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Improving Learning and Knowledge Sharing in a Technical Support Team

The Learning Curve in the Technical Support

Organization of a Telecom Vendor

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PREFACE

When I set out on this master's journey, I was not really sure at first on what it is I really wanted to achieve but as the program progressed, it became clear to me that this program had been designed to have a great impact on an individual within a short period of time. The phrase 'grounding your choices' will forever remain etched in my mind. Its impact for me was self-discovery and a deeper understanding on why things happen the way they do which culminated into the writing of this thesis which is about learning and knowledge sharing. I discovered that indeed knowledge is a time bound resource which can only continue to grow if shared. The old paradigm of knowledge is power ought to be changed to knowledge sharing is power. It is hoped that this thesis will help the reader gain new insights in the field of knowledge management.

This thesis would not have been possible without help from different sources. First, I would like to acknowledge the assistance of my instructors Marjatta Huhta Dsc. (Tech) and Leenamaija Otala Dsc (Tech). Marjatta's fastidious nature with a gentle and caring touch kept me in sharp focus whenever I wavered. Leenamaija, your insights helped me see the end from the beginning. I cannot also forget the invaluable assistance I received from Zinaida Grabovskaia (PhL) especially for leading me to the right sources when occasionally I had a challenge understanding some concepts. Thank you to all other lecturers and fellow students for their input. Your contributions enabled me produce a proposal that made me proud and earned me a personal recognition amongst my peers and sponsors.

I am forever indebted to my project sponsor for believing in me and offering me a chance to prove my worth. This however, would not have been possible without my colleagues availing themselves and offering suggestions. Last but not least, I wish to thank all my friends and family for their support and encouragement.

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The aim of this thesis was to improve learning and knowledge sharing in a technical support organization in case company involved in the design manufacture and sales of telecommunications equipment to mobile operators worldwide. Some of the equipment the case company sells requires high availability rates and as such a knowledgeable team is needed to maintain the uptime of these systems. This thesis explores the current learning and knowledge sharing challenges that could be limiting the support team in meeting its obligation to the customers.

The study adopts the action research methodology as a way to involve the key stakeholders in the process to help initiate a meaningful change that they could all feel part of. Its flexible nature also allowed several iterations until favourable solutions were found. Moreover, the researcher wanted to be an agent for change for his organization.

The outcome of this study is an all-inclusive proposal set in three parts: recommendations based on key learning indicators that are directly matched to the current challenges to guide the organization from its current state to where it needs to be, a set of tools to accelerate meeting the objectives of the key learning indicators and an action plan to drive the process.

It is hoped that a positive change will be realized over time if the action plan is followed through. Some of the improvements that are likely to occur for the case company include faster case resolution times with better quality which will in turn lead to customer satisfaction. Subsequently, the company will realize its vision of being a customer centric along with an improved bottom line.

Keywords	Knowledge Sharing, Learning Organization, Organizational Culture

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Contents

Preface

Abstract

Table of Contents

List of Figures

List of Figures

1 Introduction

The focus of this Master's thesis is to improve the learning curve in Technical Support Organizations of a Telecom Vendor. This improvement is necessary to enhance the way in which knowledge is created, acquired and transferred amongst technical support engineers. These enhancements could eventually lead to advancement in service quality to the main customers of Telecom Vendors who are the Telecom operators. For example, case resolution times would improve and so would the quality of the resolutions provided. The improvement in the learning curve would eventually help Telecom Vendors to adapt to the ever-changing business operating environment.

1.1 Key Concepts

In this era of globalization, companies operate in ever changing and disruptive environments. Due to these fast changes, organizations need ways to help them cope and still maintain their competitive advantage. One way that organization can't avoid in order to sustain their competitive edge is learning. In the words of Senge (1990), "The rate at which organizations learn may become the only sustainable source of competitive advantage" (Senge 1990:324). This implies that companies that learn and utilize this learning to shape new structures, processes, and systems are better able to thrive and prosper. Organizations that cannot adapt face extinction. Organizational adaptability is thus the central driver of a learning organization. Though organization adaptability is the main motivation for learning, an organization cannot exist without people who are the main sources of knowledge. Due to this fact, employees have come to be known as knowledge workers. The knowledge worker exists in a world of constantly evolving technology, rapid change, and the constant creation of new knowledge, has made it difficult to differentiate work and learning to the extent that to the knowledge worker, getting the job done means keeping abreast with developments in their fields, and this requires continuous learning. Unlike industrial workers, knowledge workers own the means of production: their own brainpower. Their greatest potential limitation is obsolescence. Knowledge workers, therefore, expect and need to learn through work. This makes it an important obligation for the management in organizations to create a conducive environment to meet the expectations of knowledge workers by building a learning culture, an essential to maintaining and retaining a productive workforce. Consequently, there is a need for a con-

tinuous learning in companies in order for them to stay ahead of competition hence the term learning organization. "A learning organization is a place where employees excel at creating, acquiring and transferring knowledge". (Garvin et al., 2008:1). Modern organizations are knowledge intensive where it is considered a crucial resource by these organizations to stay competitive since it is difficult for competitors to imitate. An efficient creation and transfer of knowledge is the main source to a company's competitive advantage, due to the benefits it generates. For example, it leads to a spread of best practices and saves time by preventing co-workers from having to search for a solution to the same problem many times. It also consolidates the knowledge of different individuals, something that may generate synergies and facilitate development of new services and products (Lubit 2001)

Despite the increased significance knowledge exchange has been given, and the positive effect studies have shown it has on organizational performance, the extent to which companies are successful in this vary significantly. The reason for this is that knowledge exchange is a complex process and more difficult to manage than what might be assumed at first sight due to various reasons. Firstly, the concept of knowledge is problematic to define, and therefore it can also be difficult to manage. Often it is not obvious which kind of knowledge that is desirable to transfer, nor how to realize the transfer. Furthermore, sometimes individuals within organizations do not wish to share the knowledge they possess. Since organizational knowledge, to a great extent, is based on the skills of individuals, it is important to understand what might facilitate the knowledge transfer between these individuals and the utilization of newly acquired knowledge (Argote and Ingram 2000).

1.2   Case Company Background

The case company of this study was founded in 2013 following the acquisition of other companies in the same business domain. It is privately held and operates in 39 countries with its head offices in Munich, Germany and Chicago, USA. Its office in Finland is located in Espoo. It currently employs about 3000 employees. The company is engaged in designing, developing, deploying, and supporting telecom networking products used in network management, data networking, transport switching, access networking, and managed access. Its customers are mainly the Telecom operators.

In order, to support the networking products it sells to its customers around the world, the case company relies on the expertise of its service teams located in different parts of the world. The teams are organized in a layered organizational structure namely: Tier1, Tier2 and Tier3 teams. Tier1 teams work directly with the customers either as resident engineers in customer premises or from the case company's country offices. Tier2 teams handle the cases dispatched by Tier1 teams while Tier3 teams are mainly in research and development (R&D) and are the ultimate support point when all the teams fail to find a solution to problems raised by the customers.

Although the company technical support teams are spread across Asia, North America, South America, Europe, Middle East and Africa, this thesis focuses mainly on the Tier2 team based in Espoo Finland. The team in Espoo is also known as the Center of Excellence (CoE). CoE provides technical support services for escalated cases to all Tier1 teams across all regions for different product classes. The team is currently comprised of 20 full time engineers.

1.3   Business Challenge

Customer support organizations form a critical part of any Telecom Vendor. The Telecom Vendors depend on their expertise to provide after-sales support to their customers with regards to the equipment and software supplied to these customers. Customers expect support to be provided not only with a consistent quality but also in a timely manner. The question of time is very vital to the operators because longer disruption of services directly result to loss of revenue. Therefore, to protect themselves against huge losses, they sign service level agreements (SLAs) with the Telecom Vendors that classify different kinds of issues and the timeline within which they are required to be solved. Failure to meet the conditions of the SLA would mean that the Telecom Vendor would be required to pay penalties to the customer to cover potential revenue losses. This reason alone makes it important for a technical support organization to have an up to date skilled team members able to handle customer cases within the stipulated times to avoid penalties.

Presently, the case company has a challenge in maintaining the service level agreements. The customer feedbacks indicate fast response time but delayed resolution time and sometimes the quality of the resolutions is questionable. The situation has become a big concern to one of the key customers. The customer has demanded for an im-

provement in the support services it receives from Center of Excellence (CoE) Espoo otherwise it will terminate the contract. It is against this urgent need that the case company has sponsored this study to come up with an efficient learning process that addresses the concerns raised by the customer. An initial discussion with most engineers revealed lack of adequate knowledge in some key areas of the products supported leading to delayed and poor resolutions and the main reason according to them was an inefficient knowledge transfer process.

1.4 Objective and Scope

The purpose of this study is to explore how knowledge is currently shared amongst the technical support engineers and propose a more effective working method that encourages knowledge sharing more effectively. Therefore the research question is formulated as:

> How can knowledge sharing be improved in a Technical Support Organization to create an effective learning organization?

The thesis will only focus on the Espoo Tier two Technical Support Organization where there is a current need for such a study. The organization currently has a total of twenty four employees consisting of five managers, one administrator and eighteen engineers. The scope of the study will be limited to analyzing the current state of knowledge sharing and working methods related to knowledge sharing. The study will investigate the strengths as well as the shortcomings of the current learning system and find ways of improvement. In essence, the main objective of the study would be to identify what slows down the process of sharing knowledge and propose a method of improving it.

The outcome of the study will be a proposal to the management of a pilot work process whose aim would be to hasten the process of acquiring knowledge, improve knowledge sharing practice in the organization and potentially create high performing teams that will delight customers and bring more business to the organization.

2 Method and Material

This section is about the research method utilized in this study. The research design, data collection and analysis methods used will be discussed. Finally, the validity and reliability measures of the thesis will be deliberated.

2.1 Research Approach

The research approach selected for this thesis was action research (AR). AR is a scientific research method where the resolution of a fundamental issue affecting an organization is studied in a cyclical manner with the engagement of those directly involved with the issues. The cyclical method is used to control the process where action and research are done hand in hand hence the term *research in action*. (Coughlan and Brannick 2010). The use of action research is prevalent in real situations, rather than in contrived, experimental studies, since its primary focus is on solving real problems. Nevertheless, social scientists too could use it for preliminary or pilot research, more so in vague situations where coming up with a research question is not clear-cut. Mostly, though, in accordance with its principles, it is most appropriate when circumstances require flexibility, the involvement of the people in the research, or where change must take place quickly or holistically. It is often the case that those who apply this approach are practitioners who wish to improve understanding of their practice, social change activists trying to mount an action campaign, or, more likely, academics who have been invited into an organization (or other domain) by decision-makers aware of a problem requiring action research, but lacking the requisite methodological knowledge to deal with it (Obrien 2001). It is on this premise that the researcher chose this research methodology since he is a team member of the Technical Support Organization of the case company and wanted to be an agent for change by adding knowledge to the existing learning system of the organization being studied while at the same time improves the understanding of his profession. Besides, the flexibility AR would allow the researcher to involve all the stakeholders in the research to bring a meaningful change.

The origins of action research can be traced to an American social psychologist named Kurt Lewis in the 1930s when he conducted pseudo-experimental tests with his students in factory sites and neighbourhoods to prove that improved economic gains and law and order respectively are achievable only by democratic involvement rather than tyrannical tendencies. Through his action research, he was able to prove that it is possible to create social connections amongst groups that lead to better communication

and co-operation. Enhanced co-operation and communication lead to greater effective-ness of these social units which according to him would be achievable through a sys-tematic inquest where everyone participates in a democratic manner. His systematic approach was a four step cyclical process that was *planning, acting, observing* and *reflecting* on the changes that occurred in the social circumstances with the aim of making continual adjustments. Through action research, the functions of reflective thought, dialogue, decision and action by ordinary people taking part in a communal research was given credibility. As summarized by Lewis, "no action without research; no research without action." (Adelman 1993). The research methodology applied in this thesis made use of Susman's five phased action research model. This model provided the most convenient structure since each phase elaborates what the expectation is. Figure 1 illustrates the research model.

Figure 1. Detailed Action Research model (Susman 1983).

As seen in the diagram, the first phase involves problem definition where preliminary data is gathered for a detailed analysis. Once the data is gathered and analysed, dif-ferent possible options for solutions are considered after which a single plan of action transpires and is implemented. After the implementation of the action, data on the re-sults are again collected and analysed. The analysis results consists of findings of the action implemented in terms of its success and lessons learnt. Thereafter, the problem is re-assessed and the process begins another cycle. This process proceeds in sever-al cycles until the issue is resolved.

2.2 Research Design

The starting point of the research is the research question or the business problem. This part was already done in section one. This is followed by reviewing and analysing the industry's best practices based on the literature review. The literature review helps gain an understanding of the current state of knowledge regarding the research idea. After the literature review, the research proceeded to conduct a current state analysis. The current state of analysis seeks to establish the exact need of the research in terms of where the issue occurs, who and what it affects as well as reviewing the strengths and weaknesses and the reasons behind them. To meet the demands stated above, the current state analysis constituted of interviews with the relevant stakeholders, questionnaires, brainstorming sessions and other informal dialogues to have as accurate view of the situation as possible. The participants were mainly engineers to whom the proposed new model would be targeted. In total, eight engineers out of the total 20 participated. The senior manager responsible for the centre of excellence (CoE) was also chosen as a participant since he was the project sponsor. Finally, the program/project manager responsible for the key customer account who had the most concerns about technical support quality was also involved as a participant to gain more insight from the customer since he was in touch with the customer on a daily basis. Involving as many of the stakeholders as possible was preferred so as to minimize the resistance in adopting the new proposed model. The outcome of the CSA and literature review formed the basis of the next step of the research which was information on what data collection methods were used and making sense of the findings once the data analysis was completed. Once data was collected and analysed, Susman's AR model was adopted to proceed with the research. The findings from data analysis were used to diagnose the research issue. After the problem was identified, alternative solutions were considered which eventually led to settling on one. This was the foundation for an initial proposal which was then presented to the stakeholders for evaluation and verification. The findings from the evaluation were taken into consideration and checked against the initial diagnosis to find and seal any gaps as well as incorporate constructive ideas. This iterative process was repeated until a final proposal was reached as shown in the figure below.

