INVESTIGATING KNOWLEDGE MANAGEMENT PRACTICES TO MINIMIZE THE IMPACT IN STAFF TURNOVER: A CASE IN MANUFACTURING ORGANIZASIONS

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DECLARATION

I hereby declare that the work included in this dissertation as part or as whole, has not been submitted for any other academic qualification at any other university or institute. The material included in this document contains the findings of researcher and elsewhere abstracts of previous publications where references are provided accordingly.

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Date: ……...

The above candidate has carried out research for the Masters thesis under my supervision.

Signature of the supervisor:……

Date: ……...

ABSTRACT

Skilled staff turnover plays a wide role in continuous knowledge loss in manufacturing organizations. The result of staff turnover impacts the organizational performance, productivity, effectiveness, employee performances and its knowledge. The importance of managing an organization's knowledge is a need in manufacturing organizations. This research identified the importance of knowledge management in the manufacturing sector with high staff turnover. This enables project managers to take project knowledge management into practice within the organization.

This study uses a qualitative approach. The aim of the study was achieved by a case study research strategy. Semi structured interviews were performed as data collection technique. Data was collected from TMC Trailer Manufactured Ltd, focusing on knowledge management methodologies used at the project phases and figure out the impact of staff turnover on organizational knowledge.

The knowledge management techniques vary from one project phase to another project phase. Based on the outcome of this research, project managers can identify the most effective knowledge management techniques to be used at each phases. According to the study, the most frequently used KM techniques in the planning stage were "Learning & Idea Capturing" and "Refer Knowledge Base". The most prominently used KM techniques in the designing stage was "Brainstorming" and "Learning & Idea Capturing". While the most frequently used KM technique in the building, testing and launching stages was found to be "Refer Knowledge Base". From this research study, project managers are clearly able to identify the critical areas affect by skilled staff turnover, how to prepare for in advance and minimize knowledge loss.

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LIST OF ABBREVIATIONS

AAR – After Action Review

BOI - Board of Investment

DNV - Det Norske Veritas

ISO - International Organization for Standardization

KM – Knowledge Management

PKM – Project Knowledge Management

STU – Standard Trailer Units

TMC – Trailer Manufacturing Company

CHAPTER 01

1.0 Introduction

This chapter explains the overview of this research study. Further the chapter explains the identification of the research problem, objectives and expected outcome of the research work.

1.1 Background of the Study

Employee's turnover is one of the challenging issues in business nowadays. Considerable attention has been given to the impact of turnover by senior management, human resources professionals and industrial psychologists. It is proven to be one of the most costly and seemingly intractable human resource challenges confronted by several organizations globally. According to Hayward et al. (2016); Long, Azami, Kowang and Fei (2016), employee turnover has a negative effect on organizations.

According to Mathis and Jackson (2006), employee turnover is the process in which employees leave an organization and have to be replaced. Employee turnover is related to the organizational commitment and job satisfaction. In any organization, staff turnover can occur either voluntarily or involuntarily. Voluntary turnover is referred to the termination initiated by employees and involuntary turnover is the termination of employee with no given choice in the termination due to long term sickness, moving overseas, death or employer-initiated termination (Heneman, 1998). Mathis and Jackson (2006) state that employee turnover is not only a voluntary leave but it includes involuntary turnover in broader sense.

According to studies carried out by Kreitner (2003), employee turnover as understood by human resources professionals, is the rate at which an organization's work force terminates employment and require replacement. Furthermore, according to Nugent (2009), employee turnover can be defined as a percentage figure which shows the rate at which employees move in and out of the organization.

Since employee turnover is considered to be one of the persisting problem in organizations (Arm-strong, 2009), especially if it involved quality employees that

have worked for the organization for many years, who are highly experienced, high performing and loyal individuals (Branham, 2005; Katcher & Snyder, 2007; Somaya & Williamson, 2008). On the other hand the employee turnover means that another organization may gain a new knowledgably employee who can become its competitive advantage. Thus the knowledge loss is a threat for the former organization, which increases the significance of knowledge continuity. An organization's management have to consider in advance, the ways to cope when a potential employee leaves for its competitor or on retirement. It is one of the essential factors influencing organizational knowledge continuity and it is necessary to minimize its consequences by means of knowledge management.

Knowledge management needs to be understood as a process of systematically and actively identifying, activating, replicating, storing, and transferring knowledge. Recent years several ideas and concepts of knowledge management (KM) have been developed. Knowledge management is not a purely managerial activity because it may be performed by all project team members and not only by the management team. Each team member, especially in a project that makes intensive use of knowledge, can and should take part in the creation, storage, and distribution of knowledge (Damm & Schindler, 2002). The knowledge is passed from the project level to the organization level in order to distribute it to other projects that are implemented by the organization or use it in line processes. Knowledge is passed from the organization level to the global level for the purpose of using it in global sources of knowledge. Therefore capturing the knowledge of the staff is very important and knowledge management is one of the mechanisms to do that.

1.2 Research Problem

Increasing productivity is very vital for every organization. Employee turnover is a major issue for organizations striving to hold a competitive edge in the global arena. High employee turnover reflect the instability of organizations. Organizations will be greatly effected due to high skill employee turnover. Which would in turn reflecting badly on its product quality, targets, performances and ultimately increasing the product cost. Because of these facts, retaining the organizational

knowledge is more important in the manufacturing industry. Better understanding of knowledge management techniques and organizational knowledge management is essential to minimize the knowledge loss today. This study is focused to identify the best knowledge management techniques and minimize the knowledge loss with high staff turnover environment in the manufacturing industry in Sri Lanka.

1.3 Importance of the Study

Labour turnover is a threat to organizations, resulting in knowledge loss to the organization. This leads to organization's inability to ensure continuity of the organizational knowledge growth. Retention of the organizational knowledge becomes increasingly important in the current competitive manufacturing environment for an organization's existence. Further, organizations having staff turnover may have a considerable effect to an organizational achieving its objectives.

This research aims to identify the importance of knowledge management and its techniques in a manufacturing project environment with reference to organizations with high staff turnover. The other benefit obtained from this project is the identification of the most effective knowledge management methodology to be used at each project stage. This study will support project managers to plan for ongoing projects as well as for future projects.

Further, outcomes of this research is the identification of reasons why skilled staff is leaving an organization and to identify the best practices to retain skilled staff and their knowledge within the organization. By supporting this research organizations can identify the factors to eliminate employee turnover and thus reduce the loss of knowledge when employees leave.

The background of the research and purpose of the study is to identify how to retain organizational knowledge with leaving the skilled staff from the organization.

1.4 Aim

This study aims to identify how to capture knowledge from staff leaving organizations by investigating the knowledge management practices. In order to meet this aim research objectives were identified.

1.5 Research Objectives

Following are the objectives of this research study;

- Identify the impact on leaving skilled staff from ongoing projects.
- Identify the knowledge management methodologies applied for each project stages.
- Identify the effectiveness of current knowledge management practices within the organization.
- Identify the barriers to practice knowledge management within the organization
- Propose best methods to retain the knowledge within the organization.

1.6 Research Methodology

This chapter explain the methodologies that could be deployed to answer the main research objectives of this study. Section 3.1 describes the research design adopted in this study. Semi structured interviews and document analysis were used as data collection methods. Based on the research objectives, semi structured interview questioner was developed. The interview questions were designed to extend the understanding of the meaning of knowledge management, its techniques and identify its effectiveness. In the same time, it was aimed to capture the impact on organizational knowledge with skilled staff leaving from the organization. Section 3.2 is about the research philosophy used. Section 3.3 is referring to research approach for this study. Section 3.4 describes the data gathering methods used. Section 3.5 contains the chapter summary.

1.7 Structure of Dissertation

Chapter 1 introduces the research rationale, the background of the study, justifications for the choice of sector and the studied concepts' selection. It also includes the context of this study, the research problem, the aim and objectives and the research methodology for the research problem. Chapter 2 reviews relevant literature on previous researches, it provides a brief description to the tools and techniques to be used in this study and identify relevant candidates for the research. Chapter 3 describes the methodology that was adopted in this study in a sequential order. Chapter 4 analyses the current understandings revealed though the interviews and discuss on the findings to the study. Chapter 5 gives a summary of the thesis as well as the discussion on the limitations and directions for future research. Lastly, Appendix A, B & C contains a full description of all the relevant supporting information required for this study.

CHAPTER 02

LITERATURE STUDY

2.0 Introduction

This chapter covers the literature review of the project. This chapter addresses the literature on staff turnover, knowledge management and project knowledge management. The first part looks into staff turnover and its impact related to manufacturing organizations. The second part addresses the knowledge management related literature to manufacturing projects environment.

2.1 Staff Turnover

According to Singh et al. (1994), staff turnover is the rate of change in the working staffs of a concern during a defined period. Ivancevich and Glueck (1989) stated that staff turnover is the net result of the exit and entrance of employees in an organization. The studies by Loquercio et al. (2006) observed that staff turnover is the proportion of staff leaving in a given time period but prior to the anticipated end of their contract. Kossen (1991) defined turnover as the amount of movement in and out (of employees) in an organization. Another researcher defines as employee turnover to be the rotation of workers around the labour market, between firms, jobs and occupations, and between the states of employment and unemployment (Abassi & Hollman, 2000).

Turnover is referred as an individual's estimated probability ton their will to stay or not in an employing organization (Cotton & Tuttle, 1986). A number of terms have been used for employee turnover, such as quits, attrition, exits, mobility, migration or succession (Morrell *et. al,* 2004).

According to Harhara, Singh, & Hussain, 2015, staff turnover often costs organizations both directly and indirectly. Direct expenses include recruiting and training costs, reduced productivity, and additional compensation for a new employee (Harhara et al., 2015; Hayward et al., 2016; Long et al., 2016). Indirect costs could include the loss of tacit knowledge, a decline in employee motivation, and weakening of an organization's reputation if turnover frequently occurs

(Harhara et al., 2015; Long et al., 2016). Likewise, the impact of high turnover can have a negatively effect on society as well (Vasquez, 2014).

Mathis and Jackson (2006) found that turnover is a costly problem and further, argued that, the cost related to the labour turnover can be classified as separation cost, replacement cost, training cost and hidden cost. Therefore this heavy cost components are ultimately results to decrease the productivity and the profitability of the firm.

However, there have been a number of factors that appear to be consistently linked to staff turnover. According to the studies on turnover by Mobley et al., (1979) the overall job satisfaction, job content, intentions to remain on the job, commitment, age and tenure were all negatively related to turnover. According to the studies by Ross and Miller (1984) and Janssen et al. (1998) show that there is a particular lack of satisfaction with job aspects like salary, work content and carrier opportunities which related to turnover intention.

Further, Glebbeek and Bax (2004) explain in their study that employee turnover is the replacement of labours from one place to another in the employment market; among businesses, occupations and employments; and amongst the situations of employment and joblessness.

Retaining employees and the efforts organisations put in to retain them is a prime issue for most of the organisations throughout existences of knowledgeable assets. Employee turnover can be costly from the outlook of an organisation (Suliman & Al Obaidli, 2011). The higher level of turnover results in greater expenditures associated with the hiring and training of new staffs. It costs companies cash to employ human resource employees to interview, employ applicants and provide training. Freshly recruited labours can be an expensive procedure that distracts experienced employees from profitability performances as suggested by (Rettab et al., 2009). Eventually the knowledgeable employees have to habitually train new employees with lesser amount of talented to distillate on their regular job responsibilities (Ali et al., 2010).

2.2 Impact on Staff Turnover

There are two major reasons why turnover is a critical issue in the field of human resource management (HRM) globally. First, turnover reflects to low organizational knowledge, low employee morale, low customer satisfaction, high selection costs, and high training costs, (Staw, 1980; Talent Keepers, 2004). Research studies have also shown that high employee turnover is related to lower organization performance (Glebbeek & Bax, 2004; Huselid, 1995; Phillips, 1996). Second, the decision to turnover is often the final outcome of an individual's experiences in an organization (Hom & Griffeth, 1995).

The impacts of staff turnover to an organization in terms of productivity, effectiveness, employee performance and organizational knowledge are described below.

