

**Effect of Knowledge Management in IT Project Management**  
**for**  
**Project Success**

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Administration

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**Declaration**

I do here by ,certify that this dissertation doesn't incorporate without acknowledgement any material previously submitted for the degree or diploma in any university, and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

.....

Kasuntha Ranathunga

...../...../.....

Date

The undersigned, has supervised the dissertation entitled ***“Effect of Knowledge Management in IT Project Management for Project Success”*** presented by Kasuntha Ranathunga, a candidate for the degree of Masters in Information Technology, and I do here by, certify that, in my opinion, it is worthy of submission for examination.

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Supervisor

...../...../.....

Date

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## Abstract

Knowledge management and project management are recognized as very important to gain the competitive advantage of organizations within the industry. This study empirically examines the relationship between knowledge management and project management in the project based companies within the context of the information technology industry in Sri Lanka. Most of the Information Technology (IT) projects fail due to their incapability of getting the right knowledge to the right person at the right time. Proper knowledge management will be able to address these gaps. In this case proper knowledge management techniques help project teams to share information accurately while improving project performance. Previous studies have not clearly recognized the relationship between the knowledge management techniques and the project management in project based companies for the project success.

The purpose of this research is to determine if a positive relationship exists between the knowledge management and project management. If a relationship exists, what knowledge management techniques used by the practitioners of project management are significant in terms of improving project management success?

The responses from fifty two project managers in different IT companies in Sri Lanka have been evaluated. A positivism deductive approach is used in cross-sectional time horizon and mixed approach is used to gather data.

This report explores the key knowledge management techniques used in IT project based organizations. Each of these techniques has been discussed separately and then how those factors affect the project management for project success in organizations is explained.

**Key words:** Knowledge management, Project management, Positivism, Deductive, Methodology, Data collection, Data analysis.

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## **List of Abbreviations**

KM - Knowledge Management

PM – Project Management

IT - Information Technology

CoP- Community of Practice

SPPS - Statistical Package for the Social Sciences

# **Chapter 1 Introduction**

## **1.1 Introduction**

This chapter presents the overall outline of the research. This section describes the research background, research problems, research questions, research objectives, significance of the study and the de-limitations. The research background is presented on the contextual aspects with the overall concepts used in this research. The problem statement discussed the problem domain in association with the main objectives of the research and the research questions. The research objectives are constructed to present the aims of the research. The significance of the study presents the value gain to the target audience through the research.

## **1.2 Background**

The information technology industry is fast growing and modern economy is booming creating a huge competition within the industry. Companies are always looking to upgrade their technology while IT managers frequently are hunting modern management techniques. Creating the appropriate knowledge and manage the knowledge in an efficient way is one of the main elements which leads the company to maintain sustainable position in the industry. Creating and managing appropriate knowledge can be varied among the different projects in the same organization. The knowledge created from the IT projects should be managed properly to gain the success of the future projects. According to Boondao (2013), many IT projects failed due to incapability of getting the right knowledge to the right people on right time. Hence it is really important to identify how to create knowledge and manage in every project management phase. Further need to understand how knowledge is transmitted among the team members in the project, in the form of tacit and explicit knowledge.

According to Yeong (2010), knowledge management is an emerging trend which is providing significant competitive advantage for an organization. Applying the knowledge management (KM) concepts into project management (PM) allows organizations to continue to grow and survive in the business. This is why an organization really needs to consider about managing knowledge within the project to gain success of the project.

This study explores the key knowledge management techniques affecting the success of the IT project management. Later find out the KM techniques which help to improve the PM practices. The core problem will be evaluated from the information collected through the selected project

based IT organizations in Sri Lanka. All the projects which are undertaken by these organizations can be classified as either success or failure. Each and every project, which followed different types of KM techniques, will be analyzed quantitatively.

### **1.3 Research Problem**

The PM plays a main role in the successful delivery of a project. Generally, project managers strive to do their best to deliver their best on budget, schedule, and scope by managing PM disciplines. IT projects have failed due to various factors. Inefficient PM process is a main issue in these. Many PM processes failed due to lack of KM in PM process. Efficient KM processes help to improve the PM practices in the IT projects. Even though there are some KM techniques in the PM process, still there are some gaps in between KM and PM. In order to overcome such gaps between KM and PM, it needs to build an accurate KM model for successful PM practices.

### **1.4 Research Objectives**

#### **1.4.1 Main Objective**

To identify and evaluate the knowledge management techniques and practices used in IT project management in order to achieve success of IT projects.

The main research objective is further divided into following sub objectives

#### **1.4.2 Sub Objectives**

1. Analyze the KM techniques that can contribute to IT project success
2. Find out the KM techniques which are being used in Sri Lankan project based IT companies
3. Evaluate the relationship between different KM techniques and IT project success

### **1.5 Research Questions**

In order to fulfill the above objectives, the following research questions are addressed in this study.

1. What are the KM techniques that can contribute to IT project success?
2. What are the common KM techniques being used in IT projects in Sri Lanka?
3. What is the impact on IT project success when using different KM techniques?

## **1.6 Significance of the Study**

This study evaluates the KM techniques used in IT PM for its contribution towards project success. It is useful to identify the key contributions of KM techniques for improving the PM process and achieve project success. Thereafter, this knowledge can be used to identify the different PM improvements that would result from different KM techniques.

This study will mainly help IT project managers to understand the benefits of KM techniques when it is used in PM phases to gain project success. Also, it will help the theoretical model to minimize the gap between KM and PM processes.

Further this study will help programmers, testers and implementation engineers to understand the KM techniques in PM phases, in which each of them is involved in.

Finally, this study will help almost all the project stakeholders to gain success from their IT projects by using right KM techniques at the right time.

## **1.7 De-limitation**

Following limitations were considered as key limitations of this research.

- Research population was restricted to Sri Lankan software project based companies' due to the limited time frame to fulfill research obligations.
- The research scope was constrained down to assess impact of knowledge management in project management. The other core disciplines such as quality assurance, project development, etc. were considered as out of the scope disciplines in order to minimize the complexity of the research scope.
- The research was constrained down to assess the impact of project management based on the project status.

## **Chapter 2 Literature Review**

### **2.1 Introduction**

This chapter deals with the literature review done for the research. The concept of KM, KM life cycle models, KM techniques and tools used in the industry are discussed. Then the concept of PM, PM life cycle, project based companies and KM in project phases are discussed. Next section represents the past researches and those results related to KM integration in project context. Information in this section was collected through various electronic databases like Science Direct, Emerald, Research Gate, Academia, etc. Also, this section collected information from unpublished thesis and websites.

### **2.2 Knowledge Management**

#### **2.2.1 Knowledge and KM**

According to Yeong & Lim (2010), knowledge has been recognized as the only asset that can offer organizations a competitive advantage as there is a strong linkage between core competence and organization knowledge. They explain that knowledge could be explored individually or as part of KM. In addition, they also explain KM as a process of managing knowledge to enable “creation of entirely new knowledge, while also accelerating the innovation”.

According to Boondao (2013) KM is a process of capture, attain, organize, and disseminate employees’ knowledge in a form of tacit and explicit knowledge. The explicit knowledge is knowledge that can be articulated, stored, and easily transmitted to others. It can be stored in a hard copy or in a database. Tacit or implicit knowledge is difficult to express or share with others. Tacit is kind of knowledge which can’t be readily visible or expressed. It basically contained in people’s mind. Since this type of knowledge is highly personal it’s hard to formalize and difficult to share with others (Nonaka, 2005). Tacit knowledge is the most valuable, although it’s difficult to capture, and, transfer between people is slow and costly (Magalhaes, 2004). Choy (2005) stated KM is management of organizational knowledge for creating business value and generating a competitive advantage.

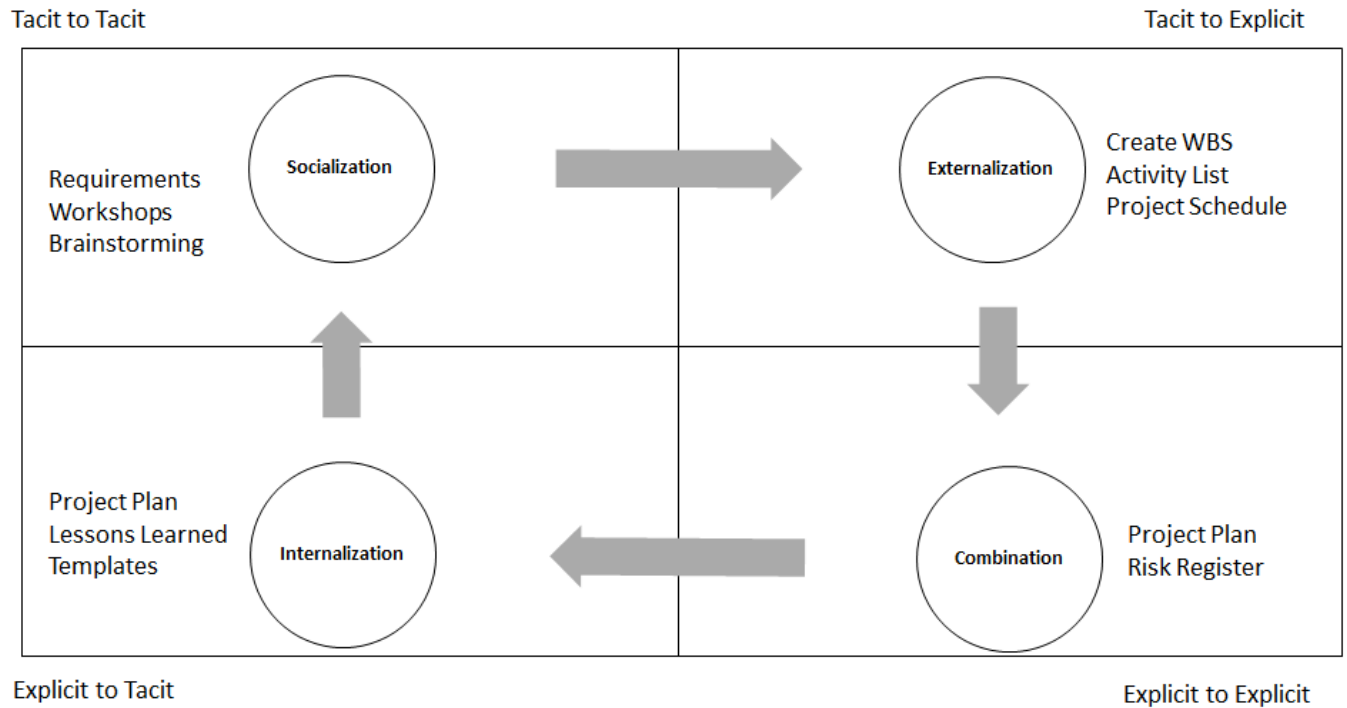


Figure 2:1: Knowledge spiral model and project activities

Source: Nonaka (2005, p.4)

The diagram in figure 2.1 shows the Knowledge Spiral Model (KSM) introduced by Nonaka (2005, p.4) to illustrate how the knowledge works in hand within each project phase. KSM model contains four main processes. They are Socialization process, Externalization process, Combination process and Internalization process.

**KSM Socialization process:** This happens on the project during project meetings, post project reviews, brainstorming sessions, workshops and project evaluations.

**KSM Externalization process:** The project's tacit knowledge is codified by creating Project Schedule, Activities List or WBS.

**KSM Combination process:** Explicit knowledge can be merged during this process, for example by creating a Project Plan that combines all other project plans, such as Risk Management Plan, Activities List, Scope Management Plan and Project schedule.

KSM Internalization process: When people review codified knowledge during this process of KSM, such as project's lessons learned or project plan from previous projects, they may gain new tacit knowledge, which they can apply in future projects implementation.

As project environment matures within the organization, knowledge also matures. As project progresses, the knowledge moves from tacit to explicit and back to tacit knowledge through the KSM.

Bhojaraju (2005) has defined KM as the process of gathering, managing and sharing knowledge of the employees within the organization. Further, he has stated that it is an obligatory practice of the company to work in collaboration and make room for integrated method for the creation, capture, organization access and use of core knowledge. Furthermore, he noted knowledge as one of the a most valuable assets of a company and KM has now become a main priority for companies of all sizes. Thus, distributing knowledge effectively across the enterprise is a serious issue for many IT companies.

The systematic process of finding, selecting, organizing, refining and presenting information, improves an employee's knowledge in a specific area of interest. Kalam (2004) has emphasized that KM helps to an organization to gain insight and understanding from its own experience. KM focus on organization on acquiring, storing and utilizing knowledge for problem solving, dynamic learning, strategic planning and decision making.

KM is not only about Knowledge Technology and it is to achieve strategic business objectives. Bhojaraju (2005) has highlighted that the organizations are facing difficulty in adhering to new technologies because it is either difficult to determine if inappropriate or appropriate to their work environments, or employees are not willing to share knowledge with others. Therefore, KM initiative have gradually become a solution for such glitches, which helps to bring people together, process and technology and helps companies to achieve their vision, mission and goals.

According to Bhojaraju (2005), the process of KM can be initiated from identification of knowledge needs of the company and then proceeding to explore the existing knowledge and create new knowledge. The diagram in figure 2.2 illustrates the KM process introduced.