BUSINESS CHALLENGE	CONCEPTUAL FRAMEWORK	CURRENT STATE ANALYSIS (DATA 1)	INITIAL PROPOSAL (DATA 2)	FINAL PROPOSAL (DATA 3)
HIGHLIGHTS Challenge: Prolonged Learning Curve **Topic:** Improving Knowledge Sharing in a Technical Support Team	Knowledge Sharing SECI Knowledge Creation and Sharing Model with Tools **Learning Organization** - Dimensions of a Learning Organization - Barriers to learning Organization - Organizational Culture	Study of current KS model Interviews with key stakeholders Learning Organization Survey (LMO)	**Key Learning Indicators** - Empowering people to learn - Promoting collaboration - Establishing Learning systems - Aligning people with the vision - Having committed leadership **Knowledge Sharing Tools** - Improved case solving tool - Proposed Group Working Model	**Key Learning Indicators** **Knowledge Sharing Tools** - Improved Group Working Model **Action Plan**
OBJECTIVE Enhance Learning and Knowledge sharing in TAC Espoo	Build a detailed CF that supports and informs the research	Study and analyze strengths and weaknesses of the current state	Create a model reflecting an outcome of the CF and feedback from stakeholders	Develop a final proposal that incorporates the feedback from the initial proposal
OUTCOME Improved Learning and Knowledge Sharing Model	Well-grounded Conceptua Framework	Summary of the strengths and weaknesses	Improved model sealing LO gaps and incorporates the strengths	A final and approved model

Figure 2. Research Design for this study.

As exemplified in the figure above, the research design followed a defined process where the business challenge was first outlined followed by the literature review around the business challenge to establish a conceptual framework for the research that grounds and firmly supports the study. This was followed by the current state analysis (CSA) done using three components as outlined in the figure. The result of the CSA formed the "data one" part of the research. These results were then analysed and the outcome presented to the key stakeholders in "workshop one". The stakeholders provided feedback from "workshop one" which was used by the researcher as "data two" for further analysis. After the analysis of data two, the researcher designed an initial proposal incorporating the feedback prepared earlier and presented this to the key stake holders and the whole team in "workshop 2" to gather more feedback. The feedback received formed "data three". This data set was analysed by the researcher and assimilated in the final proposal for approval by the project sponsor.

2.3 Data Collection and Analysis

The research made use of typical qualitative methods for collecting and analysing data such as: documentation analysis, interviews, surveys and brainstorming sessions. Below is a synopsis of the data sources and analysis methods:

2.3.1   Data 1 – Learning Organization Survey

The Learning Organization Survey developed by Leenamaija Otala (2014) is a test designed to assess how well an organization supports learning. Learning in this context means how fast an organization adopts to the dynamic operating environments and customer needs. The test analyzes how the learning and knowledge of an individual employee is harnessed, sustained and transformed to organizational knowledge. Furthermore, the test also checks the corporate leadership's commitment to supporting learning as well if the general work environment and infrastructure is designed for furtherance of learning. Last but not least, this survey also has the benefit of pinpointing pressing areas of an organization that would require improvement to enhance its image as a learning organization. The survey structure consists of 55 questions covering the areas mentioned above. A participant is encouraged to respond according to their feelings on how strongly agree or disagree with the questions on one scale and how very important or least important it is to change the status on another scale. More details on how and why the survey was conducted with regards to target audience and the response rate will be presented in section three. Below is a figure of the scale used for the questions.

SCALE 1 (CURRENT SITUATION)	SCALE 2 (IMPORTANCE)
1 = Strongly disagree	1 = Unnecessary
2 = Disagree	2 = Not important but pleasant to have
3 = neither agree or disagree	2 = Not important but pleasant to have
4 = Agree	4 = Necessary
5 = Strongly agree	5 = Absolutely necessary

Table 1: Scale for gauging the current situation versus desire to change it.

As seen on the scale above, on the left hand-side, the respondents react to the questions according to how strongly they disagree being the lowest score and strongly agree being the highest. On the right-hand side of the scale, the scale measures how very important or least important changing the status is.

This survey was an important source of data where key strengths and weaknesses became prominent. The survey was administered to 10 participants both digitally and in paper format. The respondents were selected but their responses were anonymous to keep their opinions as authentic as possible. They were aged between 24 and 50 years. Initially the survey was sent out to everyone in the organization but the responses were so few to make an impact so the researcher decided to approach particular individuals whose experiences were invaluable to this study due to the nature of their work. In total, there were 10 respondents out of the possible 24 representing 42 percent response rate. They consisted of a project manager responsible for a key account, a technical support manager, four senior technical support engineers and four technical support engineers. Their input was required as a collective effort to design a proposed model that was aligned with their expectations according to the action research methodology adopted in this study.

2.3.2   Data 2 – Interviews with the stakeholders

A second source of data was interviews carried out with key stakeholders whose objective was to gather views regarding how employees feel about the current state of learning and knowledge sharing and suggest ways on making the situation better. The internal interviews were semi-structured with the researcher asking open ended questions to get the participants to freely share their views. A total of just five people were interviewed. Once again, there was a challenge of employees' unwillingness to participate forcing the researcher to pinpoint and approach individuals whose contribution would have the most impact to the research owing to their work experience and their willingness to participate. The interviewees were a senior technical support engineer, a technical support engineer a staff technical support engineer, a senior manager and a project manager. The staff engineer was chosen since he had the most amount of tacit knowledge which he was expected to share with less experienced engineers while the less experienced engineers were selected to share their opinion and experience on how knowledge sharing has been from the more experienced engineers. The project manager was chosen because the customer concern that formed the basis of this research came from the key account he is responsible for. The senior manager was chosen since he has the general responsibility of the CoE and therefore his support and opinion as the voice of the general leadership mattered in shaping the direction of the new proposal. He was also the project sponsor. His opinion was also crucial as a non-technical user of the current process. The senior engineer was chosen owing to the

fact that he has on previous occasion aired his frustration on getting help from staff engineers and the junior engineer was chosen to represent the views of other junior engineers in terms of their experience gaining new knowledge from more experienced peers and also owing to his enthusiasm about this research from the beginning. The table below gives a summary of the backgrounds of the interview respondents.

#	JOB TITLE	EXPERIENCE	DURATION (MINS)	DOCUMENTATION
1	Senior Manager (CoE)	Over 15 years in the current role responsible for Finland TAC.	45	Fieldnotes
2	Project Manager	3 years and responsible for driving the case resolution times of a key account.	45	Fieldnotes
3	Staff Tech Support Engineer	16 years with the company and expert in Optical and Access products.	45	Fieldnotes
4	Sr. Tech Support Engineer	6 years with the case company with expertise in Network Management System (NMS).	45	Fieldnotes
5	Tech Support Engineer	2 years' experience supporting Access network elements.	45	Fieldnotes

Table 2: Backgrounds of the key stakeholder interview respondents.

As reflected in Table 1, the interviewees represented different cadres of knowledge employees who utilize the current learning and knowledge sharing model for their daily tasks with experiences ranging from 2 years to 16 years to capture the views of both less experienced to very experienced engineers.

Prior to conducting the interviews, the questions were sent out to interviewees 2 weeks in advance on the 2nd of February 2015 to give them adequate time to review and familiarize themselves with the questions and ask for clarifications whenever necessary. The actual interviews were conducted for a week between 16th February and 20st February 2015. The setting was informal with the researcher conducting the interview in the company cafeteria. Each participant had a scheduled time between Monday to Friday within the specified dates. The language used was English. There were a total of six questions to guide the interviewees on critically looking at the strengths and weaknesses of the current system. In the end, the interviewees also ended up contributing many valuable insights that would help create a useful proposal. The researcher took

field notes during the interviews for later analysis. The questions can be found can be found in the Appendix.

2.3.3   Data 3 – Internal company documents

The company documents were perused to better understand the current knowledge transfer and sharing process and map it out. First to study the case handling system this is the interface within which all customer cases are resolved. Studying this system provided sufficient insight in mapping out the process of retrieving, processing and dispersing knowledge as practised in the case company. This is because it consists of SharePoint where most of the common internal documentation is stored and shared. The process also involves accessing the proprietary knowledge repository system of the case company. This tool is similar to Google search engine. Engineers tend to use it for searching how previous cases were solved.

2.4   Validity and Reliability Plan

In order to reinforce the findings and ensure that the research is acceptable and meets the requirements of the research method the study was subjected to validity and reliability assessment. The objective of reliability is to ensure that if other researchers were to carry out the same study under the same conditions they should be able to arrive at the same results. In other words, the research should be replicable. This criterion is necessary for determining the overall validity of the study by minimizing and strengthening the results. (Yin 2003)

There are four mainstream types of validity namely: Internal validity, constructive validity, external validity and reliability. Internal validity is the extent to which study outcomes can be precisely interpreted. This means that the findings of the study should be a reflection of the observed results. Therefore internal validity is only relevant when a researcher is trying to link a cause with an effect. In this study it is not relevant since it is an exploratory rather than an explanatory research. External validity on the other hand is the process of analyzing the results to determine whether they are applicable in other circumstances. This is normally a challenge where only minimal data samples are collected. A situation similar to this study where an external validity question would be, "can the outcome of the study be replicated to other teams in the case company?" taking into account the fact that research only focused on a small team within the case

company. Construct validity can be regarded as the key term used to assess a measurement procedure used to evaluate a construct. For example in this study the construct validity would be derived from the "learning organization" questionnaire used to evaluate how well the case company supports learning. The final type of validity is reliability which as mentioned before is all about consistency of the research so that if a different investigator was to do the research all over again then they should be able to achieve the same outcome as the previous researcher. In that respect, it is necessary to document all the actions taken in the research to make it possible for future researchers to follow the work of the previous researcher. (Yin 2003)

In this study, validity will be enhanced by consulting with different teams in the case company to see if it would be possible to replicate the proposed model could be applicable to their teams as well. For example, the product development teams and product launch teams will be consulted. The reliability will be enriched by studying a broad range of relevant literature on best practices in relation to knowledge creation, sharing and management and learning organizations. Besides, case company experts will be involved in brainstorming sessions in the course of the study to seek their opinions and approvals during the model development process so that the improvement suggestions would be in tandem with their expected outcomes.

3   Best practise on Learning and Knowledge Sharing

This section gives a summary of the existing knowledge and best practises regarding learning organizations and knowledge sharing and management that eventually leads to a conceptual framework for this study.

3.1   Knowledge

This subsection defines knowledge and then continues to explain the different types of knowledge. Knowledge management fundamentals are also discussed followed by a detailed analysis of knowledge sharing.

3.1.1   Defining Knowledge

Knowledge is defined in Longman Dictionary as the information, skills and understanding gained through learning or experience. Although knowledge is closely associated with information in this definition, it is not the same thing. The formation of knowledge exists in four levels namely: data, information, knowledge and wisdom as illustrated in the figure below.
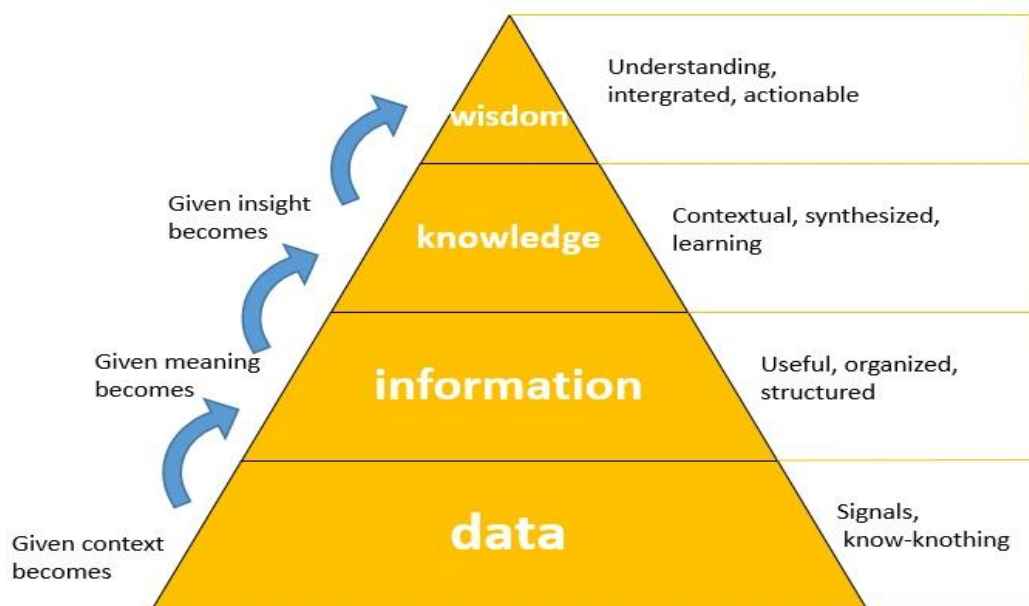
Figure 3. DIKW pyramid (Milan Zeleny 1987)

According to (Thierauf 1999), data is an unorganized representation of facts and fig-ures about something and which provide no further information in a particular context. In the words of Thierauf, data is "unstructured facts and figures that have least impact on a typical manager" (Thierauf 1999 p.6). For data to become information, it must therefore be contextualized, categorized and condensed. Information then becomes knowledge when it is interpreted by individuals and given a meaning (Nonaka et al., 2001). The interpretation of knowledge can be as a result of combined knowledge of individuals and their experience in an organization. (Davenport and Prusak, 1998). When knowledge is given insight, it becomes wisdom.