2.2.1 Impact on Productivity of the Organization

The escalation in the rate of labour turnover is a major concern for businesses. It is clearly impacting on organisational performance. Steers (2002) stated that staff turnover is costly and disruptive. Costly in the sense it reduces the output and continuous flow of production, as it requires that schedules and most of the time the programmes need to be rescheduled. The cost of staff turnover and the impact thereof effect on productivity alone is enough to depress any human resource manager and the organisation. There might be a delay in product delivery while waiting for the replacement staff to arrive. In addition, according to Ziel and Antointette (2003) there might be production losses while assigning and employing replacement staff.

Furthermore according to Doorewaard and Benschop (2003), Branham (2005), Somaya and Williamson (2008) staff departure and replacement is both time- and money consuming. Often the organisation experiences a waste of time due to inexperienced replacement of staff. Management and other staff have to spend valuable time not doing their job but trying to orientate the replacement staff. This shows that staff turnover is directly effecting organizational performance and need to be address carefully.

2.2.2 Impact on Organisational Effectiveness

Many studies have used turnover as a criterion to evaluate the effectiveness of various organizational processes, such as training (Glance et al., 1993), coaching/ mentoring (Lankau & Scandura, 2002; Luthans & Peterson, 2003; Payne & Huffman, 2005) and each selection (Barrick & Zimmerman, 2005; Meglino et al., 2000).

According to Nel *et al.* (2004), some of the factors that impact staff turnover and organisational effectiveness mentioned are mentioned below:

- Increased customer complaints on service.
- Decreasing service quality due to staff shortage.
- The replacement staff may be unfamiliar with the unit and task or duties to be performed; therefore inefficiency and errors may result.

Thus, understanding the factors that influence turnover gives organizations the opportunity to reduce selection and training costs, increase employee morale and customer satisfaction, and enhance organizational productivity and effectiveness.

2.2.3 Impact on Employee Performance

Staff turnover can also have a negative impact on other employees by disrupting group socialization processes and increasing internal conflict, which can lead to causing additional absenteeism (Neo, Hollenbeck, Gerhart & Wright, 2006). In addition, the interpersonal bond that is developed from certain period of time between employees is central to the communication patterns that are characteristic and unique to any organisation. People grow professionally and personally, and good employers are able to accommodate these changes in circumstance. A highly satisfied and impressed workforce is more capable of meeting organisational goals and customer needs than an apathetic and uninspired one (Swanepoel, Erusmus, Van Wyk & Schenk, 2003). Tyani (2001) states that cost is not only financial but must also be measured by the damage to staff morale and deficits in meeting community demand.

Due to high turnover, high levels of stress leads to employees making unnecessary mistakes and accidents. In additionally low morale leads to them not caring about what they do. Staff turnover breaks team spirit and group cohesion, which is necessary for the successful and smooth running (Grobler, 2002).

2.2.4 Impact on Organizational Knowledge

Employee knowledge is critical to the organization since their value to the organization is essentially intangible and cannot be easily replicated. When an experienced employee leaves, they take the valuable knowledge of the company with them. Also they will take customers, current projects and past history (sometimes to competitors) too. Often these is a lot of time and money spent by a company on an employee in the expectation of a future return. When the employee leaves, the investment is not realized.

Employee turnover is often identified as a negative factor affecting staffing and knowledge continuity in organisations (Fritz-Enz, 2002; Doorewaard and Benschop, 2003; Branham, 2005). Employees working out their notice periods fail to perform at full capacity and take away important knowledge. There is high chance of that they will provide it to competitors.

Beazley (2003) assesses the loss of knowledge as a serious threat to the organization. A method of challenging this threat is to introduce a structured programme for the transfer of critical knowledge. It is obvious that not all knowledge may be collected and transferred, but this is not the goal. The goal is to transfer solely the critical knowledge related to the work position that would, in case it is lost, endanger the operation of the organization. Some continuity is definitely better than none.

2.3 Knowledge Management

Knowledge is defined as the information combined with experience, context, interpretation and reflection (Davernport, De Long & Beers, 1998). Further it is explained as "A high value form of information that is ready to apply to decisions and actions, while knowledge and information may be difficult to distinguish at times. They are more valuable and involve more human interference than the raw data on which we have lavished computerization during the past forty years" (Davernport, De Long & Beers, 1998, p.43).

Knowledge management was defined as the process of applying a systematic approach to capture, structure, management and dissemination of knowledge throughout an organization in order to work faster, reuse best practices and reduce costly rework from project to project (Nonaka & Takeuchi, 1995; Ruggles & Holtshouse, 1999; Pasternack & viscio, 1998; Pfeiffer & Sutton, 1999). Further expanding the knowledge management discipline, Darroch and McNaughton (2001) defined knowledge management as the management functions that encompasses the creation of knowledge, management of the flow of knowledge within the organization and usage of knowledge in an effective and efficient manner for the long-term benefit of the organization, since the process of innovation depends heavily on knowledge as argued by Gloet and Terzioski (2004).

In addition it is further expanded that knowledge management is the process of capturing the collective expertise and intelligence in an organization and using them to foster innovation through continued organizational learning (Davernport et al. 1998).

Based on studies carried out by Zheng (2005), knowledge management effectiveness comprised of three components. The three components are knowledge acquisition effectiveness, knowledge sharing effectiveness and knowledge application effectiveness. Knowledge management is regarded as a management discipline which focused on the development and usage of knowledge to support the achievement of strategic business objectives (Ralph, 2003).

Further few more review of the literature illustrates that knowledge management has three common dimensions: knowledge acquisition or knowledge generation (Gold et al., 2001; Shapira, Youtie, Yogeesvaran & Jaafar, 2006; Yang, 2005), knowledge sharing or knowledge transfer (Dyer & Nobeoka, 2000; Choi, 2000; Ralph, 2003; Murray, 2003; Weber & Weber, 2007), and knowledge utilization or application (Zheng, 2005; Gold et al., 2001).

According to Gloet and Terziovski (2004), effective knowledge management allows knowledge sharing and provides easy access to knowledge, know how, experience and expertise. Apart from that, Darroch and McNaughton (2002) observe that knowledge management facilitates the learning process in organizations. According to the studies of Hansen, Nohria and Tierney (1999), they argue that as the foundation of industrialized economies has shifted from natural resources to intellectual assets, executives have been compelled to examine the knowledge underlying their business and how that knowledge can be used. To innovate successfully, firms must create knowledge faster than rivals (Teece & Pisano, 1994) and rapidly translate new knowledge into new products (Grant, 1996).

Accordingly Kuo (2011) observed that successful corporate knowledge management comes from the support of top management and the fundamental investment of human resource managers as well. This highlight superior performance depends on how firms utilize the knowledge organizational members possess. In order to studies by Huber (1991), the organizations acquire knowledge not only through their own employees but also through formal and informal environmental scanning. Alavi and Leidner (2001) postulate that the ability to create, store, retrieve, transfer and apply knowledge are considered the core attributes of implementing knowledge management in organizations. Further knowledge management proposes various dimensions of the concept. Zack (1999) suggested four elements which include knowledge acquisition, refinement, storage and retrieval as well as presentation. Studies by Tiwana (2002) equated knowledge management to creating, packaging, assembling, reusing and revalidating knowledge.

Acquisition of knowledge is related to using existing knowledge or capturing new knowledge which improves an organizations ability to realize its goals and in the

same time to increase organizational learning. Further knowledge acquisition is an activity within the domain of knowledge management that has been widely practiced especially among firms that want to gain specific knowledge in a specific context (Ahmad, Mohamad & Ibrahim, 2013).

Also Nonaka and Takeuchi (1995) suggested that newly acquired knowledge increases stock of knowledge available to organizations, decreases levels of uncertainty and opens new opportunities for applying and exploiting knowledge. Knowledge application is related to the actual use of current knowledge in order to solve existing problems (Alavi & Tiwana, 2002).

Lord and Farrington (2006) states that successful knowledge management is dependent on a well-functioning human resource management and the employees‟ perceived behavior in knowledge creation, knowledge sharing and knowledge application.

2.4 Project Knowledge Management

Project knowledge management (PKM) is knowledge management practiced in project situations. It creates the link between the ideas and principles of knowledge management and project management. PKM involves two basic perspectives: the inter-project and intra-project perspective. Depending on the size and structure of a project, subprojects—or inter-project constellations—could exist within a project. Because of this, a clear differentiation between the two perspectives is not always possible. Love, Fong, and Irani (2005) made a valuable contribution by setting the base for understanding knowledge management in project environments. In their work regarding the role and processes of knowledge management in project environments, they set a particular focus on knowledge management in the context of cross-functional and international project teams as well as on the role of (organizational) learning in projects. These findings are regarded as state of the art in research and literature.

Schindler (2002) builds a framework of Project Knowledge Management (PKM) and identifies three major types of knowledge in project environments. They are knowledge about projects, knowledge within projects, and knowledge from/between projects. Knowledge within projects is closely linked to the project management methodology. These are dependent on the project manager and the individual project management style. The knowledge transfer from and between projects can be categories to four main parts: such as expert knowledge, methodological knowledge, procedural knowledge, and experience knowledge. Knowledge from projects contributes to the organizational knowledge base.

The project-based organizations is require to think about how it is going to select new knowledge, where it is going to store it, and what it needs to create a fourth step of knowledge management, distribution of knowledge to new projects. “In spite of recent advances in our understanding of how to manage knowledge, its capture and transfer remain acute problems for project-based firms and organizations” (Hall & Sapsed, 2005).

PKM contributes to the reduction of project risks through awareness of mistakes and pitfalls of former projects (Schindler & Epple, 2003).

According to the studies by Love et al. (2005), without the reuse of existing knowledge or the ability to create new knowledge from existing solutions and experiences, project organizations have to create solutions to every problem, which is clearly inefficient.

Literature on project knowledge management explained, show that one of the main reason for projects failure is the improper project knowledge management. This holds true especially when considering complex project, project knowledge management is one of the main success factors in project management.

A person assigned to a project brings the knowledge he/she possesses at to the project team. This is the technical or managerial knowledge collected during all the former education, training, and participation in completed projects. (Stanislaw Gasik, 2008). After completing the project, the team member attains a new level of knowledge.

This forms the basis for the process of knowledge management planning, which produces the project knowledge management plan (PKM Plan). The PKM Plan addresses all the topics related to project knowledge management and covers both the personalized and codifying techniques of knowledge management (meetings, knowledge exchanging teams, and using knowledge repositories) in alignment with project type and needs. (Stanislaw Gasik, 2008)

Yoo and Kanawattanachai (2001) tracked the progress of 38 virtual project teams and found that project success was strongly influenced by each team member's knowledge of the other team member's areas of expertise and by the team's ability to harness this knowledge to achieve the project's goals.

2.5 The Project Phases

According to PM book of PMI, the traditional phase-gate process has five phases with four gates. The phases are

1. Scoping
2. Build business case
3. Development
4. Testing and validation
5. Launch

New products go through the full five-phase process. Moderate risk projects (such as extensions and enhancements) often use a reduced 3-phase version, which combines the scoping with the business case phase, and developing with the testing phase. Simple changes (such as a marketing request) may be executed using a light two-phase process, where the launch is rolled into development and testing too.

From the perspective of Prince (2002), the project phase is a sequence of phases through which a project must pass. There are various definitions that generally reflect different industry practices, the generally accepted sequence define as pre-

feasibility, feasibility design, implementation, commissioning, handover and operation.

Though researchers have suggested certain representative project life cycles, for example, the waterfall model and Muench et. al's (1994) spiral model for the software development life-cycle, Morris's (1994) construction project life cycle and Murphy's (1989) representative life cycle for a pharmaceutical project. As per Kulkarni et al. (2004), the projects, especially the ones having a longer lifecycle, could be categorised into many phases depending on the functions.

2.6 Knowledge Management Techniques

In terms of understanding KM techniques, Raymund Sison (2006) identified some KM techniques which are IT based and non IT based. As per his identification, these KM techniques were; Brainstorming, Learning & Idea Capturing, After Action Review were categorized as non IT based KM techniques. Blogs and Refer Knowledge Bases are categorized as IT base KM techniques.

Brief descriptions on the above mentioned techniques are described below.

2.6.1 "Brainstorming" KM Technique

According to Raymund Sison (2006), brainstorming is a simple way of helping a group of people to generate new and unusual ideas.