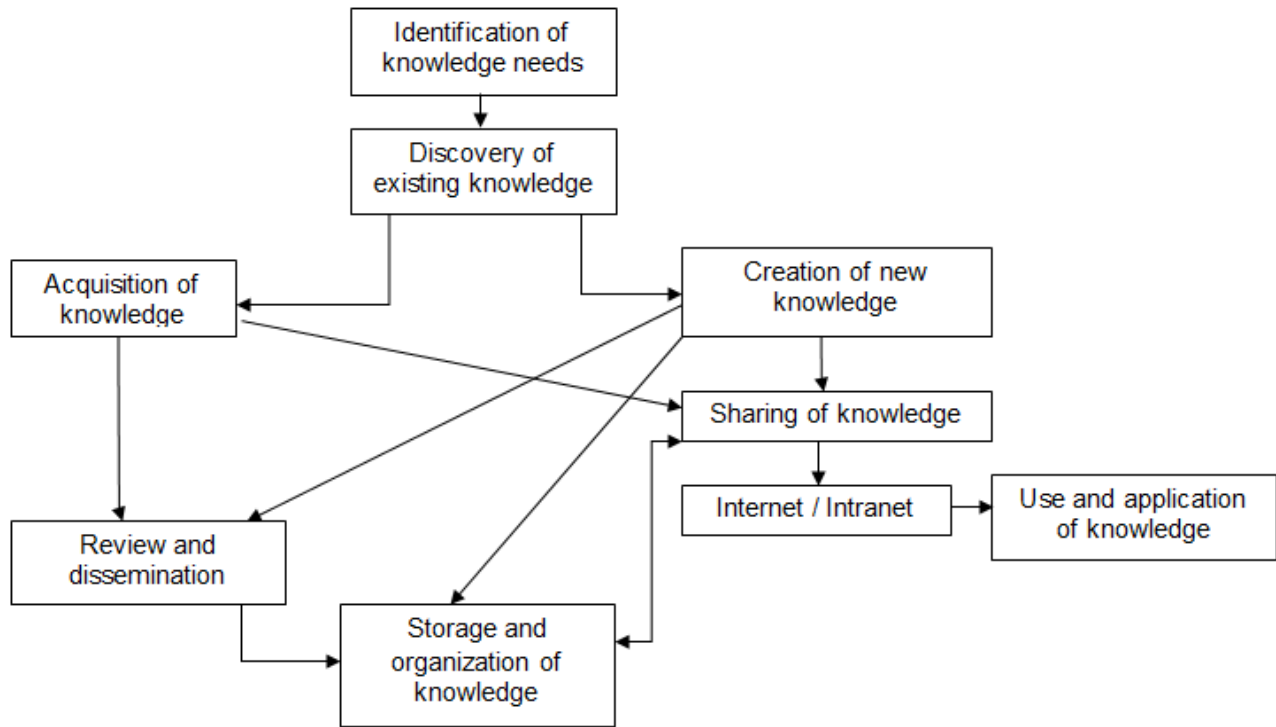


Figure 2:2: Process of KM

Source: Bhojaraju (2005)

KM is an important process for any organization in the IT industry and becomes a primary approach of the project managers. If the organization does not have proper KM it will allow reduction of the organizational memory and the knowledge, since they do not allow their employees to become knowledgeable people. It is proved by Polyaninova (2011, p.3) that a significant amount of professional time spent on the different tasks could be avoided initially itself as illustrated in figure 2.3.

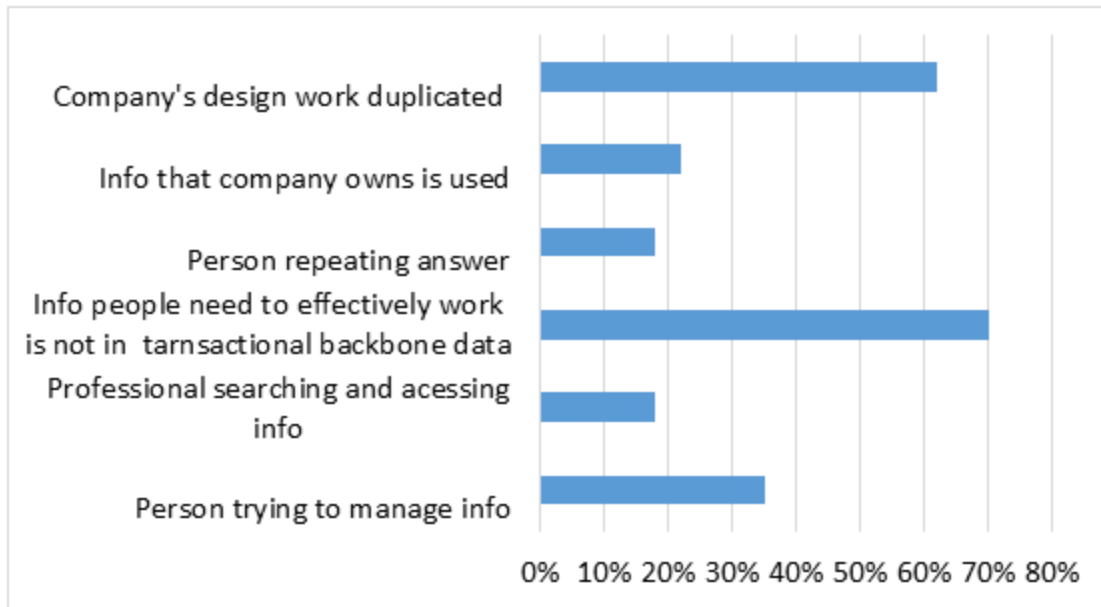


Figure 2:3: Time spent on organizational double-work

Source: Polyaninova (2011, p.3)

Polyaninova (2011) stated that it is important to ensure that the knowledge is circulated properly through the project life cycle by allowing project requirements to be well defined, explained and deliverables established with ultimate product delivery to the customer according to the requirements recognized at the start of the project. Moreover, it is necessary to make sure that knowledge is not vanished between project phases and during integration of phases. For an example, when there is a project, a team is allocated to work on a project. Team may feel that the knowledge in their mind is their own knowledge and belongs to them. Sometimes they may feel that there is not enough time to document and share the knowledge while achieving the project deadlines. In some cases, additional requirements may come from the customers at the project implementation stage. These findings by Polyaninova illustrate how they can cause direct interference on the KM process within projects.

## 2.2.2 Knowledge Life Cycle Model

According to the model shown in figure 2.4 introduced in Alekseev (2010) a knowledge life cycle may start either from an inside-organizational knowledge creation process or from knowledge acquisition process, which implies that organization may also attain knowledge from outside sources. The full life cycle of knowledge conversion on the way to organizational performance, apart from knowledge creation, contains certain stages such as knowledge refinement; knowledge storage, knowledge sharing or transfer, and knowledge utilization.

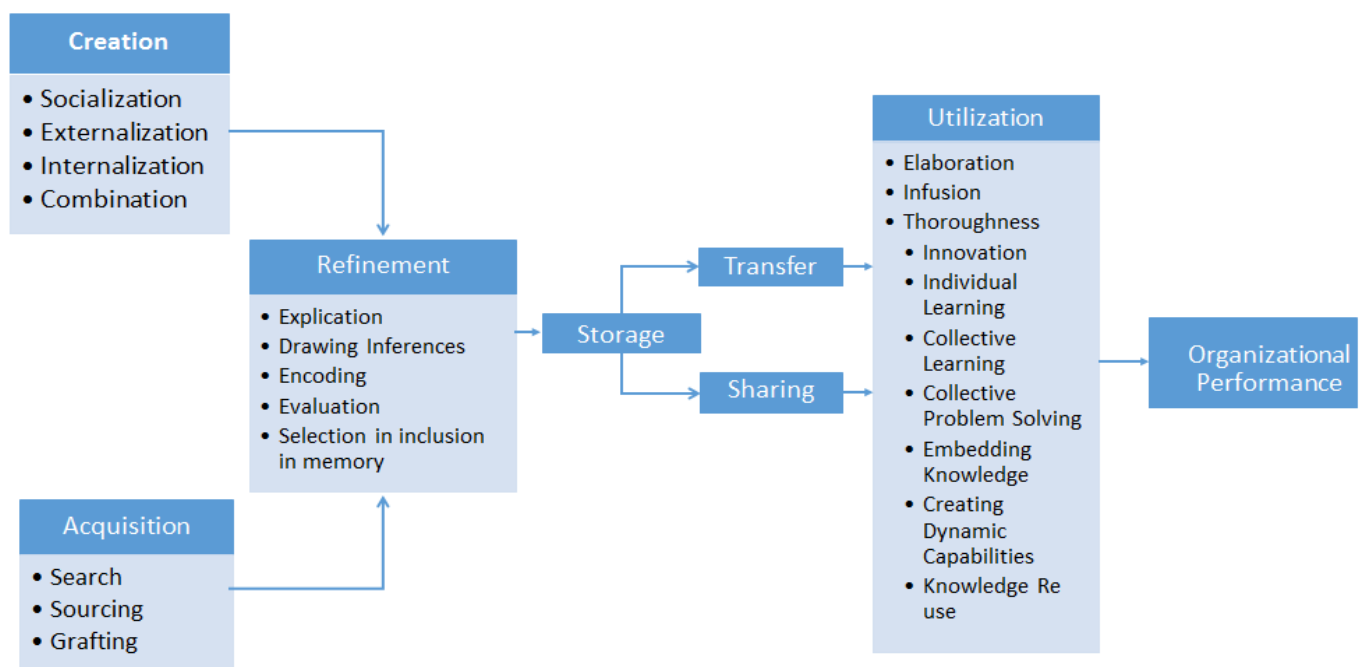


Figure 2:4: Knowledge life cycle model

Source: Alekseev (2010)

### 2.2.2.1 Knowledge Creation and Acquisition

There are two main elements to concentrate on knowledge creation stage: what is the necessity of creating new knowledge and what are the tools and techniques can be used in creating new knowledge. In some cases, creating knowledge is not important as using the previous knowledge. Alekseev (2010) stated creating knowledge is suitable for R & D companies such as construction

and IT, where projects are very challengeable. Also, it discussed about obtaining explicit knowledge from external sources. External sources may be the time of exhausting outside knowledge and adapting to organization or employing the person with required knowledge.

#### **2.2.2.2 Knowledge Transfer and Sharing**

According to Alekseev (2010), knowledge transfer is a structured way of communication. It is not like knowledge sharing but knowledge transferring involves direct interaction between knowledge sender and knowledge receiver. Therefore, knowledge transfer is more focused and purposeful. As per Alekseev, it is necessary to meet two requirements when transferring or sharing knowledge: receiver should have intellectual potential for its digestion and need to select an appropriate technique and media to transfer.

#### **2.2.2.3 Knowledge Storage and Utilization**

Alekseev (2010) stated that entire knowledge in an organization is typically stored in four main elements; employee brain, paper documents, electronic documents and electronic knowledge bases. If there are no suitable KM storing mechanisms in the organization, knowledge also leaves, when knowledgeable employees leave the organization.

### **2.2.3 Knowledge Management Techniques and Tools**

According to KM Best Practices (2009), KM techniques and tools can be in two forms: people approach and technology approach. The data in table 2.1 illustrates some KM techniques which can be implemented in the project environment with the people involvement.

Table 2:1: KM Techniques and Tools – People Approach

<b>People Approach</b>			
<b>Tool/Technique</b>	<b>Usefulness</b>	<b>Approach</b>	<b>Pros and Cons</b>
After Action Review	<p>Willing to identify the project or activity which has reached a key stage.</p> <p>Making “tacit” knowledge explicit during the life of a project or activity and making sure it is captured.</p> <p>Keeping projects in-line with the main objectives as you review each stage and reflect on current position and future actions.</p>	<p>Quick discussion at the end of each stage of the project, reflecting on progress and plans.</p> <p>This approach helps individuals to learn from and reflect on what has happened, summaries new knowledge and decide what actions to be taken before moving on to the next stage of the project.</p>	<p>Organizational culture can make it difficult to admit where things didn’t go according to plan.</p> <p>It can be difficult sometimes to allow time for reflection.</p>
Community of Practice(CoP)	<p>Bringing together an individual’s working on similar projects and explore new ways, solutions and</p>	<p>Organize online and offline collaboration - face-to-face events.</p>	<p>Difficulties of getting permission to actively participate for the events.</p> <p>The success of CoP</p>

	share good practice and ideas.		relies on participant interest and it may take a long time to show results.
			Good for giving immediate feedback
			Usually requires specialist input to coordinate efforts and produce workable report at the end.
			Obtaining time/space to do this may be problematic.  Should be done regularly for maximum benefit.
Gone well/not gone well exercise	Evaluating an event or other activity which is to be repeated where it would be useful to	Use these questions to focus a quick debrief and/or feedback at the end of an event in a quick and easy way.	Central “bank” of experience and skills to help with knowledge management across the

	quickly identify what can be improved for next time.		organization which can be utilized by everyone.
Knowledge Audit	Understanding the knowledge environment of an organization or project in order to identify and deal with knowledge gaps.	Collate an inventory of available knowledge assets and information resources through surveys, process maps, interviews, analyzing competencies etc.	Can be difficult to capture in a useful way – requires active focus on synthesizing and dissemination
Knowledge cafe	Keeping up-to-date with relevant issues in a constantly changing environment.  Informal learning from discussion with your peers.	Bring people together in an informal context and setting where they can have an open, creative conversation on topics of mutual interest which will help with making more informed decisions, validating new ways of working or devising new ideas.	Up-to-date details enable un-connected people to call on/offering assistance  Requires pro-actively keeping white pages/profiles up to date.
Narrative case study	Sharing experience with others in an easily accessible way.	Record a case study in narrative form, explaining actions and consequences,	

		outlining where, why and how things went well or might have been done differently.	
Peer Assist	Direct knowledge transfer from individuals to others.	Organize a workshop and involve people with relevant experience from other teams/organizations in project teams.	Sourcing the most appropriate “peer” may be difficult.
Rapid Evidence review	Establishing the baseline for a project prior to starting it or at regular key stages.	Undertake a systematic review of existing research and evidence using robust information sources, consolidating it and capturing key messages.	
Retrospective Review	Evaluation at the end of a project or activity to review what happened.	Use a structured evaluation or impact assessment tool to support an in-depth discussion after completion of a project.  Helps to consider	



		whether objectives were met, what went well, what did not go so well, what could be improved next time, what are the lessons which could inform future work.	
Story – telling/scenarios	Occasions when simply stating the facts might not be the best way of getting information across	Use a structured session to elicit stories of experience pertaining to specific tasks or scenarios.	

Source: (KM Best Practices, 2009)

The data in table 2.2 illustrates some KM techniques which can be implemented in the project environment with the technology involvement.

Table 2:2: KM Techniques and Tools – Technology Approach

<b>Technology Approach</b>				
<b>Tool/Technique</b>	<b>Usefulness</b>	<b>Approach</b>	<b>Output</b>	<b>Pros and Cons</b>
Collaborative technologies	Working together when people and teams need to collaborate	Web 2.0/social software		Non-technical people may need training and coaching.

	across distance and time.			
Instant Messenger	Real-time collaboration between dispersed individuals and groups	Allow/enable instant messaging between people, internally.	Save “conversations” for future reference.	Not practical for large groups of people to interact at the same time.
Intranets	Helping staff in an organization to easily find out about common corporate information and processes – particularly helpful for getting new staff up to speed quickly	A range of technological solutions available – for optimum development involve Information Management, IT, communications and HR specialists and users in development.		People won’t use it if they can’t get access. Development of the intranet should be aligned with strategic objectives
Records and Information Management	Ensuring that evidence of business decisions, activities and processes are documented, preserved and	Ensure that all staff have access to appropriate shared storage. Ensuring better way of document management.	Helps users find and share what they are looking for quickly and easily.	

	easily accessible to others.			
Web 2.0 – Social networking	Building relationships, accessing resources, capitalizing on weak links.	Keep your own personal pages up to date and comprehensive. Be open and responsive to requests for advice or help from others.	Build personal and work relationships, access and discover new aptitudes and learn new knowledge.	Can be a quick and effective way to find out resources or advice. Social networking platforms such as Facebook, LinkedIn from work and many are blocked from within council's firewalls.
Knowledge Bank	Providing easy and on-going access to mass of accumulated knowledge, leading practice etc.	Repositories of stored knowledge, captured through various tools and techniques, and shared via websites and toolkits.		People won't use it if they can't get access.