3.1.2   Types and Sources of Knowledge

In order to effectively manage knowledge, it is necessary to understand the various forms in which it exists. For example, knowledge that has been gathered by an expert for years cannot be managed in the same way as knowledge captured in a document. Knowledge can be structured as individual, structural or organizational. Structured knowledge can be regarded as knowledge that has been codified into manuals and reports while organizational knowledge refers to the activity of learning within an organ-ization. Nonaka and Takeuchi (1995) have defined structured or codified knowledge as explicit knowledge while unstructured and hard-to-codify knowledge as implicit knowledge. Explicit knowledge is transferrable via formal or systematic methods while tacit knowledge is difficult to codify since it is context specific and personal. It is there-fore hard to fully articulate and document but is highly effective in the mind of the be-holder (Serban and Luan 2002). The table below summarizes features and sources of explicit and tacit knowledge.

EXPLICIT KNOWLEDGE (DOCUMENTED)		TACIT KNOWLEDGE (KNOW-HOW EMBEDDED IN PEOPLE)
FEATURES	Easily codified Storable Transferable Easily expressed and shared	Personal Context - specific Difficult to formalize Difficult to capture, communicate, share
SOURCES	Manuals Policies and procedures Database and reports	Informal business process and communications Personal experiences Historical Understanding

Figure 4. Explicit Knowledge versus Tacit Knowledge (Serban and Luan 2002:10)

The figure above gives just a few sources of knowledge. However, Davenport and Prusak (1998) alludes that there are five sources of knowledge. The first source of knowledge they discuss is *Acquired Knowledge*. This knowledge originates externally to the organization in the form of rental or purchase from the original owners. For example, organizations hire external consultants or other specific knowledge owners to help improve on the organizations' areas of needs. It is important to note that with this type of knowledge, originality is less important than usefulness. Next is *Dedicated Knowledge* which is a source of for specialized knowledge. Sometimes organizations need to have a separate specialized staff dedicated to a specific purpose within the organization. The purpose could be for example to develop gainful products for the organization. Research and Development departments are good examples of dedicated knowledge source. The third source is *Fusion Knowledge*. When people with different perspectives are brought together to work on a project, fusion knowledge is created. The outcome of the project thus becomes a fusion of different expertise that would otherwise not have been possible if the project was worked on by a singular person or just a few members of a team. However, it should be noted that it takes time to reach agreements on shared knowledge due to differences in opinion. An example of fusion knowledge is the cross-functional teams especially in higher educational institutions. Fourthly, there is *Adaptation Knowledge*. This knowledge is normally an outcome of changes in circumstances within which a certain industry operates in. For example higher institutions these days offer online courses due to the ubiquitous nature of the internet. The last source is *Networking Knowledge*.

When people within the same discipline gather to share knowledge formally or informally, the upshot is networking knowledge. For example communities of practise are a typical example of networking knowledge.

Thus to summarize, knowledge creation happens mostly when people are grouped in networks and communities. Therefore once these human groupings fall into place, technology can be used as an aid to share this knowledge. It is therefore imperative for an organization to think of ways of grouping employees to generate more knowledge that can be shared across the organization.

3.1.3   Knowledge Sharing

The purpose of knowledge sharing can either be to create new knowledge by differently combining existing knowledge or to become better at exploiting existing knowledge. As seen in the figure above, every organization creates knowledge in one way or another. However, this knowledge is not very useful if it is not shared. Thus knowledge sharing is a very crucial element in knowledge management process especially tacit knowledge possessed by individuals which is vital to any organization's strategy as well as long term existence. Despite this common awareness, tacit knowledge sharing still remains a big challenge to most organizations because most individuals are not willing to share (Bukowitz and Williams, 1999). Technology has made it relatively easy to organize, post, and transfer certain types of information. "On the other hand, contribution is not only time consuming, but is also seen as a threat to individual employee viability" (Bukowitz and Williams, 1999). This implies that organizations have to devise ways of motivating and rewarding employees to share knowledge. Another key element that should be infused in organizations' knowledge management is collaboration. Collaboration could take many forms like special teams or task forces, project teams or work groups. Work processes and policies should also categorically encourage collaboration for example, shared database access, electronic meetings among others to enable virtual and easy collaboration.

Classifying knowledge can take many forms and models. One of the most famous knowledge creation and sharing processes is that of (Nonaka's and Takeuchi 1995) famously known as the SECI model where they researched extensively on tacit and explicit knowledge. In their research, they drew attention to the fact that western cultures tend to focus more on explicit knowledge while the Japanese emphasize on tacit knowledge. Their model visualizes organizational knowledge creation as a spiral. This spiral expands knowledge through four modes of knowledge conversion. These four modes are: socialization, externalization, combination, and internalization (SECI). Through these four modes, knowledge develops within the organization transitioning from individuals through the group all the way to organizational and inter-organizational levels. The SECI model which is based on the two types of knowledge mentioned above are explained next.

The first aspect of the model is *socialization* that links Tacit to Tacit knowledge. In this link, knowledge is transferred through practise, observation, guidance or imitation. In the business setting, on-the-job training uses basically the same principle or when organizations gain new knowledge by interacting with their customers or suppliers. This is created by socializing, spending time together or working in the same environment. In order to manage this process, Chini (2004) suggests the use of brainstorming camps, employee rotation, subsidiary project and apprentices & mentors.The principle of socialization is that individuals share feelings, emotions, experiences and mental models.

The second part is *externalization*. Knowledge is externalized when tacit knowledge is linked to explicit knowledge. In other words, it is the expression of tacit knowledge into comprehensible forms that can be understood by others in an organization. This translation is particularly difficult as it is important. Tacit knowledge is usually codified into documents, manuals etc. Tacit knowledge can be nearly impossible to codify thus the use of explanatory techniques such as concepts and metaphors are encouraged. Here, Chini (2004) suggests transfer of expert knowledge through decision support systems, analogies and metaphors, team collaboration tools and chat groups.

The next attribute is *combination* where Explicit to Explicit knowledge types are linked. This mode of knowledge conversion combines different forms of explicit knowledge to create new knowledge. Examples include exchanging and combining knowledge through various channels such as documents, meetings, telephone conversations, or computerized communication networks. In a more precise way, the combination involves the conversion of explicit knowledge into more complex sets of explicit knowledge systems. For example, in compiling annual reports, companies combine financial information from various departments into one comprehensive report. Chini (2004) contributes by suggesting best practices such as, databases, web-based access to data and intranet & internet as useful tools.

After all these steps, knowledge is said to be *internalized* when explicit knowledge is transferred to tacit knowledge. This method personifies explicit knowledge into tacit knowledge over time as the explicit knowledge sources become used and learned eventually transforming an individual's tacit knowledge base. (Nonaka and Takeuchi 1995). When this tacit knowledge is read or practiced by individuals then it broadens

the learning spiral of knowledge creation. An example is where organizations provide training programs for its employees at different stages of their working careers. By reading the training documents, employees internalize the tacit knowledge and try to create new knowledge after the internalization process. Chini (2004) also suggests learning by doing, on the job training, learning by observation and face-to-face meetings as sufficient tools. The following figure highlights the SECI knowledge sharing process including development tools.

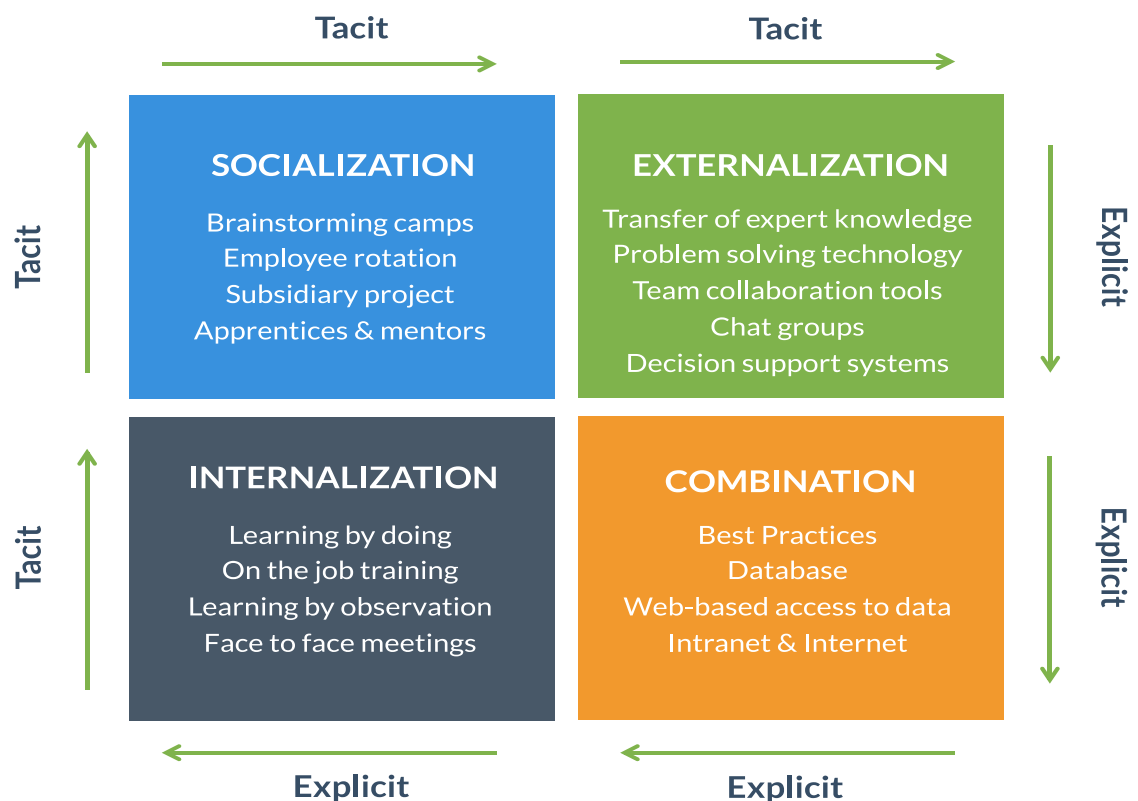|	Tacit	Tacit	
Tacit	**SOCIALIZATION** Brainstorming camps Employee rotation Subsidiary project Apprentices & mentors	**EXTERNALIZATION** Transfer of expert knowledge Problem solving technology Team collaboration tools Chat groups Decision support systems	Explicit
Tacit	**INTERNALIZATION** Learning by doing On the job training Learning by observation Face to face meetings	**COMBINATION** Best Practices Database Web-based access to data Intranet & Internet	Explicit
	Explicit	Explicit	

Figure 5. SECI Knowledge Sharing model (Nonaka 1994:20) with suggested tools of development (Chini 2004:97)

As seen in the figure above, Chini (2004) the SECI model is a manifestation of learning in organizations as a social process. This process needs to convert different types of knowledge in a cyclical way to create competitive advantage for an organization. As depicted in the model, it is a spiral process, where the creation of new organizational tacit knowledge in the Internalization phase inspires the process to repeat itself, thus increasing the individual and organization's knowledge and subsequently the organization's competitive advantage.

3.1.4   Barriers to Knowledge Sharing

Though knowledge sharing is such an important issue in any organization, sharing it is a challenge. The challenge arises from the barriers that hinder the flow of knowledge amongst colleagues. These barriers could be due to values, beliefs and habits that different individuals bring to the work place.

Therefore in order for an organization to achieve its KM objectives, such barriers need to be understood and attempts made to overcome them.

The table below is an additional summary of some inhibitions and potential remedies. (Davenport and Prusak, 1998).

Inhibitor	Potential solution
Lacking trust	Build trust and relations through personal meetings
Different cultures, wordings and references	Create a common ground through education, teambuilding, discussion and job rotation
Lack of time and meeting places	Establish time and place for knowledge transfer through meeting rooms, conference reports etc.
Status and rewards to knowledge owners	Evaluate results and create incentices for knowledge sharing
Lacking ability to acquire knowledge	Educate employees for increased flexibility. Make time for learning and encourage new ideas
Knowledge is seen as a privilege – "it doesn't concern me"	Promote a non-hierarchical attitude toward knowledge. Quality is more important than the source.
Intolerance toward mistakes and help needs	Accept and reward creative mistakes and collaborations. Establish a culture where not knowing everything is OK

Table 3: Inhibitors and solutions for knowledge sharing (Adapted from Davenport and Prusak., 1998:97)

As seen in table 3, there can be several factors that inhibit knowledge sharing. First among them is lack of trust. Trust is considered a critical factor for knowledge sharing. According to (Davenport and Prusak, 1998), trust is the trustworthiness of knowledge utilizers (buyers) in knowledge sharing. If knowledge buyers do not recognize knowledge sellers after knowledge transaction, then knowledge owners will fear sharing leading to knowledge hoarding. Thus, peer trustworthiness is required for knowledge sharing to thrive. For a multinational organization like the case company, culture is a critical component in knowledge sharing. More than just celebrating the diversity of its people, the company culture should be closely aligned with its vision. In creating a knowledge sharing culture, an organization helps itself in meetings its objectives as set out in its vision. Another factor that is often mentioned is offering rewards or incentives to encourage knowledge sharing. However, rewards should be evaluated and tied to results to ensure quality but even more so, rewards need not to be just in monetary form as people are motivated to share by more than just money. Another barrier that affects organizations today is that of knowledge hoarding. The old paradigm that "knowledge is power" needs to be changed to "knowledge sharing is power". It should be understood that knowledge sharing is in the best interest of the people. (Davenport and Prusak, 1998).

In general, before incentives are put in place to encourage knowledge sharing, disincentives ought to be removed first by ensuring the organizational culture is knowledge sharing friendly. People should be made understand that knowledge sharing is in their own best interest to help the organizations they work for succeed and thereby making them successful in doing their work more effectively , helps them to progress in their careers and brings self-fulfilment.

3.2   Learning Organization

"An organization's results are determined through webs of human commitments, born in webs of human conversations".

Fernando Flores

A study of literature on learning organizations uncovers that there is no consensus amongst different authors on what a learning organization really is. Here are some of the well-known definitions:

"Organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to learn together." (Senge, 1990:3).

" An organization that facilitates the learning of all its members and continually transforms itself in order to meet its strategic goals." (Pedler et al., 1997:1).

Although there are different definitions to what a learning organization is, there are aspects that are common to all of them. They are that Learning Organizations are those that demonstrate continuous learning and adaptive characteristics and also that characteristics of the Learning Organization should be displayed on different organizational levels; generally, individual, group/team and organizational level. (Marsick and Watkins., 2003). In summary, it can be said that a Learning Organization aims at continuous learning where the entire organization is involved through shared values.

