references for later analysis of the data (Patton, 2005). Yin (1994) proposed using multiple sources of evidence (triangulation) to check validity. Document review is a way of collecting data by reviewing existing documents. The documents may be internal to an organization or may be external. In this study, the internal documents were reviewed. Documents may be hard copy or electronic and may include reports, program logs, performance ratings,

funding proposals, meeting minutes, newsletters, and marketing materials. In this study, the documents reviewed were in form of hard copy and reports. Reviewing the existing documents helps the researcher to understand the history, philosophy, and operation of the program the researcher are evaluating and the organization in which it operates. In this study, the document review helped the researcher to give further information on the different subjects taught in the HEIs and give in-depth information on the curriculum. The document review was chosen for this study as one of the data collection methods because it is relatively inexpensive, it is a good source of background information, unobtrusive, it provides a behind-the-scenes look at a program that may not be directly observable and may bring up issues not noted by other means.

Yin (1994) pointed to the importance of paying attention to the context in which a document is created in order to understand the origin and the accuracy of the source. As documents were collected the key words were entered and an abstract was created for each source and presented in an annotated bibliography. The researcher looked at a number of information during the document reviews as stated in Table 3.7.

Table 3.7: Document Review information

Area of study	Source
Course information	Student handbook, course file, interviewing
Learning Objectives of the course	Student handbook, course file
Common core subjects for different majors	Student handbook, course file
Elective courses I and II	Student handbook, course file
Total Credit hours spend	Student handbook, course file
Credit hour assigned for each subject	Student handbook, course file
Types of skills covered in each subject (both hard skills and soft skills)	Student handbook, course file, interviewing
Credit spend for each skill	Student handbook, course file, interviewing
Types of coursework given during the semester	Student handbook, course file
Theoretical or practical concentration	Course file, interviewing

The information listed in Table 3.7 is necessary to provide better understanding on current curriculum and its design. Merriam (1985) cautioned that a meaningful analysis of the data cannot be achieved if analysis is begun after all data are collected. Therefore, accessible documents were collected and examined in conjunction with the on-going review of literature. To coordinate the data gathered, a database with a keyword description enabled access to the results of each source as it became available.

3.8   Validity and Reliability

This section presents the criteria that should be used for evaluating the quality of this research. An evaluation of validity and reliability should include all phases of the project, from the study's conceptualization and design to the way the data was collected, analyzed and interpreted (Merriam, 1985). This study implemented specific methods aimed at enhancing both the internal and external validity and also the reliability of the research findings.

3.8.1   Validity

The internal validity of this study was enhanced through the use of multiple sources of data and multiple collection methods. If data and analysis findings gathered from a case-study and an accompanying interview with the participants were consistent and complementary and findings were consistent, the internal validity of the study was strengthened (Yin, 1994). In this study, the results from questionnaires and the opinions given during the interviewing session were consistent. These strengthened the internal validity of this study.

The validity is also assessed by means of expert panel evaluation, formal studies, and pilot testing. Face and content validity are two types of frequently assessed content-related validity. Face validity is the degree to which an instrument appears to

be appropriate for its intended participants in terms of clarity of directions, appropriateness of language, and clarity of printing (Ary, Jacobs, & Razavieh, 2002; Gay, 1996; Fraenkel & Wallen, 1996). The panel members were selected based on their expertise in KM. Panelists included current students, graduated students, HEIs members and industry employers. The experts were asked to critique the instrument and to recommend changes regarding its clarity, wording, appearance, ease of use, and appropriateness of the content. With input from the panel of experts, the survey tool's content-related validity was determined to be excellent; ensuring that it would measure what it is intended to measure.

The adequacy of data is centered primarily on the number of interview participants; however the numbers alone have little to do with the quality of adequacy of qualitative data (Morrow, 2005). According to Patton (1990), the validity, meaningfulness and insights generated from qualitative inquiry have more to do with the information richness of the cases selected and the analytical capabilities of the researcher than with sample size. Adequate amounts of evidence are not achieved by mere numbers, however though sufficient numbers of research participants are important. Typically, data are gathered to the point of redundancy, which means that no new information is forthcoming from new data (Lincoln & Guba, 1985). So, what are more important than sample size are sampling procedures, quality, length, and depth of interview data and variety of evidence. As mentioned, interviewing data collected from 24 HEIs staff, 24 employers, 48 current students and 31 graduated students. Since there were no new information was forthcoming after the sample size interviewed, meaning adequate amounts of evidence was achieved. To provide for adequate variety in kinds of evidence, this study used multiple sources of data such as questionnaires, interviews, document review. Multiple data sources enhance the interpretive status of the evidence (Morrow, 2005). In this study, this is achieved by complementing the questionnaires

with other data sources such as interviewing. Sufficient trust and rapport was established with the participants to ensure the 'truth value' of the evidence as it is important that the participants are telling the truth as they know it. Adequacy of interpretation during the process of data analysis, interpretation and presentation is also an essential criterion for trustworthiness. Data analysis, interpretation and writing are a continuous and interactive process.

Yin (1984) mentioned the three principles to be followed to address the methodological problem in determining construct validity to increase the overall quality of a case study. These recommendations are: (i) to use multiple sources of evidence, (ii) creating a case study database and (iii) to maintain a chain of evidence. The first was accomplished by using questionnaires, interviewing and document reviewing to collect the required data. For creating a case study database, all the information was stored in external hard disk and CDs, organized and maintained as personal files, and finally the third recommendation was accomplished when the study kept all the related materials to the data collection process to be retrieved when necessary.