Source: (KM Best Practices, 2009)

As per Young (2010), there are 11 main KM techniques which can be implemented in the project environment, which come under Non-IT methods and there are 9 KM techniques which come under IT methods.

## **Non-IT methods and tools**

1. Brainstorming
2. Learning and Idea Capture
3. Peer Assist
4. Learning Reviews
5. After Action Review
6. Story Telling
7. Collaborative Physical Workspace
8. APO Knowledge Management Assessment Tool
9. Knowledge Café
10. Community of Practice
11. Taxonomy

## **IT methods and tools**

1. Document Libraries leading to a Document Management System
2. Knowledge Bases (Wikis, etc.)
3. Blogs
4. Social Network Services
5. Voice and Voice-over-Internet Protocol (VOIP)
6. Advanced Search Tools
7. Building Knowledge Clusters
8. Expert Locator
9. Collaborative Virtual Workspaces

Karapetyan and Otieno (2011) analyzed regarding the importance of following KM practices

- Discuss experiences gained in each project (Peer assist)
- Maintain lessons learned from new experience and tasks accomplished (Lesson learned)
- Follow-up meetings (After work review)
- Expert locaters Learning and Idea Capture
- Communication of practice
- Utilization of large scale databases, such as intranet web 2
- Documentation

This study has emphasized the KM challenges that are strongly relevant to the incubators.

Alekseev (2010) has defined six practices and tools use to managing knowledge within the PM process. They are:

KM practices:

- Decision-making depends on feedback review
- Accessing the project manager work with facilitator
- Common activities among different project managers
- Common activities among different project teams
- Brainstorming sessions
- After-work activities

KM tools:

- Storing audio/video record of meetings
- Storing reports of meetings
- Storing e-copies of paper documents
- Using internal WEB-server/forum
- Using knowledge-based decision-making system

## **2.3 Project Management**

### **2.3.1 Project**

As per the PMBOK guide, PMI (2013) has defined: “project is a temporary endeavor undertaken to create a unique product, service, or result”.

According to the PRINCE2 guide, a project is “a temporary organization that is created for the purpose of delivering one or more business products according to an agreed business case (OGC 2009:16).

In PMAJ (2005:15) “Project refers to a value creation undertaking based on a specific, which is completed in a given or agreed time frame and under constraints, including resources and external circumstances”.

### **2.3.2 Project Management**

In PMBOK guide PM is defined as “the application of knowledge, skills, tools, and techniques to project activities to meet the project requirement” (PMI 2013:6). PM is accomplished through the application and integration of PM process of initiating, planning, executing, monitoring, controlling and closing.

In PRINCE2 guide PM is defined as” the planning, delegating, monitoring and control of all aspects of the project, and the motivation of those involved, to achieve the project objectives within the expected performance targets for time, cost, quality, scope, benefits and risks” (OGC 2009:17).

The PMAJ defines project management as “the professional capability to deliver, with due diligence, a project product that fulfills a given mission, by organizing a dedicated project team, effectively combining the most appropriate technical and managerial methods and techniques and devising the most efficient and effective work breakdown and implementation routes” (PMAJ 2005:16).

### 2.3.3 Project Management Knowledge Areas

- Integration
- Scope
- Time
- Cost
- Quality
- Human Resource
- Communication
- Risk
- Procurement

### 2.3.4 Project Life Cycle

The project management is performed through the relevant tools, techniques and applications with the integration of ten knowledge areas. Based on the PMI (2013, p.77) the diagram in figure 2.5 illustrate the process groups involved in each project space.

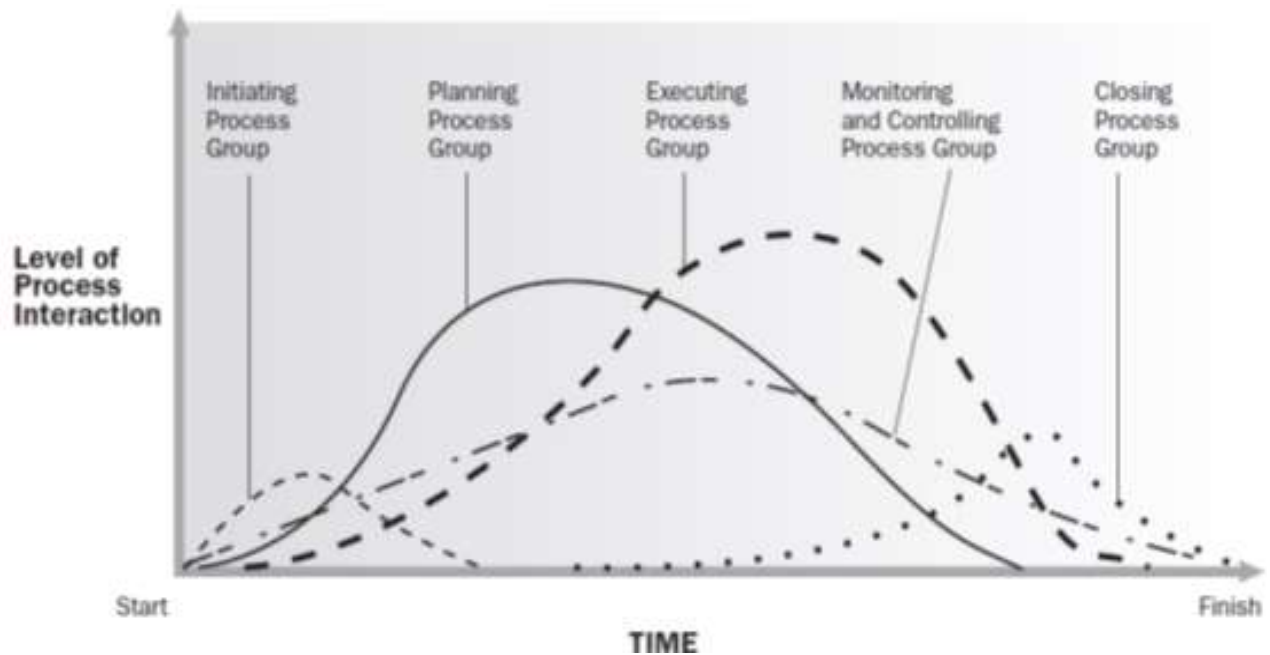


Figure 2:5: Process groups interact in a phase or project

Source: PMI (2013,p.77)

- Initiating Project: Initiate a new project or a new project phase by gaining permission to begin the project or phase.
- Planning Project: Establish the scope of the project; formulate the objectives and related action items to achieve project objectives in strategic way.
- Executing Project: Fulfill the project or product development activities according to the project specifications and project management plan.
- Monitoring and Controlling Project: Track, evaluate, and control the work progress and performance of the project.
- Closing Project: Conclude all project activities to officially close the project or phase.

As per Bojnord & Afrazeh (2006) basically there are three phases for projects. They are planning, designing and implementation.

- Planning: Planning can be defined as a process of activities that starts by breaking the project work into activities. The planning phase is greatly impacted by questions like: what, where, how, time and cost. At the end of the planning phase it has a program for action.
- Designing: In design phase, each group/individual should do the planned duties. Technical design in each part should be done in this phase. At the end of this stage it has project plans and schedules for implementation.
- Implementation: In the implementation phase translation of ideas into action is carried out.

Later monitoring of project progress is done with established dead-lines and designated responsibilities.



### **2.3.5 IT Project Management Success**

According to the OGC (2009), PRINCE2 has mentioned the key success factor of any project is that it delivers what the user expects and find it acceptable.

According to the PMAJ (2005), in order to complete a project successfully, it is need to devise a well-integrated plan takes into account budget, time as well as health, safety and environment (HSE) aspects of the project.

In general, project success can be judged on the project completed within time, cost and quality. It is also called triple constraints.

### **2.3.6 Project Knowledge**

Project knowledge is usually created by the people who are involved in the project, such as project managers, software engineers, QA engineers, release/implementation engineers and even clients. Knowledge in the projects comes from different internal sources like risk logs, lesson learnt and previous experience. Also comes from different external sources like competitor analysis and benchmarking. According to Ajmal and Koskinen (2008) project managers are responsible to perceive and utilize the knowledge within established practices in day to day team work. To find ways to this task, it requires to have a clear understanding types of knowledge and knowledge bases which should contain in proper knowledge management system. Conroy and Soltan (1998) brought out following three knowledge bases in projects.

1. Organization knowledge base – Knowledge relevant to organizations and environments in which projects are implemented in.
2. Project management knowledge base – relevant to knowledge theories and application of PM
3. Project specific knowledge base - include the knowledge acquired during the implementation of the particular project.

Conroy and Soltan (1998) has categorized project created knowledge into three general categories.

1. Technical knowledge - related to techniques, technologies and work process

2. Project Management knowledge – methods and procedures required for managing the projects
3. Project related knowledge - knowledge about clients and other stakeholders that are significant for the future business of the organization

Project knowledge is created in each phase of the project. Even during the project definition and planning phase, the working process, time and budget are creating new knowledge and experience, which can be documented, stored and perceived. During project execution, monitoring and controlling phases, the new knowledge is created and captured as project work implementation. Activities like lesson learnt can be documented in these phases for future references. It can be documented detailed explanation of already found problems and solutions (Disterer, 2002). According to Disterer (2002) project profile is another documentation tool for project knowledge. This mechanism includes the project characteristics and summaries. Collections of project profiles provide knowledge about past projects and can be used to find expertise or valuable documents to get some help and support. Project closing phase also allow to create and capturing new knowledge. This phase captured knowledge is helpful to identify and secure the knowledge and experience of project team members (Disterer, 2002). As stated by Disterer (2002) during the project closing phase it creates following new knowledge activities.

- Post project reviews
- Post project appraisal
- After action review
- Debriefing
- Re-use planning
- Cooperative project evaluation
- Reflection
- Corporate feedback cycle
- Post installation or implementation evaluation

### **2.3.7 Project Knowledge Management**

Project Knowledge Management (PKM) is the application of KM in projects. Therefore, it can be defined as the link between the principles of application of KM techniques in PM (Hanisch et al., 2009).

As per Bojnord & Afraze (2006) knowledge cycle includes the following steps: knowledge identification and capture, knowledge sharing, knowledge application, and knowledge creation. Bojnord & Afraze (2006) have stated when critical project knowledge is identified and captured it should be shared with other colleagues. This knowledge cycle should continue within the organization. Further, he has stated how knowledge is created and shared in each and every phase of the project life cycle.

In planning phase identification and application and creation take place, more and large volume of information should be analyzed in order to create necessary knowledge. Experts should apply their tacit knowledge to create necessary knowledge. In this stage necessary knowledge from different fields identifies, applies and creates.

In designing phase, the technical knowledge uses more. New knowledge should be identified, captured and shared among team members, if needed. The captured knowledge internalizes to apply during the project. Therefore, knowledge identification, capturing and creation can be seen more during this phase.

In implementation phase knowledge application and creation can be seen more. Experts should apply their tacit knowledge and create necessary knowledge. The experts who have expanded their knowledge base and experiences should apply them to create necessary knowledge.

The main three project phases and the types of knowledge used in KM have been shown in the table 2:3. This table can be used for project managers to expand their vision for better programming and management by considering knowledge like other resources (Bojnord & Afraze, 2006).

Table 2:3: KM in Project Phases

<b>Phase</b> <b>Knowledge Factor</b>	Planning	Designing	Implementation
Types of knowledge	Tacit	Explicit	Tacit/ Explicit
Interaction with	supplier, market, customer, competitors	knowledge bases	supplier, market, contractors, workers
Information from	supplier, market, customer, within organization	experts, knowledge data bases	supplier, market, worker cultures
KM cycle	knowledge identification, creation and application	knowledge identification and capture, knowledge sharing and creation	knowledge application and creation
Important factors in knowledge creation	experiment, first hand and correct information	knowledge sharing culture, knowledge transferring tools	good resource management, information and experiment

Source: Bojnord & Afrazeh (2006)

Polyaninova (2011, p.6) stated KM and PM has most similar components. PM includes system, people and tools while KM includes system, people and organizational factors. The diagram in figure 2.6 illustrates how PM and KM work in each other.

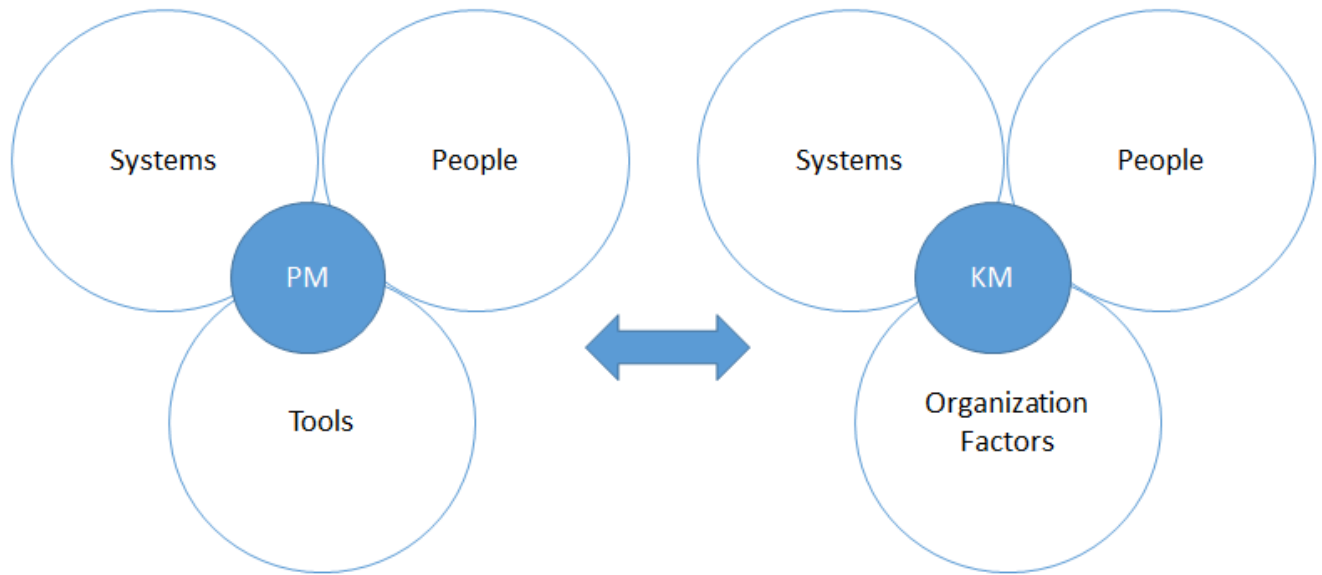


Figure 2:6: KM and PM components

Source: Polyani (2011, p.6)

Project team members frequently need to learn things which are already known in other project contexts. Their personal effectiveness helps to the project effectiveness and finally the organization effectiveness. People with knowledge of previously completed projects, assigned to similar kind of projects can gain benefit for the new project implementation. Based on the Polyani (2011, p.7) it is a way of spreading knowledge among the other new people in the project team and helps to extend overall organizational knowledge base as can be seen from figure 2.7.