3.2.1   Fundamentals of a Learning Organization

There are a few models when it comes to the theory of learning organization. Among them is Peter Senge's (1990) formula for creating the learning organization that depended on the mastery of five dimensions which are: fostering personal mastery, helping teams learn together, creating shared vision, understanding mental models, and linking these components through systems thinking. He described a new kind of leader who is able to model and facilitate such learning. Another model is that of Watkins and Marsick (1993, 1996) that identifies core practices at the individual, group, and organi-

zational levels. This research uses Watkins' and Marsick's model. The model established in their study recommended the essential building blocks of a learning organizational culture after conducting a significant amount of research that resulted in the development of a questionnaire named the Dimensions of the Learning Organization Questionnaire (DLOQ). In the DLOQ seven dimensions were incorporated. The first is to *create continuous learning opportunities*. In most learning organizations, learning and work are mixed so that people can learn on the job and opportunities are provided for ongoing education and growth. The second element is to *promote inquiry and dialogue* whereby individuals develop productive reasoning skills to express their views and the capacity to listen and inquire into the views of others. This kind of culture promotes questioning, feedback and experimentation. Third, there is a necessity to *encourage collaboration and team learning*. This implies that organizations should encourage the use of groups to open up different approaches in thinking. Groups are expected to work and learn together, and collaboration is valued and rewarded. Fourth, it is vital to *create systems to capture and share learning and have them integrated with daily work*. The systems should be easily accessible and well maintained. The fifth element is the obligation to *empower people toward a collective vision*. This means that everyone in the organization becomes involved in setting, owning and implementing this vision. Responsibility is distributed close to decision making so that people are motivated to learn toward what they are held accountable to do. The sixth requirement is to *connect the organization to its environment*. Individuals are helped to see the effect of their work on the entire organization. This in turn encourages employees to use information they gather around them to adjust work practices resulting in better experiences to those directly affected by their work. Finally the organization must provide *strategic leadership for learning*. Leaders have to model, champion and support learning, and must use learning strategically for business results.

According to Marsick and Watkins (1999), these seven action dimensions are distinct but also interrelated. As mentioned previously, these dimensions can be divided further into three levels namely: individual, team/group and organizational learning. Level one learning influences learning on the other levels. In the first level of learning, the individual level composes of the first two dimensions: Continuous Learning and Inquiry and Dialogue. The second level of learning, team/group learning is reflected in the dimension of Collaboration and Team Learning. The third level of learning, organizational learning consists of four dimensions: Systems to Create and Share Learning, Empower

People, Connect the Organization to its Environment, and Strategic Leadership. All seven dimensions, along with a description of each and what level of learning they belong to are summarized in Table 2.

DIMENSION	DESCRIPTION	LEVEL OF LEARNING
Create continuous learning opportunities (CL):	Learning is designed into work so that people can learn on the job; opportunities are provided for ongoing education and growth	Individual Level
Promote inquiry and dialogue (ID):	People gain productive reasoning skills to express their views and the capacity to listen inquire into the views of others; the culture is changed to support questioning, feedback, and experimentation.	Individual Level
Encourage collaboration and team learning (CT):	Work is designed to use groups to access different modes of thinking; groups are expected to learn together and work together; collaboration is valued by the culture and rewarded.	Individual Level
Create systems to capture and share learning (SCL):	Both high – and low – technology system to share learning are created and integrated with work; access is provided; systems are maintained.	Individual Level
Empower people toward a collective vision (EMP):	People are involved in setting, owning, and implementing a joint vision; responsibility is distributed close to decision making so that people are motivated to learn toward what they are held accountable to do.	Individual Level
Connect the organization to its environment (CO):	People are helped to see the effect of their work on the entire enterprise; people scan the environment and use information to adjust work practices; the organization is linked to its communities.	Individual Level
Provide strategic leadership for learning (SL):	Leaders model, champion, and support learning; Leadership uses learning strategically for business results.	Individual Level

Table 4 (The seven dimensions of learning (Marsick and Watkins 2003, p 139).

All the dimensions mentioned in Table 4 are reflected in Leena Maija Otala's (2014) learning survey questionnaire, a tool that has been used in a few organizations to diagnose the current learning status in order to identify gaps that deter organizations from becoming better Learning Organizations at individual, team and organizational levels and that's why it was chosen for this study.

3.2.2 Culture as a necessary component of a Learning Organization

"Suppose we were able to share meanings freely without a compulsive urge to impose our view or conform to those of others and without distortion and self-deception. Would this not constitute a real revolution in culture".

David Bohm
(1917 - 1992) American Physicist & Philosopher

The aspects described above are all necessary in transforming an organization into a learning one. However, all these factors are stimulated by the organizational culture. Culture is an important aspect because no matter what an organization does to manage knowledge, the actions will always be influenced by its culture and therefore it is necessary to study an organization's culture and take it into account to give the best chances of success for undertaking efforts to becoming a learning organization. (Ipe., 003). In a recent study by Chai & Nebus (2012) it was discovered that culture is an important factor that determines the norms regarding the capturing and sharing of knowledge in the organization. The basic elements of culture such as norms and values have an influence on knowledge sharing process. These elements shape communication language, formal and informal ways of communicating, rules, regulations, routines and technology which directly impacts knowledge sharing aspects. Moreover, an organization's culture is said to influence employee's knowledge sharing behavior as well as indirectly affect a manager's attitudes towards learning and knowledge sharing process (Chai and Nebus 2012). Similarly, human resources practices are also known to influence learning through organizational culture such as, fairness in decision-making and open communication and as such, it is suggested to initiate and promote an organizational culture that supports learning and knowledge sharing (Cabrera 2002).

In general, literature presented above clearly advocates having an organization culture that is friendly to learning. It can be concluded that having a culture that supports learning would include .traits like learning at work processes, open communication, fairness, continuous improvements and room to make mistakes. These highlighted elements have a direct impact interpersonal knowledge sharing process for a learning organization.

3.2.3   Barriers toward a Learning Organization

Having looked at some of the characteristics necessary to become a learning organiza-
tion, it is still a wonder why so many organizations still fail in their quest to achieve this
goal yet it can be reasoned that most organizations incorporate the elements men-
tioned above. In a survey by Harper and Glew (2008), they observed that typically im-
provement efforts in most organizations fail 80 percent of the time. The survey was
based on the results of 250 respondents from diverse organizations where they uncov-
ered that there are over 1000 reasons that bar organizations from learning. These rea-
sons range from leadership and management problems, organizational factors as well
as external and future factors as condensed in the table below

BARRIERS	DESCRIPTION
Leadership does not set the example for learning	The idea of organizational learning is not championed, and lessons from previous experience are not incorporated
Not soliciting ideas	Management is unwilling to seek good ideas from employees
Lack of empowerment to learn and change	Lower-level employees are not encouraged to experiment with new approaches or initiate change
Inadequate training	Top management does not provide sufficient time and funding for job-specific and advancement-related training
Inadequate system for knowledge acquisition and sharing	There is no common database to contribute, store, access and disseminate information
Lack of performance measurement and accountability for poor performance	People who do exceptional work are not rewarded and those who do poor work continue doing poor work

Table 5: Barriers to Learning Organization

Thus to summarize table 5, the essence of a learning organization is to have leadership that embraces learning and leads by example. When learning is embraced, people will feel empowered and be more willing to share ideas for improvement. When this empowerment is combined with an accommodating culture where there is room for mistakes, innovation becomes inevitable and an organization like the case company could be positioned to becoming a better learning organization.

3.2.4   Conceptual Framework of This Thesis

The findings from the existing knowledge and best practises suggest that for an organization to learn and grow its knowledge base, some key dimensions need to be adhered to. However, to achieve progress towards successful implementation of those key dimensions, certain barriers need to be eliminated. Once the barriers are eradicated, a set of tools are proposed that could accelerate the achievements of the objectives set in the dimensions of Learning. These key dimensions together with the possible barriers for achieving them combined with a recommended set of tools for sharing knowledge form the conceptual framework for this thesis as shown in the figure below.
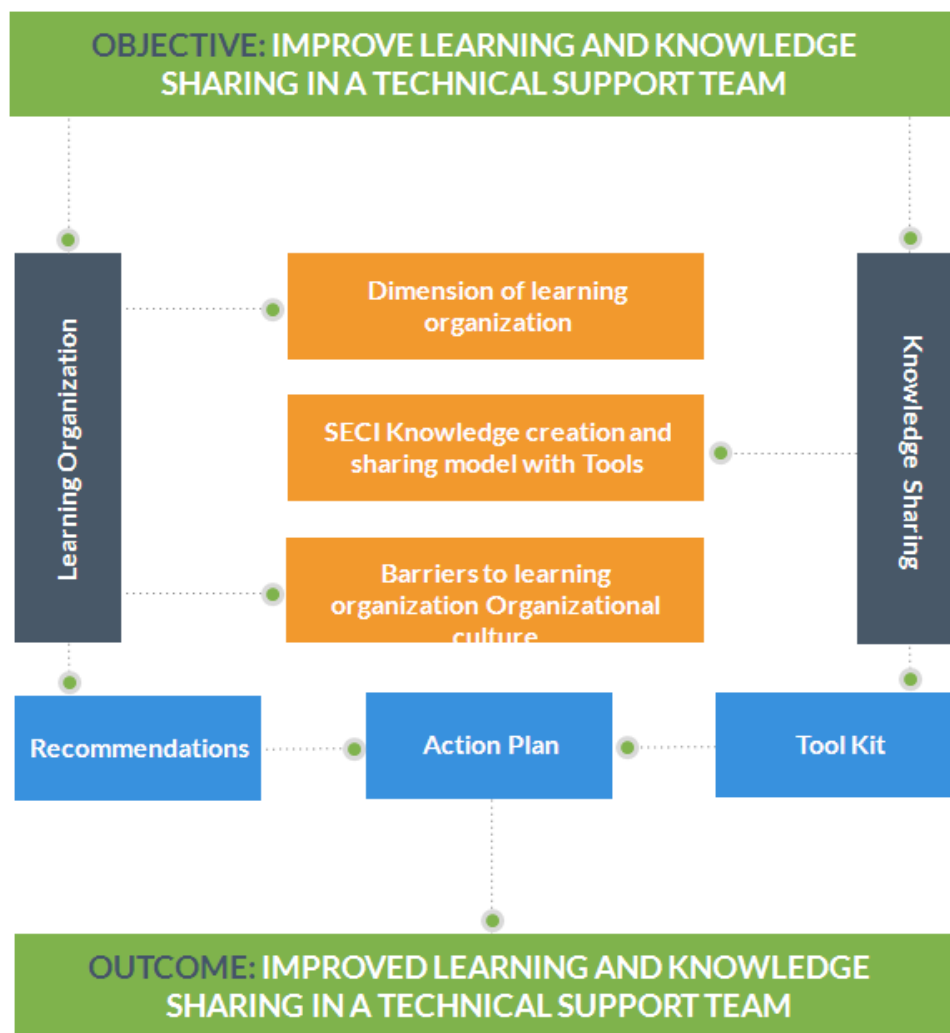
Figure 6. A conceptual framework for improving learning and knowledge sharing in a technical support team.

As shown in figure 8, the seven key dimensions of learning are studied in depth to come up with more crystallized focus areas for the case company. In the end, five key elements are found to be relevant with the current situation of the case company. These dimensions cannot be achieved without first eliminating barriers to learning organization. But the overarching element to achieve all these is having a culture that supports learning and so it was necessary to study organizational culture and how it influences learning and knowledge sharing. Only after that, can a toolkit be created to hasten the learning process. Consequently, the identified dimensions labelled *key learning indicators* were then juxtaposed with the key findings of the current state analysis together with the possible barriers and presented to the stakeholders for feedback and proposal suggestions. The feedback was then used to build recommendations. These

recommendations together with the tools recommended in the SECI model for knowledge sharing was used to produce the final proposal. The proposal building process together with the explanations on the key learning indicators and the set of tools are presented in section 5 of this thesis.

4 Current State Analysis

This section discusses and analyzes the current practices, methods and tools used by the case company to transfer, share and maintain knowledge with the aim of identifying some bottlenecks impeding efficiency. First, the case handling process will be reviewed. Next, the data collected earlier from key stakeholder interviews and learning organization survey will be analyzed to assess the underlying strengths and weaknesses. Finally, a summary of the findings of the current process of the technical support organization will be provided.

