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Developing a Conceptual Framework for IT Business Knowledge Management and Organizational Learning Systems

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ABSTRACT:
In the dynamic and competitive environment of the Information Technology (IT) business field, effective knowledge management (KM) and organizational learning (OL) are critical for achieving success in a competitive market. This thesis explores the integration of KM and OL to enhance organizational performance through improved knowledge sharing and learning processes. The primary research question addressed is: How can IT business KM and OL be integrated effectively? It is evident from literature review that organizations can have competitive advantages by the practice of knowledge creation and utilization. The assets from organizations' knowledge can be converted into learning modules to become more efficient and growth of employees over time within organizations' context. To answer research question, the study defined three objectives: (1) Investigate existing KM, OL, and integrated system practices within IT firms to understand their effectiveness and areas for improvement; (2) Identify barriers to knowledge sharing and learning in IT firms; and (3) Develop a conceptual framework integrating KM with OL System.

Employing a mixed-methods research design, a survey was designed for the study that combines quantitative questions with qualitative open-ended questions to gather data in different perspectives from IT professionals. The quantitative component analyzes variables related to KM and OL practices, while the qualitative component provides deeper insights into the recommendations and challenges that can be solved in the integrated system.

The findings of the study show that while many IT firms have established KM and OL practices, significant barriers, such as learning cultural resistance, lack of time, inadequate training, inconsistent process and technological limitations, hinder effective integration. The developed framework emphasizes a systematic approach, integrating KM and OL systems, that improve communication, provide technology infrastructure, and centralized database management system. This framework objective is to make better decision-making, promote effective learning, utilize innovation, and enhance overall organizational efficiency.

This research contributes to the existing knowledge Management System (KMS) by providing empirical evidence on the integration of KM and OL in IT firms, and offers practical recommendations for overcoming barriers, by presenting a comprehensive framework that can be adapted by IT firms to optimize their KM and OL Systems. The study's implications and recommendations provide valuable insights for practitioners and set a foundation for future research.

KEYWORDS:
Conceptual Framework, IT Business, Knowledge Management, Organizational Learning System.

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Vaasa, 17/12/2024

Md Sakib Al Emran

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SYMBOLS AND ABBREVIATIONS

KM	Knowledge Management
KMS	Knowledge Management System
OL	Organizational Learning
OLS	Organizational Learning System
SM	System Management
IT	Information Technology

1 Introduction

Knowledge Management (KM) enhances organizational performance by assisting organizations in storing and utilizing resources that benefit employees and enable maximum effective use (King, 2009). Nonaka and Takeuchi (1995) stated that Japanese companies' success can be attributed to their "organizational knowledge creation" skill rather than their facilities for manufacturing, availability of cheap financing, and cooperative relationships with suppliers, clients, government agencies, or other partners, though these factors are also significant. It is evident that knowledge creation, utilization and regular updating helps organizations from a diverse perspective. The focus of the study is to investigate the KM area, integrating with Organization Learning (OL) as a System that can help organizations to maximize efficiency.

In the Information Technology (IT) field, focusing on KM and OL is an important factor as technological evolution is happening all the time. To maintain competitive advantages organization organizations should practice KM and OL environments. This practice has a great impact on organizations such as ability to manage more efficiently and convert Organization Knowledge into asset. This thesis study focuses on KM and OL to create different two systems and integrating them together to make the best use of it. The title of the thesis is, “Developing a conceptual framework for IT business KM and OL Systems”. The conceptual word refers to the creation of architecture design of the System. This thesis first investigated the current practices through literature review and survey, and later analyzed the current practices and recommendations data collected from IT professionals.

1.1 Background and Purpose of the Study

IT sector companies are at the front of innovation and rapid changes with time among other business fields. The dynamic nature of the IT field demands continuous learning and adaptation. KM can help organizations to sustain in the market for a longer period, and it involves processes such as storing, distributing and using it as organizational

knowledge. The Knowledge Management System (KMS) includes strategies to identify, create, present and distribute for reuse. Organizational Learning System (OLS) utilizes the knowledge company must convert into different learning module to train employees for specific project for making better decision and managing efficiently by learning from own company data. Every organization has different focuses depending on the services they are providing in the market. The KM and OL System varies with organization requirements, and the company can have a unique effective system.

At this stage KM and OL implementation is not something to practice theoretically; rather focusing on it and making the best use of it by further research and development to sustain in the market. By integrating these two important elements, it ensures that knowledge is not accumulated, can be utilized to promote innovation, improve performance and maintain market competitive advantage. The purpose of the study is to investigate existing KM and OL practices within IT firms and identify barriers to their integration with data analyses. Finally, the study develops a framework that connects KM and OL together, to have a systematic approach for a stable and dynamic system.

1.2 Research Question

The research question is focusing on the central part of the research, which is how can an IT business KM and OL be integrated effectively? The research question guides to identify the mechanisms, strategies and practices that can be applied to enhance the utilization of KM and OL of IT organizations. The research question also guides to divide the KM and OL practices into different parts, observed, combined and recommended for improvement. By addressing the research question, the study aims to find important insights and practical recommendations for IT firms to the KM and OL Systems within organizations.

1.3 Objectives

To address the research question, three research objectives are designed. These objectives are chosen carefully to investigate from different perspectives and connect them to develop a dynamic framework by integrating KM and OL within IT firms. The research objectives are as follows:

- RO1: Investigate existing KM, OL and integrated system practices within IT firms to understand their effectiveness and areas for improvement
- RO2: Identify barriers to knowledge sharing and learning in IT firms
- RO3: Develop a conceptual framework integrating knowledge management with organizational learning in IT firms

The objectives are designed for a clear roadmap of the research, so that they guide the investigation in the right direction.

1.4 Research Method

The study used a mixed method research approach, combining both quantitative and qualitative analysis to achieve a detailed understanding of the research problem. The data is collected from IT professionals; thus, it is appropriate for solving the research problem. Both quantitative and qualitative data were collected using a survey and 94 participants responded. Statistical analyses are used for analyzing quantitative data and thematic analysis for analyzing the qualitative data. The quantitative part involves the current practices and the barriers to KM and OL Systems. The qualitative component involves the recommendations for improvement and the challenges that need to be addressed for integrating the KM and OL Systems.

Data analysis involved the use of statistical techniques to show the Demographics of the participants of the survey, Comparative Analysis based on different demographics, Correlation Analysis to identify the relation among variable; thematic analysis to identify the key themes from the open-ended questionnaire data of the survey. The mixed method

helped the study to address the research problem from different angles and provided a comprehensive understanding of the integration of KM and OL. This research method successfully guided to developing a framework for recommendations to IT firms.

1.5 Limitations of the Study

It is important to acknowledge certain limitations depending on the different factors. The first limitation of the study is the focus on IT firms only. Thus, the study focuses on a specific field and the findings are not generalizable to other industries. The second limitation is that the reliance on self-reported data from surveys may introduce bias, as respondents may not accurately recall their experiences. The third limitation is the sample size because of the timeline of the thesis. A bigger dataset can lead to different results. Fourth, this study captures the current trends, which may have an impact on the further development of the IT industry. The detailed limitations have been included in the Methodology section of the thesis as it has relation with data analysis to understand it better.

Although there are few limitations, the study provided valuable insight into the integration of KM and OL with IT companies and finally recommended a dynamic framework that helps to achieve sustainable goals for organizations.

1.6 Thesis Timelines

The thesis timelines are presented in the tabular format in Table 1 showing required time to complete all the steps.

Description	Start	End
1. Master's thesis proposal and creating Research Plan	15th February, 2024	28th March, 2024
2. Master's thesis plan presentation on the University	12th April	---
3. Literature Review	20th April, 2024	28th May, 2024
4. Topic Approval	April, 2024	---
5. Methodology Design	1st June, 2024	15th June, 2024
6. Survey Design, Modifications based on feedback and finalization	16th June, 2024	12th July, 2024
7. Data Collection	15th July, 2024	1st October, 2024
8. Data Analyses	5th October 2024	28th October, 2024
9. Writing Results and Conclusion	4th November 2024	28th December 2024

10. Presenting Research at the University	30th December 2024	---
11. Submitting Thesis in Osuva	31st December 2024	---

Table 1 Thesis Timelines

The study followed the timelines shown in Table 1 for the completion of the study.

1.7 Thesis Structure

The structure of this thesis is designed to guide the readers for the comprehensive exploration of integrating KM and OL systems together with IT companies. The chapter is designed in way that it has connections with previous chapter, which created a cohesive narrative. This study is divided into five main chapters and other necessary parts that support the research and add value to it. Each section has its own importance and contribution to this study.

Chapter 1: Introduction

The Introduction chapter presents a brief overview of the thesis. First it starts with presenting a brief background, that indicates the importance and significance of the study. Later it discusses the aim and purpose of the study. These lead to formulation of research question and objectives to answer the research question. The research design and methodology are explained. The following parts presented the primary limitations of the study and an overview of the thesis structure.

Chapter 2: Literature Review

The Literature Review chapter provides a detailed review of existing literature on KM, OL, and their integration based on published papers, books and other important

resources. This chapter is divided into several parts, starting with the KM concepts, followed by a discussion on OL concepts. The later part reviews the integration of KM and OL that highlights the existing concepts, strategies, and methods. The final part of the chapter is System Design and Management (SDM) that delves into the specific example of IT project that includes different stages of the project. SDM is divided into the subtopics which are related to this project and review each component of SDM to understand a technical aspect of the KM and OL Systems.

Chapter 3: Methodology

The Methodology chapter explains the research design that utilizes both quantitative and qualitative components. This chapter describes the participants of the study, data collection method, and the analyses process. The ethical considerations are discussed in this chapter elaborately to maintain the research standards. The following section discusses the reliability and validity of the study that helps to develop the framework that aligns with the study and fulfills the requirements. Finally, the limitations are revised and presented in detail by mentioning the key limitations of the study that offers a critical perspective on the research design and execution.

Chapter 4: Results

The Result chapter is the main chapter where findings are presented in a structured manner. The chapter begins with demographics analysis, that examines the variables of participants' such as job role, experience levels, organizations size, and work setting. A comparative analysis later describes to assess the current KM and OL practices, key barriers and the existing KM and OL integrated Systems. Correlation analysis follows the sequence, and it shows the importance of relation among variables. In the respective sequence this chapter includes thematic analysis to identify the main themes. The final part of this chapter is the framework development, that integrates all the analyses together and suggests a framework that offers a solution to current issues.

Chapter 5: Conclusions

The Conclusion chapter presents an overview of the findings and discusses the implications for practice. First it summarizes the key findings and highlights the contributions of the findings for better KM and OL Systems. Later the chapter presents the barriers of the system found from this study. This chapter also indicates the contribution of knowledge for organizations, emphasizes the insights and framework that developed through this research. Practical implications present the recommendations for IT organizations aim to integrate KM and OL efficiently. Finally, this chapter concluded with the recommendation for future research and final words on the research and its significance.