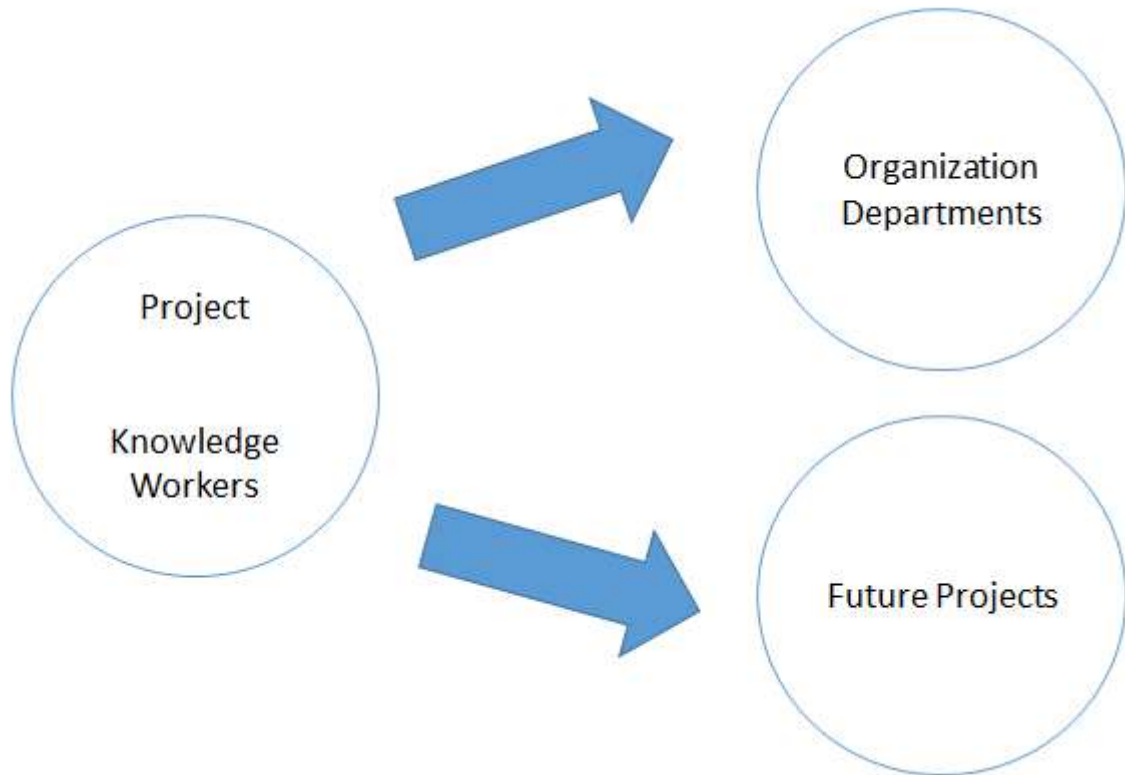


Figure 2:7: Knowledge workers and knowledge spread

Source: Polyaninova (2011, p.7)

**Benefits of project knowledge Management:** Successful project knowledge management creates capable employees with enough knowledge for better decision making. This capability enables cost and time saving for the organization. Most of the time successful projects consist accumulated knowledge, individual and collective competency (Kasvi et.al, 2003).

Polyaninova (2011) stated following project knowledge management benefits.

- Add competitive advantage while reducing cost of the project
- The previous experience and knowledge can be utilizing in future projects to resolve obstacles and issues
- For the project stakeholders, it gives documented knowledge information about previous projects
- Customers also can gain benefits as project goes in an effective way.

- Bad or good experience from the current project will help to improve the implementation of future projects. Also, it helps to fill the knowledge gaps.

### **2.3.8 General Management Knowledge and Skills**

The main role of PM is understanding and applying the knowledge, tools, and techniques. In addition to any area-specific skills, general management proficiencies are also required for the project and effective project management (PMI, 2013). They are:

- Leadership
- Team Building Motivation
- Communication
- Influencing
- Decision making
- Political and cultural awareness
- Negotiation
- Trust building
- Conflict management
- Coaching

### **2.4 Integrating KM with PM**

Previous sections have explored about the KM, PM and IT project management success. In this section, it will explore how to integrate KM with PM based on the literature.

According to Boondao (2013) KM is a process to capture, attain, organize, and disseminate employees' knowledge for tacit and explicit knowledge. Project Management also can be defined as the application of knowledge, skills and techniques to execute project effectively and efficiently (Yeong& Lim, 2010). Choy (2005) has stated KM is management of organizational knowledge for creating business value and generating a competitive advantage. Further, Boondao (2013) has stated KM is used to ensure to obtain the right knowledge to the right person at the right time. As per the Al-Zayyat, Al-Khalidi, Ibrahim, Tadros, and Al-Balqa (2010) KM facilitates a project team to reduce doing re-work and compresses the time that it takes to plan projects.

Effective knowledge management helps to create and manage the knowledge and fills gaps throughout the project duration. Therefore, KM allows greater control over the Project Initiating, Planning, Executing, Monitoring, Controlling and Closing stages by reducing uncertainty. KM processes indicated that most effective in improving the management of projects is knowledge creation and with knowledge codification followed by knowledge capturing with knowledge communication and then knowledge capitalization (Al-Zayyat et al., 2010).

Further, Yeong and Lim (2010) discusses about how individual share knowledge in a project environment. They have proposed a theoretical framework which emphasize that both KM factors and PM factors could have significant influence on project success. This emphasizes the need for continuous feedback and alignment of knowledge in the project environment.

As per Al-Zayyat et al. (2010) that there is a positive association among the KM and the improvement in the management of projects. Further they have elaborated the reason behind this positive relationship may be since KM increases the awareness and accessibility of the knowledge available which improves the management of projects. KM allows project team to reduce doing re-work and decrease the time that it takes to plan projects.

In a business environment one of the main criteria in decision making is financial performance. Therefore, through applying different management approaches and strategies, organizations pursue maximize profits. The undertaking of KM initiatives is no exception and is dependent on the same rules (Alekseev, 2010).

The relation between KM and PM is often represented as KM in project environments (Lytras and Pouloudi, 2003). According to Alekseev (2010) KM is applicable to the business environment should deliver measurable benefits to an organization that undertakes it. Moreover Alekseev (2010) explained if there is no evidence of any development in processes or procedures throughout the period of application of KM techniques, then the KM approaches should be reviewed and changed accordingly. It is important to understand contextual dependences of knowledge nature applicable to the organizational and project lifecycle, in order to achieve better results during integration of KM techniques. The many research theories clearly show that with KM practices it is possible to help to enhance organizational performance. The variety of KM practices is applicable for achievement of each particular project success factor.



A certain overlying of responsibilities among PM practices and KM techniques have been discovered. The number of problems relates to effective PM have been well defined. They are, lack of competence of a project manager, lack of skilled and qualified staff, not learning from past experience, poor communication. Those problems could be overcome by using such KM approaches as, organizing of training programs, supporting knowledge transfer and sharing procedures, using a knowledge-based decision-making system, and using communication and KM tools.

Leseure & Brookes (2014) describe the convergence of both areas as cognitive repetition of knowledge application in different configurations. The core project knowledge is built from the projects. Therefore, from the perspective of PM, it is essential to use KM in order to transfer knowledge within the project teams or across them. They stated that imperfections in KM may result in low project performance. According to their empirical analysis, the main problem in KM across the project's life cycle is construction of collective knowledge. Tacit KM possessed by experts is also a critical challenge for the effective PM.

Moreover, Reich (2007) recognized ten main knowledge-based risks that might affect expressively in PM. Some of them are, weaknesses in learning from past projects lessons, glitches in integrating and transferring knowledge, lack of a knowledge map. In order to manage those risks, Reich (2007) prescribed five knowledge-related initiatives. They are, establish a learning climate, establish and maintain knowledge levels, create channels for knowledge flow and develop team memory and use the risk register.

They highlighted the need for project based organizations to have the “right knowledge” to the “right person(s)” at the “right time” in order to decrease project schedule and cost, to increase project quality. The authors stated KM enhances communication within project team, resulting in a better understanding and sharing of project objectives. It provides with best practice awareness, lessons learnt, project management methodologies and techniques.

“Projects, whether or not we choose to think of them as temporary organizations, involve considerable knowledge processing” Reich (2007). According to his perspective a project is a ground for knowledge creation, utilization and sharing, where learning is critical for project performance and success.

“KM in the context of a project is the application of principles and processes designed to make relevant knowledge available to the project team. Effective KM facilitates, the creation and integration of knowledge, minimizes knowledge losses, and fills knowledge gaps throughout the duration of the project” (Reich, 2007, p.8).

Schoen, Mason, Kline, and Bunch (2005) studied the PM practices in the context of incubators, evaluating and suggesting the most appropriate and useful models for handling incubation projects. Further, he focused his attention on the PM models as facilitators of innovation, defining them as mechanisms for knowledge flow.

As it was postulated by Collinson and Gregson (2003, p.192) they mentioned that modern field of KM studies contribute significantly in a better understanding of origins and development of ventures. Especially such knowledge management mechanisms as “knowledge-sharing” and “knowledge-integration” between and within the companies are considered to be very important aspects for having in-depth insight in the area of incubation projects.

KM is important for both sides, according to Scillitoe and Chakrabarti (2010) incubators have to get in-depth understanding of the venture needs or technological difficulties, so that relevant knowledge or network of knowledge sources can be offered to maximize learning of technological, business and other skills.

Vast theoretic and empirical studies are related to specific knowledge management practices such as knowledge sharing, knowledge co-production, integration and others. Knowledge sharing between entrepreneurs is also a significant aspect of knowledge management within incubators. Knowledge integration is also a significant component of KM. As start-up projects involve so many human activities, extensive diversity of knowledge is anticipated and integrated into the client’s knowledge base. He has brought forward incubation projects that are strongly dependent on knowledge creation, sharing, integration and utilization. In contrast to other regular commercial organizations, incubators are aiming to develop an appropriate knowledge foundation and knowledge network through each of their projects according to the needs of the entrepreneurs.

KM in most PM methodologies begins and ends with the ‘lessons learnt’ document that is created after the completion of a project. This document is a good exercise, but does not do much to manage knowledge during the project or ensure that knowledge is transferred among project members because project members must know to read the document to receive any value from it. It is widely reported that project failure rates are still very high. Industry research shows fifty to sixty percent of all projects are considered failures. While most research blames these failures on poor project management and/or lack of executive sponsorship (Reich, 2007), the fact that there is very little knowledge transfer and sharing among project teams, has to play a key role in allowing these failures to occur. By building a framework that can be used to help improve knowledge transfer within the project teams, it is hoped that the failure rate due to knowledge-based issues will drop significantly. This framework, which still is in the early development stages, should help organizations to understand the underlying requirements for project knowledge management, provides best practices for knowledge management in projects and provides a way to build a corporate culture that is focused on sharing knowledge.

Bojnord & Afrazeh (2006) in his study emphasized that the project knowledge need to be managed such as other tangible resources in the product environment. KM techniques can be used to handle the knowledge and experiences in projects for more productive results. Further he has discussed the necessary knowledge, KM stages and policies and important factors during three stages of a project life cycle, planning, designing and implementation.

In different phases of projects, types of knowledge, people and the information needed can be varied. Knowledge creation can be seen in all phases of the project cycle. The sources of information and the type of knowledge used more in each phase can be vary from type of projects and final production in each project too. Project managers are the responsible persons who need to consider different kinds of required knowledge and the KM technique for better planning. These mechanisms change according to the projects and final products. Comparing these mechanisms and policies in each type of projects, project managers will be able to find out the better KM techniques for each and every project. This knowledge can feed back as an enhanced resource to other projects. Knowing about sources and types of knowledge and people who create it in each phase of project can guide for better feedback system. This feedback

system affected the final product too. Mechanisms of recording and retrieving them in each phase should be studied.

Based on the literature, KM and PM also brought on the surface a certain gap between comprehensive background of KM theory and concrete improvements in terms of project delivery. Lack of empirical evidences describing connection between using of specific KM practices and achievement of better project results induced to conduct a detailed survey regarding this problem. It is therefore of great interest to investigate whether using of the KM practices can enhance successfulness of project delivery.

## Chapter 3 Theoretical Framework

### 3.1 Introduction

This chapter concludes all the main findings from the chapter two related to the study. Using the previous chapter findings, it has presented a conceptual framework of the study. Then independent variables and dependent variables of the research are clearly defined. Finally, the researcher brought out some theories related to data analysis, which will be utilized in chapter five.