It is further define as a process which involves a group of people who meet to focus on a problem and then intentionally propose as many deliberately unusual solutions as possible through pushing ideas as far as possible (Chimay J. Anumba, Charles Egbu & Patricia Carrillo, 2005). The participants shout out ideas as they occur to them and then build on the ideas raised by others. All the ideas are noted down and are not criticized. Only a brainstorming session over once the ideas are evaluated. Brainstorming helps in problem solving and the creation of new knowledge from existing knowledge (Tsui, 2002).

2.6.2 “Refer Knowledge Base” KM Technique

In the literatures for sharing tacit and explicit knowledge, this knowledge management strategy has been discussed in the literature, known as the codification strategy. It has the objective to collect knowledge, store it in databases, and provide the available knowledge in an explicit and codified form. Such a reuse of explicit knowledge and solutions can save time and money. Thus the design of databases, document management, and workflow management can be considered to be part of this strategy. The codification strategy is assumed to be successful for these companies whose business strategy requires re-using existing knowledge (Hansen et al., 1999; Malhotra, 2004).

2.6.3 “Learning & Idea Capturing” KM Technique;

The learning and idea capturing technique is a key technique in knowledge management (KM), and take place at a personal and team level to capture the learning and ideas collectively and systematically' (Raymund Sison, 2006).
Accordingly, the focus of the personalization strategy is not to store knowledge, but to use Information Technology to help people communicate their knowledge. The objective of the personalization strategy is to transfer, communicate, and exchange knowledge via knowledge networks such as discussion forums. If the business strategy focuses on generating new or customer specific solutions or product innovations the personalization strategy should be chosen rather than the above discussed codification strategy (Hansen et al., 1999).

2.6.4 “After Action Review” KM Technique;

After action review (AAR) is a KM technique focused on learning from a specific event. During the process of after-action reviews, participants in an activity, event, or project conduct a structured discussion of what happened and why in order to learn from the experience (NHS, 2001).

Further, After Action Review (AAR) is a technique to evaluate and capture lessons learned upon completion of a project. It allows project team members to discover for themselves what happened, why it happened, and how to sustain strengths and improve on weaknesses. (Raymund Sison, 2006). Below described most common questions discussed during AAR include:

· What was supposed to be done?

· What has been actually achieved?

· What went well?

· What could have gone better?

In after-action review it reviews on what went well or wrong and try to get to the root of the reason. AAR is a useful way to identify successes and define best practices as well as AAR also seeks to learn from obstacles, mistakes, and other problems. It helps to identify and share all lessons learned, both positive and negative, are documented. It takes the form of a quick and informal discussion at the end of a project or at a key stage within a project or activity. It enables the individuals involved to:

• review what has happened

• summarize new knowledge

• decide on what action should be taken next

2.6.5 "Blogs" KM Technique

A Blog is a very simple 'journal style' website that contains a list of entries, usually in reverse chronological order. The entries are typically short articles or stories, often relating to current events (Raymund Sison, 2006).

Blogs are most commonly used as an online version of a personal journal. Essentially, a blog is simply a web page that contains periodic, chronological ordered posts, additionally grouped by categories. Users visiting the blog can often add comments to posts. Administering a blog (updating it by adding new posts, creating links to other web pages, adding pictures, categorizing posts, etc.) is extremely simple. Setting up a blog can be more complicated but keeping it updated

and posting end-user comments to it is very easy. User settings are typically highly configurable. Because of the importance on reverse chronological posting, blogs are often characterized as promoting form over content. Blogs are most commonly used as an online daily journal or personal KM tool. For example, teenagers may post photos, poetry, game scores and other content to share with their friends. Others have used it as a log file, to record chronological data like system updates.

Further it described in literatures as a slang term for a web log (Kimiz Dalkir, 2005). The web log is popular and fairly personal content form on the Internet for the uninitiated. A person's web log is much like an open diary. It chronicles what a person wants to share with the world on an almost daily basis (Blood, 2002). According to Kimiz Dalkir (2005), a blog is a frequently updated, publicly accessible journal.

2.7 Chapter Summery

This chapter investigated the literature related to project knowledge management, KM techniques and employee turnover and its impact on organizational knowledge. There was a need to address related issues in knowledge management and knowledge continuity in organizations as to move forward.

There was no literature related to the trailer manufacturing industry both locally and internationally to be found. From the literature, it was found that the issues and impact of staff turnover in terms of organizational knowledge, productivity and effectiveness, employee performance. Further it present literature related to project knowledge management, project phases and KM techniques.

CHAPTER 03

RESEARCH METHODOLOGY

3.0 Introduction

The research methodology is an approach which provides a researcher with the necessary tools to complete the research successfully. Silverman (2013) stated that research methodology is a specific approach which researchers select to help in mastering the execution of research including the planning, data gathering and data analysis. The studies of Crotty (1988) in order to complete rational and coherent research, a researcher should carefully choose an approach which directs the methods which are employed in order to answer research problem. Creswell (2009) illustrated that the research methodology is the systematic approach a researcher adopts to achieve the research's aim.

This chapter discussed the methodology selected to answer the problem of the study. It discussed about the choices available, followed by selecting the chosen research model, data collection method and data analysis techniques used. Discussions on the questioner pilot study, actual distribution of the questionnaire and the process of analyzing data are also presented in this chapter. In this chapter the discussion of the analyzing the interviews and the analysis of the documents are also presented. Furthermore, the research design is also illustrated in this chapter.

3.1 Research Design

With the process of making decisions by carrying out a research, the researcher need to initially start it by critically and carefully thinking about the nature of the research. He or she has to consider carefully about the events wish to include in it. Investigating the literature to extract a final and clear answer on this subject would not be possible due to the clear disagreements between scholars about the terminologies, the order and the nature of the events which should be included in a research design.

According to the nested model shown in figure 3.1, philosophy is understood as one of different perspective and thus Kagioglou, Aouad, Hinks, sexton and Sheath (1998). Their focus was mainly on boosting the inner research approaches and research techniques. Thus, (Kagioglou et al., 1998) listed only three elements: research philosophy, research approach and research techniques (Refer Figure 3.1).

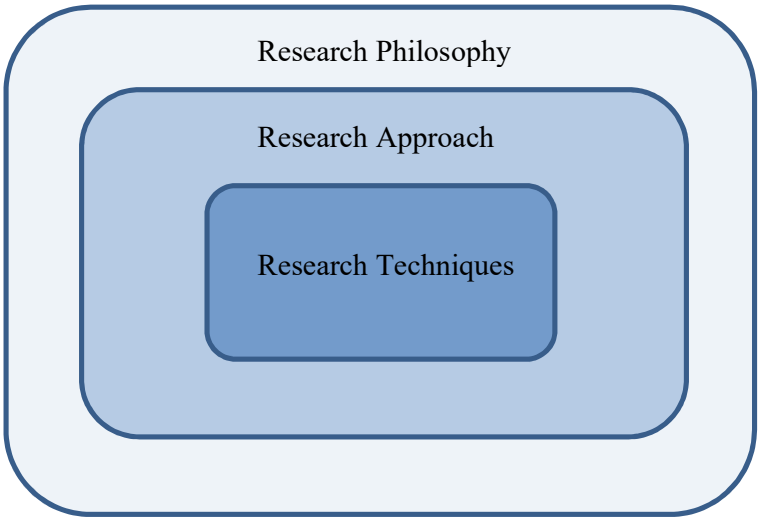

Figure 3_1: Nested Model or Hierarchical Model (Kaglioglou et al., 1998)

The research philosophy created by the outer box directs and energizes the inner research approaches and techniques. The research approaches incorporate qualitative and quantitative methods. Research techniques include data collection tools such as literature review, questionnaire survey, interview, observations, experiment and workshop.

Having discussed the research model adopted for this study, the following sections discuss the content of chosen model in detail by following each layer and associated with the position of this research.

3.2 Research Philosophy

Research philosophy as stated by Saunders, Lewis, and Thornhill (2016) is the first layer which needs to be considered in any research. According to Creswell (2013), mentioned that it is vital to understand research philosophy at the early stage of the research.

Referring to Bryman (2012), there are two main philosophical approaches in social research. They are ontological and epistemological. Ontology is about the logical investigation of the different ways in which different types of things are thought to exist and the nature of the various kinds of existences. Epistemology deals with question of knowledge acceptability in a discipline and the methods through which knowledge is acquired. Similarly ontology, epistemology and methodology are the studies of what, why and how of a research project.

3.3 Research Approach

Research approach is to establish the best possible way of answering the research questions. Bryman (2012) stated that it is vital for a researcher to base the research on a theory in order to complete a research successfully.

It is a strategy of enquiries which moves from philosophical assumptions to research design and data collection (Myers, 1997). The research approach or strategy can be categorized in many ways. One of the most common classification is quantitative, qualitative or a combination of both methods – called triangulation or mixed research methods (Fellows & Liu, 2003; Neuman, 2006).

The decision on which type of research strategy to follow depends on the purpose of the study and the type and availability of the information which is required (Naoum, 2007). Briefly review the characteristics of the quantitative and qualitative research methods in bellow sections.

3.3.1 Qualitative Research

Qualitative Research is primarily exploratory research. Qualitative research is to understand how people see and interact with the world (Fellows & Liu, 2003). It is a survey of the subject undertaken without prior formulations, the objective is to gain understanding and collect information and data such that theories will emerge (Fellows & Liu, 2003). In the same time it is used to gain an understanding of underlying reasons, opinions, and motivations. It provides awareness and understanding into the problem or helps to develop ideas or hypotheses for potential quantitative research study. Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include individual interviews, focus groups (group discussions) and participation/observations. The sample size is typically small, and respondents are selected to fulfil a given quota.

3.3.2 Quantitative Research

Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into usable statistics. It uses empirical approaches such as survey methods, laboratory experiments, formal methods (e.g. econometric) (Myers, 1997). It is used to quantify opinions, attitudes, behaviors and other defined variables and generalize results from a larger sample population. Quantitative Research uses measurable data to formulate facts and uncover patterns in research. Quantitative data collection methods are much more structured than Qualitative data collection methods. The main strengths of quantitative research methods lie in precision and control. The samples collected from quantitative research are often large and representative, hence the results can be generalized to the larger population within acceptable error limits (Bryman, 2012).

Table 3.1: Quantitative vs. Qualitative Approaches

(Adapted from Bryman and Bell (2003); Neuman (2006); Naoum, (2007))

Criteria	Qualitative Research	Quantitative Research
Role	Attitude measurement based on opinions, views and perception measurement	Fact-finding based on evidence or records
Nature	Hard-Science	Soft-science
Sample/Cases	Small in number, non-representative of population and respondents selected to fulfil a given requirement	Large in number, representative of the population and based on random selected respondents/samples
Data Collection	Unstructured or semi-structured interviews	Structured Questionnaires/Experiments
Nature of Data	Rich and deep	Hard and reliable
Data Analysis	Thematic	Statistical
Role of theory in relation to research	Inductive; generation of theory	Deductive; testing of theory
Relationship between researcher and subject	Close	Distant
Relationship between theory/concepts and research	Emergent/development	Testing/confirmation
Outcome	Findings are not conclusive, cannot be generalized and usually exploratory and /or investigative	Findings are conclusive, can be generalized and used to recommend a final course of action

3.3.3 Justification to use Qualitative Methodology

There are several considerations when selecting a methodology similar to qualitative according to Marie C. Hoepfl (1997). According to the perspective of Strauss and Corbin (1990), stated that qualitative methods can be used to better understand any phenomenon about which little is yet known. They can also be used to gain new perspectives on things about which much is already known, or to gain more in-depth information that may be difficult to convey quantitatively. Thus, qualitative methods are appropriate in situations where one needs to first identify the variables that might later be tested quantitatively, or where the researcher has determined that quantitative measures cannot adequately describe or interpret a situation. Research problems tend to be framed as open-ended questions that will support discovery of new information.

From the researchers' perspective, the ability of qualitative data to more fully describe a phenomenon is an important consideration. Also from the reader's perspective it is applied the same. According to Lincoln and Guba (1985), stated that "If you want people to understand better than they otherwise might, provide them information in the form in which they usually experience it" (p. 120).

Referring qualitative research reports, it is typically rich with detail and insights into participants, may be epistemologically in harmony with the reader's experience (Stake, 1978) and thus it is more meaningful.

Based on above discussion, this research study is following the qualitative methodology as the research approach.