References:

The Reference section includes all the sources, cited throughout the study, that provide a comprehensive list of bibliography that follow the academic standards practice. It also serves as a resource for readers who are interested in further exploring the topic discussed in this thesis work. The reference list follows the university guidelines and the research norms.

Appendices:

The Appendices include supplementary material that supports the research. Appendix 1 contains the master's Thesis Survey Questionnaire, that was used to collect data from IT professionals. Appendix 2 includes the Informed Consent document that was used for the survey to inform the research policies and procedures that ensure transparency and validate the ethical practice of this research.

This structured approach ensures a logical flow of information, guiding the reader through the research process and findings in a coherent and systematic manner.

2 Literature Review

This thesis's literature review reviews the importance of Knowledge Management (KM), Organizational Learning (OL), Integration of KM and OL, and System Design and Management (SDM). KM and OL components are interrelated, to form a robust framework for IT business, KM and OL Systems need to be addressed on a literature basis. This study considered SDM as an example of an approach for developing a framework.

2.1 Knowledge Management (KM)

According to King (2009), knowledge is a "justified personal belief," that highlights its subjective and dynamic characteristics, focusing that knowledge is not a fixed thing but a dynamic and developing idea that people and organizations actively cultivate and control. Many initiatives have concentrated on increasing the development, acquisition, and sharing of knowledge to boost its use cases and productivity. Organizations should establish a system that facilitates the oriented collection, circulation, and use of information to focus on innovation and continuous improvement (King, 2009).

KM's significance is critical. Due to human cognitive power limitations, organizations often have difficulties maximizing the usefulness of large-scale data they produce. KM solves this difficulty by implementing solutions that assist companies in collecting, classifying, and using the huge data they generate from their operations. Effective KM enables them to overcome cognitive limitations and ensure the storage and availability of important insights for strategic planning and decision-making. KM includes several activities such as data generation, acquisition, enhancement, archiving, sharing, and application-level support. By concentrating on these elements, KM creates the opportunity for the conversion of raw data into meaningful insights, thus increasing an organization’s innovative capabilities and preserving its competitive advantage in a rapidly changing market (King, 2009).

Organizations in general recognize KM as a crucial component for achieving success. The strategic use of KM may provide significant benefits, enhancing an organization's ability to sustain in the dynamic market. Using KM, management can improve the way they prepare for market risks, build new products and services, and effectively acquire new markets. Moreover, KM facilitates the transformation and effective use of organizational resources, ensuring long-term sustainability and growth. This thorough method of KM improves organizational efficiency and allows organizations to capitalize on new opportunities, thus reinforcing their market position (Ghasemi & Gholami, 2016).

Modifying KM to correspond with the organization's distinct attributes and areas of expertise is essential for its effectiveness. To conduct KM activities, organizations must recognize the requirements and operational complexities of different types of organizations and industries. A single KM technique may not be enough for the desired results. Organizations want to use customized KM strategies that correspond with their distinct characteristics and operational needs. This ensures that KM procedures are relevant and well-integrated into the organizational framework enhancing their effectiveness and impact (Ghasemi & Gholami, 2016).

The current and future success of organizations increasingly depends on effective KM strategies, which exceed conventional dependence on monetary and physical resources. KM provides managers with the strategic perspective necessary to achieve corporate objectives and offer service expansion, by creating value for customers. A well-implemented Knowledge Management System (KMS) improves information gathering across several domains, enabling businesses to tackle complex problems with a comprehensive, sophisticated approach. This method encourages a culture of strategic risk-taking, supported by insights from research, marketing, product development, and production. Consequently, KM is a crucial component of organizational strategy, promoting innovation, efficiency, and sustainable competitive advantage (Ghasemi & Gholami, 2016).

Knowledge is an essential resource for businesses and individuals seeking competitive advantages in the market. Nonaka and Takeuchi (1995) categorized knowledge into two types: Explicit and Tacit. Explicit knowledge engages formalization, frequently transforming into documents and databases. With less effort, organizations can efficiently convey and distribute it. Tacit knowledge is based on individual experiences and skills in nature. Though it is complex to cultivate and circulate tacit knowledge but important for promoting innovation and creativity within the company. For an efficient KM plan or strategy, the collaboration of these two types of information is essential (Sucahyo et al., 2016).

To strengthen the accuracy and efficiency technology is crucial currently for enhancing KM procedures, significantly influencing innovation. Information and Communication Technology (ICT) developments have transformed remarkably the processes of information production, collection, storage, and distribution within organizations. Technological improvements and innovations such as Artificial Intelligence (AI), Machine Learning (ML), and Big Data Analytics (BDA) created the opportunity to effectively tackle huge amounts of data and find important insights that promote innovation. By using advanced technology, organizations can utilize it for better KM processes and that can help for better decision-making, problem-solving, and the development of creative products and services. Technology offers the organization for KM and at the same time improves their performance and market competitiveness (Sucahyo et al., 2016).

Furthermore, Mohammadi et al. (2018) emphasize more relevant and necessary information according to the company's needs and objectives; to achieve success this is crucial to motivate employees. KM makes sure that the strategic acquisition, organization, and distribution of information for employees possess the necessary information for performing their tasks and aligning with organizational objectives. The access to organized and pertinent data facilitates decision-making and increases efficiency, and the organizations' overall performance. Consequently, KM functions as an essential guide, aligning individual support with broader corporate goals.

KM operates on two distinct types: raw data and refined data. The first type consists of raw data, which includes numerical values, calculations, and attributes in text or in other formats, which are the essential elements of KM. This raw or unprocessed data is essential, although it often lacks context and meaning itself. The second type involves transforming raw data into information by refining and modifying it to meet the organization's specific needs. An organized display of this collected information improves its accessibility and helps in decision-making processes. KM creates the opportunity to ensure relevant and practical data that aligns with the organization's strategic objectives by converting raw data into useful insights (Mohammadi et al., 2018).

KM is characterized as the capital for organizations, representing the most sustainable resource for long-term growth and advancement. In comparison with financial or physical assets, knowledge capital never diminishes with time rather increases its worth as it distributes and operates inside the business. If an organization views KM as an essential asset, it can continually improve its capabilities, innovate, and adapt to changing markets. This sustainable management of resource approach escalates the importance of KM in promoting a culture of continuous improvement, by ensuring the organization's durability and success (Mohammadi et al., 2018).

2.2 Organizational Learning (OL)

OL is characterized as a dynamic process that requires iterative knowledge exchanges at different levels, including people and groups, which eventually influence the company (Crossan et al., 1999). The dynamic nature of OL serves as an important element in their influence on performance implementation. Sucahyo et al. (2016) conducted research indicating that proficient techniques enhance OL capacities, thereby promoting employee growth and organizational sustainability. By cultivating an atmosphere of regular knowledge acquisition, processing, and application, organizations may obtain enduring improvement and maintain long-term competitiveness.

Văcărescu-Hobeanu (2018) defines five essential components of OL: structure, information (acquisition, sharing, and retention), human resource practices, organizational culture, and leadership. These characteristics provide a detailed foundation for executing OL procedures inside organizations. A systematic method for gathering, distributing, and storing knowledge is crucial for promoting a culture of continuous learning. Effective human resource practices, a supportive corporate culture, and robust leadership are essential for maintaining OL practices. Organizations should be adaptive and capable of identifying and correcting faults to effectively deploy OL procedures. This flexibility enables businesses to respond proactively to changes, preserve resilience, and attain continuous development and innovation. Therefore, the integration of OL processes is essential for entities seeking to prosper in dynamic and complex systems.

On the other hand, Walczak (2008) claims that OL plays an essential role in multinational organizations, especially considering the variety of cultural environments in which they function. Integrating cultural aspects into OL models greatly improves their effectiveness and relevance across diverse geographies. Cultural aspects enable international organizations to customize their training programs to correspond with local cultures, beliefs, and business practices, thereby fostering a more inclusive and adaptive working culture. This alignment improves the success of OL activities and promotes employee engagement and collaboration, as employees recognize respect and comprehension within their cultural practices.

It is important to regularly update and apply the necessary changes regarding the cultural influences for maximizing the advantages of OL in global contexts. To more effectively correspond with the distinct requirements in different locations, multinational organizations may modify their OL models to attain their strategic objectives with higher efficiency. This approach has flexibility that ensures learning and development initiatives are consistent worldwide while being also relevant to local contexts, tackling issues and possibilities within each cultural aspect. To secure long-term success in a globally diverse

market including cultural elements in OL models allows multinational organizations to sustain competitiveness and promote innovation (Walczak, 2008).

Nowadays, it is obvious that organizations experience continuous change that requires continuous learning and adaptation to sustain competitiveness. Exchanging knowledge offers to sustain the ecosystem of the emerging dynamics market by adapting OL within the organization. A comprehensive approach to learning and development requires companies to see it as a system and work on it. The idea of OL came with the evolution and rise of modern management theories, highlighting its fundamental significance in current organizational operations. Seeing an organization as a system of collective factors focuses on the need for synchronizing individual and collective learning processes to achieve organizational success stated by Fitriastuti et al. (2019).

2.3 Integration of KM and OL

Fitriastuti et al. (2019) describe that KM and OL Systems have a significant impact on an organization's ability to achieve its goals. Through prioritizing KM and OL Systems, organizations can offer a culture of continuous improvement and innovation. The usefulness of KM and OL System approaches in sustainable organizational competitiveness is enhanced by their adaptation to changes and new opportunities. The integration of KM and OL Systems for organizations to plan their strategies is highlighted as critical for improving performance and attaining strategic goals. The study of KM and OL Systems has raised concerns and presents opportunities for further research.

Additionally, Fitriastuti et al. (2019) state to improve the generalizability and applicability of research findings a comprehensive strategy can be a solution which may include multiple industries, multiple regions, and global contexts. They mention thorough interview techniques to understand the implications of KM and OL Systems methodologies. In different organizational settings, the operational dynamics of these systems can be better understood through the application of different methodologies (Fitriastuti et al., 2019). The KM and OL Systems have challenges and opportunities shown in their analysis of

academic work. Several experts mention their opinions on the relationship between KM and OL, which directly influences productivity and creativity. The relationship proves that improving one aspect can be affected positively by another, resulting in overall gains in organizational capabilities. Thus, the integration of KM and OL is crucial for using information to promote performance and development.