### 3.2 Conceptual Framework of the Study

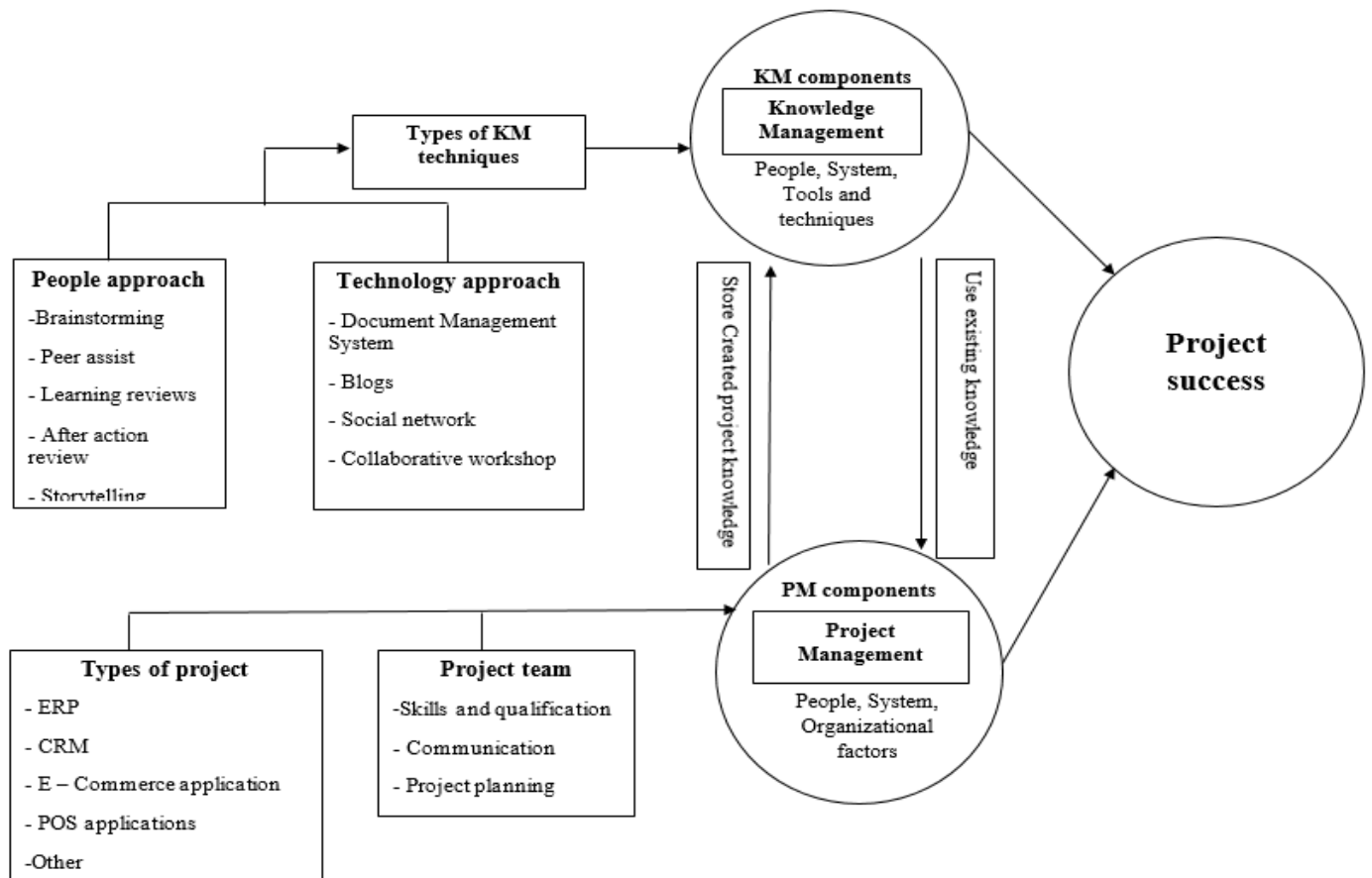


Figure 3:1: Framework of the KM and PM integration model

Based on finding of the literature, the success of the IT Company is highly reliant on how it manages their knowledge within the organization. Therefore, KM is very important in the effective management of the projects. Polyani (2011) stated KM and PM has most similar components. PM includes system, people and tools while KM includes system, people and

organizational factors. So, they can merge and work on each other as shown in the above diagram.

Organizational knowledge contains the basic domain knowledge and other knowledge sources which come under explicit knowledge. Human experts working in the organization represent the tacit knowledge. PM is more focused on the group or team involved in the project. In order to create new knowledge within the projects, PM is focused on combining and utilizes both explicit and tacit knowledge.

Managing the gained knowledge from the failures and successes of previous projects is important for long-term sustainability of the organizations within the competitive IT industry. Project team members frequently need to learn things that are already established in the organization. They need to acquire and adapt knowledge that exists in the organizational memory. The knowledge from previous projects is stored in an employee's mind or documents and repositories in the organization. PM absorbs the organizational knowledge and create the project specific KM. KM focused on the ways of organization to manage effectively within the industry and it identifies the way the projects are handled. Any IT project creates new knowledge and contributes to the learning process of the whole organization, project specific KM increases the overall organizational ability of managing knowledge, as well as projects.

As per the finding on literature, there are so many KM techniques and tools which used to manage the knowledge. These techniques and tools can be used in Project environment to create, share, manage and store the knowledge which is created within the project context. This knowledge can be converted to the organizational knowledge and stored in the repositories to use in future projects. The effect of the KM techniques and tool can be varied based on the project category and the people or the project team including Project Manager. Therefore, it is important to identify the relationship between KM and PM, whether the outcome of the Project is affected by the types of KM tools used during the project, is there any relationship between KM tools and the project categories as well as the characteristics of the employees.

The conceptual framework for the research is designed based on the finding from the literature and the information gathered via interviews.

The integrated framework model that combines KM and PM is shown in figure 3.1. The research undertaken in this thesis is focused on KM techniques and Project success. Therefore, the simplified theoretical model for the research is shown in figure 3.2

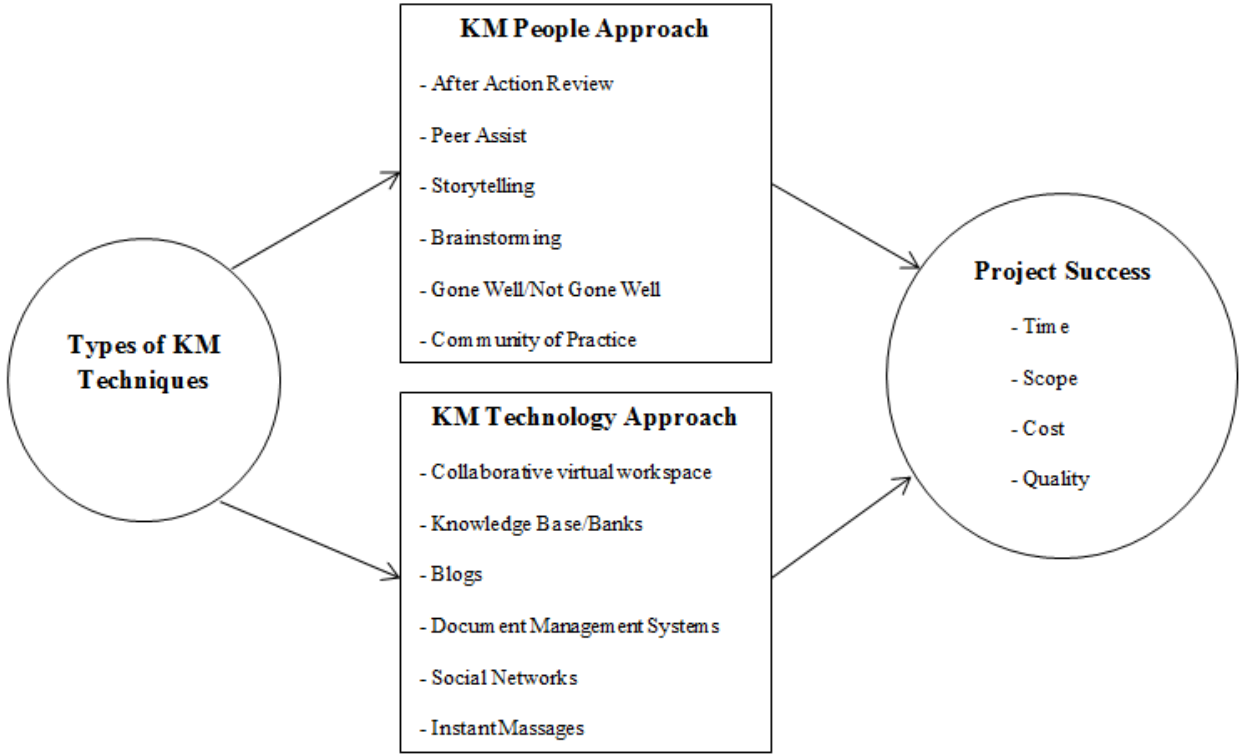


Figure 3.2: Simplified theoretical model

### 3.3 Variables

#### 3.3.1 Independent Variables

The table 3.1 illustrates the two main independent variables identified in the study as types of KM techniques that effect on the success/ failure of PM.

First independent variable identified in the research is different types of KM People’s approach techniques and tools. This variable is measured by the different types of KM People’s approach techniques and tool used in the each and every project by the organizations. The second independent variable is KM Technology approach techniques and tools. This variable also measured by the different types of KM Technology approach techniques and tool used in the projects by the organizations.

Table 3:1: Independent variables of the study

<b>Variable</b>	<b>Factor/ Techniques</b>	<b>Reference</b>
KM People’s approach techniques	Brainstorming	Young(2010), Alekseev(2010)
	Peer Assist	Young(2010) , Karapetyan and Otieno(2011), KM Best Practices(2009)
	After Action Review	Young(2010) , Alekseev(2010), KM Best Practices(2009), Karapetyan and Otieno(2011)
	Storytelling	Young(2010), KM Best Practices(2009)
	Gone well/Not Note	KM Best Practices(2009), Karapetyan and Otieno(2011)
	Community of Practice	Young(2010), KM Best Practices(2009), Karapetyan & Otieno(2011)
KM Technology approach techniques	Document Management System	Young(2010), Disterer(2002), Alekseev(2010)
	Knowledge Bases / Banks	Young(2010), KM Best



		Practices(2009), Conroy and Soltan (1998), Alekseev(2010)
	Blogs	Young(2010), Alekseev(2010)
	Social Network Services/ Web 2	Young(2010), Alekseev(2010), KM Best Practices(2009, Karapetyan & Otieno(2011)
	Collaborative Workspaces	Young(2010) , Alekseev(2010), KM Best Practices(2009)
	Instant Messenger	KM Best Practices(2009)

### 3.3.2 Dependent Variables

Project success considered as the main dependent variable of this research. PM is measured with success or failure of the projects of the selected project based organizations. The table 3.2 illustrates the dependent variables of the study.

Table 3:2: Dependent variables of the study

Variable	Factor/ Techniques	Reference
Project Management success	Project success (on time , on cost , on quality)	Project Management Institute(2013) PMAJ (2005) OGC (2009)
	Project failure (out of time , out of cost , out of quality)	Project Management Institute(2013) PMAJ (2005)

### **3.4 Population and Sampling**

#### **3.4.1 Population of the Study**

According to the type of research unit of analysis would be the set of IT projects completed in the project based organizations in Sri Lanka. Therefore, research has taken relevant steps to perform non-probabilistic convenient sampling.

There is a large number of companies which come under the IT project based companies in Sri Lankan context. This research is focused on IT project based companies which are highly using KM technologies as a part of their project life cycle. Therefore, companies which are not highly using KM tools, companies which are not having diversity of the projects and companies which are not having variance of the KM practices in their projects are not covered in the research. Selected companies are well reputed IT project based companies in Sri Lanka and they have practiced KM as a part of their projects.

The researcher expected to collect data from following mentioned software project based companies which are using knowledge management techniques in their projects. The following set of companies' cover almost all the categories of IT companies which exist in Sri Lanka.

1. Virtusa
2. IFS
3. WSO2
4. Pearson Lanka
5. Codegen
6. Atune
7. 99X
8. ExileSoft
9. ISM APAC
10. Duo Software
11. Geveo Australasia
12. DirectFN
13. Cake Labs (Leapset)

The projects from above mentioned organizations are selected to gather data for the research, since they are the leading software project based companies in Sri Lanka. In addition to that companies are selected to cover all types of the IT companies, such as large and medium scale, long-term sustainable, new companies and companies which are following international standards. But the projects from small companies are not used, to collect data, since, in smaller companies there is no active usage of KM techniques or tools. Also, there is no need of accurate KM tool or techniques since there is no large number of employees.

Selected companies can be categorized based on the business scale as below:

- ✓ Large and medium scale – Virtusa, IFS, WSO2, Pearson, 99X
- ✓ Long-term sustainable – ExileSoft, Duo Software, Atune, Codegen
- ✓ New companies – ISM APAC
- ✓ Companies following international standards - Cake Labs (Leapset) .Geveo Australasia, DirectFN

Based on the interviews conducted with project management heads of the selected organization, recently completed projects have been identified. According to the finding, basically there are four types of projects handled by the selected organizations. They are, ERP, CRM, E-commerce and POS applications.

### **3.4.2 Sample Size of the Study**

The researcher has conducted non-probabilistic convenient sampling mechanism and will be considered 52 IT projects as the sample. This sample size will represent recently completed 52 projects in IT project based organizations in Sri Lankan IT industry.

### **3.5 Hypothesis**

The study is to identify the effect of Knowledge Management in IT Project Management for Project Success. The researcher has identified two main independent variables based on the theoretical framework. They are knowledge management people's approach techniques and knowledge management technology approach techniques. The dependent variable is project success. Based on these variables hypothesis of this study can be defined as:

### Hypothesis 1

H01a = There is a relationship between KM People's approach techniques and IT project success

H01o = There is no relationship between KM People's approach techniques and IT project success

### Hypothesis 2

H02a = There is a relationship between KM Technology approach techniques and IT project success

H02o = There is no relationship between KM Technology approach techniques and IT project success

### **3.6 Theories Related to Data Analysis**

Since this is a quantitative research the results were analyzed using SPSS software.

Cronbach's alpha test will conduct to ensure the coefficient of reliability for the set of items using 20 responses. Since the survey will be conducted among the responses from various demographic locations it is important to measure the reliability of the questionnaire. The standard acceptable alpha range is 0.7 to 0.95.

Pearson Correlation and ANOVA will be used to analyze the data. Simple average method will use to establish required variables using responses from multiple questions. These newly established variables will be used to do further analysis.

- **Pearson Correlation**

This statistical evaluation will be conducted to identify the relationships among the independent variables and the dependent variable. In this test if the R value gives positive value, then it can be considered the tested variables have a positive correlation. If the value is negative, then the particular variables have negative correlation. If the Sigma value is less than 0.05 then the tested two variables have a strong co-relation.