3.8.2 Reliability

Reliability concerns the stability and consistency of the study over time and is ensured by creating and maintaining a case study database and developing a clear case study protocol (Yin, 1994). Reliability is the extent to which, if the inquiry were replicated, the processes could be followed by the reader and the same choices be made by the researcher. The reliability of these findings relates to whether or not the research systematically studied what is claimed to study (Carter, 1999). Reliability minimizes the errors and biases in a study. As outlined previously, the research was based on five fundamental research questions. These research questions were used to maintain the focus of the research.

Reliability of this study was also enhanced through a dependable audit which included the construction and maintenance of documentation as well as an account of the process of inquiry. Yin (1994) stated that researchers should strive to develop a formal, presentable database so that, in principle, other investigators can review the evidence directly. The reliability of the instrument was assessed using Cronbach's alpha (see Table 3.8).

Table 3.8: Reliability Coefficients (Cronbach's alpha)

Questionnaire	Categorical Variables	Cronbach's Alpha
Current Student (n=246)	Importance of KM in HEI	0.952
	Issues in our current curriculum review process	0.864
	Causes of unemployment	0.943
Graduated Student (n=147)	Importance of KM in HEI	0.889
	Issues in our current curriculum review process	0.817
	Causes of unemployment	0.805
Employer (n=152)	Importance of KM in HEI	0.813
	Issues in our current curriculum review process	0.825
	Causes of unemployment	0.806
HEI (32)	KM practices within HEI	0.834
	Issues in our current curriculum review process	0.815
	Causes of unemployment	0.864

The reliability of a measure refers to its consistency. This notion is often taken to entail two separate aspects: external and internal reliability. External reliability refers to the degree of consistency of a measure over time. Internal reliability is particularly important in connection with multiple-item scales. It raises the question of whether each scale is measuring a single idea and hence whether the items that make up the scale are internally consistent.

This study employed the internal consistency method in which Cronbach's alpha coefficient was used. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. According to Sekaran (2000), any reliabilities that were less than +0.60 were generally considered to be poor, while those in the range of 0.70 were acceptable, and those over 0.80 were good. Thus the closer

the reliability coefficient gets to 1.0, the better it is considered to be, meaning that the internal consistency reliability is higher. In this study, an internal reliability of different sections of the variables was assessed using the Cronbach's alpha technique. Table 3.8 shows the results of the reliability analysis for each item on the interval scale. The results of the reliability analysis for each categorical variable on the scales showed high reliability coefficients whose range was between .805 and .952. In this particular study, coefficients of 0.8 and above were deemed very reliable, and hence it could be deduced that the items in the questionnaire had high internal consistency and reliability.

Finally piloting and testing and retesting the questionnaire and interview script were done to strengthen the validity and reliability. Salant & Dillman (1994) discussed issues related to refining and collecting questionnaires. Pilot case study was conducted to ensure respondents understood the instructions and the questionnaire itself as well as to verify the length of time required to complete the questionnaire process. Piloting and testing and retesting the questionnaire and interview script were done to strengthen the validity and reliability.

The pilot study helps researchers to refine the data collection with regard to both the content of their data and the procedures to be followed. It also helps investigators pose relevant questions and provides a cross check for the proposed research design (Yin, 1994). For this study, the pilot case study, the HEIs, Students and industry where the study is based were selected for reasons of access, convenience and willingness of respondents to participate.

Using a combination of data collected via questionnaires, interview and review of documents, the viability of the research questions and research design was altered and refined. The pilot study helped in, (i) assessing the effectiveness of the questions and the interview protocols, (ii) identifying potential data that was likely to be obtained and also potential problems that might occur during the data collection process and

coding activities and (iii) allowing for practice in the interview setting and estimating the time requirements for each activity.

An appropriate strategy was then developed to address those problems and issues arising from the pilot activities and data to ensure reliability and validity of the research. LeCompte & Preissle (1993) discussed critical issues related to interviewing such as locating participants, gaining trust and refining the interview protocol. The pilot study was crucial to appropriately phrasing the questions, defining what participants may have needed for interviewing and rehearsing the interview protocol.

3.8.2.2 Ethical Procedures

Before initial contact with the campus sites, the researcher will have approval from the Faculty of Computer Science and Information Technology (FCSIT) to conduct research (see Appendix E). Secondly, the researcher also attached the consent letter (see Appendix F). The Informed Consent letter contained information regarding the researcher's name, role, institution, and the name and purpose of the research project.

Issues of participant confidentiality and survey anonymity were reassured, as well as highlighted benefits of participating in the study. The study also attached the supervisor's permission letter to conduct the questionnaires and interviewing (see Appendix G). Participants were also informed on data security, how to request a summary of the results of the study, and to get contact with the researcher. Due to the design of both the study and survey there are no foreseeable risks associated with either the institution or individual participate in this study.

3.9   Summary

Chapter 3 has provided a detailed description of the research methodology used to explore the use of KM approach in HEIs to support the curriculum review process. As stated in Chapter 1 and 2, this study attempted to answer three objectives. The first focus is to determine the importance of KM approach in HEIs to support the curriculum review process. The second focus is to determine the underlying reasons of unemployed graduates using FCSIT as a case study. The third objective is to design and develop a KM tool to support HEIs curriculum review process. A pilot study tested the validity of the instrument and the data-gathering techniques. The opinions were gathered through both quantitative and qualitative method to obtain details about KM in HEIs. With these results that are gathered through different research methods, a proposed KM tool would be further explained in Chapter 4 and Chapter 5.