On the other hand, Walczak (2008) states the importance of more extensive investigations of KM and OL in a variety of cultural environments. According to him, the integration of cultural factors into research is crucial for a better understanding of KM and OL methodologies. Researchers can identify weak points in existing KM practices through comparative evaluations across many cultures and economic growth. This comparative analysis may reveal specific challenges and issues that may not be evident within a unique cultural or economic framework. These results may later inform the refinement of theoretical frameworks, increasing their relevance and effectiveness in cultural contexts (Walczak, 2008).

Sucahyo et al. (2016) mention the critical role of KM in OL and claim that the adoption of KM techniques by organizations and individuals has a greater impact on learning capabilities. In the present dynamic corporate environment, where continuous learning and adaptation are crucial for maintaining a competitive trend, KM technique adoption is particularly important. Organizations need to promote a culture of continuous growth and innovation through effective KM, that ultimately enhances their overall performance and market competitiveness.

King (2009) points out the relationship between OL and KM, highlighting that they are distinct but interrelated concepts in organizational growth. Easterby-Smith and Lyles (2003) assert that OL prioritizes the processes of generating, acquiring, processing, and using knowledge within an organization. Conversely, KM emphasizes the essence of knowledge—its preservation, accessibility, and distribution. KM selects and manages the knowledge that OL pragmatically executes. The interplay between OL and KM

underscores the need to not only gather valuable knowledge but also effectively use it to promote continuous development and innovation within organizations.

KM's primary goal is to facilitate OL, allowing organizations to gain sustainable improvement through the effective use of their collective knowledge. OL is essential in cultivating a culture of continuous growth as it uses information to refine processes, augment decision-making, and stimulate innovation. By incorporating OL into their strategic framework, organizations may create a sustainable competitive advantage, adapt to changing environments, and achieve success in the long term. Continuous learning and adaptation are crucial for maintaining relevance and effectiveness in an ever-evolving organizational prospect. The incorporation of effective KM techniques, with a significant focus on OL, is crucial for achieving development and improvement in the organization (King, 2009).

In their research, Sucahyo et al. (2016) investigate the adaptation of KM at individual and organizational levels to examine its impact on OL. They found from their study that to improve OL, KM methods are critical, which have a direct influence on organizational performance. Sucahyo et al. (2016), mentioning Argote and Miron-Spektor (2011), state that organizational performance has a significant influence on the systematic acquisition and use of knowledge derived from experiences associated with organizational processes. To achieve organizational long-term success, it is required an interaction between KM and OL that can significantly use the information and help gain the experience in optimum time.

2.4 System Design and Management (SDM)

Incorporating SDM into the discussion on KM and OL is vital as it offers a systematic framework for understanding the successful implementation and sustainability over time within an organization. SDM includes the whole lifespan of a system, from its starting to closing stages. This lifecycle view is crucial as it ensures that KM and OL efforts are not only efficiently developed and implemented but also consistently monitored, assessed, and improved over time. By examining the complete process, IT businesses may

more effectively align their KM and OL strategies with their overall objectives, ensuring that information is gathered, distributed, and used properly throughout the system's lifecycle. This approach facilitates the early identification of possible issues, adaptation to changes, and the preservation of the relevance and efficacy of KM and OL processes within a dynamic organizational context.

To effectively develop, execute, optimize, and maintain a system requires efficient SDM that aligns with company objectives. The integration of KM and OL Systems with SDM methods improves the effectiveness and flexibility of IT business operations through continuous improvement and informed decision-making. This collaboration cultivates a culture of creativity and resilience inside the company (Nonaka & Takeuchi, 1995).

This section reviews the relevant literature on the subtopics of Starting the System, System Implementation and Optimization, System Operations, and Ending the System stages of an SDM. Figure 1 presented below visualizes all the steps in SDM and the connection between them. Each category can be defined as a sub repository and all the processes can be defined as a cluster of SDM. The keywords of repositories and clusters have been used in the generalized version of the framework development.

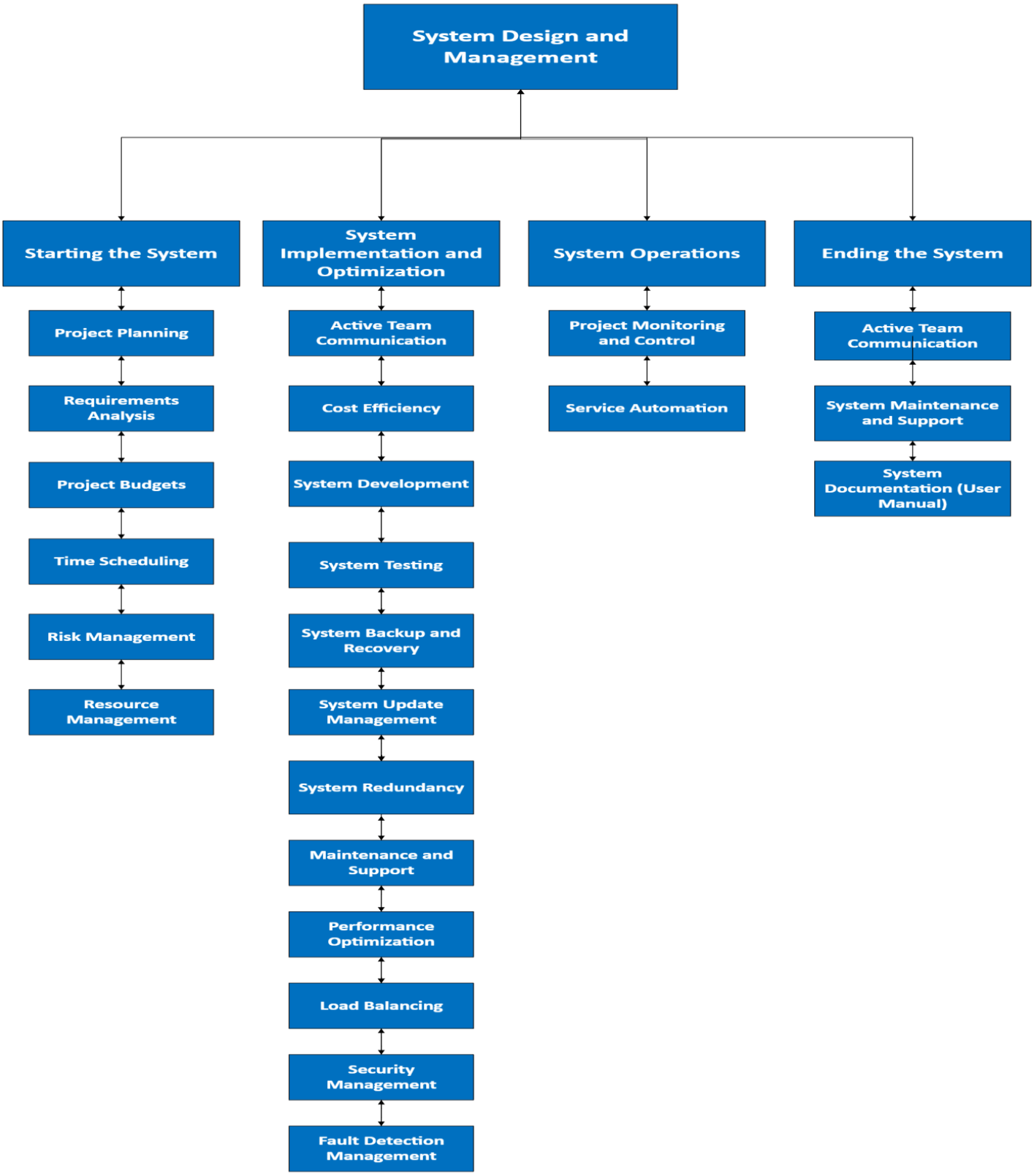

Figure 1. SDM Clusters

2.4.1 Starting the System

Efficient IT System Operation is critical for the success of companies. This section examines the different stages associated with starting the SDM, emphasizing Project Planning, Requirements Analysis, Project Budgets, Time Scheduling, Risk Management, and Resource Management.

2.4.1.1 Project Planning

Project planning, the first stage in SDM, establishes the foundation for all ensuing actions. This phase involves defining the project scope, goals, deliverables, and milestones. A well-defined project plan assures that every stakeholder holds an identical knowledge of the project's objectives and the methodologies for achieving success (Irfan et al., 2021). Effective project planning includes the identification of Key Performance Indicators (KPIs) to assess progress and success.

In the field of IT business, project planning must incorporate information Databases, Collaborative Tools, and Learning Management Systems (LMS). Planning for such systems necessitates aligning the technology infrastructure with the company's strategic objectives (Irfan et al., 2021). This connection ensures that KM activities strengthen and improve corporate learning processes.

2.4.1.2 Requirement Analysis

Requirement analysis is a critical step in SDM, including the identification and documentation of end-users' specific requirements and functions. Sommerville (2011) emphasizes that detailed requirements analysis is a must for creating systems that fulfill user expectations and function as designed. Methods like interviews, questionnaires, workshops, prototype investigation and definition are often used to collect requirements from stakeholders.

In IT business, requirement analysis must concentrate on recognizing knowledge processes, user roles, and the groups of knowledge to be managed. Davenport and Prusak (1998) propose that a comprehensive investigation of knowledge requires support in the development of systems that enhance efficient knowledge collection, archive, and retrieval. Moreover, including user input at this phase might result in better user-centric and efficient systems and prototype case fall studies.

2.4.1.3 Project Budget

Project budgeting involves assessing the financial resources necessary to accomplish the project within the specified scope and timeline. PMI (2017) emphasizes that detailed budgeting is crucial for project success, as it ensures the allocation of enough resources for all project activities. The budget must include expenses associated with staff, technology, training, reserves for emergencies or uncertainty, and documentation.

In the implementation of an IT business KMS, budgeting must include expenses related to the licensing of software, hardware, integration services, and continuous maintenance, depending on the specific need. Nonaka and Takeuchi (1995) highlight the significance of making investments in technologies which promote knowledge development and distribution. Furthermore, allocating funds for training programs is essential to guarantee that employees are competent at using the new technologies, thus optimizing their advantages.

2.4.1.4 Time Scheduling

Time scheduling involves the planning and management of the project timetable to ensure that all tasks are accomplished within the expected timeframe. Lock (2020) states that efficient time scheduling involves developing a comprehensive project timeline, recognizing dependencies, and distributing resources to activities or tasks. Instruments like Gantt charts and critical path analysis are often used to illustrate and monitor timetables for projects.

In IT business KMS time scheduling must account for time needed for system design, development, testing, deployment, and maintenance. It is essential to consider the time required for user instruction and system integration. Alavi and Leidner (2001) emphasize that precise scheduling helps in regulating stakeholder expectations and minimizing project delays and losses.

2.4.1.5 Risk Management

Risk management involves the recognition, evaluation, and mitigation of risks that might impact the project's success. According to Kerzner (2009), risk mitigation is a proactive strategy for predicting and mitigating possible problems before their progression. Risk recognition, risk evaluation, risk response formulation, and risk control and monitoring are the procedures of risk management.