- **ANOVA**

It is a statistical method that stands for analysis of variance. Researcher will use two ways ANOVA to identify the relationship between two or more variables against the dependent variable. If the Sigma value is less than 0.05 then it can be considered as there is a significant effect between tested independent variables with the dependent variable.

## Chapter 4 Research Methodology

### 4.1 Introduction

In this chapter, it presented mainly the methodological aspect of the study. Research methodology has been described by using research philosophy, research approach, research strategy, and research choice and research time horizon. Then the researcher has discussed about the types of data, data collection techniques and data collection ethics of the study. Also, this chapter included the population and sample to be considered for the chapter five. The chapter concluded the hypothesis development of the study.

### 4.2 Research Methodology

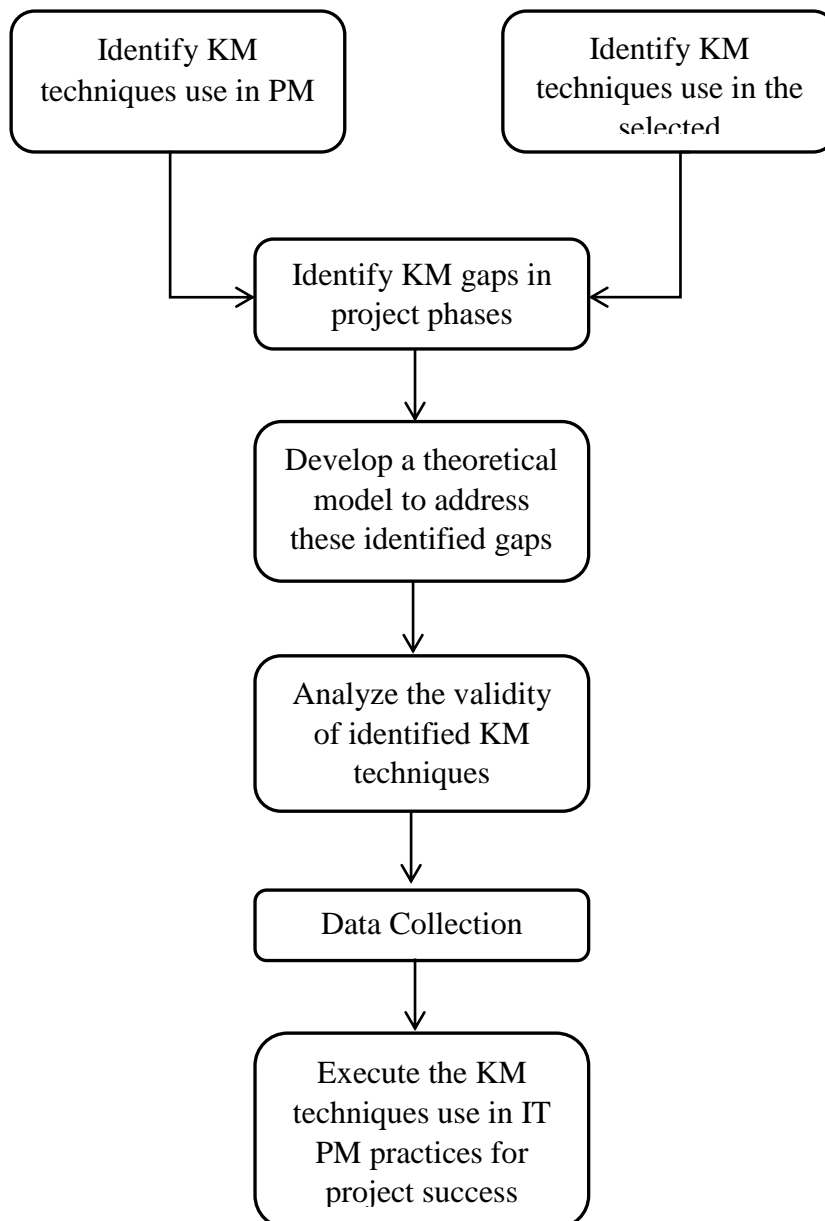


Figure 4:1: Research methodology

Table 4:1: Research methodology

Stage	Task
Identify KM Techniques used in PM phases	Find out the common KM techniques used in the IT Project Management from the literature review
Identify Knowledge Management Techniques used in the selected Organizations	Gather the information of the completed Project status (Success/failure) of the selected organizations. Apart from that collect relevant information by conducting face-to-face interviews and sharing semi structured questionnaires.
Identify the Knowledge Management gaps in the Projects	Perform a gap analysis to identify the Knowledge Management gaps in each and every project phase.
Develop a theoretical model to address identified gaps	Develop a theoretical framework based on the identified factors and Knowledge Management gaps in the selected project.
Analyse the validity of identified Knowledge Management factors	Analyse and evaluate the theoretical framework using hypothesis testing.
Data collection	List of semi structured questionnaire will be distributed among the selected sample population to gain relevant information.
Evaluate the Knowledge Management Techniques use in IT Project Management Practices for the project success	Evaluate the feedback to determine the validity of the developed theoretical framework. Evaluate the impact of the KM techniques used in IT Project Management for the project success.

The model illustrated in figure 4.2 is designed by considering the different layers in the research onion by Saunders, Lewis, & Thornhill (2009).

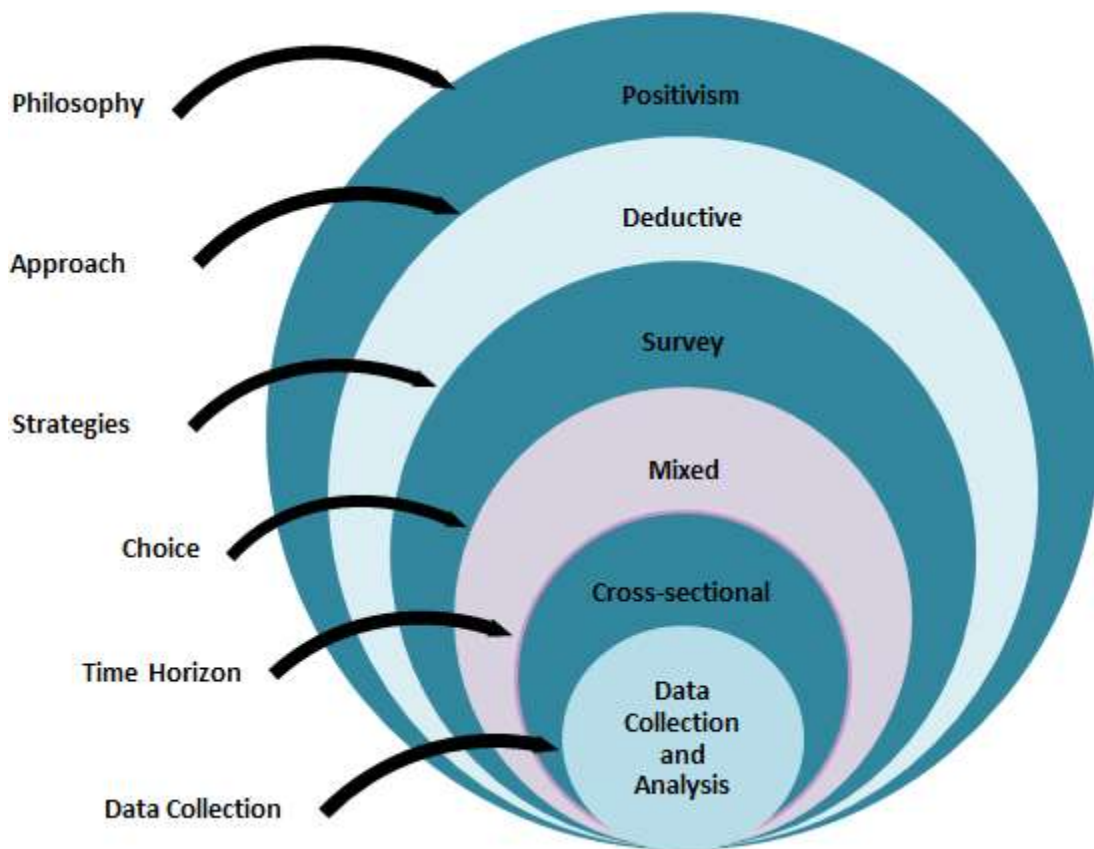


Figure 4:2: Research process based on onion

Source: Saunders, Lewis, & Thornhill (2009)

Positivism generates hypotheses which can be tested and deductive approach uses to answer it. Survey uses to test the hypothesis. Since this study needs to complete within a certain time frame, cross sectional time horizon is used. Interviews and semi structured questionnaire is used to collect data for this study.

#### 4.2.1 Research Philosophy

The ultimate goal of this study is to identify how KM affects in IT PM for project success. Positivism has selected as research philosophy which generates hypotheses that can be tested.



#### **4.2.2 Research Approach**

Deductive approach has been selected as research approach since it starts with a set of questions to answer the main questions of this study. The process of deduction approach moves from theory to the research questions, data collection and findings to the research questions.

#### **4.2.3 Research Strategy**

Survey used to study several completed projects in selected IT companies in Sri Lanka.

#### **4.2.4 Research Choice**

Mixed method has been chosen as the research choice for this study since it uses both qualitative and quantitative methods to collect data.

#### **4.2.5 Research Time Horizon**

Since the time has been limited, time horizon method is used for this study. This method measures behavior of many groups at a single point in time.

### **4.3 Data Collection**

The data are collected from the several IT projects based companies in Sri Lanka. So, researcher guaranteed to those companies that these data are strictly used only for academic purposes.

#### **4.3.1 Primary Data**

The primary data collection is used to find out the exact KM techniques use in PM process in the selected organizations. Interviews and semi structured questionnaires will be used to collect primary data.

#### **4.3.2 Secondary Data**

The secondary data collection is used to examine the existing literature related to KM techniques and PM processes. Also examine how KM techniques affect in PM phases for project success. Apart from the literature survey, projects information of the selected organizations will be considered as a part of the secondary data.

#### **4.3.3 Data Collection Techniques**

Mainly the researcher has used following techniques to collect data for this study.

#### **4.3.3.1 Interview**

Conduct interviews with head of projects to collect following information in their organizations,

- Ensure the organization uses KM techniques in their project phases
- Details about the common KM techniques use in their organizations

Set of open ended questionnaire has been used to conduct the interview with the head of projects in selected organizations. The list of open ended questions has been included in Appendix section.

#### **Summary of the interviews**

Based on the interviews conducted with the project heads of the selected organization, it has identified the highly used KM techniques in Sri Lankan IT industry. These companies are using KM as a part of their project life cycle or in the regular works without knowing the actual meaning/terms of those techniques or tools. In general, people are educated about few common KM techniques such as After-Action Review, Documentation and Brainstorming. At the mean time employees are using Social Networks, Collaborative Works Spaces and Peer Assists without knowing that they are using KM techniques or tool. For an example, employee use to share Lesson Learnt, gone well notes and practice Story telling while doing sprint reviews or QA retrospectives without knowing those are KM techniques. In this research, researcher strive to determine this gap and educate the people in the IT industry to use theses KM tools and techniques in an accurate manner.

According to the interview findings, there are 12 main KM techniques used in the organizations. They are, After Action Review, Peer Assist, Story Telling, Brainstorming, gone well/not gone well exercise, Community of Practice (CoP), Collaborative Virtual Workspace, Knowledge Bases/Banks, Blogs, Document Management Systems, Social Network Services and Instant Messenger.

Based on the interview research main objective is defined to fulfill the industry requirement. Therefore, data are collected to identify, is there a different of improvement of the PM based on the different KM techniques. Main objective is defined as, is there any improvement of PM based on the different type of the KM People's approach and Technology approach techniques.

#### **4.3.3.2 Questionnaires**

Set of semi structured questionnaire is distributed among the project managers in the selected organizations in order to find answers for research questions. Five-point liker scale technique used to prepare semi structured questions (5 = Very High, 4 = High, 3 = Moderate, 2 = Low, 1 = Very Low). The target audience is project managers and scrum masters of the project team. Since this is a qualitative analysis the SPSS software will be used to analyze the data.

#### **4.3.3.3 Questionnaire Structure**

The set of questionnaires designed to analyze the following areas.

- Questions for collecting demographic information
- Questions to identify the KM People's approach techniques use in recent projects
- Questions to identify the KM Technology approach techniques use in recent projects
- Questions to identify the success or failure of the recently involved project

The list of semi structured questions has included in Appendix section.

#### **4.3.4 Data Collection Ethics**

There can be some ethical issues coming up when collecting data for a research. According to Kumar (2011) following ethical issues may occur if the researcher does not handle the participants properly. Ethical issues may occur at the time of collecting information, seeking consent, providing incentives, seeking sensitive information, the possibility of causing harm to participants and maintaining confidentiality. Researcher has used following steps to avoid ethical issues.

- Got approval from the project heads to conduct interviews, distribute questionnaires, got data from company website and other documents
- Used random sample with fair distribution
- Used anonymous data collection (use Google sheets)
- Sensitive data collection approaches not used
- Clearly reported and documented the collected data (interviews and questionnaires)
- No data is shared with the third-party recipients

## **Chapter 5 Data Analysis**

### **5.1 Introduction**

This section describes the outcome and analysis of the research. All the findings were assessed and presented using the statistical software tool Statistical Package for the Social Sciences (SPSS). Primarily the analysis of the individual variables was presented in a statistical way with visual and summary representations. Next the hypothesis determined in methodology chapter were evaluated and presented against the significances in level of 0.05 or 95% confidence through Pearson correlation technique. At the end of the research, conceptual framework is derived based on the results of the research.

### **5.2 Data Reliability**

A pilot survey has been conducted with twenty responses to ensure the reliability of the questionnaire. The data were collected from different demographic locations and analyzed by using SPSS. Cronbach's alpha co-efficient test was carried out for all the identified independent and dependent variables for this study.

#### **5.2.1 Cronbach's alpha Co-efficient for Knowledge Management People's approach**

Cronbach's alpha co-efficient for independent variable, Knowledge Management People's approach has been tested using SPSS and following shows the test result of it. The test result was above 0.7 and it has given 0.724. According to Tavakol & Dennick (2011) the test value can be taken as the positive alpha value for Knowledge Management People's approach.