3.4 Research Strategy

From the perspective of Bryman (2008) and Punch (2005), a research strategy is the academic strategy by which researchers intended to tackle research in order to answer the research question in a social context. In the literature, there is considerable argument that a research strategy can be either qualitative or quantitative. Saunders et al. (2016) stated that, in quantitative research, research

tends to collect data in the form of numbers where as in qualitative research the intension is to collect in the form of options, concepts and perspectives. From the literature of the studies of Creswell (2009), the quantitative approach allows a researcher to examine a theory or hypothesis and then the researcher collects the required evidence to either support or refute the hypothesis or the suggested theory. On the other hand, with the qualitative approach, an understanding of the studied phenomenon will occur once the meanings and options on the studied phenomenon have been collected from the participants.

Easterby-Smith et al. (2008); Remenyi (1998); Saunders et al. (2016) list experiment, survey, case study, action research and ethnography as common research strategies can be undertaken for the research. Thereby, selection of the research strategy needs to be reflect the philosophical stance of the study as well as the research approach that has been under taken.

3.5 Case Study

3.5.1 Definition and use of the Case Study

Yin (2009, p.18) defined a case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". He added that such a strategy has the strength to assist the researchers in investigating an elaborate phenomenon in a natural setting. Denscombe (2010) argued that the case study strategy helps a researcher to gain an in-depth picture of the relationships and processes within the phenomenon. Therefore, a case study approach is more common in qualitative studies than in quantitative studies.

Yin (2009) stated that a case study strategy should be used when questions such as "how" and "why" are being asked and that it is preferable to use this approach to answer questions about a contemporary set of events over which the researcher has no control. The case study approach with regards to research philosophies, assumptions, approaches and strategies were stated in literature (Sixton, 2003, cited in Keymniyage, 2009).

Case studies are useful for revealing the details of a phenomenon, in particular the relationship between the phenomenon and its context. According to Yin (2009), the design can be one four: single-case (holistic) design, single-case (embedded) design, multiple-case (holistic) design and multiple-case (embedded) design (see Figure 3_2)

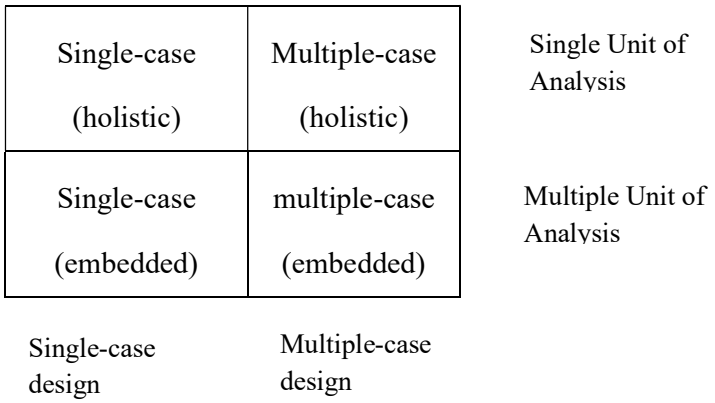

Figure 3_2: Case Study design and unit of analysis (Yin,2009)

In terms of single design, the focus of the research undertaken will be on one case. The study can be critical, unique, representative, revelatory or a longitudinal study (Yin, 2009). A critical case can be used to extend new contribution to the theory while a unique case is used to investigate a new case. With regards to the representative case, it is usually undertaken when the case is common, thus, studying one case is adequate to obtain an understanding about other case. A revelatory case design allows a researcher to carry out an investigation into a context or phenomenon which has not been examined previously.

Identifying the design for a case study will help a researcher to collect data accurately and make sense of the findings and of the link between them and the collected data.

For this study, single case study research strategy has been selected as it involves investigating a contemporary phenomenon. Further case studies provide the opportunity to use multiple sources of evidence, which is valuable for this study.

3.6 Research Technique

In this research study, the researcher incorporates qualitative approach. As noted by Dörnyei (2007), qualitative data are 'most often' collected by researchers through interviews and questionnaires. However, studied by Kvale (1996) described that interviews -compared to questionnaires- are more powerful in eliciting narrative data that allows researchers to investigate people's views in greater depth. In a similar vein, Cohen et al. (2007) add that interviewing as a valuable method for exploring the construction and negotiation of meanings in a natural setting.

According to Berg (2007) identified that the value of interviewing is not only because it builds a holistic picture, analyses views, reports detailed of informants, but also because it enables interviewees to speak in their own voice and express their own feelings and thoughts. Moreover, interviewing, as well as other qualitative approaches, differs from quantitative methods in the sense of its ability to analyze the resulting data making an allowance for participants' social life. The usefulness of interviews has long been identified, that is, as qualitative researchers tend to provide detailed descriptions of individuals and events in their natural settings, interviewing has 'usually' been thought of as a key factor in research design Weiss (1994).

In this study, the researcher aims to perform qualitative research. The qualitative method will assist the researchers to gain interview data were collected through semi-structured, in-depth interviews (see Appendix A).

3.6.1 Data Collection

3.6.1.1 Historic Data

At the initial stage of the study, data will be collected from Trailer Manufacturing Company's (TMC's) electronically stored internal historic data records. Permission to access these data record will be obtained prior to the research study from company TMC's upper management. The terms of non-disclosure of any crucial

information to rival competitors is agreed upon prior to the conducting and obtaining of raw data.

3.6.1.2.1 Interviews

Semi-structured interviews were carried out on a sample that has experience on the tropic under investigation. The participant recruitment procedure and data collection method will be discussed below. Therefore, data will be collected from 15 to 16 personnel ranging from managers to executives within the organization. Participants were approached via phone and email. They were informed of the nature and purpose of the study, and were invited for a face-to-face interview with the researcher at their place of work or at a meeting room during the lunch break/hour or normal working hours. As participants are at a managerial to executive level, the interviews were conducted both in Sinhala and English. All interviews will be audio-recorded with prior consent from the participants and will be transcribed verbatim. A structured interview protocol with predetermined questions will be developed based on the existing literature to guide the flow and direction of the interview. Interview questions are provided in Appendix A.

3.6.2 Data Analysis Procedure

It is commonly considered that one of the important parts of any research is the data analysis because it assists to examine the gathered data and to research at appropriate conclusions according to them. Data analysis procedure consists of examining, testing, tabulating, categorizing or otherwise recombining both qualitative and quantitative evidence to address the initial proposition of a study (Yin, 2014). In the perspective of Yin (2014), highlighted that to reduce potential analytical difficulties, a general strategy for data analysis should be developed. In addition, the experience of various methods of data analysis, no specific data analysis has been found to accommodate case study (Petty, Thomson, & Stew, 2012; Yin, 2014). In addition Easterby-Smith, Thorpe, and Jackson (2008) noted that it is important that the researcher follows to analysis procedures that are consistent with

the philosophical choices of the study. This research adopted qualitative analysis procedure. The data collected from the semi structured interviews were analyzed.

3.7 Chapter Summary

This chapter described a detailed account of the research nested model in terms of the research philosophy, the research approach, the techniques and procedures.

Qualitative methodology used through face-to –face semi structured interviews as the data collection method used and discussed about the data analysis techniques. The initial stage of the study involves data gathering; historic company data along with the data obtained through interviews.

Table 3.2 Objectives of the Research within Data Collection Method

Objectives	Literature Review	Interviews
Identify the impact on leaving skilled staff from ongoing projects	✖	✖
Identify the knowledge management methodologies applied for each project stages	✖	✖
Identify the effectiveness of current knowledge management practices within the organization		✖
Identify the barriers to practice knowledge management within the organization and propose best method to overcome.	✖	✖
Propose best methods to retain the knowledge within the organization	✖	✖

CHAPTER 04

DATA ANALYSIS

4.0 Introduction

This chapter will present the finding and analysis of the study investigated as mentioned in the research methodology. The results obtained are presented, while extra reading material and study data will be presented in the appendixes.

Historic data available within TMC is initially drawn out to assess, analyze and to identify the pending current issues on high labour turnover that TMC is currently facing which is hampering its sustainable growth. The data obtained from interviews is used to analyze the issue at TMC.

Semi structured interview was selected as the data collection method. The interviews were conducted for management level decision makers of TMC covering all departments. The interview questions were designed to get an understanding of the role of KM within the organization, current KM practices and how to capture knowledge of staff leaving the organization. The study provides guidelines to implement KM practices to capture knowledge from staff. It also guides the organization on how to retain their staff within the organization and on how to motivate and get the maximum output from them. It also provides reasons for the staff leaving the organization while executing manufacturing projects.

4.1 Introduction to Case Study Organization

TMC is one of the leading global manufacturers of Port & Road trailers in Sri Lanka. TMC caters the growing demand for trailers and related products in South Asia, Middle-East and Africa. Since the inception, the company has designed and manufactured a variety of trailers for both export and domestic markets. The TMC company specialization is in Port Trailer requirement as well as Road Trailer requirement including specialty needs for logistic and mining industry.

TMC has two manufacturing plants in Sri Lanka, the largest facility and one more facility with an annual capacity of approximately 1200 standard trailer units (STU) per shift. Since TMC is manufacturing a very wide range of trailers, the no of STUs for each and every trailer is the common measuring factor based on the labor hours.

TMC was registered as BOI Company (i.e. Export Oriented Company) in 2002, which benefits Duty free facility for all the export products. And it has obtained ISO 9001:2008 certifications by Det Norske Veritas (DNV) and monitor quality standards.

TMC has a strong dominant market name build within 26 years within the world especially on Terminal Trailer market. The company volume of business given bellow table for past three years.

Table 4.1 TMCs' Volume of Business for Past Three Years

	Volume of Business in (USD)			No of Trailers Produced		
Year	Domestic	Export	Total	Port	Road	Total
2017/18	362,068	5,336,444	5,698,512	138	254	392
2016/17	972,423	4,784,979	5,757,403	106	394	500
2015/16	294,991	5,028,401	5,323,392	124	222	346

4.1.1 TMC Group Manpower

Presently TMC consists of a workforce of 261 employees including senior management, managers, executives, supervisors, charge hands, line leaders and factory workers covering welders, fabricators, painters and maintenance staff. TMC Organizational chart provided in Appendix C. Below provides the breakdown of TMC manpower for the year 2017/18. Senior management includes the Chief executive office, Operational Manager, Chief finance controller, DGM marketing and DGM HR & Administration.

Table 4.2 TMC Group Manpower

No	Designation	No of Persons
1	Senior Management	05
2	Executives & Managers	51
3	Supervisory	06
4	Clerical	10
5	Workmen	167
6	Workmen (Trainees)	22
Total		267

4.1.2 TMC High Staff Turnover

Even though TMC having healthy order book as per above table 1.1, due to skilled staff turnover which is bringing more impact on lowering manufacturing efficiency, increasing product cost, delaying delivery commitments, quality issues, reworks due to design and fabrication amendments and modifications and so many. Considering financial years 2015/16, 2016/17, 2017/18 staff turnover as bellow table 4.3,

Table 4.3: TMCs' Staff Turnover for Past Three Years

Year	Staff Turnover
2017/18	3.32%
2016/17	6.50%
2015/16	6.02%

Usually it takes time to get on hand on experience on the business by new employee as one design is completely different to the next design. The workers experience and knowledge support to make the project success. In such a situation to make the projects the knowledge retention is more and more important in this industry. Since the experienced personnel from this heavy duty trailer manufacturing industry very scare, next person overtake the vacant position will take some time to capture the knowledge. In material of what is the role he/she is playing in the project, leaving one person from the project it highly affected to the success of the project as project knowledge leaving the organization with him/her.

In order to complete the project with committed time targets, the TMC is struggling with high staff turnover. Most of the orders link with late delivery penalties, so it is very critical to manage the orders through order confirmation, estimation, design stage, material planning, purchasing, manufacturing, assembly, testing, freight forwarding till product commissioning. Apart from maintaining its quality standards, plant efficiency, product cost, delivery commitments, TMC struggling in terms of retaining its organizational knowledge within the company due to high staff turnover.

For a trailer manufacturing company it is valuable to know the impact on leaving a project member from the organization to identify the stage that most workers left the organization. Where company management can alert about such stage and take managerial decision to overcome such problem. Also management can enforce some knowledge management mechanism and they can prioritize based on the stage and the role mostly left the organization. To do that the trailer manufacturing company should know it beforehand.