KMS of IT organizations can guide risk management which includes technological challenges, data security vulnerabilities, and human resistance to change. Davenport and Prusak (1998) suggest that a comprehensive risk analysis can identify potential risks and formulate solutions for their mitigation. This should include the implementation of strict security protocols, comprehensive training, and a culture of continuous development.

2.4.1.6 Resource Management

Resource management deals with the planning, allocation, and monitoring of the resources necessary for project completion. According to PMI (2017), resource management offers the accessibility of appropriate resources at the optimum point, therefore enhancing project performance. Resources of a project may include persons, technology, and materials.

Resource management should prioritize the availability of competent workers for the development and maintenance of the system with the support of KMS. Nonaka and

Takeuchi (1995) point out the significance of using both internal and external knowledge to expand the system's capabilities. Finally, KM and OL should ensure the establishment of the necessary technology infrastructure to facilitate resource management.

2.4.2 System Implementation and Optimization

Implementation and optimization of systems are crucial phases in the life cycle of IT business KM and OL systems. This section examines the essential components of effective implementation and optimization, emphasizing Cost Efficiency, System Backup and Updates Management, System Testing, Active Team Communication, Redundancy for Interruption Services, Maintenance and Support, Performance Optimization, Load Balancing, Security Management, Fault Detection Management, and System Backup and Recovery.

2.4.2.1 Active Team Communication

Strong team communication is a must to operate and develop IT systems successfully. Effective communication ensures that team members stay connected and updated, and can collaborate productively. DeMarco and Lister (1999) mention that communication failures may result in misconceptions, project delays, and poorer outcomes. Tools including project management software, instant messaging systems, and collaborative workspaces enhance efficient interaction among team members (Kerzner, 2009). Consistent meetings and updates ensure that all stakeholders are informed and updated on project progress and any arising challenges.

2.4.2.2 Cost Efficiency

Cost efficiency is an essential factor of IT system services. It requires maximizing the return on investment while reducing costs. Boehm (1981) says that cost-effective system development and deployment need a precise approach and allocation of resources. Establishing KMS often requires substantial upfront expenditures on technology and training; however, these expenses may be mitigated by the enduring advantages of enhanced sharing of KM and OL (Davenport & Prusak, 1998).

Strategies for obtaining cost efficiency include using open-source software, employing cloud-based solutions to minimize infrastructure expenses, and embracing agile development approaches to improve flexibility and reduce waste (Schwaber & Beedle, 2002). Moreover, cost-benefit analysis may help in identifying areas where investments will provide the highest returns.

2.4.2.3 System Development

The development of the system, based on detailed requirements and planned strategy, is a significant phase of the life cycle of the IT Systems for business KMS and OLS. Several critical stages need to be taken care of while developing it, which contributes to the system's general success and sustainability (Sommerville, 2011). Agile methodologies such as Scrum and Kanban are frequently used to ensure flexibility, uninterrupted services, and iterative improvement, which makes the development method more adaptable to changing demands (Schwaber & Beedle, 2002). To ensure seamless functioning and relevance, it is necessary to integrate the framework already in place and to adapt it so that it meets the precise business requirements (Boehm, 1981).

All documentation is essential to help both users and developers to work together to ensure the success and sustainable maintenance of the system (Kerzner, 2009). The User Manual, and the Technical Specifications, which provide valuable support throughout the life cycle of the product, are included here. In addition, close cooperation with the framework is necessary to ensure consistency with organization objectives and client needs during the development phase. Periodic updates and iterative improvements, guided by client feedback, help to improve the framework and enhance its system’s functionality. Companies can build robust, efficient, and user-friendly systems that contribute to their management and corporate learning opportunity.

2.4.2.4 System Testing

System testing is the assessment of a system's operation, efficiency, and security before its deployment. Sommerville (2011) emphasizes the need for extensive evaluation to identify and solve problems, ensuring that the system fulfils customer requirements and operates reliably in different environments.

Businesses require functional testing to verify functioning, performance testing to evaluate responsiveness under load, and security testing to detect possible vulnerabilities (Myers et al., 2012). User Acceptance Testing (UAT) is also essential as it involves end-users in the assessment process to confirm that the system fulfills their requirements and expectations.

2.4.2.5 System Backup and Recovery

System backup and recovery are vital to ensuring accessibility to data and continuous operation. Regular backups prevent data loss due to hardware malfunctions, cyberattacks, or human mistakes, while recovery plans assure the prompt recovery of systems to their prior functionality (Chapple & Seidl, 2023). In KMS, efficient backup and recovery procedures are crucial for safeguarding important business data and reducing downtime. Methods like incremental backups, offsite storage, and disaster recovery strategies enhance the security of information (Rittinghouse & Ransome, 2009).

2.4.2.6 System Update Management

To maintain organizational integrity and stability, effective management of system update is essential. Update solutions are essential to keep the users updated and improve the security of users to protect from cyberattacks, also regular updates are necessary to maintain and improve organizational performance (Chapple & Seidl, 2023). It is important to maintain appropriate approach of updating in KMS to safeguard important corporate factors.

Automated update management system ensures the obligatory role that software components are regularly updated and upgraded, thus reducing vulnerabilities and improving system performance. These systems can simplify the updating process, ensuring that all crucial security measures are used for promoting the overall performance and safety of the Framework of KM and OL Systems.

2.4.2.7 System Redundancy

Redundancy is an essential component of system architecture, intended for ensuring service continuation in the occurrence of faults or errors. Redundant systems offer backup components that control after hardware or software failures, thereby reducing downtime and service disruptions (Tanenbaum & Van Steen, 2007). Redundancy can be accomplished by KMS which includes methods such as data replication, backup clusters, and distributed systems. This accessibility of information repositories ensures the continuation of OL events through proper investigation.

2.4.2.8 Maintenance and Support

Regular maintenance and support are necessary for making sure the operating efficiency and reliability of IT systems. Maintenance adds regular executions like software updates, hardware servicing or replacement, and performance monitoring, while support involves solving user issues and finding solutions for smooth service (Chapin, 2000). Effective maintenance and support solutions offer a proactive monitoring system to identify and solve problems in advance of the process, personnel support regular training, and the development of specific Service-Level Agreements (SLAs) to regulate customer requirements (Bon et al., 2007).

2.4.2.9 Performance Optimization

Performance optimization is for improving the productivity and reliability of IT systems. Hennessy (2012) says that performance optimization has processes for improving system components, improving code, as well as improving resource allocation to get better

results. Performance optimization through KMS ensures optimum quick access to and retrieval of information, hence boosting decision-making and productivity. Methods such as indexing, caching, and load balancing to improve system efficiency (Elmasri & Navathe, 2011).

2.4.2.10 Load Balancing

Load balancing is a method of distributing system weights across several computer resources to prevent any one component from being saturated in the tech field and it can be different according to the company's services. This technique improves the overall reliability of the system, availability, and performance (Tanenbaum & Van Steen, 2007). The load balancing process can be supported through KMS to ensure the handling of large-scale data access and user requests, maintaining the system's responsiveness and efficiency. Load balancing methods like round-robin, least connections, and IP hash may be used to efficiently distribute loads (F5, 2020).

2.4.2.11 Security Management

Security management is a must for securing any IT systems against attacks and vulnerabilities to follow ethical practices and protect users' privacy. This part of SDM has a series of actions to protect data, prevent unauthorized access, and ensure consistency with regulatory standards (Peltier, 2001). Organizations often include sensitive company data, making security management an essential priority and KMS can be a great guide for it. Strategies include the function of encryption, restricted access, detection of breaches, and periodic security audits to identify and mitigate issues (Whitman & Mattord, 2017).

2.4.2.12 Fault Detection Management

Fault detection management is identifying and repairing system errors and issues to ensure optimum performance. Methods such as real-time monitoring, testing devices, and predictive analytics offer prompt identification of errors and prevent system failures (IEEE, 2008). In KMS, a reliable failure detection system makes sure that the maintenance

of data integrity and enables users to obtain reliable information. Techniques, for example, automated monitoring can alert administrators of possible concerns, and facilitate timely repairs (Broy et al., 2005).

2.4.3 System Operations

Effective system operations are crucial for the continuous accomplishment of SDM. This section emphasizes Project Monitoring and Control, along with Service Automation, as vital parts of system operations.

2.4.3.1 Project Monitoring and Control

Project monitoring and control involves continuous supervision of project operations to ensure follow-through to schedules and achievement of objectives. This procedure incorporates monitoring growth, offering modifications, pragmatic, propagating and executing corrective actions as required. PMI (2017) states that solid monitoring and control are crucial for the early identification of potential issues and for assuring consistency in the project's schedule, budget, and scope. In the field of IT business KMS, Project Monitoring and Control requires regular assessments of system performance, user satisfaction, and the effectiveness of data distribution. Metrics such as system uptime, user access frequency, and data use rates may provide insights into the operational health of the system. Kerzner (2009) emphasizes the need to use project management tools and software for real-time monitoring and reporting.

Moreover, including systems for feedback that allow end-users to report problems and suggest improvements is essential for system improvement and optimization. This iterative method not only ensures system alignment with business goals but also improves user experience.

2.4.3.2 Service Automation

Service automation means the use of technology to execute regular operations and procedures autonomously, hence improving efficiency and consistency. In technologically advanced business KMS, automating improves processes like data input, workflow management, and data updates, enabling human resources to concentrate on more strategic operations (Lacity & Willcocks, 2016). Automation tools, including Robotic Process Automation (RPA) and Artificial Intelligence (AI), may significantly improve the efficiency and accuracy of KM procedures. AI-driven search algorithms can instantly retrieve pertinent data from extensive databases, hence improving the accuracy of information retrieval (Russell et al., 2010). Automated content labelling and classification could improve the company's efficiency and accessibility of data resources.

In addition, service automation can improve system scalability and flexibility. As businesses develop and grow, automated solutions may be readily expanded to manage increasing data quantities and user counts without impacting performance (Brocke & Rosemann, 2010). Such flexibility is essential for maintaining the pertinence and effectiveness of KMS in transforming business environments.

2.4.4 Ending the System

Completing the final stage is essential for ensuring the reliability and persistent success of SDM. This section discusses the significance of Active Team Communication, System Maintenance and Support, and System Documentation in the final step.