4.1 Case Handling Process

This section begins with the case handling process due to the fact that it is the place where the organization knowledge is utilized the most and thus understanding how it works is considered vital for this research. The process basically defines the path followed by a new ticket from the first time it is created to the time the customer accepts its closure. The figure below illustrates the process.
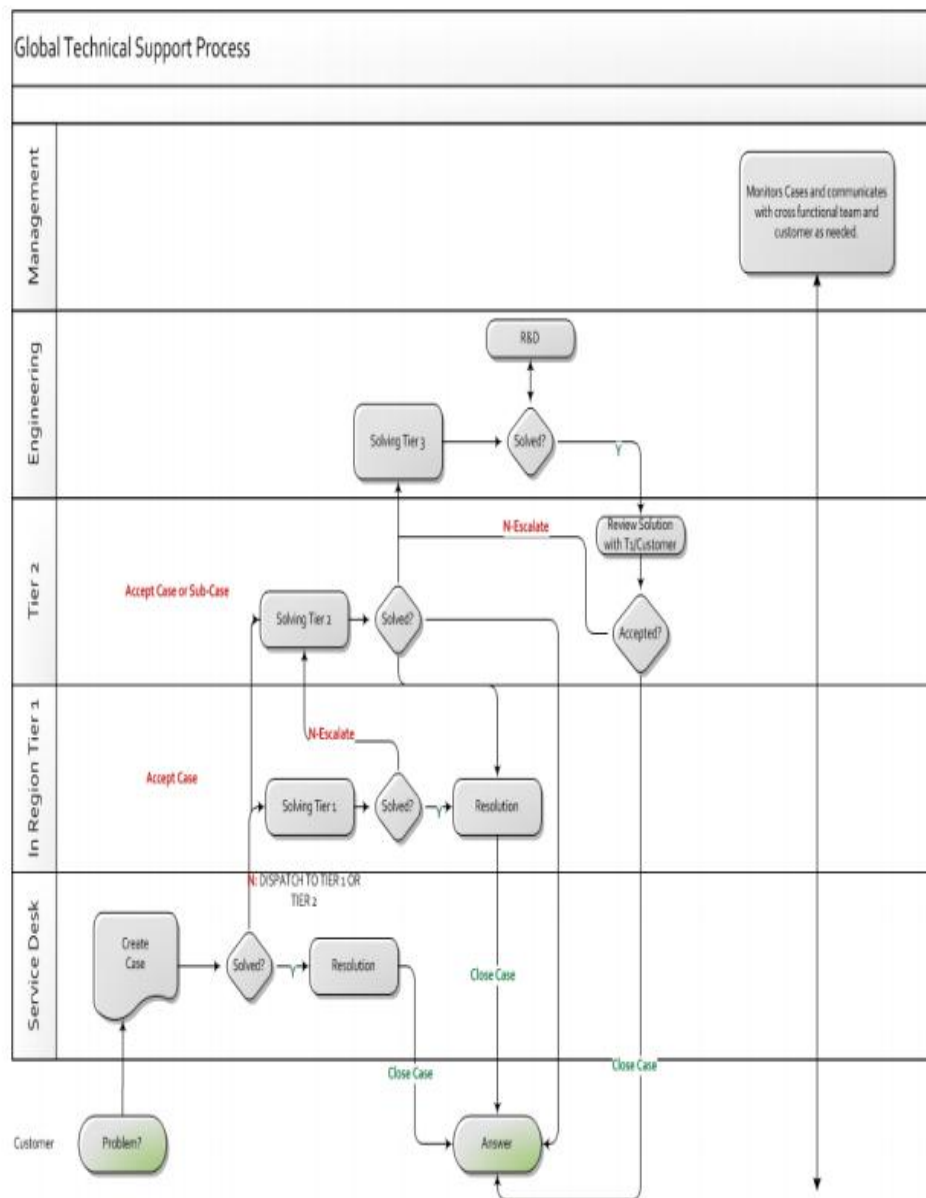
Figure 7. Case Handling Procedure of the case company (Internal company documen-
tation 2014).

As shown in the figure above, the process is triggered when a customer notices a prob-
lem. At that point, they have three options of creating a case: The case can be created
via email, phone call to the service desk or through a web based case handling-tool. If
a case is dispatched to the service desk, they first check from the knowledge repository
if a similar case already exists and if there is a solution to it. If a solution exists, they
inform the customer of the same and if the customer is satisfied with the answer, the
case is closed. If the service desk is not able to solve the ticket, they dispatch it to the

regional tier 1 engineers who would then investigate the case and if a solution is found, the customer is notified and with the authorization of the customer, the case gets closed. If a solution is not found at the tier 1 level, the case proceeds to the tier 2 level for advanced investigations which in most cases also involves replicating the issue in the local lab. If the tier 2 engineers are able to solve the issue, the case is closed through the same procedure as described in earlier steps. At this point, if the tier 2 engineers are not able to resolve an issue, it is usually due to a bug so the case is eventually progressed to engineering team. The engineering team consists of R&D product developers and designers who possess advanced product knowledge for the most complex problems. Once they find solution or fixes for the bugs, they pass the information down to tier 2 who then relay the information to tier 1 and eventually to the customer. The engineering team can also directly communicate with the customer. If the customer accepts the solution, the case is closed.

Since this study focuses only on the tier 2 technical support organization, it is necessary to map the case resolution process within that level to better understand the strengths of the process as well as the existing weaknesses. Figure 6 shows a simplified case handling process map and how knowledge resources are utilized by an individual to ultimately resolve a case.
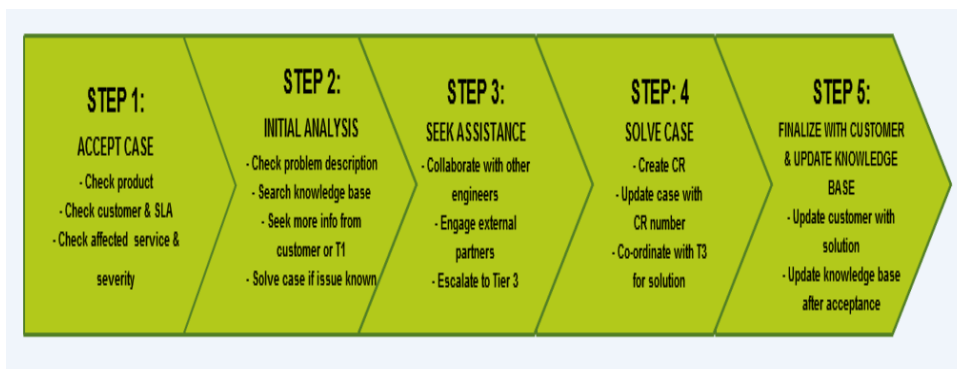
Figure 8. CoE technical support process

As shown in the figure 6, the process begins at step 1 when a case is dispatched to a tier 2 engineer from either a tier engineer or directly from the customer, the tier 2 checks that the basic information related to the case is available before moving to the next step. The basic information checked here are: product type, customer, affected service, the severity and SLA. After this basic information has been verified, the case

moves to the initial investigation stage in step 2 where the engineer begins investigating the case by checking and verifying the problem description. If the problem description is not clear, then the engineer would seek clarity from either the tier 1 or the customer who dispatched the case. After that, the engineer would then use his own knowledge or search the knowledge base for known issues. If the issue is known, then a solution would be delivered. If not, the engineer proceeds to step 3 which is to seek help from other engineers or from external product vendors if the product does not belong to Coriant. If there is still no solution at this moment, then the case would be escalated to tier 3 (R&D) through the creation of a change request (CR) in step 4. This CR would trigger an investigation for a possible bug by R&D. The engineer then updates the case with this CR number to inform the customer of the current investigation status. Once the case is resolved by tier 3, the customer is informed and the knowledge base is updated for future reference in the final step 5.

In analysing the process, it can be summarized that this is otherwise a solid process that defines quite well what an engineer is expected to achieve at each stage but which is mostly focused on individual engineers. No provisions have been made for working in groups which slows down knowledge processing especially if individuals have more cases to handle. Therefore, an improvement of the process is necessary to minimize knowledge processing times and optimize resources.

4.2   Learning Organization Survey

The LO survey was used to gauge the current state of the company as far as learning goes. Management's commitment to supporting learning and the general work environment is also checked. Most importantly, the tool helps identify strengths and weaknesses of an organization in its learning environment development efforts. After receiving the survey results, a quantitative analysis was done on the survey using the criteria that statements or questions with the highest scores for present situation and highest scores for importance were regarded as strengths while those with the lowest scores for present situation and highest scores for importance were deemed as weaknesses. In the end, the strengths and weaknesses were captured in a web format as illustrated in figure 6.
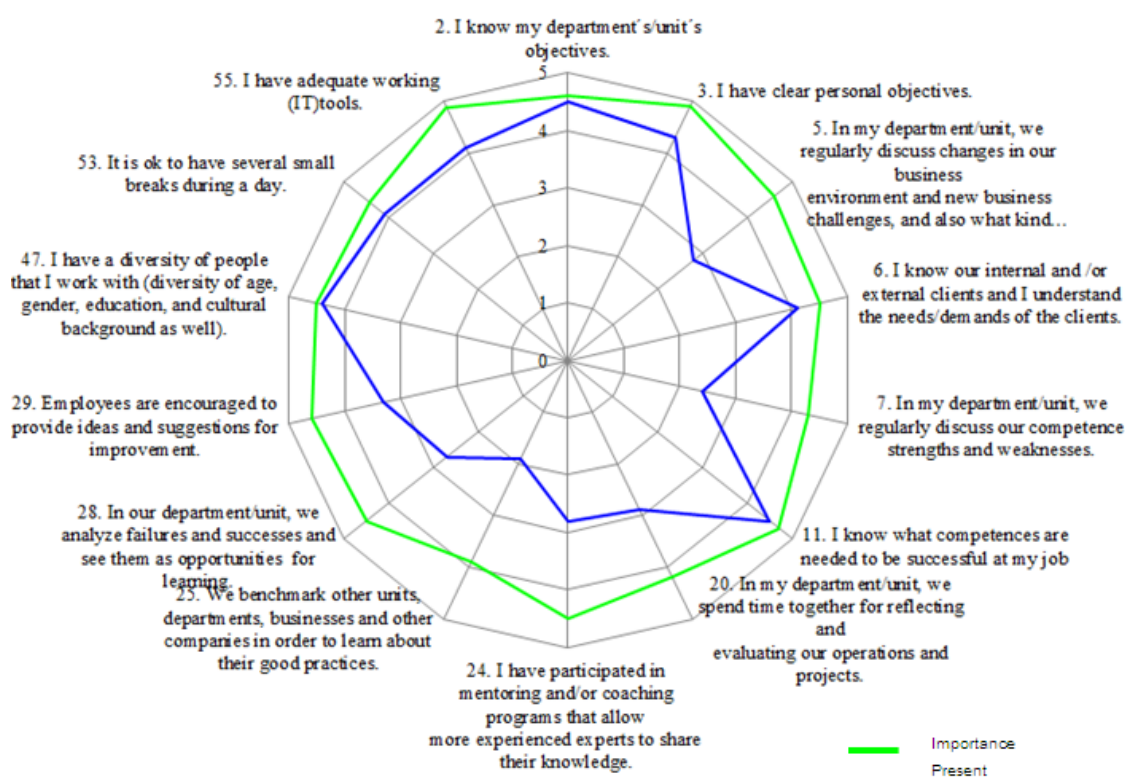
Figure 9. Findings of the LO survey

Based on this analysis, the following were the main strengths and weaknesses discovered. From the findings of the web analysis as summarized in the strengths and weaknesses, there was a very strong feeling that employees know what their individual as well as unit's objectives which implies that the organization is presently in good standing as far as understanding internal and external clients' needs go. The organization is also strong when it comes to employees knowing what competences they need to succeed in their duties. The organization has also done a good job in terms of diversification. The respondents felt positive towards the fact that they have colleagues from different cultures, backgrounds, expertise, age as well as gender.

Although the organization was strong in the key areas mentioned above, there were some gaps in other areas. For example, on the question of understanding business changes the organization scored pretty low on the survey. This means that employees are aware of the need to know the transformations going on in the industry and therefore the willingness to update their skills to keep up with the changes. However, they are not getting enough support from the management to keep pace with the circum-

stances. This situation is further exacerbated in another question regarding discussions on the organization's strengths and weaknesses. The feeling was that dialogue on this issue is not such a regular event consequently slowing down the learning curve because the team cannot improve what they don't know indicating that failures and accomplishments are not examined often. The situation is extended even further to the individual level where it was discovered that discussing individual work performance and seeking feedback are not done on a regular basis. Another important limitation disclosed from the survey was that of inadequate mentoring and coaching sessions by more experienced experts to pass on knowledge to less experienced employees. This clearly reveals a real need by the less experienced engineers to be mentored by their older and more experienced colleagues. Last but not least, there seems to be lack of benchmarking initiatives to share experiences and best practises. Even though this aspect is important, it is significant to note that the score for importance was not as high as compared to other questions which could mean that it is not such a high priority for the organization to improve on at the moment. Overall, the results and the analysis of the survey provided a good background to the current state. After the survey, personal interviews were conducted to further drill down on issues highlighted in the LO survey.

4.3   Interviews with the key stakeholders

The case company's technical support organization's employees were interviewed to get an overview of the current knowledge sharing and transfer situation. As far as an informant is concerned, the current process is sufficiently operational but he felt that engineers need to do more documentation of their work to make it more visible not only to other engineers but also to the management who from time to time need to know what is going on with the cases. Here is part of his sentiments when I asked him if the current process sufficiently:

The current system is ok. What I sometimes find difficult is current information regarding on going cases. Engineers are not normally updating the SharePoint or if they update usually the information is not enough sometimes or is very technical so I have to go to the case notes or call the engineer if it is a critical. It is easier if the current status is frequently updated in SharePoint. (Informant #1, data 1, table 2)

From these sentiments, it can be concluded that in the process map, there seems to be a gap in "updating knowledge" stage and improving that would make the system more robust. The views of the informant also reflect communication challenge on the part of engineers since they tend to keep their communication on a technical level making it a little difficult for non-technical managers to follow their cases. These opinions were also echoed by another informant when asked about the challenges he is facing with the current knowledge transfer and sharing process. He said:

The main challenge is the delay in communication by the engineers. As you are aware, company X has very tight SLAs and any slight delay could result in penalty. You see me following engineers for updates all the time. Something needs to be done to change this. TSEs need to update cases as often as possible. (Informant #2, data 1, table 2)

The statement above seems to unravel another gap in the process. The gap exists both at the "initial analysis" and "seek assistance" stages. The feeling here is that it takes a while for cases to get updated while investigations are on-going something that could affect quality metrics and have a financial impact on the case company. The interview continued with a few more informants to find out some of the causes of sluggish learning amongst engineers. A challenge that emerged amongst the less experienced engineers was that there was unwillingness to share knowledge by the more senior engineers. Here are is an expression from an informant that captures this feeling in response to how this issue affects his work.

Knowledge sharing helps us learn from each other. Those with less experience and knowledge can learn from those with more. However, I don't think it always worked very well. Sometimes people are reluctant to share knowledge and information for one reason or another. Extracting help sometimes is like pulling tooth. (Informant 5, data 1, table 2)

This statement is a strong pointer that mentoring and coaching culture is not strong in the case company and therefore calls for an improvement. The interview also sought opinions from the participants on how to make a new model more effective than the predecessor. A senior engineer remarked as follows.