These studies focused on identify high labour turn over areas and most effective knowledge management methodology for such areas.

4.2 Data Sample

The data samples were collected after interviewing 16 people. They were from different departments of TMC, involved in trailer manufacturing projects, representing Marketing, Engineering, Production, Quality, Shipping & Logistics, Supply Chain, Human Resource, IT and Finance Departments. The interviewers list and their details are shown in Table 4.4 below.

Table 4.4: Details of the Participants for the Interview

No	ID No	Designation	Department	Experience in Years
1	IN_01	Engineering Manager	Engineering	5
2	IN_02	Senior Design Engineer	Engineering	6
3	IN_03	Supply Chain Manager	Supply chain	5
4	IN_04	Operations Manager	Independent	3
5	IN_05	Director In Charge	Independent	24
6	IN_06	Manager Shipping & Logistics	Shipping & Logistics	9
7	IN_07	GM- Marketing	Marketing	9
8	IN_08	Assistant Manager Engineering	Engineering	5 ½
9	IN_09	Assistant Manager HR	HR	13
10	IN_10	Manager IT	IT	9 ½
11	IN_11	Manager QC	QC	4
12	IN_12	Assistant Production Manager	Production	3
13	IN_13	Consultant HR	HR	2
14	IN_14	Internal Auditor	Finance	1 ½
15	IN_15	Assistant Manager , QA	QC	2
16	IN_16	Assistant Production Manager	Production	2 ½

4.2.1 Characteristic of the Participants

The participants selected for the interview were representing TMC at management level decision making. Their experience in TMC is illustrated in Table 4.5 below.

Table 4.5: Interviewees Experience in Trailer Manufacturing Industry

Experience	No of Participants
Less than 2 years	1
2-5 Years	6
5-10 Years	7
More than 10 years	2

From the selected participants, only 13% are working with TMC for more than 10 years. Those who are working for between 5-10 years recorded 44%, between 2-5 years recorded 37% and who are working for less than 2 years recorded only 6%. Therefore, the majority of the interviewees are well experienced in the trailer manufacturing industry and they are well aware of the pros and cons of the industry while executing various types of trailer manufacturing projects

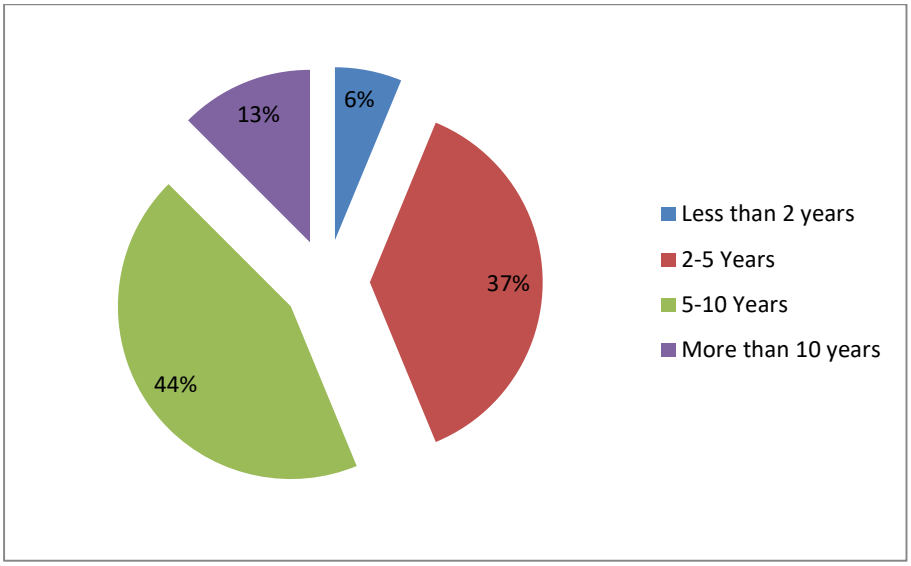

Figure 4.1: Length of the Interviewees' Work Experience in TMC

4.3 Impact on organizational knowledge with skilled staff leaving

Form the view of all the interviewees; they agreed that there is an impact on skilled staff leaving the organization with reference to retaining organizational knowledge. According to the perspective of one interviewee it was stated that "If the organization is unable to transfer knowledge and experience gained over a period of years among individuals, it will be a loss for the organization" (IN_02). His suggestion for this issue was proposed as "always encourage sharing, working as a team to transfer the knowledge and reduce knowledge loss of skilled staff. Otherwise it could cause a larger impact on the organizational knowledge."(IN_02). Similarly, from the perspective of another participant it was stated that "the effects are sometimes massive. Worse case is part of tacit knowledge goes out with them" (IN_04). He further added "If not properly documented, the same error can be repeated, may be you have to start from the ground level, try out trial and error methods to figure out what is the correct methodology. The developing cycle time will be high as a result of it" (IN_04).

Another manager stated about the knowledge loss to the organization by mentioning that "We can save explicit knowledge, but tacit knowledge will be a loss for the organization. We need time to train a new person." (IN_05). From the view of another participant it was stated, "There is a clear impact of this. When a project is started, if one of the skilled staff leaves it will have a negative impact on the ongoing project." (IN_07).

Another view from a participant was that "In most of the projects, if they do not have a system to record the information and technologies it will have a bigger impact" (IN_11).

From the perspective of another manager he indicated that leaving of skilled staff impact on two things as "leaving skills and scarcity of skills. Leaving skills can be manageable if the market is available. But on the other hand scarcity and retaining skills could pose a threat." (IN_13)

Summarizing all the comments given by the interviewees, skilled staff leaving will have a direct impact on the organizational knowledge of TMC. As a project based

manufacturing company, because of this reasons the impact is very high. The company need to address this issue very carefully and take precautions to retain the organizational knowledge within the company.

4.4 Impact of skilled member leaving the project

The interviewees identified the impact on project timeline, cost, scope and quality caused by skilled staff leaving the organization. They were asked to rank the impact.

From the perspective of one interviewee it was stated that "considering cost it also can be high, but in the case of quality it is very high" (IN_01). He further added "I think as for scope there will not be much of an effect" (IN_01). Apart from that another participant added that "effect on time, cost and quality is not very high but in the case of scope it will not effect. Actually this is based on the assumption that new projects need tacit knowledge" (IN_04).

From the perspective of another interviewee he added that "time line is high, cost would be low, even if we use alternatives, the cost of taking an alternative solution will incur some cost"(IN_12). He further commented that "There would not be much effect on quality, as already alternatives exist. But in the case of the workers who are directly involved in the project, would have an effect on the quality process. It can be rated as high. Scope can be changed. It will be low" (IN_12).

From the view of another decision maker who commented on that impact as "if it is a key person, timeline would be very high and the cost low. Quality related, we have a frame work for the project, I see a big impact. There will be no effect on scope" (IN_05).

Summarizing all the comments given by the interviewees, the project time line is the most affected stage due to skilled staff turnover. Secondly, the quality of the product also affected and gives a direct impact to the organizational manufacturing process standards. Identifying the consequences of skilled staff turnover on project timeline, cost, quality and scope, the company needs to follow proper knowledge management practices to overcome this issue.

4.5 Understanding the KM Role within the Organization

In this section, the main aim is to present the findings from the interview questions that focused on understanding the KM role within the organization and to identify the key person who can play the role of KM within the organization.

From the analysis of the information received at the interviews, 14 participants identified that there is a KM role within the organization. Only 2 participants did not identify a clear role of a KM within the organization in the present context. The perspective of one decision maker at top management level was, "Looking into TMC as a project based company, I don't think at the moment we have a KM role performing in our organization" (IN_05). Altogether 14 interviewees identified that there is a role of KM within the organization. The perspective of another participant was that "I know that there is a role of a knowledge manager in our company, but there is no specific person who plays the role of a knowledge manager overall. It is stored in individual departments" (IN_08). Further he stated that "actually in my knowledge it is not stored in one person" (IN_08).

Another interviewee who did not identify the KM role in the organization commented that, "I don't see any one person carrying overall knowledge about projects. There is some knowledge but it is stored individually, in each department" (IN_15).

Table 4.6 Identification of a KM Role within the Organization

	No of Participants
KM Role Identified	14
KM Role not Identified	2
Total no of Participants	16

With reference to the main role of a KM, the interviewees commented as below. Except from two interviewees the other participants expressed their view on a key personality who can play the role of the KM within the organization with respect to their understanding.

From the perspective of one participant who identified a role of a KM within the organization stated that “the KM should definitely be the Engineering Manager or a Design Engineer as he knows the overall process of the project from start to end” (IN_01). Similarly, another interviewee added that “can consider Engineering Manager for a knowledge manager role” (IN_13). Further he added that “He will be the link for marketing as well as for the designing, manufacturing and all other functions. The Engineering Manager should be thorough with marketing as well. He should know market trends, current market; has to manage the project for future production to match market trends” (IN_13). In the same context, another participant added that “considering overall operation it should be the Design Engineer or Engineering Manager. They are the personnel involved in the process from start to end” (IN_03).

One of the interviewees stated that “considering overall operation it should be Director in Charge. He knows the entire process of the company such as all personnel working in each and every department, ex. Production, Quality, Engineering, Finance, HR and so on. He has been in the company from its initiation” (IN_14). Further he explained that “He has been working in almost all production processes as an Engineer. Therefore, he has the capability of quickly triggering technical issues then and there and is able to give a better solution with his valuable experience” (IN_14). He went on to state, “further he is overall in charge and has unlimited access to all data sources” (IN_14).

Another participant commented on the KM role within the organization as “Considering the overall function, I feel DIC is the knowledge manager as he overlooks the overall function of the company from a to z” (IN_16).

One of the interviewees commented on KM role, as “considering overall operation it should be the Operations Manager” (IN_02). He explained his views further as “He knows all personnel working under him, ex. Production manager, Quality Manager, Engineering Manager and so on. He knows the work role” (IN_02). Furthermore, he commented that “another thing is Operations Manager has more experience, knows the role specially, and where to find data, what the issues are that have occurred based on his experience” (IN_02).

According to the findings from the interviews participants stated that the Engineering Manager, Design Engineer, Production Manager, Operations Manager, Director in Charge, Production Executive and Chief Finance Officer plays a role of KM in the organization. Only 3 participants stated that, there is no person playing a role of a KM within the organization, but they agreed that there is a need of a KM role within the organization.

Summarizing the results from the interviews, out of 16 interviewees 4 participants stated that the KM role should be performed by Engineering Manager. 3 participants stated that KM role should be assigned to the Engineering Manager or Design Engineer. At the same time 02 interviewees commented that DIC should carry the KM role within the organization. The findings are shown below in Table 4.7

Table 4.7: Identification of KM within the Organization

Role of KM Identified as	No of Participants
Engineering Manager	4
Engineering Manager or design engineer	3
Engineering Manager or Production Manager	1
Operations Manager	1
Production Executive	1
DIC	2
CFO	1
KM Role Not available currently	3
Total	16

4.6 The KM Techniques, Effectiveness and Barriers within the Organization

TMC project phases starting from planning, designing, building, testing and launching were covered by the interviews to identify the KM methodologies used. The KM techniques covered in the interviews were as follows:

1. "Brainstorming" KM technique
2. "Learning & Idea Capturing" KM technique
3. "After Action Review" KM technique
4. "Refer Knowledge base" KM technique
5. "Blogs" KM technique

The effectiveness of these techniques in each project stage was identified and its importance was highlighted by the interviewees.

Considering the TMC project stages, plan, design, build, test and launch stages were analyzed according to the interviewees' views.

4.6.1 Planning Stage

The responses from the interviewees for the planning stage are listed below in Table 4.8. The KM techniques currently been practiced within the organization for planning stage were identified and its effectiveness ranked accordingly by them.

In Table 4.8, it is seen that 6 interviewees identified brainstorming as one of the KM methodologies used in planning stage. At the same time 11 participants stated that Learning and Idea Capturing is used in this stage. 6 participants commented that After Action Review is being used in this stage. It was identified by 11 interviewees that Referring Knowledge Base is being used as a KM technique in planning stage. There were two participants who commented that Blogs Techniques were also used in this stage. Only one interviewee agreed that all the above five techniques will be useful in the planning stage.