2.4.4.1 Active Team Communication

Effective team communication is essential at the final stage of SDM, since it ensures that all contributors have the same understanding of project objectives and responsibilities. Tuckman’s (1965) model of group development highlights the need for excellent communication throughout a project's lifespan, particularly during the ending period. This phase requires rigorous evaluation of accomplishments and insights gained, fostering an

environment of completion among team members. Regular feedback and discussions can encourage the sharing of views on the project, assisting in the finding of best practices and areas for advancement in future projects (Kerzner, 2009). Project Management applications and collaborative tools significantly improve continuous communication, enabling team members to exchange ideas and maintain interactions post-project completion (Crispin & Gregory, 2009).

Finally, the development of communication pathways allows teams to collect insights from stakeholders and users, promoting a culture of continuous growth and learning. Anantatmula (2010) states that open communication channels promote team dynamics and boost user involvement and satisfaction, which are essential for the continuous success of KMS.

2.4.4.2 System Maintenance and Support

System maintenance and support are essential for the reliability and effectiveness of IT business KMS. Routine maintenance tasks, including software upgrades, system patches, and performance monitoring, are crucial for maintaining system functionality and relevance (Chapin, 2000). Burge and Brown (2003) claim that a systematic maintenance strategy is essential for improving system reliability and satisfaction with users. The development of a specialized support team is essential, as it rapidly and effectively resolves user issues thus decreasing downtime and maintaining production (Bon et al., 2007).

Moreover, integrating user input into maintenance and support techniques is crucial for the continuous improvement of the system. Consistently gathering insights on system performance and user experience helps identify possibilities for improvement, ensuring the KMS remains responsive to users' requirements (Davenport & Prusak, 1998). When the project is completed, the focus of the project is to maintain and provide support for the installed system.

2.4.4.3 System Documentation (User Manual)

User guides have an important role in the final phase of SDM. Detailed documentation provides users with essential tools to proficiently navigate. It assures that users learn about the system's features, thus increasing effective utilization and promoting sharing of data (Sommerville, 2011). A detailed user manual must include explicit instructions for system operations, troubleshooting protocols, and best practices for using the system's functions. Anderson (2016) states that good user documentation serves as both a reference tool and a means to improve user experience by reducing uncertainty and stress during system interactions. Access to accurate and comprehensive data enhances user interaction with the system, resulting in boosted OL or individual user learning.

It is necessary to maintain current documentation, since systems often go through changes over time. Frequent reviews and updates of user manuals verify that customers are informed of the most recent features and improvements (Chomal & Saini, 2014). Technical documentation, including system design and configuration specifics, is crucial for IT personnel responsible for continuous maintenance and additional features (Sommerville, 2011). Extensive documentation may function as a key training resource for recruits, enhancing their initial integration experience. Organizations could lower the learning curve linked to new systems and improve overall productivity by offering thorough instructions and resources (Preece et al., 2002).

The integration of KM and OL is essential for efficient SDM. Fundamental concepts from KM theory emphasize the significance of acquiring, distributing, and using information to improve organizational efficiency and creativity. OL theory enhances this by highlighting the mechanisms that organizations use to adapt and grow, gaining knowledge from their experiences and insights. The interaction between KM and OL fosters a dynamic and adaptive approach to system administration, ensuring the routine storage, updating, and utilization of information. This integration is crucial for recognizing and rectifying the research gap in this study, as it underscores the need for a holistic framework that utilizes both KM and OL to enhance system performance. Understanding these theoretical

foundations allow to justify this study's research question more effectively and design a study that thoroughly investigates how integrated KM and OL methods might improve SDM performance.

3 Methodology

This study aims to investigate the existing KM and OL practices within IT firms to understand their effectiveness and areas for improvement, and to identify barriers to knowledge sharing and learning in IT firms. This study conducted a survey, using data analysis results to develop a dynamic sustainable framework for IT business KM and OL Systems. This section provides an overview of the research methodology used, which includes Research Design, Participants, Data Collection Methods, Data Analysis Process, Ethical Considerations, Reliability and Validity, and Limitations of the Study. The following parts will categorize the study's results and investigate their significance for formulating a conceptual framework for IT business KM and OL Systems.

3.1 Research Design

This research used a mixed-methods technique, which includes both qualitative and quantitative methods. The survey approach was chosen to provide a detailed understanding of this study's issues by combining quantitative data with an in-depth analysis of the text. Mixed-methods research offers data triangulation; thus, it can enhance the reliability and validity of the outcomes (Creswell, 2014). The survey questionnaire was divided into demographic, KM, OL, Integration of KM and OL, and Framework sections. KM and OL sections focus on the existing practices and issues that IT professionals face at their workplace. The questionnaire has been attached to Appendix 1 for reference.

3.1.1 Quantitative Component

The quantitative part of this study involves processes such as collecting data through a structured survey using the Likert system and multiple-choice questions and analyzing data quantitatively. The survey questionnaire has 32 questions, which include both closed-ended and open-ended formats. Among 32 questions, 29 questions are related to Likert-scale based questions and multiple-choice types for a quantitative analysis. The closed-ended questions intend to collect quantitative data about numerous aspects of

KM and OL Systems recommendations and issues that can be solved. Quantitative elements are considered more in this study to focus on the recommendations and obstacles as these elements are common in general among employees in different organization levels. This can help to understand different perspectives depending on the organization's size, experience level and so on.

3.1.2 Qualitative Component

The qualitative part of this study involves evaluating responses to the two open-ended questions provided in the survey. The aim of the questions is to gather detailed insights and perspectives from participants, based on their competencies and experiences. The number of responses of two open-ended questions are 31 and 28 respectively, achieving an extensive qualitative data set for thematic analysis. These analysis results have been implemented while developing the framework.

3.2 Participants

This study focuses on IT professional's engagement in KM and OL within their respective organizations. A meaningful sampling technique was adopted to select the respondents, ensuring that they have relevant knowledge and experience in the field, so they can provide the necessary data to address the issues. A total of 94 volunteers participated in this research study, to achieve diverse knowledgeable data (Patton, 2002). The participants are mainly from Finland and Bangladesh, and fewer of them are from different countries which ensures diverse data. To reach the participants, the thesis author utilized professional networks to have a varied and reasonable sample size. All the IT operations are somewhat standardized globally; also collecting reasonable sample size based on different region is challenging; analyzing them separately and comparing is complex in terms of the timeline of the thesis; thus, the focus is on handling data altogether to understand the situations and find issues instead of separating the sample based on locations. Adding locations data can be considered in future research. For privacy concerns, this study ignored the location data of the participants from the survey.

3.3 Data Collection Method

Individuals were contacted through an online questionnaire for data collection. For this study, a structured online survey was designed to collect data. The survey was designed initially following a thorough review of the current literature and had an evaluation to verify its clarity and reliability for this study and then forwarded to three IT professionals for feedback. After receiving feedback from participants, the final version was developed with the agreement between the thesis author and thesis supervisor. The survey included parts focused on demographic details, existing practices and views in KM, encountered challenges, and practices and views on OL Systems. According to Dillman et al. (2014), participants should have enough time to complete the survey, and further reminders to increase response rates and this was followed for the data collection. The data collection period was from 15th July 2024 to 1st October 2024. The survey was distributed via professional social media LinkedIn and email.

3.4 Data Analysis Process

To ensure consistency and accuracy, data has been carefully processed before analysis and categorized by essential demographic data such as experience level, job role, work setting and organizational size. The data preparation stage includes processes of assessing responses for completeness, effectively addressing missing data, and classifying qualitative responses into significant categories (Dalkir, 2017; Nonaka & Takeuchi, 1995).

The systematic preparation of this study approach ensures the reliability of data and trend analysis of organizations (Creswell & Plano Clark, 2018). This study analyzed data in a mixed-method approach by admitting that statistical analysis alone may not provide in-depth insights. For analyses, Excel software and Webropol professional statistics tool were used in this study. Descriptive analysis has been performed in Excel to summarize demographic data using descriptive statistics and to assess responses to existing KM and OL strategies and their efficiency. The comparative analysis has been performed using

Excel data analysis tool to compare responses across the demographic groups to identify significant differences and trends. In correlation analysis, Pearson correlation coefficients are calculated using the Webropol professional statistics tool for investigating the strengths and linear relation among variables of successful KM and OL practices. Thematic analysis for qualitative data of open-ended question responses has been applied in Excel to determine common themes and patterns, as well as content analysis to quantify the occurrence of themes, obstacles or ideas expressed by respondents (Nonaka & Takeuchi, 1995). For thematic analysis, first the main ideas are identified by carefully reading all the responses. In the second phase of thematic analysis all the themes are identified based on the main ideas. The final phase is converting the main ideas into the corresponding themes and categorizing themes.

The results from both quantitative and qualitative investigations are integrated to develop a dynamic conceptual framework for IT business KM and OL Systems (Dalkir, 2017). This mixed-method approach integrated statistical analysis with thematic insights for this study, yielding a thorough understanding of KM and OL integration. The methodology, analytical process, and results are recorded for improvement, to develop a comprehensive and realistic framework.

3.5 Ethical Considerations

Ethical consent had been obtained from the research ethics before the start of data collection. Participants received a brief description of the survey and a PDF document explaining the detailed study's goal, their rights, and the precautions used to ensure privacy and anonymity. The informed consent has been attached in Appendix 2. All participants were given informed permission before completing the survey. The obtained data was securely kept, with access limited only to the study team. These methods ensured that the research complied with ethical norms and respected the rights and privacy of the participants (Bryman, 2016).

3.6 Reliability and Validity

To ensure the reliability and validity of this study, several key actions were undertaken. The questionnaire was first reviewed by consulting IT professionals, whose responses suggested significant modifications, to improve the content validity (Middleton, 2024). The sample size was determined with the discussion of the thesis supervisor, faculty member who reviewed the research plan presentation and the practical feasibility of reaching people for the survey response. The research plan board member suggested around 100 samples for this research and the survey received 94 responses that enhanced the validity of this research. Reliability has been ensured by pre-testing the questionnaire with a limited group of participants to find and correct errors, hence ensuring consistent findings across several use cases (Middleton, 2024). These measures collectively enhanced the quality of the study design, ensuring that the results were both dependable and valid. The job roles analysis of participants ensures that the study is relevant to IT field, supports the study's validity and reliability.

3.7 Limitations of the Study

This study acknowledges several limitations. First, the lack of time constrained the depth of the research, limiting extensive data collection and analyses. Second, the study's focus was confined to the IT sector due to the author's lack of knowledge in other sectors, which may restrict the generalizability of the findings to different industries. Third, the specificity to IT businesses means the framework may not be directly applicable to non-IT sectors without significant adjustments. But with modifications based on the requirements it can be applied in other fields and organizations can benefit at all levels. Fourth, this research is limited to developing a theoretical framework rather than a fully functional software application. Fifth, the study's sample size consisted of 94 respondents, which limits the statistical power and generalizability of the findings. Sixth, the geographical mix of sample size instead of separating them because of the timeline of the study and challenges to collect enough samples from different regions. Finally, the study captures current trends and practices, and future developments in technology and business

practices may impact the applicability and relevance of the proposed framework. These limitations suggest that periodic reviews and updates to the framework will be necessary to maintain its relevance over time.