There should be bench markers and measurements of progress. Managers should take an active role to insure knowledge sharing is in progress and discuss with engineers more frequently (privately) if there any shortcomings. (Informant 3, data 1, table 2)

From this remark, it could be noticed that there is lack of benchmarks in place and also a weakness in performance measurement systems. Engineers are also keen to receive more feedback from their superiors regarding their progress.

As a summary, the key findings from this interview were that in general, the knowledge sharing and retrieval tools were in good shape. For example, the interviewees did not mention any flaws with SharePoint or the proprietary knowledge database currently in use. Nonetheless, there seemed to be a general feeling that the users of the knowledge system who are the engineers required some development to make the most out of the system. The first improvement point was that the knowledge base was not getting updated regularly by the engineers after case closures. The second issue that came up was that cases were taking a bit longer to get updates, a situation that could be attributed directly to the third concern which is lack of mentoring and sharing culture in the case company. Lastly, the interviews uncovered non existing bench marking and performance evaluation/feedback culture. The next subsection takes a look at the most recent customer survey to analyse the customers' opinion about our services.

4.4   Key Findings from the Current State Analysis (Data 1)

After the completion of the current state analysis, it was concluded that objectives are clear both at the organizational level and at a personal level with customer needs clearly defined and understood by everyone.

The personnel also understood what skills and competences are needed from them to meet their objectives. The employees also appreciate the organization's effort in promoting diversification as evident cultural backgrounds, expertise, age and gender. However, there were challenges that hinder the organization from realizing its full potential as a knowledge sharing organization. These bottlenecks were categorized as follows:

STRENGTHS	WEAKNESS
Objectives of department or until are clear	No Forum for informal discussions around the work related topics
Personal objectives are clear	Lack of knowledge sharing via mentoring coaching
Customer needs and demands are clear	No Benchmarking of unit, department, other business, companies etc…
Personnel understand what competences are needed to be successful at work	No culture of learning from failures
The organization is diversified (age, gender, education, cultural background, expertise)	Lack of immediate feedback about the performance at work

Figure 10. Strengths and Weaknesses of the case company

As seen in figure 8, the strengths and weaknesses came down to just five in each category. The key findings were that the case company is robust when it comes to relaying organizational as well as personal objectives. Customer needs are also well defined and understood by the employees. Subsequently, the staff recognizes the required skills necessary for them to satisfy customer needs and also succeed at other tasks as required by the case company. The employees are also cognizant and appreciative of their diversity. Despite of all these achievements, a lot still needs to be done to make the case company climb the learning curve faster. Currently the company has not established any framework for casual dialogues or forums for employees to freely discuss topical issues around work. There was also lack of mentoring and knowledge sharing programs for senior employees to pass knowledge to junior employees. This is a hindrance to the furtherance of the learning curve. Furthermore, the organization is currently not performing any internal and external benchmarking to acquire some best practises. Additionally, a learning culture that encourages and learns from failures as it does on achievements does not seem to exist which could be a precedent of the fact that currently, the practise of immediate feedback about work performance is not strong.

5   Building Proposal for the Case Company

This section merges the results of the current state analysis and the conceptual framework towards the building of the proposal. First, the stakeholders are presented with the key findings from the CSA that are mapped against key learning indicators and possible barriers. Next the feedback from the stakeholders is used as part of the initial proposal preparation.

5.1   Findings of the CSA and Conceptual Framework

After the completion of the conceptual framework and the current analysis, a workshop was held to brief the project task force of the findings and to seek their feedback on the same. In order to aid the team in visualizing the current challenges against where the organization ought to be, the following five themes dubbed key learning indicators were put side by side with the findings of the CSA and the barriers. This was done to help the stakeholders map the current challenges in the organization and give them an easy time in providing valuable solutions.

KEY LEARNING INDICATOR	CURRENT STATE OF LO (OBJECTIVES MET OR NOT)	POSSIBLE BARRIERS
People empowered to Learn and Change	YES: People understand what competences are needed at work and encouraged to learn. NO: No culture of learning from failures and lack of immediate feedback about work performance	Management not soliciting ideas People lack empowerment to learn and change
Collaboration and team learning promoted	NO: Lack of knowledge sharing via mentoring or coaching NO: Lack of job rotations	Lack of forums for learning and knowledge sharing.
Established systems that capture and share learning	NO: The current system is individualistic and does not encourage knowledge sharing. NO: Engineers not adequately updating cases and are not always willing to be consulted by others. NO: Managers are not enthusiastic about giving feedback.	Inadequate system for learning and knowledge sharing. Lack of motivation or incentives to share knowledge
People aligned with the vision	YES: Unit, department as well as personal objectives are clear. YES: Customer needs and demands are clear. YES: The organization is diversified in terms of age, gender, culture, background and expertise.	
Visible and Committed Leadership	NO: Managers do not provide frequent feedbacks to engineers for performance and progress.	Lack of performance measurement and accountability for poor performance.

Table 6: Case company improvement recommendations.

As illustrated in figure 9, the five key learning indicators which were conceptualized by the researcher based on the literature review concerning the current best practices in this field. The KLIs are explained below as follows:

The first key learning indicator identified was *People empowered to Learn and Change.* From the current state, the company is in good standing in this dimension because individuals are supported and encouraged to continuously develop their skills. The company has various internal as well as external courses to increase its people's skill levels. The employees also understand what competences are needed to succeed at their work. The company should continue with this trend to further strengthen the individual learning abilities. However, to enhance these individual's abilities, there should be a change in the organization's culture into that where it is encouraged to experiment and make mistakes and also get frequent feedback. As it is now, the culture of learning from failures and getting swift feedback is non-existent. Some barriers to this could be due to the fact that the management is not keen on seeking ideas from employees leading to a situation where the employees just settle in their comfort zones due to lack of new challenges learn new skills despite the resources being there. It could also kill their desire to give opinions and make amendments if they feel that their opinions are not being taken seriously. Second key learning indicator was that of *Promoting Collaboration and Team Learning.* Some work is needed to bring this dimension to a good standing within the team. The current situation enlightens that knowledge sharing via mentoring or coaching is currently lacking in the technical support team. Some of the possible inhibitors could be that the current system is inadequate and does not encourage knowledge sharing through coaching or mentoring. There might also be lack of trust amongst colleagues, lack of status and reward system to knowledge owners hence making them use their knowledge as a source for power. These barriers ought to be eliminated to create a culture that would eventually unlock different modes of thinking thus enabling the transfer of tacit to tacit knowledge. The third learning indicator was having *Systems to Share and Capture Learning.* The analysis from current state analysis brought to light the fact that the current case solving tool does not cater for group working model but rather geared towards individuals where the responsibility of solving a case lies with an individual engineer from start to end. This has led to among other things, engineers not being able to share knowledge with other engineers or concerned managers adequately through the share point system. Some of the barriers for this could be due to the pressure involved in handling these cases individually with limited opportunities to consult. This can sometimes lead to the feeling of inade-

quacy thereby making the engineers to shy away from sharing ideas for the fear of be-
ing judged when they make mistakes. If these inhibitions are curtailed, then the level of
transfer of *tacit* to *tacit* knowledge could increase thereby bolstering *fusion knowledge*
of the organization. Fourthly was making *People Aligned with the Vision.* As far as this
dimension is concerned, the organization seems to have done a good job in communi-
cating its vision across the organization as most people knew what the vision of the
organization was and what was expected of them to attain this vision. Lastly was hav-
ing *Visible and Committed Leadership.* It was revealed that some work is needed in
this area if the organization is to achieve its goal of becoming a learning organization.
The management has done a good job communicating the vision of the organization to
employees. Now, there is a need for more work in providing strategic direction to real-
ize that vision. At the present moment, there seems to be lack of constant feedback
from the managers to the employees. This in turn leaves the employees in the dark
when it comes to evaluating their performance and making necessary improvements.
The barriers perhaps could be that there is low morale amongst the managers to per-
form their duties or also due to the fact that the current feedback system only provides
for quarterly feedback sessions.

5.2   Data 2 Results - Feedback and Proposal Ideas from the Stakeholders

After the presentation of the key findings, the stakeholders were in agreement that the
result of the current state analysis was a fair reflection of the case company's present
situation and therefore did not object to any of the aspects highlighted. Next, the stake-
holders were requested to give ideas for developing a proposal. The first suggestion
was that the *management needs to seek for improvement ideas* more often from the
engineers and take actions on the suggestions provided. The feeling was that if this is
done more frequently, then everyone would be held accountable for the performance of
the team. It was also suggested that the current system should be modified to incorpo-
rate group work in order to foster more *collaboration and teamwork.* Then there was a
suggestion of *offering incentives* to encourage individuals to share knowledge by way
financial rewards or promotions. This suggestion was debated at length with some of
the stakeholders especially engineers implying that the current promotion system is
vague and does not encourage performance with some engineers claiming they have
been stuck in their positions for many years despite meeting all the requirements that
would make them eligible for these promotions. Lastly, there was a request for *job rota-
tions* to be introduced. This idea was especially supported by less experienced engi-

neers who felt that there was a need to exposure especially at the regional offices. They said that this would not only offer them first-hand experience with issues as they occur at customer sites but they would also be able to co-operate better with the tier one engineers and have an opportunity to improve the quality of escalations and eventual case solutions.

The project sponsor defended some of the findings highlighted in the current situation stating that for example on the issue of incentives and job rotations, the current financial situation of the company, would not sustain job rotations or award regular promotions. He however mentioned that this idea is a topic of discussion by the top management and it would be introduced as soon as the situation gets better. On the idea of promoting more engineers regularly, he quipped that the current policy is based on regional quotas and that talks are in progress to improve the situation and so at the moment it would be difficult to consider that idea. He nevertheless supported the idea of special financial rewards to encourage people to share knowledge to be implemented in the proposal. As for other improvement suggestions, the management wished to see a proposal that *supported better initial case evaluation and handover* to hasten the case resolution process. They added that since they had been complains from key customers regarding case handling quality, they would like to see a learning model that *prioritizes work according to the SLAs* as well *boost case resolution times and quality.* All these ideas were considered and incorporated into the initial model discussed next.

5.3   Initial Proposal

Based on the feedback received from the key stakeholders, this study proposes the following recommendations. They are made up of empowering people to learn, promoting collaboration, establishing learning systems, aligning people with the vision and having committed leadership. They were conceived to seal the identified gaps and incorporate the existing strengths of the case company. Figure 10 gives a summary of the recommendations.

KEY LEARNING INDICATOR (KLI)	CURRENT STATE OF LO (OBJECTIVES MET OR NOT)	BARRIERS TO LEARNING ORGANIZATION	RECOMMENDATION
Empowers People to Learn and Change	**Yes:** People understand what competences are needed at work and encouraged to learn **No:** No culture of learning from failures and lack of immediate feedback about work performance.	- Not soliciting ideas. - Lack of empowerment to learn and change	People should be encouraged to question, give ideas and feedback and experiment more
Promotes Collaboration and Team Learning	**No:** Lack of knowledge sharing via mentoring/coaching. Lack of job rotation	- Inadequate system for knowledge acquisition and sharing - Also see table 4 for inhibitors to KS.	Group model to access different modes of thinking. Collaboration should be valued and encouraged.
Established Systems that Capture and Share Learning	**No:** The current case solving tool is individualistic and does not encourage knowledge sharing. **No:** Engineers are not adequately updating cases to share knowledge and not willing to be consulted. **No:** Managers are not enthusiastic in giving feedback.	- Inadequate system for knowledge acquisition and Sharing	Technology systems and culture should be designed to capture and share learning and integrated with work. People should be rewarded to encourage sharing knowledge
People Aligned with the Vision	**Yes:** Objectives of department/unit clear. Personal objectives are clear. **Yes:** Customer needs and demands are clear. The organization is diversified (age, gender, education, cultural background, expertise)		People should be involved in setting, owning and implementing a joint vision.
Visible and Committed Leadership	**No:** Managers do not provide feedback to engineers frequently with regards to performance and progress.	- Lack of performance measurement and accountability for poor performance	Leaders should model, champion and support learning;

Table 7: Improvement recommendations for the case company

As highlighted in figure 10, the objective was to match each recommendation against the key strengths and weaknesses. This way, it would be apparent as to what gap or strength areas are being addressed. The recommendations were conceived on the basis of eliminating the possible barriers by infusing the suggestions given earlier by the stakeholders as well as conclusions from the researcher to create a way to reach the objectives suggested in the key learning indicators. The recommendation that *people should be encouraged to question, give ideas and experiment more* is targeted towards eliminating the barrier of not soliciting ideas and to turn around the current state where people are not adequately learning from failures. This also incorporates the feedback from stakeholders that the management ought to seek improvement ideas from the employees from time to time. The company stands to gain because individuals will no longer take the back seat but would be willing to bring forth new ideas and experiment more due to the elimination of fear of failure resulting in overall improvement in organizational knowledge by way of linking tacit to explicit knowledge. This recommendation could be implemented in the form of forums where engineers gather on a regular basis to recap on current cases and openly discuss cases. The next recommendation is to come up with a group model that incorporates junior and senior engineers. The current situation enlightens that knowledge sharing via mentoring or coach-

ing is currently lacking in the technical support team. Some of the possible inhibitors could be that the current system is inadequate and does not encourage knowledge sharing through coaching or mentoring. There might also be lack of trust amongst colleagues, lack of status and reward system to knowledge owners hence making them use their knowledge as a source for power. These barriers ought to be eliminated to create a culture that would eventually unlock different modes of thinking thus enabling the transfer of tacit to tacit knowledge. The practical implementation of this recommendation is to form cross-sectional product focused groups that would include various subject matter experts working together with less experienced engineers to share knowledge and expertise. The different groups would then gather on a regular basis to exchange knowledge with other groups. The discussion topics for the group gatherings could include interesting or perhaps difficult customer cases encountered within a given period of time. If implemented, the amount of *fusion knowledge* as well as *dedicated knowledge* in the organization could increase significantly.