One of the participants stated that "in this stage most effective KM methodologies will be Learning and Idea Capturing and Refer Knowledge Base. Sometimes we may use a little of the Brainstorming Methodology." (IN_01). Another interviewee commented that "most of the time it is Knowledge Base and we can use Learning

and Idea Capturing as well" (IN_03). From the perspective of another interviewee it was evinced that "in planning stage I think most of the time it is Knowledge Base. We can use our past experience to tackle this stage. Mainly it is helpful to identify the lead time, delivery period estimations based on the past data. Brainstorming will not be important in this stage" (IN_02). At the same time one participant stated that "it is most of the time Knowledge Base. Using past experience, I recognize risk areas and the processes should be looked into with more caution. Mainly it is helpful to identify the lead time, delivery period estimations based on the past data" (IN_14). Further, she added "Brainstorming will be important in designing of internal controls not in planning stage of trailer manufacturing projects" (IN_14).

Further, one interviewee added that "In planning stage we use Brainstorming, Learning and Idea Capturing, After Action Review as well as Refer Knowledge Base. As you know planning is a mix of codification and personalization. So I think we are using all the above techniques other than Blogs" (IN_04). Another perspective of one interviewee was that "Brainstorming should happen at the beginning as well as at the end. Initial brainstorming on how we can do this with minimum staff, minimum resources, minimum time and minimum cost" (IN_13).

The highest number of responses received for planning stage KM methodology was "Learning and Idea Capturing and "Refer Knowledge Base". The second highest received was for "Brainstorming" and "After Action Review". The lowest response received was for "Blogs Technique".

The responses received from the interviewees given in the bellow table 4.8.

Table 4.8: Responses for KM Methodologies Apply in Planning Stage

KM methodology	IN_01	IN_02	IN_03	IN_04	IN_05	IN_06	IN_07	IN_08	IN_09	IN_10	IN_11	IN_12	IN_13	IN_14	IN_15	IN_16
Brainstorming				✓		✓				✓		✓	✓		✓	
Learning and idea capturing			✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓
After Action Review	✓			✓						✓			✓		✓	✓
Refer Knowledge base		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		
Blogs									✓				✓			

4.6.2 Designing Stage

The responses from the interviewees for the designing stage are listed below in Table 4.9. The KM techniques currently being practiced within the organization for this stage were identified and the effectiveness ranked accordingly by them.

From the above Table 4.9, 15 interviewees identified Brainstorming as one of the KM methodologies used in design stage. At the same time 15 participants commented that Learning and Idea Capturing will be used in this stage too. Only 5 participants commented that After Action Review is being used in this stage. It was identified by 11 interviewees that Referring Knowledge Base is being used as a KM technique in design stage. There were two participants who commented that Blogs Techniques was also used in design stage. Only one interviewee stated that all the above five techniques will be useful in the design stage.

From the perspective of one interviewee "most important is Brainstorming. We can develop a new design through brainstorming" (IN_02). He further added that "Learning and Idea Capturing and Refer Knowledge Base will be more effective in this stage" (IN_02). Use of knowledge from senior designers to know their past experience, what the weak points are, how you overcome these challenges etc. and, we can also use old stored design models which can be improved based on their suggestions" (IN_02). Another interviewee stated "Brainstorming is more important" (IN_12), referring to a new design, designer needs to see all the aspects, structure, dimensions, loadings, region, regulations, climate conditions etc. Further, he added "Learning and Idea Capturing is used in design stage too; we need to share the experience and share the knowledge among others to overcome practical problems and issues so that others can also share their knowledge to give a better output" (IN_12). According to the perspective of another interviewee, "Brainstorming is more important, but we are using it at a very low level. Learning and Idea Capturing is used too, which is how we improve our product design. After Action Review can also be used, but I see no use of it for our current practice" (IN_15).

Considering all the responses received from the interviewees, the highest number of responses received was “Brainstorming” and “Learning and Idea Capturing” for the KM methodology used in this stage. The second highest received was for “Refer Knowledge Base”. The lowest response received was for “Blogs Technique”.

The responses received from the interviewees are given in Table 4.9 below.

Table 4.9: Responses for KM Methodologies Apply in Designing Stage

KM methodology	IN_01	IN_02	IN_03	IN_04	IN_05	IN_06	IN_07	IN_08	IN_09	IN_10	IN_11	IN_12	IN_13	IN_14	IN_15	IN_16
Brainstorming	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Learning and idea capturing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
After Action Review				✓						✓			✓		✓	✓
Refer Knowledge base	✓	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓		
Blogs													✓			✓

4.6.3 Building Stage

The responses from the interviewees for the building stage are listed in Table 4.10 below. The KM techniques currently being practiced within the organization for this stage were identified and the effectiveness ranked accordingly by them.

From the above table 4.10, 6 interviewees identified Brainstorming as one of the KM methodologies used in building stage. At the same time 10 participants stated that Learning and Idea Capturing will be used in this stage. 8 participants commented that After Action Review is used. It was identified by 13 interviewees that Referring Knowledge Base is being used as a KM technique in building stage. One participant commented that Blogs Techniques is used in this stage. At the same time one interviewee stated that all the above five techniques will be useful in the building stage.

The views of interviewee in order are as follows. One interviewee stated that "it is Referring to Knowledge Base. If it is new, we can use Knowledge and Idea Capturing" (IN_02). Further he added "Brainstorming is not much relevant to this stage. For this case most of the time it is experienced base, not much written in this stage" (IN_02). According to the perspective of another participant, "We are having pre-production meetings, actually that is also to discuss about the project, what are the difficult corners, share past experiences etc. which means that Learning and Idea Capturing is touched at this stage"(IN_05).

One interviewee further added that "in building stage, when the product comes to this stage, all the other parameters are already finalized. What are the ongoing projects, parallel work, and material availability. Therefore, we do brainstorming to streamline our process and see the possibility of improving the lead time, process quality and efficiency" (IN_12). Another participant said that "Knowledge Base effectiveness is high in this stage" (IN_15).

Considering all the responses received from the interviewees, the highest number of responses received for building stage for KM methodology used was "Referring Knowledge Base". The second highest received was "Learning and Idea Capturing".

The 3rd was “After Action Review” and 4th was “Brainstorming”. The lowest response received was for “Blogs Technique”.

The responses received from the interviewees are given in the Table 4.10 below.

Table 4.10: Responses for KM Methodologies Apply in Building Stage

KM methodology	IN_01	IN_02	IN_03	IN_04	IN_05	IN_06	IN_07	IN_08	IN_09	IN_10	IN_11	IN_12	IN_13	IN_14	IN_15	IN_16
Brainstorming	✓			✓					✓	✓		✓	✓			
Learning and idea capturing		✓		✓	✓		✓	✓		✓		✓	✓	✓		✓
After Action Review	✓		✓	✓		✓				✓		✓	✓			✓
Refer Knowledge base	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Blogs													✓			

4.6.4 Testing Stage

The responses from the interviewees for the testing stage are listed in Table 4.11 below. The KM techniques currently being practiced within the organization for this stage were identified and the effectiveness ranked accordingly by them.

From the above table 4.11, only 2 interviewees identified “Brainstorming” as one of the KM methodologies used in testing stage. At the same time 7 participants stated that “Learning and Idea Capturing” will be used in this stage. 6 participants commented that “After Action Review” is used. It was identified by 12 interviewees that “Refer Knowledge Base” is used as a KM technique in building stage. Only two participants commented that “Blogs Techniques” was used in this stage.

According to the responses received from the interviewees regarding the testing stage, one interviewee stated that “mostly Knowledge Base” (IN_01). Another participant added that “in testing stage only Refer Knowledge Base is used. We use the knowledge of existing and available persons and do the test” (IN_15).

From the perspective of another participant, “Brainstorming is used. Learning and Idea Capturing is also useful” (IN_12). Another participant stated that “there is no Brainstorming in this stage. Learning and Idea Capturing is not much important” (IN_13). Further, he added “After Action Review is very important” (IN_13). According to him in testing stage Blogs are very important as it will help to know where we went wrong. Yet another decision maker stated that Brainstorming, Learning and Idea Capturing and After Action Review are used” (IN_10).

Another interviewee pointed out that the need to understand what the requirements are, basically for load testing, operational testing, needs to be done during the production stage and some to be done at the customers’ site before commissioning and handing over the product. The need of identifying what is the requirement and what action needs to be taken accordingly was highlighted by the interviewee. One decision maker highlighted that “when the product comes to this stage, most of the time delivery is very critical, so we do brainstorming with our team and see how fast we can do it, what are the points which help us to improve the productivity and

efficiency" (IN_16). Further he said that "it acts as another form of Learning and Idea Capturing method" (IN_16).

Considering all the responses received from the interviewees, the highest number of responses received for building stage for KM methodology used was "Referring Knowledge Base". The second highest received was "Learning and Idea Capturing". The lowest response received was for "Blogs Technique" and "Brainstorming" for testing stage.

The responses received from the interviewees are given in Table 4.11 below.

Table 4.11: Responses for KM Methodologies Apply in Testing Stage

KM methodology	IN_01	IN_02	IN_03	IN_04	IN_05	IN_06	IN_07	IN_08	IN_09	IN_10	IN_11	IN_12	IN_13	IN_14	IN_15	IN_16
Brainstorming										✓		✓				
Learning and idea capturing					✓		✓			✓	✓	✓	✓			✓
After Action Review			✓	✓						✓			✓		✓	✓
Refer Knowledge base	✓	✓		✓		✓	✓	✓	✓	✓			✓	✓	✓	✓
Blogs													✓			✓

4.6.5 Launching stage

The responses from the interviewees for the launching stage are listed in Table 4.12 below. The KM techniques currently being practiced within the organization for this stage were identified and the effectiveness ranked accordingly by them.

From the above Table 4.12, 3 interviewees identified “Brainstorming” as one of the KM methodologies being used in launching stage. At the same time 5 participants stated that “Learning & Idea Capturing” will be used in this stage. 4 participants commented that “After Action Review” is used. It was identified by 11 interviewees that “Referring Knowledge Base” is being used as a KM technique in launching stage. Two participants stated that “Blogs Techniques” were used in this stage. Apart from that one interviewee agreed that all the above five techniques will be useful in the launching stage.

From the perspective of one interviewee, “when you launch your product you need to position your product in the correct market, correct time frame and correct price positioning. Those are the most important criteria” (IN_07).

With reference to the launching stage, one of the interviewees expressed his views as “I think we are not focusing much on that. Actually you need to use “Brainstorming” and “Learning & Idea Capturing” to position our product in the market” (IN_12). Another interviewee stated that “in implementation stage it directly involves “Knowledge Base”. Review based on “Knowledge Base” and past experiences” (IN_14).

Considering all the responses received from the interviewees, the highest number of responses received for launching stage for KM methodology used was “Refer Knowledge Base”. The lowest response received was for “Blogs Technique”.

The responses received from the interviewees are given in the Table 4.12 below.

Table 4.12: Responses for KM Methodologies Apply in Launching Stage

KM methodology	IN_01	IN_02	IN_03	IN_04	IN_05	IN_06	IN_07	IN_08	IN_09	IN_10	IN_11	IN_12	IN_13	IN_14	IN_15	IN_16
Brainstorming				✓						✓		✓				
Learning and idea capturing				✓			✓			✓		✓			✓	
After Action Review			✓	✓						✓			✓			
Refer Knowledge base	✓	✓		✓	✓	✓	✓	✓		✓	✓		✓	✓		
Blogs				✓									✓			

4.6.6 Other KM Techniques Used within the Organization

The summary of the information received from the interviewees is shown in Table 4.13 below.

Table 4.13: View on other KM Methodologies Applied.

	No of Persons
Other KM Methodologies Identified	6
Other KM Methodologies not Identified	10
Total	16

From the perspective of the interviewees who agreed there were no other KM methodologies for TMC project process, one participant stated that "all KM methodologies are covered, but we need to have continuous improvement, which would be better. We can use lean approach to improve further. Like PDCA cycle (Plan, Do, Check and Act), we can improve the product using past experience, we can reduce idle time and lead time etc., and increase productivity" (IN_02).

From the interviewees who commented that the other KM methodologies are available, one stated that "sharing information, managing knowledge and creating a culture which we need to start the project and, which cannot happen without a brainstorming session" (IN_13). The perspective of another participant was "If we can introduce a computer base system to codify the tacit and explicit knowledge which would be more useful to the company to improve in an effective manner" (IN_14). Yet another interviewee stated that "If we can prepare a data base collecting past data and analyzing it which can help us to provide solutions for our problems, use of problem finding techniques to get better solutions for our problems, I think this too will be a better method for us." (IN_12).