4 Results

This chapter presents the analyses and findings of the study, to address the research questions and support research objectives. The analyses are divided into two parts, first analyzing the quantitative data and then, analyzing the qualitative data of this research. It starts by examining the Demographics of participants data – respondent's backgrounds and experiences. This helps to understand the different views and experiences of this research. The Comparative Analysis examines how KM and OL practices differ among various demographic groups and organizational settings. Next, the chapter shows the Correlation Analysis, to find linear relations between KM and OL variables. Qualitative data have been processed by applying Thematic Analysis to understand the themes and patterns of participants experiences and perceptions. The chapter concludes with the integration of analyses and presents the framework of KM and OL Systems. The outcomes are robust, diverse, beneficial for users and reliable because of the detailed approach of the thesis to identify the problems and find solutions.

4.1 Demographics Analysis

This section gives a brief description of the Demographic characteristics of the participants of the study. This examination includes the Job Role, Experience, Organization size, and Work Settings data field. Demographic circumstances play an important role in understanding the different perspectives and experience reflected in the examination, which then leads to the creation of a conceptual framework that combines KM with OL.

4.1.1 Job Role Analysis

The data of IT professionals provides a wide range of job positions. The received response of job roles (shown in Figure 2), 22 participants (24.4 %) identified as Software Developers; 14 participants (15.6 %) identified as System Engineer, 13 participants (14.4%) as Network Engineer, 7 participants (7.8%) as Project Manager, and 34 participants (37.8%) held other positions.

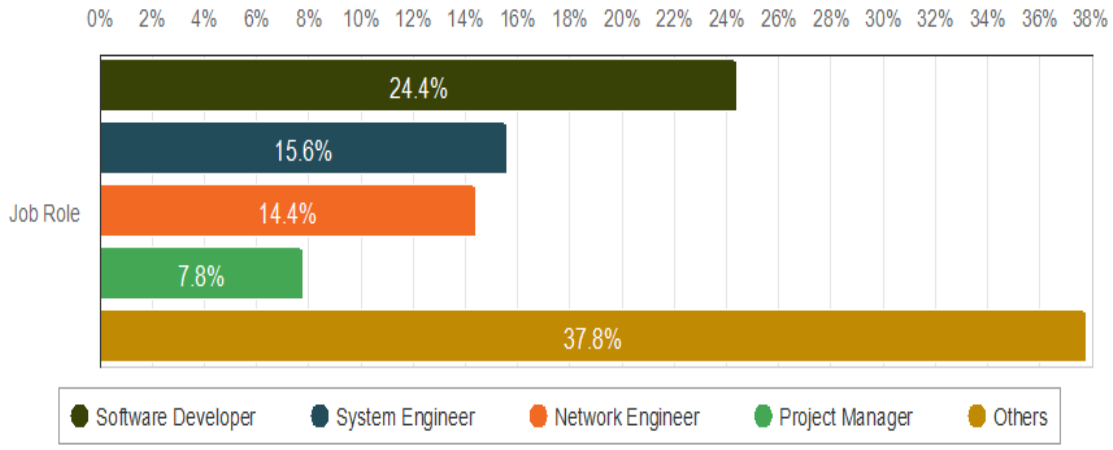

Figure 2. Respondents Job Role Statistics

Figure 3 shows the word count analysis of the "Ohters" category of job roles of respondents. The "Others" category encompasses positions of IT consultants, Tech. Support Engineer, IT Security, Data Analyst, Cloud Service Engineer and more associated with IT fields offering a comprehensive perspective on the perception and implementation of KM and OL practices across various functions within IT organizations. The diversity between the job roles pinpoint difficulties in understanding the sharing and studying by challenges the distinct obstacles encountered by different professionals. This diversity of "Others" category has impacts on the framework and which can lead in the future development to have a connection with other fields other than IT field.

Figure 3. Word Count Analysis (Job Role)

Participants from several IT fields significantly enhance the consistency of the analysis, ensuring that the insights gathered are relevant. It also validated the outcomes found

from the research. The diversity ensures that the study captures a wide range of job positions which is essential for a comprehensive understanding of the KM and OL practices. The variety of expertise of the participants contributes to the identification of the technical challenges and the prospects of further development, thus strengthening the overall findings and the decision on the analysis.

4.1.2 Experience Level Analysis

Participants' experience levels change from Entry level to Senior position, providing a thorough understanding of KM and OL practices at different stages of their careers. Figure 4 shows the sum of 18 participants (19.8 %) reported 0-1 year of experience, while 37 participants (40.6 %) claimed 1-3 years of experience. Furthermore, 25 participants (27.5%) entered the 4-6 years of experience, and 11 participants (12.1%) had more than 6 years of experience. The wide range of experience levels ensures that the examination collects information from individuals with a career ranging from beginner to those with considerable expertise in the IT sector. For the examination of relevant KM methods for different experience level professionals and the prospect of further development, the analysis is necessary.

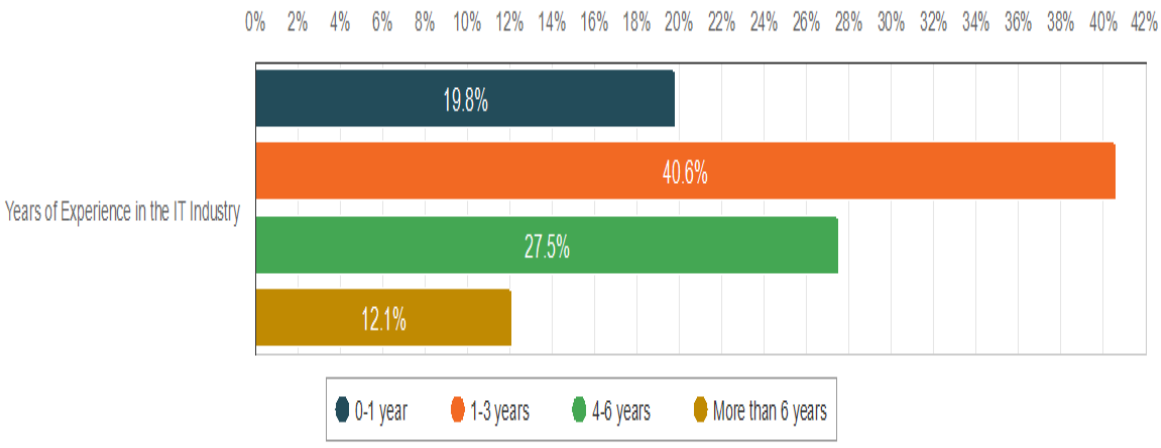

Figure 4. Respondents Experience Level Statistics

The participants, together with 0-3 years of experience, 19.8 % participants who had 0–1-year experience and 40.6 % participants who had 1-3 years of experience. This group, composed of approximately 60 % of all participants, highlights the importance of relevant KM and OL practices for early-career stage professionals. The analysis indicates that this study is most relevant for professionals in the early-career stage. This group has the strength to bring new ideas and fresh concepts into the organization to improve the system over time from their feedback. To recognize the opportunities for progress and innovation in the IT sector, it is essential to address the problem from an early stage so that the starting journey becomes smooth and efficient.

4.1.3 Organization Size Analysis

The analysis considers participants from small, medium, large and very large IT organizations, facilitating a comparative study on KM and OL practices across different organization sizes. Figure 5 indicates the organization with 1-50 employees, a total of 24 participants (27%) of the total number of participants. Moreover, 20 participants, or 23%, came from medium organizations with 51-200 employees. Moreover, 12 employees accounted for 14% and were associated with large organizations with 201-500 employees. In the end, 32 participants 36% of the total number of employees are 501 to more. This spectrum of organization size is crucial for creating a conceptual framework for KM and OL Systems, ranging from small to very large enterprises, allows for a comprehensive comparative analysis of KM and OL practices.

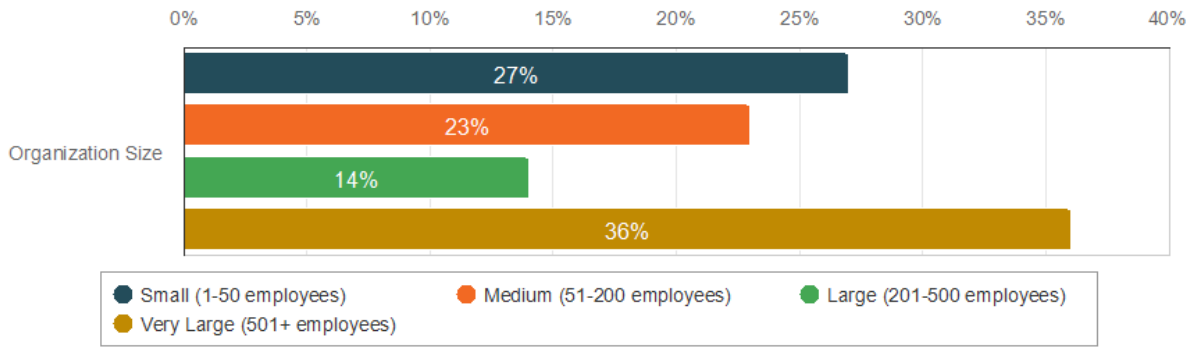

Figure 5. Respondents Organization Statistics

The analysis helps to compare different practices of KM, OL and integrated system and indicate specific factors that need to be addressed. The mix of different organization size data indicates relevant factors that validate the research findings.

4.1.4 Work Setting Analysis

There is diversity among the primary work setting of the participants, which reflects the various environments of the IT industry. The distribution of the work environments is detailed in Figure 6 as follows: 54 participants (59%) work in an office ecosystem, 9 contributors (10%) work remotely, and 28 participants (31%) use a hybrid model. This variation in the work environment gives valuable perceptions about the adaptation of KM and OL methods to different operating conditions, including conventional office environment, completely distant work setting, and hybrid model which integrates simultaneously both approaches. The availability of information is essential for the practical application of KM and OL methods, as well as for the elimination of obstacles to information exchange and learning. The work setting of the office, remote, and hybrid model offer valuable perceptions of personalized information of KM and OL methods for improving productivity and support in all separate environments.