The next recommendation was to *create systems that share and capture knowledge as well as rewarding people to motivate them in sharing knowledge*. The current case solving tool does not cater for working in groups but rather geared towards individuals where the responsibility of solving a case lies with an individual engineer from start to end. This has led to among other things, engineers not being able to share knowledge with other engineers or concerned managers adequately through the share point system. Some of the barriers for this could be due to the pressure involved in handling these cases individually with limited opportunities to consult. This can sometimes lead to the feeling of inadequacy thereby making the engineers to shy away from sharing ideas for the fear of being judged when they make mistakes. If these inhibitions are curtailed, then the level of transfer of tacit to tacit knowledge could increase thereby bolstering *fusion knowledge* of the organization. To improve the situation practically, the current case solving system would need to incorporate elements of knowledge sharing like group work, and organizational culture that encourages engineers to share knowledge. A motivation for the engineers to share knowledge would include special financial rewards especially if engineers are consulted while off duty. Non-financial rewards like gift cards could also be handed out to recognize achievements both at individual and group level. The fourth recommendation was that *people should be involved in setting, owning and sharing a joint vision.* As far as this dimension is concerned, the organization seems to have done a good job in communicating its vision across the

organization as most people knew what the vision of the organization was and what was expected of them to attain this vision. The organization could use this strength by infusing it in the overall improvement plan. For example, while creating the group model recommended earlier, the model could be based on key customers. This means one group per key customer with the rest of the customers being distributed equally amongst all the groups. This way, the vision of the organization to be intimate with its customers could be realized because the group members will not only get to know the customers better, they would also be able to solve their cases much faster and with better quality due to the collective brain power as per the wishes of the management as learned in the feedback. Lastly, it is recommended that *leaders should model, champion and support learning.* Some work is needed in this area if the organization is to achieve its goal of becoming a learning organization. The management has done a good job communicating the vision of the organization to employees. Now, there is a need for more work in providing strategic direction to realize that vision. At the present moment, there seems to be lack of constant feedback from the managers to the employees. This in turn leaves the employees in the dark when it comes to evaluating their performance and making necessary improvements. The barriers perhaps could be that there is low morale amongst the managers to perform their duties or also due to the fact that the current feedback system only provides for quarterly feedback sessions. The practical recommendation would be to have integrated forums between managers and engineers on a regular basis where cases and other common issues would be reviewed openly and also private sessions held with the individual engineers before or after the meetings if a situation calls for it. In general, these recommendations are targeted towards encouraging people to work together and improving the sharing of tacit knowledge as a priority for the case company. Next, a set of tools were incorporated in a new model to reinforce the recommendations. Figure 10 displays the current model as a foundation for which the new model is built.
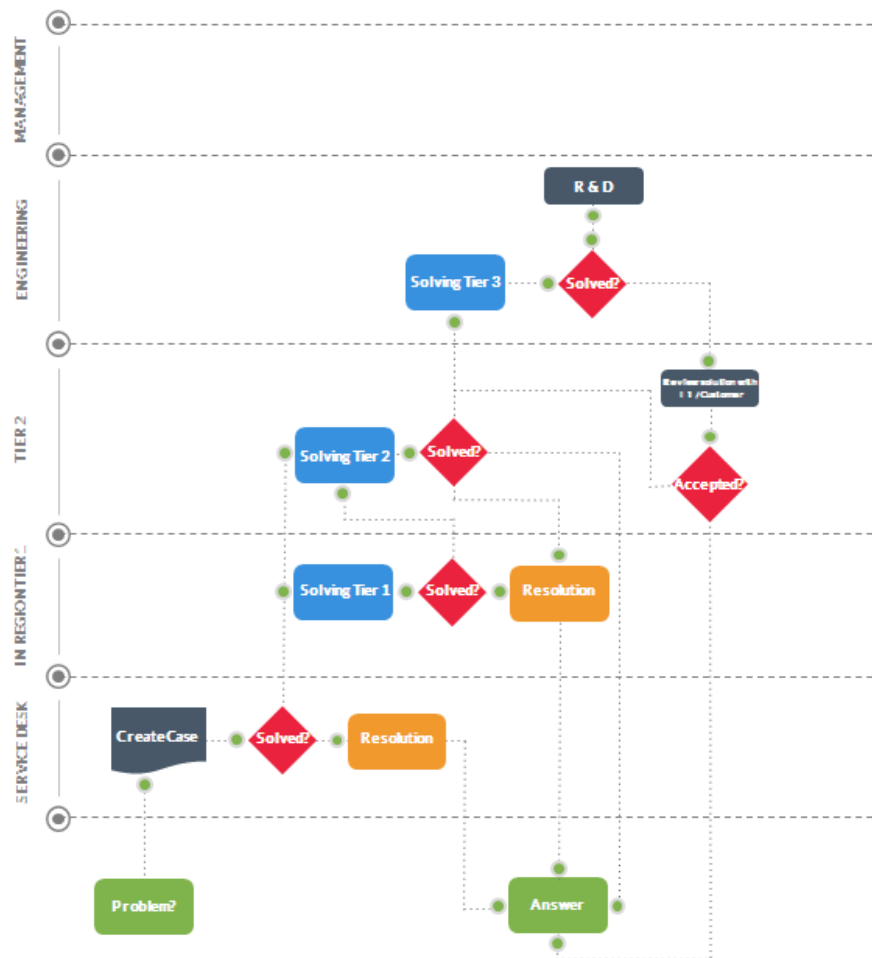
Figure 11. The current case solving tool

As demonstrated in the figure 10, the Espoo CoE falls under Tier 2. At this level, engineers receive escalated from the regional Tier 1 engineers where after an initial evaluation by the Tier 2 ETS engineers, the case is the assigned to an individual Tier 2 engineer who then becomes responsible for the case from the beginning to the end. This current model offers limited opportunities to consult with other engineers. This in turn leads to delays in case resolutions and low quality in some of the responses provided by some of the engineers. Therefore, it was necessary for the new proposed model to focus on implementing the proposed changes with this current model as the anchoring framework. The next figure illustrates the proposed model with explanations of how it intends to meet knowledge sharing objectives.
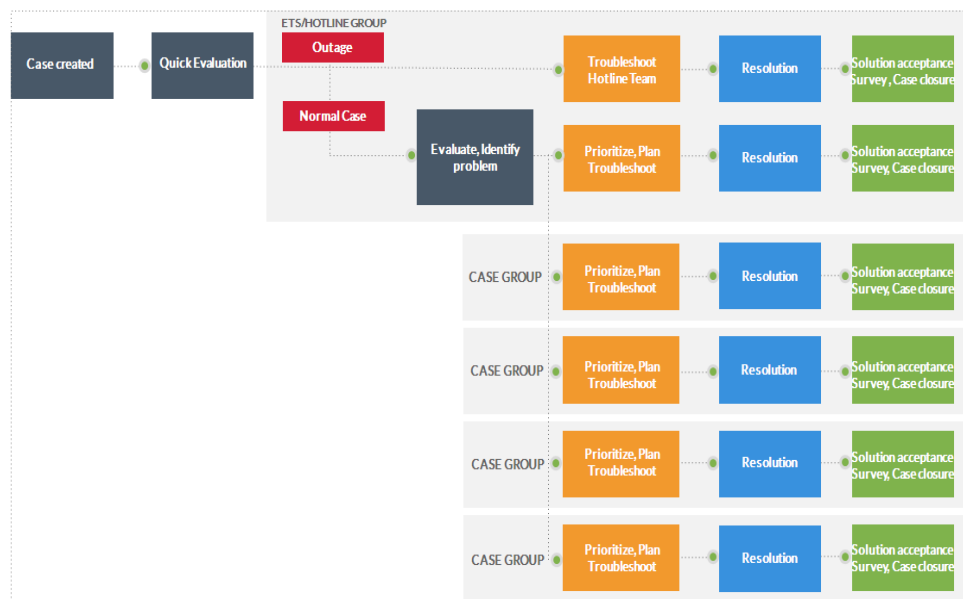
Figure 12. The proposed group working model

As shown in the figure, the model separates cases into two categories, hotline and ordinary cases. When a case gets escalated from a regional office, gets processed based on its priority level. This means that an outage situation will get the attention of the hotline team to expedite a resolution while normal cases are evaluated and redistributed to various teams. This separation of cases allows the engineers to see more clearly where their *priorities should be based on, either by the escalation type or SLA.* The cases also get evaluated with more engineers leading to *better quality handover* to the respective groups. This model introduces *group working structure* right from the beginning providing engineers with opportunities to consult with other as opposed to the current model. In the current model, the engineers are clustered into five different groups. With the exception of the Extended Time Services (ETS) group that currently handles all product types due to the fact that they operate beyond normal office hours, the rest of the groups will handle cases filtered by product types and key customers. The figure below shows how this will work.
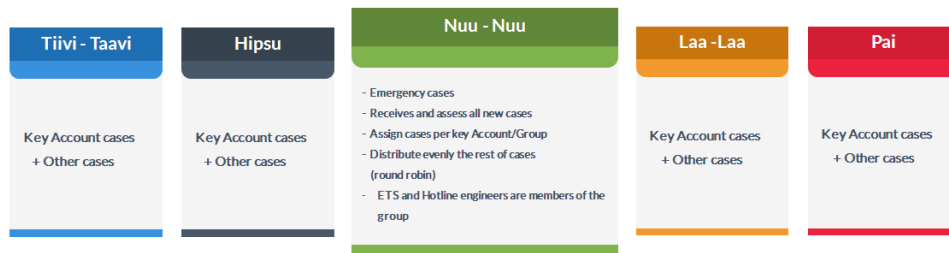
Figure 13. Groups and case handling for knowledge sharing.

As shown in figure 12 there will be four groups split according to the four key customers that case company currently has. Then these groups will be further classified according to product types to make it easy to split workload. In practical terms, it means that if a case comes from key customer A, then that case will be handled only by the group that handles cases from that key customer. This process will be repeated for all other groups. All other cases from normal customers will then be redistributed in a round robin fashion to *achieve load balancing.* The process will aid in *understanding the needs of not only the key customers better but also all other customers*. This will in turn help drive the people to the vision of the company of becoming customer centric.

Other than making prioritization easier, this proposed model aims to *create a better sharing knowledge environment through mentoring and coaching* because these groups will consist of expert engineers and less experienced ones all taking responsibility for cases and sharing ideas on how to move the cases forward. Because of the joint responsibility, the spirit of *experimentation will also be enhanced* due to the fact that people will be more willing to exchange ideas to help the group in solving the cases. This combined brain power will *make case resolutions faster and the quality will also improve* because of the additional pairs of eyes of experts in the group to provide guidance and insight.

The model also hopes to make the team's leadership more visible and active as well as promoting internal benchmarking. To achieve these, the proposal has adopted formal forums approach named ceremonies. Figure 13 below illustrates this approach.

Round table ceremony	Product ceremony	COE ceremony	Retrospective ceremony
- Group - Daily - Daily tasks - Quick improvements	- All product experts/product + Product responsible manager - Weekly - Case knowledge sharing - Warroom	- 1MC/group + Managers - Weekly - Metrics - Loading sharing - Quick improvements sharing	- 1MC/group + Managers - Monthly - Improvements

Figure 14. Ceremonies to promote individual and group knowledge sharing.

The ceremonies have been designed to foster learning at individual level, team level and organizational level. The *round table* ceremony will work at the group level where group members will meet every morning to prioritize on the daily and deliberate on responsibilities. Group members will discuss and solve cases and share knowledge on the most effective ways to achieve their goals. Each group member will have an opportunity to share ideas, ask questions and contribute in any other way to help the team achieve its goals. This approach aims to not only strengthen individual learning but also combine the individual tacit knowledge into collective explicit knowledge documented in the case support tool and other case company's knowledge sharing systems e.g. SharePoint. Each week, a group member will be assigned the role of master of ceremony (MC) giving him/her the authority to lead the team's activities for the whole week. Among other responsibilities, the MC will chair daily meetings to execute the daily team's tasks. The MC will also represent the team in the weekly team/COE ceremony whose function will be explained later. The approach of having every group member take a leadership role not only fosters equality in the group but also instills leadership skills and could be a silent, non-financial motivator for people to come forward and share knowledge.

Next is the *product* ceremony where all subject matter experts in particular products will facilitate a knowledge sharing session regarding interesting cases that are currently being solved. These cases are called *war room* cases and are normally related to particular product's software or hardware malfunctions. In the old model, these "hot" cases have previously been handled by the senior most product engineers but how they handled the cases was not properly documented and shared with the other engineers. The proposed model will still have the senior most product engineers drive the solution of

the cases in their own groups. However, the problem of inadequate knowledge sharing that existed in the previous model will be solved by holding weekly product ceremonies facilitated by the product experts themselves to share knowledge regarding how they are handling these cases. Less experienced engineers or even other senior engineers will get a chance to learn and ask questions. The product experts will not only share knowledge but they will also share best practices with the other groups thereby promoting *internal benchmarking.* The management will be represented by the relevant product managers who are also the group managers. The role of the manager would be to provide feedback regarding performance from the customer's point of view since they are usually the points of contact for war room cases due to their sensitive nature. The feedbacks are the deliberated by the team and the ones that require action are acted upon immediately. This way, customer needs can be communicated right away and the team would then readjust itself according to those needs.

The third ceremony is the *CoE ceremony* where the appointed MC per group attends a session with the managers to represent his groups' issues. Here, snapshots of the groups' performances are reviewed. Things like the number of cases handled by the team are looked at to assess if load balancing has been achieved. Also assessed, are staffing needs like sick leaves that might impact performance hence reduction in work loads to maintain quality. Both the MCs and the managers also have a chance to offer each other feedbacks on the groups' activities for quick improvements. This approach would *make leadership more visible and accountable* by offering, receiving and acting on feedbacks more frequently.

The final ceremony in the model is the monthly *retrospective* ceremony. This can be referred to as the mother of all ceremonies. It is an opportunity to share *best practices* regarding various issues facing the groups. The appointed MCs per group begin by briefing the forum about the past month's activities of their respective groups, their triumphs, past challenges and how they overcome them and solicit ideas to tackle any current challenges they might have.