Accordingly, one participant added as "I feel we should have R&D" (IN_09). Similarly another interviewee added "If we can prepare a data base collecting past data and analyzing it which can help us to provide solutions for our problems, use of

problem finding techniques to get better solutions for our problems I think this too will be a better method for us."(IN_11).

Summarizing all the views received from the interviewers, introducing a computer based system to store knowledge is important. Also preparation of a data base to store past data and analyzing will be also helpful to continuity of the organizational knowledge.

4.7 The KM Barriers and How to Overcome those Barriers

From the analysis of the information received in the interviews, one participant stated that "we are doing After Action Review for similar products, we might not have similar projects, and if it is a first time project we don't have any resources to compare. So we cannot quantify some facts. We cannot say the value that is quantity quality transformation. We cannot identify correctly" (IN_01). From another perspective, one interviewee said that "lack of time management, facing difficulties in managing time for the discussions" (IN_13). Further he added "no proper scheduling. The other factor is leadership" (IN_13). Accordingly, another participant stated that "Main barrier is hesitating to accept mistakes. Secondly, lack of recording" (IN_14). From the perspective of another interviewee it was stated that "one is staff turnover, if an experienced person leaves and his/her knowledge is not properly transferred we will face problems as his/her knowledge is not stored. Sometimes some individuals don't allow to transfer their knowledge, if that kind of person leaves the company will lose his knowledge as it is not transferred anywhere" (IN_02). He added further "Technology transfer will be the major problem" (IN_02). Another manager indicated that lack of latest software usage as "most of the time it is the lack of software platform for collaboration. Documentation takes up effective time of engineers" (IN_04). In the same aspect another interviewee stated that the barriers are lack of capability of software skills in analyzing, but even though engineering has the analyzing skills, they are unable to get what we need correctly. We don't have exposure to the required area" (IN_06).

According to the view of another participant, “explicit knowledge does not form high pressure within the organization. One of the main challenges is that of technology” (IN_05). Similarly, another participant stated that “one of the main challenges is that of technology” (IN_07). Further he added “When it comes to manufacturing you need to have all the sophisticated machines. To get the right product if you don’t have the technology it will be an issue. Also, the knowledge of the product needs to be updated, knowhow about advanced technologies, exposure to exhibitions, forums and worldwide events is needed greatly to be competitive with others” (IN_07). From the perspective of another two interviewees it was stated that the problem with lack of documentation, staff leaving frequently, having to work with dissatisfaction etc. one participant said that “documentation is not properly done, staff leaving frequently, having to work with dissatisfaction, demotivated staff etc.” (IN_09). To his comment the other interviewee added that “Project details are not properly documented after completion of the project. Therefore, this will lead to repetition of errors and maybe we need to start again from the bottom the next time as the data is not properly maintained” (IN_08). He further added that “If the skilled member leaves we don’t know more details about those projects. All the data will be lost. I think ISO documentation will cover this at least to some extent” (IN_08).

Summarizing up, the barriers for the KM process in TMC were identified as lack of documentation, repeated errors, technology not being transferred properly, high staff turnover, lack of updated technology, software, lack of software skills, lack of leadership qualities, time not being properly managed and, dissatisfaction and demotivated staff.

4.7.1 Understanding How to Overcome those KM Barriers

The findings from the interview are as follows. One interviewee stated how to overcome KM barriers as “by improving team work to give better productivity and output which will then improve knowledge sharing. They can share the know-how and ideas, which will result in delivering better output” (IN_02). He further added “Training will be more useful, documentation is a must, and in case someone leaves

the organization by referring those documents others can find some solution to the problem. By this it will not take much time than having to start anew. Training, documentation, knowledge sharing can be used to overcome these barriers" (IN_02). According to the perspective of another participant, it was highlighted that proper documentation is a must and he further added "need to document after project closing. And also need to develop a bottom layer to transfer that knowledge in case of skilled personnel leaving" (IN_08). He further added "Better procedures to be in place to manage and store individual's knowledge" (IN_08). Accordingly, one of the managers said "if we can store and share data related to TMC projects somewhere, it will be useful in later stages and we can refer that data anytime" (IN_06).

According to the perspective of one participant it was stated that there was a need of introducing strict rules and regulations to overcome these barriers" (IN_13). Further he highlighted the importance of offering project ownership and responsibilities to individuals. With reference to demotivation and dissatisfaction among the team one participant expressed his views highlighting the need of developing confidence and building the confidence of the team among the team players. Further another interviewee added "if TMC can introduce a system of rewards or incentives for sharing knowledge by way of an appreciation of their efforts in order to motivate employees it can be used to overcome these barriers" (IN_11). Further, one participant stated with reference to team building and encouraging the team as "encouragement also plays a vital role. It is psychological" (IN_02).

Also another interviewer commented on this as "if it is a first time project we don't have any resources to compare. So we cannot quantify some facts. We cannot say the value that is quantity quality transformation we cannot correctly identify" (IN_01).

In summarizing the comments received by the interviewees, team building, sharing knowledge, proper training, strict rules and regulations, maintaining proper software flat form for collaboration were suggested as methods to overcome KM barriers in TMC.

4.8 The Most effected stage of skilled staff member leaving the project

The critical stage was identified from planning, designing, building, testing and launching. One of the interviewee stated that "it is engineering design and manufacturing. This will be the two critical stages" (IN_01). From the perspective of another interviewee it was stated that "The most critical stage of skilled migration is planning" (IN_13). Apart from that from the view of another participant it was stated that "there are two stages, design stage and building stage. Most critical is the design stage. Building cannot proceed without a design. The planning stage comes third" (IN_02). Similarly, another participant agreed that "the most critical stage should be the design stage. Everything will depend on the design, if the designer is leaving in between the project segment a new person would have to start from the beginning. Therefore, it will be the most critical stage as per my view" (IN_07).

Another interviewee added "Obviously it is in building stage as we need experienced staff to get quality output" (IN_14).

The summary of the comments from the interviewees is shown in Table 4.14 below.

Table 4.14: Critical Stage Identified

Critical Stage Identified	No of Participants
Designing & Building	5
Designing	3
Building	3
testing	2
Planning	3

4.9 Understanding the Reasons for Staff Leaving the Organization

According to the findings from the interview it was noted that the reason for leaving the organization is due to various issues. One interviewee stated that "There can be

many reasons such as job satisfaction, salary package and future career development." (IN_01). From the perspective of another participant it was mentioned that "it can be leadership, environment, knowledge and skills followed by the 'purse' " (IN_13). With reference to that he further commented that salary level will come at a later stage as other factors play the major role for most of the cases. But, at the same time another interviewee stated a different view that "most of the employees leave because of less pay" (IN_03). According to another participant it was stated as "mainly it is seeking new opportunity, higher salary and may be other personal issues also" (IN_04). In the same context one interviewee stated "can be due to various reasons, psychological, such as demotivation, lack of pay, no opportunity for future growth etc;."(IN_02). He further added that "Here it could be many of the reasons, such as, employee satisfaction is essential. It can be job satisfaction, salary package, and future career development. Also may be unable to work with current boss or clash or no proper team work" (IN_02). One of the key decision makers added that "it is due to various reasons inside the organization or outside factors like salary, location, job satisfaction, career development, internal issues, and so many" (IN_05). In addition to that another interviewee stated "I think it is majorly dissatisfaction. And also I think it is about career development opportunities they are looking for"(IN_09). From the perspective of another interviewee it was stated that "I feel if the employee cannot see a clear career path they will tend to leave. Skilled employees will get a lot of opportunities. I feel that is the main issue" (IN_06). Another participant had a different view that "It is basically on stress without knowing the job, ability to complete the given tasks. I don't think salary has much effect" (IN_10).

Further, one interviewee commented that "one is salary scale, others sometime could be migration for overseas employment. Some also tend to leave subsequent to disciplinary action being taken."(IN_16).

After analyzing the comments, the views of the interviewees can be illustrated as below.

From the above Table 4.15, 7 interviewees identified job satisfaction as an issue of leaving. At the same time 11 participants commented that salary level also is an issue for this. 10 interviewees commented on future career development as an issue. At the same time according to the interviewees, leadership, knowledge, environment and skills also play a role on taking decisions for leaving the organization for skilled staff. From the perspective of interviewees also identified looking for new opportunity, other personal issues, location and internal issues as decisions taken for leaving the organization.

Table 4.15: Reasons for Leaving the Organization

Reasons for leaving	IN_01	IN_02	IN_03	IN_04	IN_05	IN_06	IN_07	IN_08	IN_09	IN_10	IN_11	IN_12	IN_13	IN_14	IN_15	IN_16
Job satisfaction	✓				✓		✓		✓	✓				✓	✓	
Law salary	✓	✓	✓	✓	✓		✓	✓					✓	✓	✓	✓
Future carrier development	✓	✓			✓	✓	✓	✓	✓		✓			✓		✓
Leadership							✓						✓			
Environment													✓	✓		
Knowledge										✓			✓			
Skills												✓	✓			
New Opportunity				✓		✓	✓		✓		✓	✓				
Other Personnel issues				✓												
Location					✓											
Internal Issues		✓			✓			✓								

4.10 Other Possible way of Capturing Knowledge

This is with reference to the interview question introduced to get ground information about the person who left the organization for past few years and to investigate any possibility of capturing his/her knowledge on the time of he or she left.

Findings from the interview were that, one participant commented as "over 2-3 years regarding the experience gained on the particular project prior to the member leaving the organization. (IN_01) Another perspective of an interviewee was that "Depending on the industry and environment. Cannot give an exact time frame. Industry would be the existing one. There is no use of making ink pens and black boards these days. And the next thing is the demand" (IN_13). Most of the participants agreed that experience should be at least above one year. Another interviewee commented that "Depending on what important role he played within the organization, I would say more than 3 years" (IN_14).

From the responses received for question, regarding the possibility of capturing the knowledge of the skilled person leaving the organization, one of the interviewees said 'you can do any KM during the time after he decided to leave" (IN_01). Another participant added that "we cannot capture at the last moment" (IN_16). From the perspective of another interviewee it was stated that "it should start from the beginning" (IN_15). He further added "You should develop another layer and let them work along with them and gather knowledge and experience based on it. This will help to transfer knowledge to some extent, but you cannot do all this at the last stage" (IN_15). Furthermore, one participant said "it is very few. If the person leaves with short notice, then of course we can do nothing about it. Actually it is very difficult to do it at the time of leaving" (IN_07). Another participant stated "if a member decided to leave, we cannot retain his knowledge. It is better to have systems in place. System implementation is the best. Then the second one can start. System to be in place" (IN_13).

Apart from that some interviewees agreed that their knowledge can be coded to some extent. From the perspective of an interviewee it was felt that "to some extent"

(IN_08). He also stated that “When doing a project, we have the backup, ISO recording also acts as a reference. With ISO you have documented the knowledge to some extent” (IN_08). Another interviewee added that “Here the important thing is not to try to capture his knowledge at the last moment, but to get ready with a bottom layer. Bottom layer should absorb his knowledge. For example, training personnel can be kept working with him, so they can absorb his knowledge. It is not a 100% transfer, but to some extent” (IN_12).

Majority of the interviewees were of the view that knowledge cannot be transferred at the time of leaving of the skilled personnel, but need to develop a bottom layer to capture the knowledge from the beginning. Proper documentation should be encouraged always. The organization should encourage team work, so that when working with a team only we can have KM in the project stages.

4.11 Chapter Summery

In this section, detailed discussion of the data analysis presented. Impact on organizational knowledge with skilled staff leaving as well as impact to the ongoing project was discussed as per the interviewees’ point of view. Further it expand to understand the KM role within the organization, KM techniques used in each project phases, its effectiveness, other KM methodologies used and the barriers to practice KM within the organization and how to overcome those barriers were discussed. Further this study elaborates to identify the most effected stage of skilled staff leaving the project and reasons for leaving. In addition it was discussed the experience of the left member and the possibility for capturing his/her knowledge when the time of his/her leaving.

CHAPTER 05

CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the conclusion, limitations and recommendations derived from the study carried out for a trailer manufacturing company based in Sri Lanka. The results related to the research objective are further discussed in this chapter.