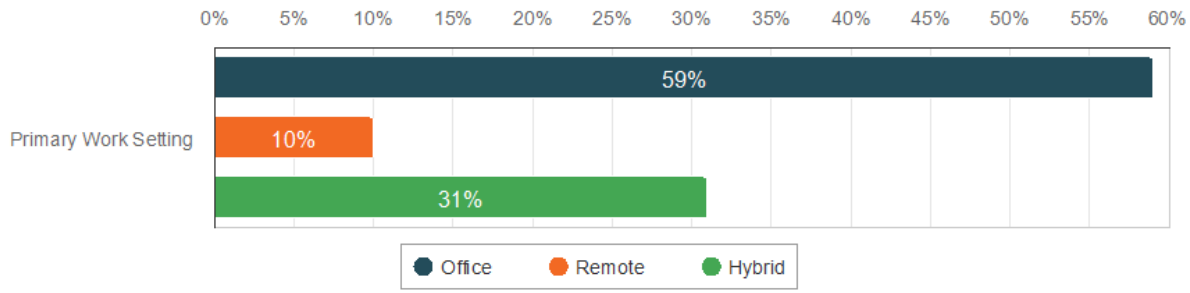

Figure 6. Respondents Work Setting Statistics

The demographic analysis of IT professionals, including job roles, experience levels, organization sizes, and work settings, highlights the diverse perspectives and experiences that inform the integration of KM with OL. This diversity ensures a comprehensive understanding of KM and OL practices across various functions and environments. The inclusion of different job roles validates the research, experience levels present the diversity of different professionals to develop a framework that can be applied in all levels, while the range of organization sizes helps to compare different attributes of variables, and work settings facilities that the framework should be easily accessible for all different environments. These insights are crucial for developing a robust conceptual framework that enhances organizational performance and promotes a learning environment.

4.2 Comparative Analysis

The main objective of this comparative review is to examine the current state of KM and OL practices within IT corporations, identify obstacles to proficient insight sharing and learning, and progress with developing a conceptual framework for integrating KM and OL. To address the three critical analysis objectives of RO1, RO2, and RO3, the current evaluation should be structured. The evaluation is divided into three main parts: current KM practices and obstacles, current OL practices and obstacles, and Integrated KM and OL Systems practices, and obstacles.

4.2.1 Current KM Practices and Obstacles

The effectiveness of the current KM practices of an organization demonstrates a mainly beneficial trend. Figure 7 shows, out of total respondents, a significant majority, 56 %, consider the KM methods to be effective, while a further 7 % consider them to be very effective. This suggests that KM procedures are beneficial and well implemented by more than half of the respondents. However, there is still scope for improvement, as 17 % of respondents remained neutral and proposed that such practices do not adversely or positively affect their employment. On the less beneficial side, 11 % of respondents classified the KM approaches as ineffective, and 9 % classified them as very ineffective. These figures show that, from a majority point of view, KM techniques constructively pose a significant minority challenge, which may remain due to several variables.

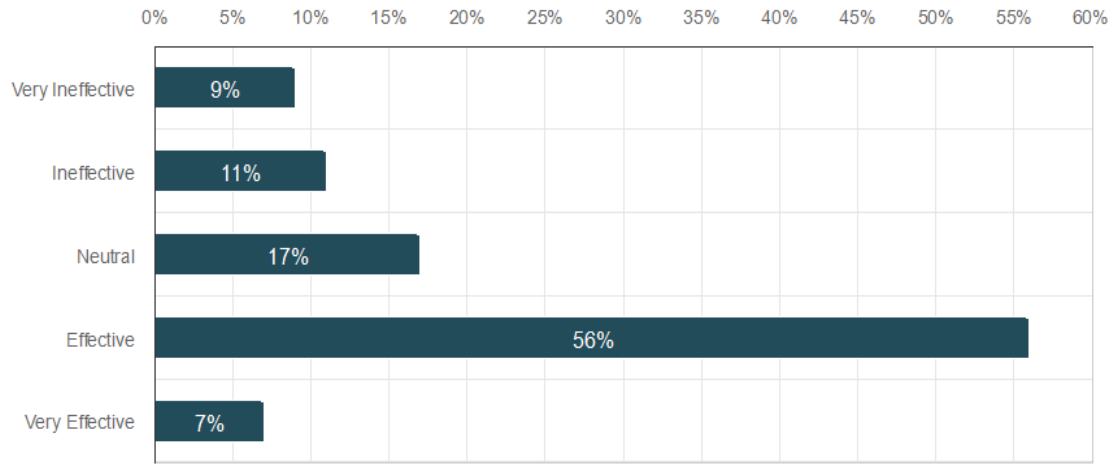

Figure 7. Current KM Effectiveness

The productivity of an organization's KM practices changes significantly in terms of organization sizes. The bar chart diagram in Figure 8 shows the observed current KM practices in organizations with a change in size, measured in terms of employees. In the case of small enterprises, the objective is perceived to be ineffective, together with a significant proportion of the very ineffective, ineffective, and neutral. There is also a balanced circulation in medium-sized enterprises, with a more personal and effective evaluation,

but the maximum trend still ineffective. Large corporations have different points of view and tend to be slightly effective and efficient. In contrast, very large institutions provide a strong useful perspective with a high percentage of effective and very effective evaluation, but the maximum ratio is very ineffective. This means that organizations at all levels still have a huge scope of improvement of KM effectiveness.

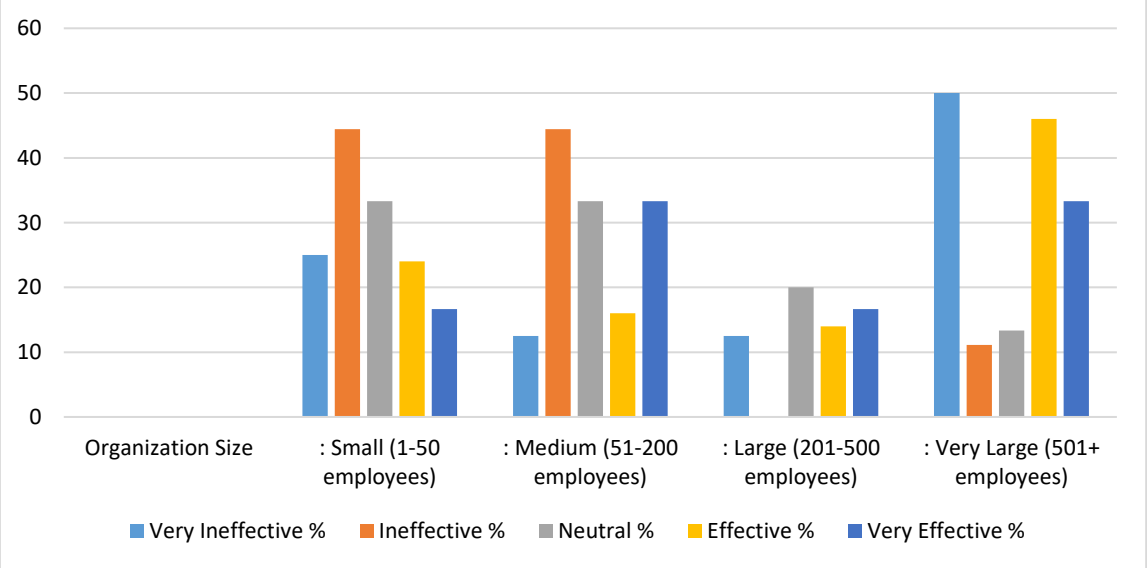

Figure 8. Organization Size vs Current KM Effectiveness

Figure 9 shows among the 88 respondents provided 182 responses to identify the barriers of KM (RO2). The most frequently mentioned barrier is “lack of time”, with 51 % of respondents recognizing it as a major issue. The second most mentioned obstacle by 47 % of respondents, is that the “poor organization culture” is not likely to be beneficial for information exchange and collaboration. In addition, “inadequate training” is third importance, 39% of respondents expressing their concern, that scores as essential for better guidance on KM instruments and approaches. “Lack of management support”, fourth obstacle recognized by 36% of respondents, suggests that KM programs are struggling to gain success. To conclude, 34 % of respondents mentioned “insufficient tools/technologies”, meaning that the KMS may remain obsolete or not user-friendly. To improve the efficiency of KM methods within the organization, it is essential to overcome these obstacles.

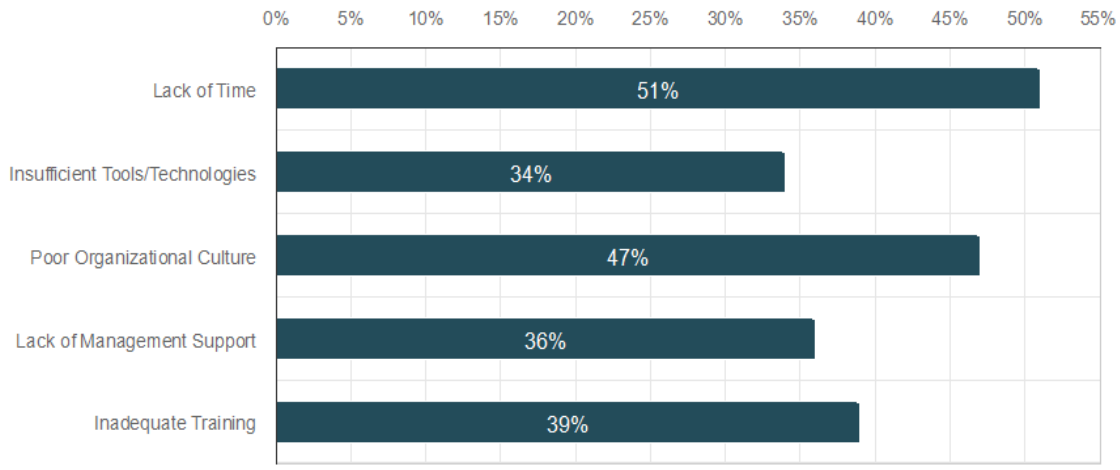

Figure 9. KM Barriers

The organization can improve its methods by having a better functioning KMS. This examination will contribute to the establishment of a further development and simplified system for managing and sharing knowledge and information within the organization.

4.2.2 Current OL Practices and Obstacles

The examination of the frequency of opportunities for OL, development, and progress within the organization reveals a constructive insight towards the target of RO1. The examination of the OL indicates a helpful viewpoint among employees. Figure 10 presents 55% of respondents described the training tradition as supportive, and 18% of respondents described it as very supportive. The survey indicates that over 73% of respondents believe that the organization provides a supportive environment for acquiring knowledge and growth. Nevertheless, a significant proportion of respondents, 19% remain neutral, meaning that they are not aware of the supportive surroundings of OL tradition. The smaller percentage, 6 %, describes the tradition as unsupportive and 2 % as very unsupportive, highlighting the fact that there is locality where the organization can improve. The conclusions above suggest that, as the overall education tradition is acknowledged positively, and those who have an unsupportive environment, could more firmly promote the OL to continuing development and growth.