Table 5:1: Cronbach’s Alpha co-efficient for Knowledge Management People’s approach

**Case Processing Summary**

		N	%
Cases	Valid	20	100.0
	Excluded <sup>a</sup>	0	.0
	Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.724	.729	6

### 5.2.2 Cronbach's alpha Co-efficient for Knowledge Management Technological approach

The pilot survey for Knowledge Management Technological approach Cronbach’s alpha co-efficient gave a value which was more than 0.7. It resulted 0.713 was considered as a valid value for the Knowledge Management Technological approach according to Tavakol & Dennick (2011).

Table 5:2: Cronbach’s Alpha co-efficient for Knowledge Management Technological approach.

**Case Processing Summary**

		N	%
Cases	Valid	20	100.0
	Excluded <sup>a</sup>	0	.0
	Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.713	.735	6

### 5.2.3 Cronbach's alpha Co-efficient for Project Success

The pilot survey for Project Success Cronbach's alpha co-efficient gave a value which was more than 0.7. It resulted 0.732 and it was considered as a valid value for the Project Success according to Tavakol & Dennick (2011).

Table 5:3: Cronbach's Alpha co-efficient for Project Success.

**Case Processing Summary**

		N	%
Cases	Valid	20	100.0
	Excluded <sup>a</sup>	0	.0
	Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.732	.796	8

### 5.3 Demographic Analysis

Demographic analysis helps to analyze the basic information of the projects which is considered as the unit of analysis of the research. This set of information helps to create the profile of the selected projects upon the category, duration and number of team members of the projects

Above mentioned areas can be illustrated as follows from the collected data.

### 5.3.1 Project distribution according to their category

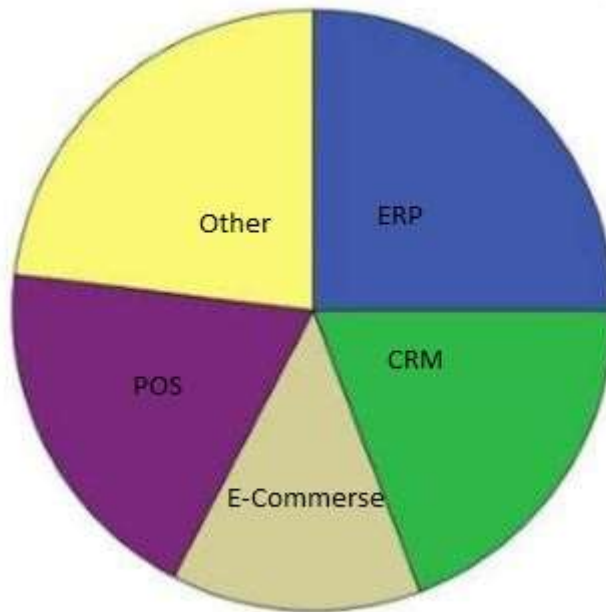


Figure 5:1: Project distribution according to their category

The above figure 5.1 illustrates how these selected projects diverse among the main project categories. Based on the findings, there are about 25% of projects identified as ERP projects. Other than other set of projects can be identified as CRM – 19.2%, E-Commerce – 13.5, POS – 19.2% and other – 23%. Even though there is no high fluctuation among the categories still ERP projects have high segment in the selected sample.

### 5.3.2 Project distribution based on the completion duration



Figure 5:2: Project distribution based on the completion duration

According to the above figure 5.2, most of the projects (25%) have taken 1 to 2 years to complete. Altogether 6-12 months and more than 2 years of period have taken to complete 46% of projects. Other than that, based on the above diagram it can be identified 3 months projects – 15.4% and 3 to 6 months projects – 13.5%.



### 5.3.3 Project distribution based on the number of members in the team

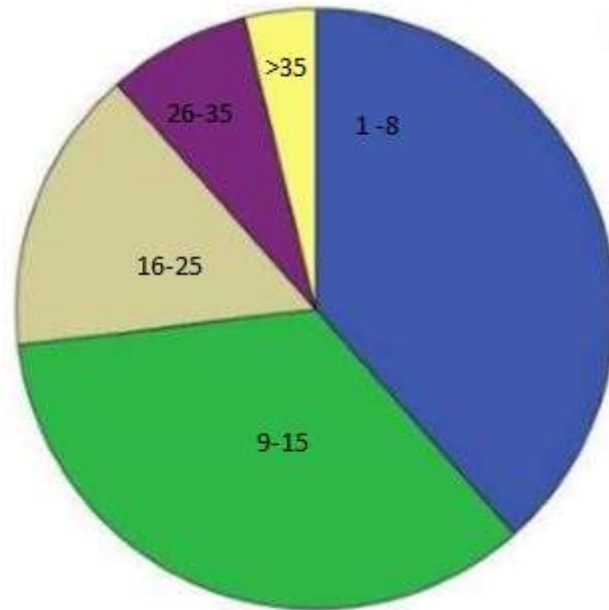


Figure 5:3: Project distribution based on the number of members in the team

The above figure 5.3 illustrates the diversity of the number of members in the project team. Based on the findings, there are 1 to 8 members in 38.5% of projects, 9 to 15 members in 34.5% of projects, 16 to 25 members in 15.4% of projects, 26 to 35 members in 7.7% projects and more than 35 members in 3.8%. According to the above facts most of the projects have slight small team with 1 to 8 members.

### 5.4 Inferential Analysis with Pearson Correlation

This section concludes co-relation between each independent and dependent variable and these are calculated and analyzed using the SPSS tool. All fifty-two responses are considered as valid responses and are analyzed to derive more meaningful outcome. Each independent variable is measured by using multiple questions via questionnaire. The scores of the questions were recorded, computed and then defined the most frequent occurrence (or mode) as the final score of each independent variable.

### 5.4.1 Correlation between KM people’s approach and Project Success

Table 5:4: Correlation between KM people’s approach and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.63	.687	52
KM_People_Approach	3.14	.654	52

Correlations			
		Project_Succ ess	KM_People_A pproach
Project_Success	Pearson Correlation	1	.325
	Sig. (2-tailed)		.019
	N	52	52
KM_People_Approach	Pearson Correlation	.325*	1
	Sig. (2-tailed)	.019	
	N	52	52

\*. Correlation is significant at the 0.05 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.325 indicates that there is a positive correlation between KM people’s approach techniques and the project success. The correlation sigma p value observed between project success and KM people’s approach techniques variables is 0.019. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between KM people’s approach techniques and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. Therefore, it determined the first hypothesis discussed in the research have a strong relationship. There is a strong association between Knowledge Management People’s Approach Techniques and IT Project Success.

### 5.4.1.1 Correlation between After Action Review and Project Success

Table 5:5: Correlation between After Action Review and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
AfterActionReview	3.60	1.034	52
Project_Success	3.44	.895	52

Correlations			
		AfterActionReview	Project_Success
AfterActionReview	Pearson Correlation	1	.472**
	Sig. (2-tailed)		.000
	N	52	52
Project_Success	Pearson Correlation	.472**	1
	Sig. (2-tailed)	.000	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.472 indicates that there is a positive correlation between After Action Review (KM people's approach techniques) and the project success. The correlation sigma p value observed between project success and After-Action Review is 0.000. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between After Action Review and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between After Action Review and IT Project Success.

### 5.4.1.2 Correlation between Peer Assist and Project Success

Table 5:6: Correlation between Peer Assist and Project success

#### Descriptive Statistics

	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
PeerAssist	3.40	.774	52

#### Correlations

		Project_Succ ess	PeerAssist
Project_Success	Pearson Correlation	1	.388**
	Sig. (2-tailed)		.004
	N	52	52
PeerAssist	Pearson Correlation	.388**	1
	Sig. (2-tailed)	.004	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.388 indicates that there is a positive correlation between Peer Assist (KM people's approach techniques) and the project success. The correlation sigma p value observed between project success and Peer Assist is 0.004. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Peer Assist and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Peer Assist and IT Project Success.

### 5.4.1.3 Correlation between Storytelling and Project Success

Table 5:7: Correlation between Storytelling and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
StoryTelling	2.94	1.018	52

Correlations			
		Project_Succ ess	StoryTelling
Project_Success	Pearson Correlation	1	.158
	Sig. (2-tailed)		.264
	N	52	52
StoryTelling	Pearson Correlation	.158	1
	Sig. (2-tailed)	.264	
	N	52	52

Pearson Correlation coefficient  $r$  value is 0.158 indicates that there is a positive correlation between Storytelling (KM people's approach techniques) and the project success. The correlation sigma p value observed between project success and Storytelling is 0.264. Since sigma value is greater than .05 (standard significant level 0.05) which means chosen sample is having not enough evidence to prove that there is positive relationship between storytelling technique and the project success in the population. Therefore, it can determine in the selected sample there is a weak correlation. There is a weak association between Storytelling and IT Project Success.

#### 5.4.1.4 Correlation between Brainstorming and Project Success

Table 5:8: Correlation between Brainstorming and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
Brainstorming	3.44	1.110	52

Correlations			
		Project_Succ ess	Brainstorming
Project_Success	Pearson Correlation	1	.332*
	Sig. (2-tailed)		.016
	N	52	52
Brainstorming	Pearson Correlation	.332*	1
	Sig. (2-tailed)	.016	
	N	52	52

\*. Correlation is significant at the 0.05 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.332 indicates that there is a positive correlation between Brainstorming (KM people's approach techniques) and the project success. The correlation sigma p value observed between project success and Brainstorming is 0.016. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Brainstorming and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Brainstorming and IT Project Success.

### 5.4.1.5 Correlation between Gone Well Not Gone Well and Project Success

Table 5:9: Correlation between Gone well/not well and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
Gonewellnot	2.71	.957	52

Correlations			
		Project_Succ ess	Gonewellnot
Project_Success	Pearson Correlation	1	.175
	Sig. (2-tailed)		.215
	N	52	52
Gonewellnot	Pearson Correlation	.175	1
	Sig. (2-tailed)	.215	
	N	52	52

Pearson Correlation coefficient  $r$  value is 0.175 indicates that there is a positive correlation between Gone well/not well (KM people's approach techniques) and the project success. The correlation sigma p value observed between project success and Storytelling is 0.215. Since sigma value is greater than .05 (standard significant level 0.05) which means chosen sample is having not enough evidence to prove that there is positive relationship between Gone well/not well technique and the project success in the population. Therefore, it can determine in the selected sample there is a weak correlation. There is a weak association between Gone well/not well and IT Project Success.

### 5.4.1.6 Correlation between CoP and Project Success

Table 5:10: Correlation between Community of Practice and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
CopS	2.73	1.087	52

Correlations			
		Project_Succ ess	CopS
Project_Success	Pearson Correlation	1	.165
	Sig. (2-tailed)		.242
	N	52	52
CopS	Pearson Correlation	.165	1
	Sig. (2-tailed)	.242	
	N	52	52

Pearson Correlation coefficient  $r$  value is 0.165 indicates that there is a positive correlation between Community of Practice (KM people's approach techniques) and the project success. The correlation sigma  $p$  value observed between project success and Community of Practice is 0.242. Since sigma value is greater than .05 (standard significant level 0.05) which means chosen sample is having not enough evidence to prove that there is positive relationship between Community of Practice and the project success in the population. Therefore, it can determine in the selected sample there is a weak correlation. There is a weak association between Community of Practice and IT Project Success.



### 5.4.2 Correlation between KM technology approach and Project Success

Table 5:11: Correlation between KM technology approach and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.63	.687	52
KM_Technology_Approach	3.44	.895	52

Correlations			
		Project_Success	KM_Technology_Approach
Project_Success	Pearson Correlation	1	.492**
	Sig. (2-tailed)		.000
	N	52	52
KM_Technology_Approach	Pearson Correlation	.492**	1
	Sig. (2-tailed)	.000	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.492 indicates that there is a positive correlation between KM technology approach techniques and the project success. The correlation sigma p value observed between project success and KM technology approach techniques variables is 0.000. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between KM technology approach techniques and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. Therefore, it determined the second hypothesis discussed in the research have a strong relationship. There is a strong association between Knowledge Management Technology Approach Techniques and IT Project Success.

### 5.4.2.1 Correlation between Collaborative Virtual Workspace and Project Success

Table 5:12: Correlation between Collaborative Virtual Workspace and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
CWW	2.94	1.074	52

Correlations			
		Project_Succ ess	CWW
Project_Success	Pearson Correlation	1	.680**
	Sig. (2-tailed)		.000
	N	52	52
CWW	Pearson Correlation	.680**	1
	Sig. (2-tailed)	.000	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.680 indicates that there is a positive correlation between Collaborative Virtual Workspace (KM technology approach techniques) and the project success. The correlation sigma  $p$  value observed between project success and Collaborative Virtual Workspace is 0.000. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Collaborative Virtual Workspace and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Collaborative Virtual Workspace and IT Project Success.

### 5.4.2.2 Correlation between Knowledge Bases/Banks and Project Success

Table 5:13: Correlation between Knowledge Bases/Banks and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
KB	3.58	1.054	52

Correlations			
		Project_Succ ess	KB
Project_Success	Pearson Correlation	1	.743**
	Sig. (2-tailed)		.000
	N	52	52
KB	Pearson Correlation	.743**	1
	Sig. (2-tailed)	.000	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.743 indicates that there is a positive correlation between Knowledge Bases/Banks (KM technology approach techniques) and the project success. The correlation sigma p value observed between project success and Knowledge Bases/Banks is 0.000. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Knowledge Bases/Banks and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Knowledge Bases/Banks and IT Project Success.

### 5.4.2.3 Correlation between Blogs and Project Success

Table 5:14: Correlation between Blogs and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
Blogs	3.29	.936	52

Correlations			
		Project_Succ ess	Blogs
Project_Success	Pearson Correlation	1	.594**
	Sig. (2-tailed)		.000
	N	52	52
Blogs	Pearson Correlation	.594**	1
	Sig. (2-tailed)	.000	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.594 indicates that there is a positive correlation between Blogs (KM technology approach techniques) and the project success. The correlation sigma p value observed between project success and Blogs is 0.000. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Blogs and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Blogs and IT Project Success.

#### 5.4.2.4 Correlation between Document Management Systems and Project Success

Table 5:15: Correlation between Document Management Systems and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
DMS	3.67	1.043	52

Correlations			
		Project_Succ ess	DMS
Project_Success	Pearson Correlation	1	.410**
	Sig. (2-tailed)		.003
	N	52	52
DMS	Pearson Correlation	.410**	1
	Sig. (2-tailed)	.003	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.410 indicates that there is a positive correlation between Document Management Systems (KM technology approach techniques) and the project success. The correlation sigma p value observed between project success and Document Management Systems is 0.003. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Document Management Systems and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Document Management Systems and IT Project Success.