5.1 Objective 01: Identify the impact of leaving skilled staff from ongoing projects

According to the findings from this study, there is an impact on ongoing projects and continuity of organizational knowledge when skilled staff leaving the project. With reference to the ranking on impact on leaving skilled staff, the highest impact reflected on project time line. This is mainly due to the commitment on product delivery time and lead time is already fixed and agreed by the manufacture. In terms of the deviation of project duration, the staff turnover is directly impact because of the knowledge loss. The second reason is the scarcity of skilled labour within the industry. Because of that it will take time to recover. In terms of the rankings received from the study it was identified as project time line, quality, cost and scope respectively effected due to skilled labour turnover in manufacturing organizations. According to the study it was identified design and building stages as most impacted phases due to high turnover rates.

5.2 Objective 02: Identify the knowledge management methodologies applied for each project stages

According to the findings from this study, the KM method varies from one project phase to another. The KM methodologies used in manufacturing projects such as “Brainstorming”, “AAR”, Learning and Idea Capturing”, “Refer Knowledge Base” and “Blogs” were identified. All above five methods are used in each project phases of trailer manufacturing process. The most used methods for planning stage is “refer Knowledge Base” and for design stage is “ Brainstorming” and “Learning & Idea

Capturing". Considering building, testing and launching stages, the most used technique is "Refer Knowledge Base".

5.3 Objective 03: Identify the effectiveness of current knowledge management practices within the organization

According to the study, the effectiveness of KM methodologies is varying from one project phase to another. When considering the planning stage most effective techniques are "Learning & Idea Capturing" and "Refer Knowledge Base". In designing stage, "Brainstorming" and "Learning & Idea Capturing" are the most effective KM methodologies used. Considering the building stage, most effective technique is "Refer Knowledge Base". The most effective KM technique identified for testing stage as well as for the launching stage is "Refer Knowledge base".

5.4 Objective 04: Identify the barriers to practice knowledge management within the organization.

Several barriers which inter related to practice KM within the organization. It was found that high staff turnover play major role of retaining the organizational knowledge within the organization. It also involves organizational areas of planning, enabling, motivating as well as personnel barriers. Lack of KM goals, no proper plan for store the knowledge, leadership, team work, organizational culture, lack of updated technologies, proper transfer of knowledge plays major role of these barriers. On the other hand barriers related to personnel, attitudes and behaviors of staff, demotivation, and dissatisfaction, lack of time to devote for KM activities, lack of skills and lack of pay were identified major as barriers.

According to the study, encourage sharing knowledge, team work building, leader ship development, proper trailing, develop skills of the staff, strict rules and regulations were identified to overcome those barriers practices in the organization.

5.5 Objective 05: Propose best methods to retain the knowledge within the organization

According to the study, it was proposed that appointing of a KM is highly in need within the organization, the documentation and sharing of the knowledge has to be encourage. In terms of capturing the knowledge, need of developing a bottom layer to transfer that knowledge. Team building and develop the confidence between team players, offering the ownership & responsibility is also identified as best methods to retain organizational knowledge within the organization.

5.6 Recommendations from findings

Considering the KM role identification of the trailer manufacturing organizations, the need of a role of project manager was identified. In order to improve the KM within the organization, recommended on educating the managers regarding the KM practices and use of retaining organizational knowledge. The organization should take immediate actions to fill the gap of a knowledge manager as all the projects are implemented are does not have a knowledge manager. Also the organization should take immediate actions to maintain law turnover rates as it is directly affected on continuity of the organizational knowledge. Also the documentation of the project knowledge should encourage after closing the each projects.

5.7 Limitation

Initially it was identified that there is a lack of prior research studies carried out in the trailer manufacturing industry both locally and internationally, which would have helped lay a better foundation to the tropic being investigated.

By conducting interviews with a small number of participants it is not possible to generalize the findings to the larger population of individuals involved in the trailer manufacturing industry. Furthermore, the views of individuals in the manager level, who are the main participants, may not match the views of their subordinates. They may also not be inclined to reveal much detail about the current status due to

pressures by the upper management. Also the study was limited to identify the impact on staff turnover in the managerial level. Therefore, the extent to which data may be able to extract may be limited.

5.8 Future Research

While carrying out the research study it was identified that there were areas that could benefit by further research, including the KM practices with high staff turnover organizations that had been generated in this study.

The areas of identifying best fitted KM techniques for each project phases of manufacturing related organizations where high staff turnover exists can be further studied for continuity of the organizational knowledge.

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APPENDIX A

Interview Questions from Project Manager/ Project member

1. Are you believed that there is an impact on organizational Knowledge when a skilled staffs leave from the organization?

2. What is the impact of skilled project member left the project?

    - Timeline
    - Cost
    - Quality
    - Scope relative to your phase

3. What do you think the most critical stage / highly effected with skilled staff turnover in a project?

4. Have you identified the role of a Knowledge manager in your manufacturing projects?

5. What is the knowledge management methodologies applied in each stage of the project?
    - Planning
    - Design
    - Building
    - Test
    - Launch

6. What is the effectiveness of above KM methodologies in each stage?

7. Do you have any suggestion for any other knowledge management methods to be used other than the above methods?

8. What are the barriers you have faced when doing KM in your projects?

9. What are the methods applied to overcome those barriers?

10. What do you think about the reason of a project member left the project?

11. How long the particular project member worked in your organization?

12. Any knowledge management happened at the time he/she left the project?

APPENDIX B

Sample of Interview Transcription

Interview IN_02:

Interviewer: MSC PM Research Student

Interviewee: Senior Design Engineer

Interview setting: Interview conducted in DLT head office (Engineering Department room). The interview was conducted at 8.30 am on Thursday morning.

Total Time (interview duration): 15 Minutes Approximately.

Interviewer> Hello

Interviewer> This is with regard to the interview questions.

Interviewee> Ok. Sure, can we start then?

Interviewer> Yes. Let's start with, as you know starting from marketing department, engineering, production, Quality, Supply chain, Imports & exports, stores to commissioning the trailer, covering overall process, **have you identified the role of a KM in your manufacturing projects**?

Interviewee> Yes, considering overall operation it should be operation manager. He knows all personnel works under him, ex. Production manager, Quality Manager, Engineering Manager and so on. He knows the work role; another thing is operation manager is with more experience better as he knows specially the role, and where you can find the data, what are the issues occurred based on his experience.

Interviewer> Ok.

Interviewer> **What is the knowledge management methodologies applied in each stage of the project** starting from planning, designing, building, testing and launch?

Interviewee> In planning stage I think it is most of the time it is knowledge base. We can use our past experience to tackle this stage. Mainly it is helpful to identify the lead time, delivery period estimations based on the past data. Brainstorming will not be important in this stage.

Interviewer> so you can proceed for design stage, what is the KM methodology using?

Interviewee> err.. in design stage most important is brainstorming. If It is a new design we can develop the design through brainstorming. Also we can consider learning and idea capturing and refer knowledge base will be more effective. We can use the knowledge from senior designers, to know the past experience, what are the week points, how you overcome this challenges etc. we can use old stored design models and can improve based on their suggestions.

Interviewee> then.. in building stage it is knowledge base. If it is new we can use knowledge and idea capturing. Brainstorming is not much relevance to this stage. err...for this case most of the time it is experienced base, not much written in this stage.

Interviewee> in testing stage, err.. like load testing, it will be mostly knowledge base.

Interviewer> ok, then what about launching, most likely it is the commissioning stage?

Interviewee> hmm. in commissioning stage it is directly on knowledge base.

Interviewer> can you also tell me **how effective that methodology**?

Interviewee> in planning stage it is high and in design stage it is very high.

Interviewee> hmm. In building stage it is low, testing stage and launch no much effect, it is considered as low.

Interviewer> ok, then **do you have any suggestion for any other knowledge management methods to be used other than the above methods?**

Interviewee> err… I think if we have continuous improvement, which is better. We can use lean approach to improve further. Like PDCA cycle (plan, do, check and act), we can improve the product using past experience, we can reduce the idle time, lead time etc. and increase the productivity.

Interviewee> ok, **what are the barriers you have faced when doing KM in your projects**

Interviewer> err. I think one is staff turnover, if an experienced person leaving, if the knowledge not properly transfer we will face problem as his knowledge not stored. Sometimes some individuals doesn't allow to transfer their knowledge, if that kind of person leaves the company will loss his knowledge as it is not transferred anywhere. Technology transfer will be the major problem.

Interviewer> err. So **what are the methods applied to overcome those barriers** as you think?

Interviewee> hmm. If we can improve the team work to give better productivity output, because of that knowledge sharing will improve. They can share their knowledge, ideas and can give a better output. Training will be more useful, should have written documents, in case someone leaves you can refer that documents and find some solution to the problem. So it will not take much time than if we starting with a new. Training, documentation, knowledge sharing can be used to overcome this barriers.

Errr.. Encouragements also play a vital role, I think it is psychological, they will think it is no use.

Interviewer> ok, **do you believed that there is an impact on organizational knowledge when a skilled staffs leave from the organization?**

Interviewee> definitely yes. There is a larger impact. If the organization unable to transfer the knowledge because knowledge and experienced gain over a period of years in the organization if not transferred among the individual will be a loss for the organization. So its better to always encourage sharing , working as a team to transfer the knowledge and reduce the knowledge loss of the skilled staff. If not there might not be larger impact on the organization with skilled staff leaving the organization.

Interviewer> ok, fine **what is the impact of skilled project member left the project on time line, cost, quality and scope to your phase ?**

Interviewee> err... time line it is high if in the design stage, if it is in the planning stage it is low. Considering some person leaves from procurement the company can something and overcome it. But in the design stage, processing on modelling, drawing preparation, there will be a high impact. So time line effect is high and cost is also high.

Interviewee> In the case of quality there is no that much of effect as they are following procedures. Most of the cases they have written document almost. They have to follow ISO documents, standards that are already documented. Errr.. In the case of the scope not much effected. There might be negligible effect.

Interviewer> ok fine, **what do you think the most critical stage / highly effected with skilled staff turnover in a project?**

Interviewee> ok, there is two stages, design stage and building stage. I think most critical is the design stage. Building cannot proceed without a design. The planning stage comes third.

Interviewer> ok. **What do you think about the reasons of the project member left the organization?**

Interviewee> err... can be due to various reasons, psychological, such as demotivation, lack of pay, no opportunity for future grow like that. Employee satisfaction is essential, than under satisfaction. it can be job satisfaction, salary package, future carrier development there can be so many. Unable to work with current boss or clash, no proper team work.

Interviewer> ok. **How long the particular project member worked in your organization?**

Interviewee> over 8-10 years

Interviewer> **Any knowledge management happened at the time he/she left the project**

Interviewee> hmm. yes to some extent. When doing a project we have the backup, ISO recording also act as reference. ISO you have documented the knowledge to

some extent. So when working with a team only we can have KM in the project stages.

Interviewer> Ok. Thanks for coming

Interviewee> No problem.

Summary of interview IN_02

The summary of interview IN_02 is presented in bellow tables. The interview identifies the KM to be the Operations Manager at DLT Factory, Dankotuwa. The KM methodologies and its effectiveness are identified and tabulated in Table B_02_01 for each project stage.

Table B_02_01 Knowledge management methodologies applied in each stage

S/No.	Project stage	Knowledge management methodology applied	Effectiveness of the KM methodology
01	Planning	Refer Knowledge base	High
02	Designing	Learning & Idea Capturing Refer Knowledge Base Brainstorming	Very High Very High Very High
03	Building	Learning & Idea Capturing Refer Knowledge base	Law law
04	Testing	Refer Knowledge Base	Law
05	Launching	Refer Knowledge Base	Law

It was noted that there was no other methods for KM than the above mentioned KM methodologies. The highly effected stage identified as Design stage for skilled staff turnover in ongoing projects. Impact for the project due to project member leaving the project identified as per bellow table B_02, Most impact rank as 5 and least impact rank as 1 as per interview.

Table B_02_02 Impact to the Project on him/her leaves the Project

S/No	Impact for the project due to project member left the project	Importance of the challenge
1	Impact on project time line	high
2	Impact on project cost	Very High
3	Impact on quality of the project outcome	law
4	Impact on project scope	No effect

APPENDIX C

ORGANIZATION STRUCTURE