6 Validation of the Proposal

This section discusses the validation of the proposal. First the initial proposal is presented followed by a summary of the feedback which leads to the development of the final proposal and an action plan for its implementation.

6.1 Findings from the Initial Proposal

The initial proposal was presented to the whole CoE team in a town hall session. The presentation at the town hall was conducted by the researcher in three parts. Firstly, the recommendations which consisted of the key learning indicators, current state analysis of the case company as a learning organization, the possible barriers to making progress towards a better learning organization and finally the recommendations. Next, the previous feedback given by the key stakeholders was also presented to ensure transparency with the whole CoE team and to seek further their endorsement as to whether the feedback was a reflection of majority's feelings. Lastly, the recommendations and the proposed model were presented by first highlighting the pain points they intended to address followed by an explanation of how it intended to solve them with the aid of the visual display of the model. The purpose doing the presentation in this format was to seek validation that each of the three sections was a true representation of what they had hoped for and to get as specific feedback as possible in order to come up with a robust model that met the individual employee's expectations and ultimately the case company's goals.

6.2 Data 3 Results - Final Feedback

At the end of the town hall session, the following feedback was provided:
With regards to the recommendations framework given based on the key learning indicators, current state analysis, barrier and recommendations, no improvement feedback was given. The team ratified those as valid since most of them participated in the learning organization survey as well as the interview session.

On the initial proposal, the whole team was positive about the group working concept and optimistic about its prospects especially on the idea of integrating senior engineers and the less experienced ones. The junior engineers felt this arrangement could help in improving their learning curve because it would now be easier to access and consult

the senior engineers which proved to be a challenge before. The senior engineers on the other hand were hopeful about having reduced and more balanced workloads hence making them do much more quality work and also improve the case resolution times. The only idea for improvement was in the area of ceremonies where the engineers requested to have an all-inclusive idea sharing session in at least one of the ceremonies to give everyone a chance to give their opinion about issues affecting them. The idea was accepted by all and it was agreed that the retrospective ceremony would be used for this purpose. Instead of holding the monthly sessions with only the MCs and the managers, the retrospective ceremony would now involve everyone. The frequency of the ceremony was agreeable to all to give everyone time to gather improvement ideas. Before concluding the feedback town hall, the researcher requested for suggestions for names of the groups. After an animated deliberation around the subject, the team settled for the names of the British Television Series characters "teletubbies" which were translated to Finnish to localize them to the group namely: Nuu-Nuu, Pai, Laa-Laa, Tiivi-Taavi and Hipsu. The reasoning behind the choice of the names was that as an organization, our main goal is to improve the sharing of tacit knowledge and these characters invoke psychedelic feeling yet at the same time espouse humility and willingness to make mistakes in the quest for discovering the world around them. These are qualities that the team felt the need to emulate.

6.3   Final Proposal

The initial proposed model was as a result of conceptual framework, current state analysis, feedback and suggestions from stakeholders and the researcher's own conclusions. This was presented initially to the key stakeholders and the whole team for evaluation, feedback and validation. Following the feedback, there were only two changes from the initial proposal which was altered. Therefore, this final version excludes the attributes of the initial proposal that did not require modifications. The following figures present the diagrams before and after the modifications.
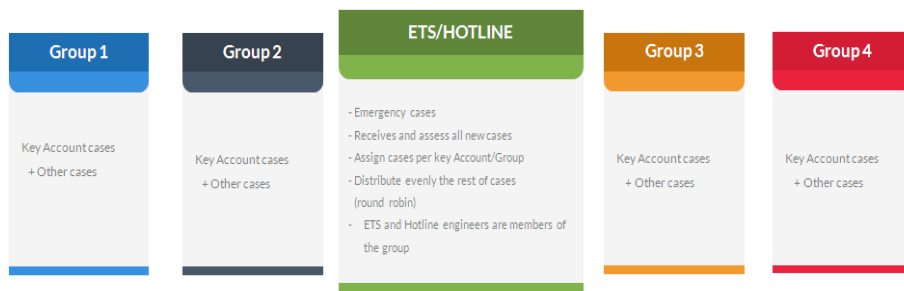
Figure 15. CoE proposed groups before feedback.

Figure 16. CoE proposed model groups after feedback

Figure 17. CoE proposed ceremonies before feedback

Figure 18. CoE proposed ceremonies after feedback

As illustrated in figure 15, the groups now have names as suggested by the team during the feedback session. Each of the groups will handle cases from key customers as well as other cases evenly distributed by the Nuu-Nuu group. Figure 17 incorporates the changes requested by the team of having at least one general session ceremony. Retrospective ceremony will now have everyone participating monthly to share improvement ideas. This ceremony would act as the main bucket for gathering *major improvement ideas* where everyone regardless of what position they hold in the company would be invited to give their opinion about anything they feel is affecting their performance and requires improvement. It also improves the commitment of the leaders because at this gathering, the managers have the opportunity to give feedback to their respective groups regarding the improvement suggestions raised. In this ceremony, the managers would also brief the team on the progress of previous improvement suggestion ideas and give specific performance feedback at individual or group level. If the feedback is individual, the manager would initiate a private meeting with the individual concerned. This way, individuals would not have to wait for a month to receive feedback like they do now.

6.4   Action Plan.

Following the validation of the proposed model, the management has defined a roadmap for the piloting of the new model as follows:
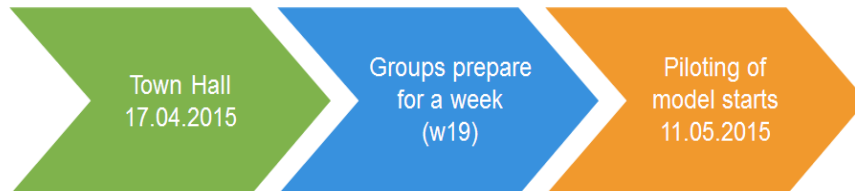

Figure 19. Action plan for the final proposal

During week nineteen, the team will lay the ground work for the piloting. The ground work would involve choosing which key customers go to which groups and also redistribution of all the other customers to all the groups using a round robin model to achieve load balancing. The groups will also have a chance to discuss how they will conduct their round table ceremonies daily in order to effectively achieve their group goals. The piloting of the new model officially begins on 11 May 2015.

7 Discussion and Conclusions

This section is a summary of the subject matter of the thesis and its outcome. Some managerial implications of the study are offered and also how well the objectives of the study are met with outcome is evaluated. Finally, the validity and reliability of the study is also assessed.

7.1 Summary

This thesis concentrated on studying the learning and knowledge operations of a technical support team in a multinational telecommunications vendor. The aim of the study was to improve the current knowledge sharing system to make the team a better learning organization thus the research question was formulated as: *How can knowledge sharing be improved in a Technical Support Team to create an effective learning organization?* To realize this goal, the study adopted action research methodology due to its flexible and collaborative nature where all the stakeholders would participate in the study to bring forth an all-inclusive proposal with data being collected and analyzed using qualitative research methods.

To begin with, a literature review was conducted to examine what has been written in the areas of knowledge sharing and learning organization and to evaluate best practices regarding these subjects. This led to the development of a conceptual framework that this thesis would be based on. The conceptual framework consisted of the definition of knowledge and the types, competence, knowledge sharing, knowledge management fundamentals and learning organization.

After building the conceptual framework, the study proceeded by conducting a current state analysis of the case company. This was done in three parts. First, the current global technical support process was evaluated since it is the main outline within which knowledge is generated and shared across the global technical support teams. Next the study utilized Learning Organization survey tool developed by Leenamaija Otala (2014) to conduct a survey to establish the current situation as far as learning and competence goes. The survey was followed by interviewing the key stakeholders as the last source of data in the current state analysis.

Based on the results of the current state analysis and the conceptual framework, a rec-ommendation framework was derived that included key learning indicators juxtaposed with findings from the current state analysis alongside barriers to becoming a learning organization and the recommendations to offer the case company a clear picture of the current state and where it needs to be to improve its learning curve. These recommen-dations were then presented to the key stakeholders for evaluation and feedback. Fol-lowing the feedback, an initial proposal was conceived which was then presented to the whole team for more feedback and validation. Subsequently, the final proposed model was created that addressed the pain points highlighted in the recommendations taking into account the feedback gathered from the stakeholders earlier on. This proposal was approved by the project sponsor with the piloting already scheduled in the near future.

7.2   Managerial Implications

This thesis proposed practical recommendations which if implemented would improve the learning curve of the case company. These improvements have been suggested with the view of creating an open organization culture that would be more ready and willing to learn and grow its knowledge base. However, to achieve this growth, the management of the case company would be required to take a few actions.

First of all, the biggest challenge that this thesis addressed was the issue of sharing tacit knowledge and as such, the new model incorporated group working style in all the phases of the model to unleash and share this knowledge. Consequently, the man-agement would be required to plan, commit and follow through with the implementation to ensure the model realizes its full potential. Gladly, this process has already begun with elaborate plans for piloting in place.

Secondly, the new model has been designed to seek improvement feedback on a more regular basis. Again the management has to show enthusiasm and willingness to exe-cute improvement changes submitted by its users. To reiterate this point, a few issues were left unaddressed in the final proposal because of the inability to incorporate them at the completion of this model. These issues are related to motivation and rewards. These aspects are crucial in boosting the morale of the team to fully commit to the sys-tem. Therefore the management is urged to try and address these pending issues as soon as it is viable to demonstrate their seriousness about the success of the new model.

7.3 Evaluation of the Thesis

This sub-section provides a review on how well the outcome of the study compared with its objective as well as evaluating its reliability and validity.

7.3.1 Outcome versus Objective

This thesis set out to improve the learning curve of a technical support organization by enhancing the current learning and knowledge sharing system of the case company with culmination of a new working model. This table extracted from the research plan highlights the path taken to the final outcome. Each of the stages is evaluated.

	BUSINESS CHALLENGE	CONCEPTUAL FRAMEWORK	CURRENT STATE ANALYSIS (CSA)	INITIAL PROPOSAL	FINAL PROPOSAL
OBJECTIVE	Enhance learning and knowledge sharing in COE Espoo	Build a conceptual framework that support and informs and informs the research	Study, analyze and interpret data to determine strengths and weakness of the current state	Create a model that reflect the result of the CF and CSA	Develop a final proposal that integrates feedback from the initial proposal
OUTCOME	Enhanced Learning Sharing Knowledge Sharing Model and a shortened Learning Curve	Well-grounded conceptual framework	Summary of the strengths and weakness	A well-grounded model that seals the gaps and incorporates the strengths	A validated and accepted proposal

Table 7: Objective versus the Outcome of the Thesis

The objective of the business challenge was to find a way to enhance learning and knowledge sharing with the expected outcome being an improved learning and knowledge sharing model and a shortened learning curve. This objective has been met partially. A new model has been created but its impact in terms of shortening the learning curve is yet to be felt. Therefore its evaluation can only be complete once it is implemented and monitored over a period of time. Next was the conceptual framework where the objective was to bring forth a conceptual framework that informs and supports the research with the expected outcome of a well-grounded conceptual framework. Here, the objective can be said to be met since the most important theory regarding the research question was discussed. On the current state analysis, the outcome met the objectives by utilizing different sources of data and analysing them to come up with a broader view of the current state. The initial proposal aimed to create a model that reflects the results of the current state analysis and the conceptual framework. This objective was met because the recommendation framework was developed based on the concepts gained from the conceptual framework. The results of the CSA were

incorporated alongside the KLIs in the framework to show exactly where the strengths and the gaps were in meeting the KLIs. Last but not least, the objective of the final proposal was to produce a model that considered the feedback of the initial proposal with the outcome being a valid and accepted proposal. This objective was also met with the final proposal accepted by the project sponsor and a pilot plan already in place. Subsequently, it can be concluded that this thesis did meet its objectives hence the study is accomplished.

However, there were still ideas that could be considered for further research. For example, the case company is a multinational with employees from different nationalities. In as much as the new model champions group work, the impact of cultures from these nationalities on the model could be studied. For instance, there are cultures where people prefer to work alone and therefore readjusting to this new model could affect their performance. Secondly, it would be fascinating to test this model on other technical and non-technical teams to test its validity in cross functional teams.

7.3.2   Reliability and Validity

As outlined in section 2.4, this thesis adhered to several procedures in order to improve its validity and reliability. To ensure validity, there was first and foremost a detailed plan for data collection and analysis which was followed as best as possible. Secondly, during the research, the case company key stakeholders were being consulted with on a regular basis to update them on the progress of the research, seek their feedback as well as suggestions for the proposal to ensure it was a true reflection of what they had hoped for. Interviews were also used as a data source where at all times, the summaries were sent back to the participants to verify that it is a reflection of their opinion and were allowed to make amendments whenever they felt something was amiss. Reliability was enhanced by utilizing different sources of data such as interviews, surveys and the case company internal case tracking tool. The study also made use of only well-grounded literature sources to develop a conceptual framework for the study.

In the end, the reliability and validity of the study was strengthened more when the final proposal was presented in a workshop for the whole team that consisted of managers and engineers to further seek validation and other improvement ideas and avoid probable bias. The proposal got a positive feedback and was approved by the project sponsor for piloting which was a final proof that they considered it valid and reliable.

However, there were a few shortcomings that were considered. Due to time constraints, it was not possible to validate the proposal with other similar teams within the case company like developers or product launch teams. There was also the initial challenge of lack of interest to participate in the interview. This situation was however improved in the final validation stage where everyone participated in the workshop and was offered the opportunity to challenge the outcome of the study.

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APPENDIX

List of interview questions

Focus	Questions	Field notes
LEARNING AND KNOWLEDGE SHARING	1. As a follow up to the recently conducted learning organization survey, how does the current Knowledge Sharing process directly affect your work? 2. Does this current Knowledge Sharing process sufficiently support your work?	
BARRIERS	3. What do you think are the challenges facing the current knowledge transfer and sharing process in TAC? 4. According to you, what are the possible causes of the challenges mentioned above?	
IMPROVEMENT SUGGESTIONS	5. What improvement suggestions would you give for these challenges? 6. In proposing a new model, what opinions would you give to make it effective?	