### 5.4.2.5 Correlation between Social Network Services and Project Success

Table 5:16: Correlation between Social Network Services and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
SNS	3.25	1.370	52

Correlations			
		Project_Succ ess	SNS
Project_Success	Pearson Correlation	1	.644**
	Sig. (2-tailed)		.000
	N	52	52
SNS	Pearson Correlation	.644**	1
	Sig. (2-tailed)	.000	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.644 indicates that there is a positive correlation between Social Network Services (KM technology approach techniques) and the project success. The correlation sigma p value observed between project success and Social Network Services is 0.000. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Social Network Services and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Social Network Services and IT Project Success.

### 5.4.2.6 Correlation between Instant Messenger and Project Success

Table 5:17: Correlation between Instant Messenger and Project success

Descriptive Statistics			
	Mean	Std. Deviation	N
Project_Success	3.44	.895	52
IM	3.31	1.528	52

Correlations			
		Project_Succ ess	IM
Project_Success	Pearson Correlation	1	.730**
	Sig. (2-tailed)		.000
	N	52	52
IM	Pearson Correlation	.730**	1
	Sig. (2-tailed)	.000	
	N	52	52

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson Correlation coefficient  $r$  value is 0.644 indicates that there is a positive correlation between Instant Messenger (KM technology approach techniques) and the project success. The correlation sigma p value observed between project success and Instant Messenger is 0.000. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between Instant Messenger and the project success in the population. Therefore, it can determine in the selected sample there is a strong positive correlation. There is a strong association between Instant Messenger and IT Project Success.

## 5.5 Inferential Analysis with ANOVA

ANOVA test was conducted to identify the relationship between KM people's approach techniques and KM technology approach techniques towards the project success. Mentioned scenario is interpreted in the below sections.

Table 5:18: ANOVA - KM people's approach techniques and KM technology approach techniques towards the project success

Dependent Variable: Project\_Success

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	40.327 <sup>a</sup>	9	4.481	376.385	.000
Intercept	296.216	1	296.216	24882.179	.000
KM_People_Approach	26.531	3	8.844	742.861	.000
KM_Technology_Approach	.119	3	.040	3.332	.028
KM_People_Approach * KM_Technology_Approach	.260	3	.087	7.273	.000
Error	.500	42	.012		
Total	657.000	52			
Corrected Total	40.827	51			

a. R Squared = .988 (Adjusted R Squared = .985)

F value of the interaction effect between KM people's approach techniques and KM technology approach techniques towards the project success are 7.273 and the significant value is 0.00. Since sigma value is less than 0.05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between interaction effect (KM people's approach techniques \* KM technology approach techniques) and the project success within the population.

F value of the KM people's approach techniques is 742.8 and the significant value is 0.00. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is having enough evidence to prove that there is a positive relationship between KM people's approach techniques and the project success within the population.

F value of the KM technology approach techniques is 3.332 and the significant value is 0.028. Since sigma value is less than .05 (standard significant level 0.05) which means chosen sample is



having enough evidence to prove that there is a positive relationship between KM technology approach techniques and the project success within the population.

Therefore, it determined the first and second both hypothesis discussed in the research have a strong relationship for the project success. There is an association between KM people's approach techniques and the project success. Also, there is an association between KM technology approach techniques and the project success.

## 5.6 Summary of the Findings

Table 5:19: Correlation coefficient comparison

<b>Hypothesis</b>	<b>Independent variable</b>	<b>r value</b>	<b>Sigma values</b>	<b>Relationship to the dependent variable</b>
There is a relationship between KM People's approach techniques and IT project success	KM People's approach techniques	0.325	0.019	Strong
	After Action Review	0.472	0.000	Strong
	Peer Assist	0.388	0.004	Strong
	Storytelling	0.158	0.264	Weak
	Brainstorming	0.332	0.016	Strong
	Gone Well Not Gone Well	0.175	0.215	Weak
	Community of Practice	0.165	0.242	Weak
	There is a relationship between KM Technology approach techniques and IT project success	KM Technology approach techniques	0.492	0.000
Collaborative Virtual Workspace		0.680	0.000	Strong
Knowledge Bases/Banks		0.743	0.000	Strong
Blogs		0.594	0.000	Strong
Document Management Systems		0.410	0.003	Strong

	Social Network Services	0.644	0.000	Strong
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Table 5:20: ANOVA Comparison

<b>ANOVA test case</b>	<b>Independent variables</b>	<b>f value</b>	<b>Sigma values</b>	<b>Significant status</b>
KM People's approach * KM Technology approach	KM People's approach	742.8	0.000	Strong
	KM Technology approach	3.332	0.028	Strong
	Interaction	7.273	0.000	Strong

## **5.7 Summary**

The collected data for the research were evaluated in this chapter. Primarily the analysis of the Cronbach's alpha was conducted to comprehend the validity of the data for further analysis. Secondly, independent and dependent variables were assessed in statistical way and demonstrated by using graphical and numerical methods in this chapter. Then correlation among the independent and dependent variables were evaluated and presented against the significances in level of 0.05 or 95% confidence through Pearson correlation technique. The ANOVA test is used to analyze the significance between the interactions of KM people's approach techniques and KM technology approach techniques towards project success. At the end of the research, theoretical framework is derived, based on the research findings.

The research analysis led to the conclusion that KM techniques are significantly co-related with the PM practices compliance for the IT industry in the context of software project based companies.

## **Chapter 6 Discussion and Conclusion**

### **6.1 Introduction**

This section summarizes the main findings of the study and the material presented in the main body of the study. Conclusions and suggestions conveyed the goal of the thesis and further elaborate the suggestion for the future aspects of the research area. The researcher has used a simple close ended questionnaire with relation to a Likert scale which gathered primary data which was needed for the analysis of the research topic. The gathered data was processed and analyzed using Cronbach's alpha through the SPSS analytical tool for internal consistency. Two hypotheses were identified to find out the relationship of the KM in PM for project success. These hypotheses were statistically proven in the chapter five of the research resulting to agree with the researcher's research objectives. Secondly, this chapter would make recommendations that could be applied in the project based companies in order to gain high benefits' over applying concepts of KM in projects. Chapter concluded with the ideas for the future researchers for the same research area.

### **6.2 Discussion**

This section discusses about the research findings based on the research objectives and the defined hypothesis. Therefore, the main research objective and each hypothesis are discussed by presenting a summary of the research findings of the research analysis. The objectives and the hypothesis in this research were listed below and elaborated, based on the finding of the analysis.

Main objective of the research was:

**To evaluate the Knowledge Management techniques, use in IT Project Management practices in Sri Lanka.**

From the literature review it was shown that the KM people's approach techniques and technology approach techniques are affecting the PM for project success. The majority of the respondents agreed that the above statement is clearly affected to their PM. This was further analyzed and presented in research analysis chapter (table 2.1 and table 2.2).

Hypothesis of the research, and they were:

**H01a = There is a relationship between KM People's approach techniques and IT project success.**

The research literature review chapter was disclosed that there is an impact on IT project success from KM people's approach techniques. Questionnaire was designed and gathered data to determine that there is a relationship between KM people's approach techniques and project success. In this case mainly evaluate six different types of KM people's approach techniques which are After action review, Peer assist, Storytelling, Brainstorming, gone well not gone well and Community of practice (CoP). These sets of techniques were highly utilized in the selected sample (projects). It was assured by the research participants (project managers, scrum masters) that there is a strong relationship between KM people's approach techniques for the PM for project success in Sri Lankan software project based companies.

The impact of each technique was separately evaluated through the SPSS. Based on the finding (refer table 5.18) Peer assist are having a very strong relationship with the PM success. The sigma value presented though the correlation for those techniques are closer to .000 and it strongly indicated that there is a very After-action review strong association between these techniques and the PM success. In addition to that Brainstorming also has a strong relationship with the project success. Based on the finding it indicated that there is a weak relationship with the Storytelling (sigma value 0.264), Gone Well Not Gone Well (sigma value 0.215) and Community of Practice (sigma value 0.242) with the project success.

## **H02a = There is a relationship between KM Technology approach techniques and IT project success.**

The research literature review chapter was disclosed that there is an impact on IT project success from KM technology approach techniques. Questionnaire was designed and gathered data to determine that there is a relationship between KM technology approach techniques and project success. In this case mainly evaluate six different types of KM technology approach techniques which are Collaborative virtual workspace, knowledge bases/banks, Blogs, Document management systems, Social network services and Instant messenger. These sets of techniques were highly utilized in the selected sample (projects). It was assured by the research participants (project managers, scrum masters) that there is a strong relationship between KM technology approach techniques for the PM for project success in Sri Lankan software project based companies.

The impact of each technique was separately evaluated through the SPSS. Based on the finding (refer table 5.18) evaluated all the technology approach techniques having a very strong relationship with the PM success. The sigma value presented though the correlation for those techniques are closer to .000 and it strongly indicated that there is a very strong association between these techniques and the PM success.

### **6.3 Conclusion**

The result of this statistical analysis has shown how a project's success is affected due to consequences of KM people's approach techniques and KM technology approach techniques. The high degree of responses accepted that the consequences such as most of the KM people's approach techniques and KM technology approach techniques are significant factors towards project management compliance. Moreover, this research analysis has been proved that the compliance of project success is strongly affected by KM people's approach techniques such as after-action review, Peer assist and brainstorming. Also, KM technology approach techniques such as collaborative virtual workspace, knowledge bases/banks, Blogs, Document management systems, Social network services and Instant messenger are having strong impacts on project success.

By building a framework focused on the above discussed, KM techniques can be used to help improve knowledge transfer within project teams, it is hoped that the failure rate due to knowledge-based issues will drop significantly.

#### **6.4 Contribution to the Research Area**

This research contributes to the area of Project Management by examining how Knowledge Management affects the project management practices for project success in IT projects based companies in Sri Lankan software development companies. The research discussed consequences of KM techniques and its effects to software project management activities in software project based companies in IT industry in Sri Lanka. Since management of knowledge is highly affected to the project management success it is vital to study about the effect of KM techniques in PM. It was illustrated that KM and project management compliance in project context are tightly co-related. This direction will enable project managers or the teams of the software project based companies to select best KM techniques to reduce their project failures.

#### **6.5 Recommendation**

It is greatly recommended for the management of software project based organizations to use necessary KM techniques in projects to prevent or reduce the knowledge gaps among members of the project team. This will enable project managers to maintain strong team commitment throughout the project or product development lifecycle towards a successful delivery of the project by achieving project and project management obligations. Through the analysis of the research it has been identified that KM people's approach techniques such as after-action review, Peer Assist, Brainstorming and KM technology approach techniques such as Collaborative virtual workspace, knowledge bases/banks, Blogs, Document management systems, Social network services and Instant messenger are required to be considered in PM to reduce knowledge gaps.

Moreover, the above table 5.18 and 5.19 illustrate the fact that each independent variable has a strong correlation with other independent variables. It has provided strong evidence that to maintain sustainable KM techniques within the project context. The organizations will have to consider about necessary KM people's approach techniques and technology approach techniques to increase productivity of the project outcomes.



## **6.6 Future Study**

Due to the limited time frame the data analysis was conducted only by using Pearson Correlation and Two-way ANOVA. Use of a more efficient analysis mechanism would have strongly proven the hypothesis much further. Future studies could be performed on the same thesis with suitable data analysis methods such as multiple regression to prove the hypothesis.

This research was conducted to study the impact of KM on project management disciplines in project context. There are other disciplines such as software quality assurance, software development, business analysis, managed and support services that are associated to develop and deliver software product or services. Therefore, the future research is to study the impact of KM on all the other disciplines in software project based industry. Since the lack of knowledge is a main issue in the Sri Lankan software project based industry, this research was targeted on software development companies in Sri Lanka as a total population. Consequently, the future research is to study all the IT companies in Sri Lanka that experience issues in knowledge management.

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## Appendices

### Appendix 1: Set of open ended questions for the experts

Q1. Is organization used knowledge management techniques as a part of project management?

Q2. Do you have written policies or procedure for knowledge management techniques?

Q3. Is it mandatory to use knowledge management techniques in project phases?

Q4. What are the existing knowledge management techniques/tools use in your organization?

Q5. Does organization conduct knowledge management sessions for the employees?

### Appendix 2: Set of semi structured questionnaire to collect data

#### Demographic Information

1. My recent project belongs to

1. ERP	4. POS
2. CRM	5. Other
3. E-Commerce	

2. Duration of my recent project

1. Up to 3 months	4. Between 1 to 2 Years
2. Between 3 to 6 months	5. More than 2 years
3. Between 6 to 12 months	

3. The number of team members involved in my recent project

1. Between 1 to 8	4. Between 26 to 35
2. Between 9 to 15	5. More than 35
3. Between 16 to 25	

**Knowledge Management People’s approach Techniques used in your recent project**

In my recent project, the level of usage of following KM People’s approach techniques

(Scale: 1- Very low, 2 - low, 3 - Moderate, 4 – High, 5 - Very high)

	1	2	3	4	5
4. After Action Review					
5. Peer Assist					
6. Story Telling					
7. Brainstorming					
8. Gone well/not gone well exercise					
9. Community of Practice(CoP)					

**Knowledge Management Technology approach Techniques used in your recent project**

In my recent project, the level of usage of following KM Technology approach techniques

(Scale: 1- Very low, 2 - low, 3 - Moderate, 4 - High, 5 - Very high)

	1	2	3	4	5
10. Collaborative Virtual Workspace					
11. Knowledge Bases/Banks					
12. Blogs					
13. Document Management Systems					
14. Social Network Services					
15. Instant Messenger					

**Status of your recently completed project (Evaluate through triple constraints cost, quality and time).**

(Scale: 1- Strongly Disagree, 2 - Disagree, 3 - Moderate, 4 - Agree, 5 - Strongly Agree)

	1	2	3	4	5
16. Project activities and milestones were achieved within the schedule					
17. Able to deliver the project to customer within the agreed time					
18. Project activities were achieved within the estimated budget					
19. Initial fund allocation was sufficient to complete the project					
20. Project was completed with minimum bugs					
21. The project was properly closed by delivering final product, service, or result.					

22. Overall satisfaction of recent project performance

1. Very low	4. High
2. Low	5. Very high
3. Moderate	

23. Number of new system enhancements requested by the customer for recently completed project

2. Very low	5. High
3. Low	6. Very high
4. Moderate	