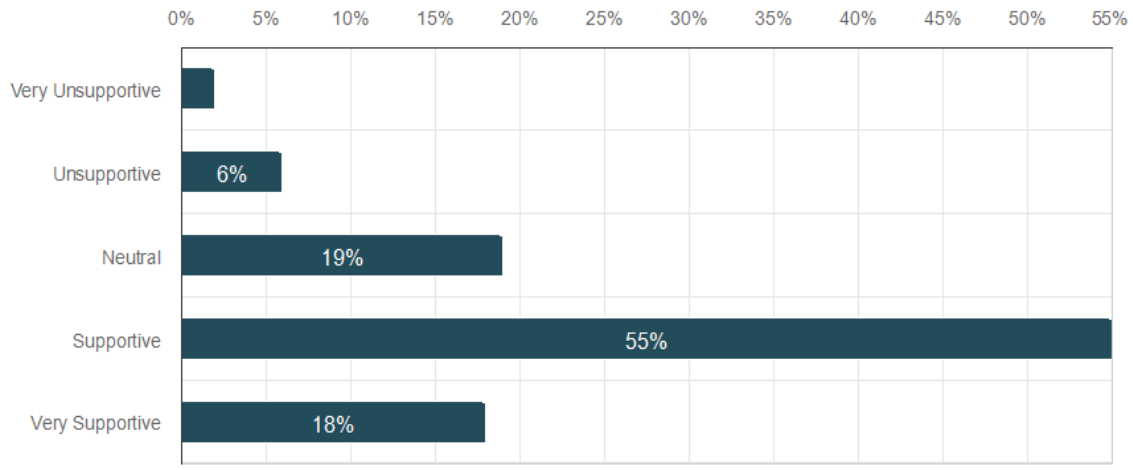

Figure 10. Current OL Practice Environment

The bar chart in Figure 11 shows the stages of support varying in different organization sizes, sorted by number of employees. Small enterprises have a significant proportion of very unsupportive and unsupportive responses, suggesting a general dissatisfaction or lack of support for OL. The rate of neutral responses is also relatively high, expressing a considerable unawareness of OL. The medium-sized enterprises have the distinctive fragments of unsupportive, neutral, and supportive imply a diversified response. For large organizations, the table also shows an unsupportive trend. The very large organizations with a high percentage of supportive and nurturing categories, at the same time the unsupportive factor is maximum. The bar chart reveals that even if the maximum responses are supportive and in organization size level, all the all types of organizations need attention here to improve.

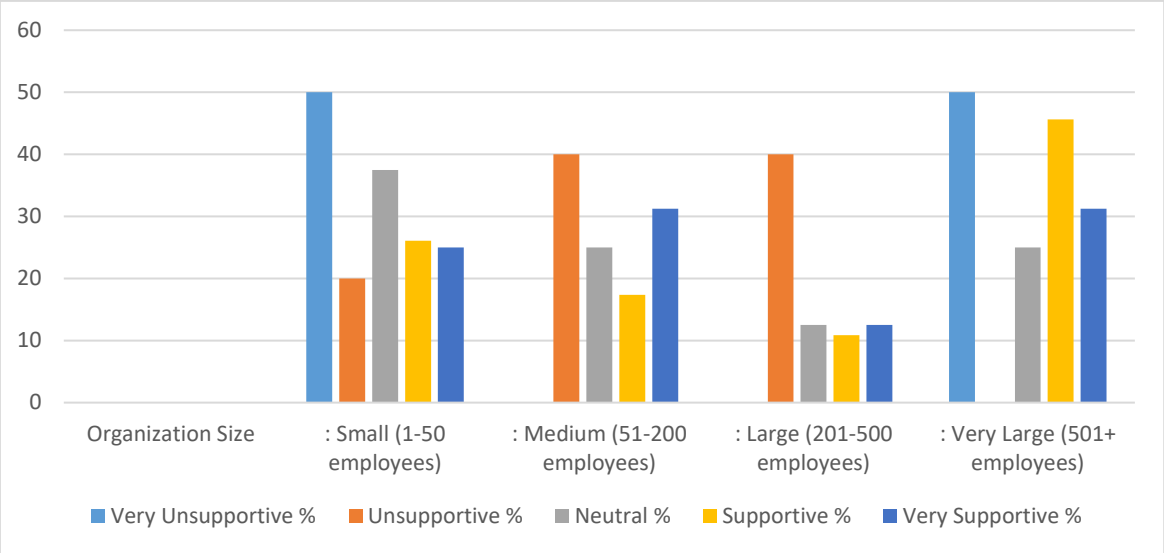

Figure 11. Organization Size vs Current OL Practice Environment

To address RO2, the examination points out the various essential obstacles to OL and growing within the organization. Figure 12 reveals among the 86 respondents and 189 responses, the most frequently mentioned obstacle is lack of time, while 66% of respondents considered it a major problem. In addition to their regular obligations to engage in acquiring knowledge and development, the present proposes that employees regularly have a very high workload than learning opportunity. The following major obstacle of inadequate of training programs answered by 51 % of respondents. 35% of respondents found that there is an insufficient budget and resistance to change, suggesting that reluctance to adopt new techniques are significant obstacles. In the end, 33 % of respondents mentioned poor communication, pointing out that ineffective dissemination of information on training opportunities may hinder contribution. To boost the organization's training and development efforts, to ensure employees have the time to learn, enough training, budget, mindset and good communication medium to increase and improve their skills, it is essential to overcome these obstacles.

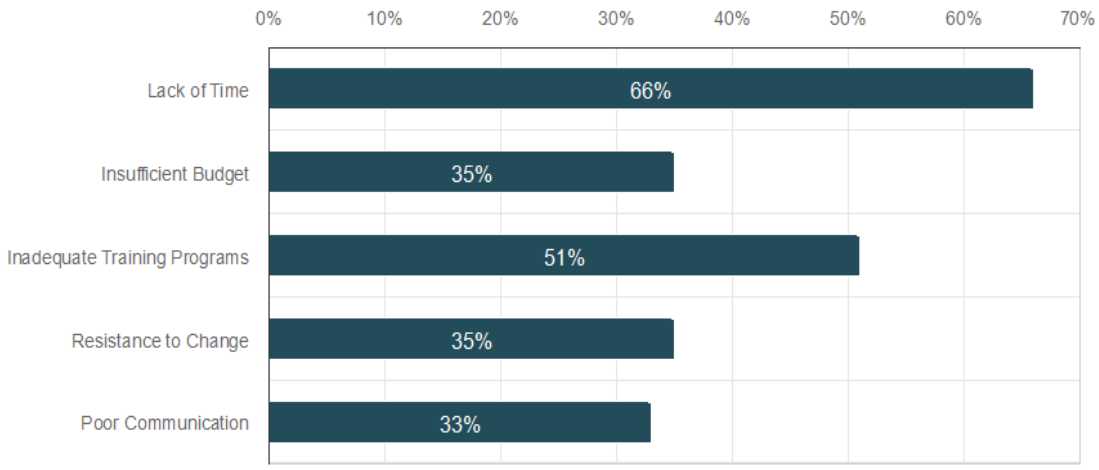

Figure 12. OL Barriers

The organization can improve OL by understanding these barriers and the current practices on acquiring knowledge opportunities and society, thus addressing RO3. The combined technique will contribute to the development of a more cohesive and effective system for managing and sharing information within the organization.

4.2.3 Integrated KM and OL Systems Practices, and Obstacles

To address the RO3, the assessment of statistics on the integration of KM and OL within the organizational, reveal a constructive insight between employees. Figure 13 indicates among respondents, a significant portion, 38% identify their system is well integrated, and 5% rate them as very well integrated. This implies that in total 43 % of respondents believe the integration of KM and OL evolution techniques is in their favor.

Nevertheless, a large proportion of respondents, 42 %, describe the integration as somewhat integrated, meaning that their organizations are not focusing on it. On the less desirable side, 10% of respondents classified the integration as poorly integrated, and 5 % said it’s not integrated at all. These results show that the current integrating KM and OL techniques have still essential gaps which need to be overcome to achieve a more cohesive and useful integration. The refinement of these variables would contribute to the overall effectiveness and success of the organization's KM and OL.

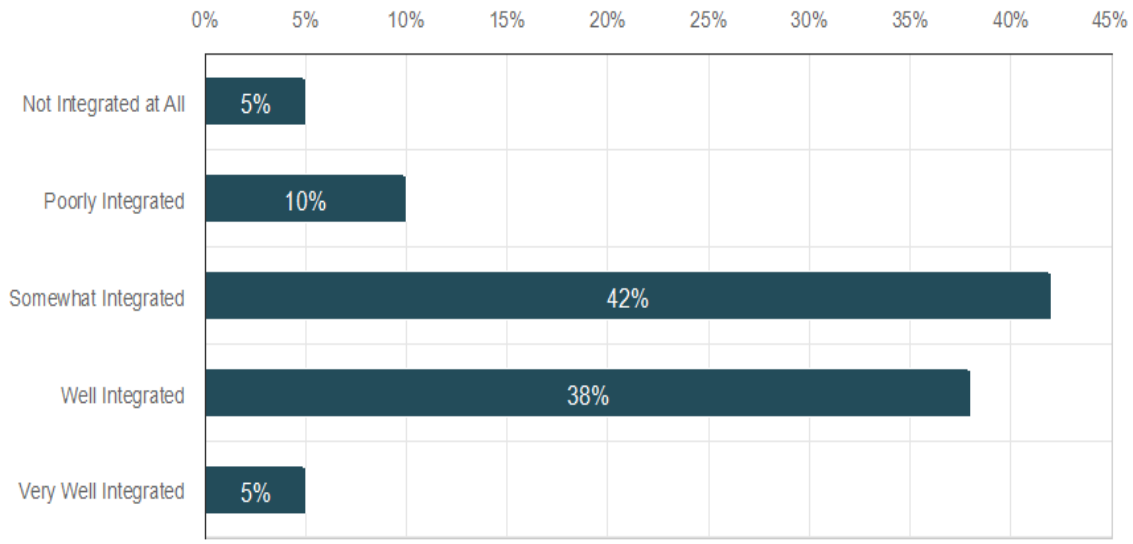

Figure 13. Current Integration Statistics

The bar chart in Figure 14 shows how KM and OL approaches are integrated within a wide range of enterprises. For small enterprises, the majority show that they are not integrated, but rather slightly integrated, which shows the potential for further development. The medium-sized enterprises show a diverse situation, with a high percentage of respondents describing these methods as very well integrated and not integrated at all. A significant portion state that they are poorly integrated. Large organizations show a poorly or well-integrated, but also a significant mention of remain somewhat integrated. In very large organizations, the methods are mainly acknowledged, together with the high percentage of well-integrated or very well-integrated, and a smaller proportion expresses not integrated at all. This suggests that organizations at all levels have opportunities to improve the integrated system.

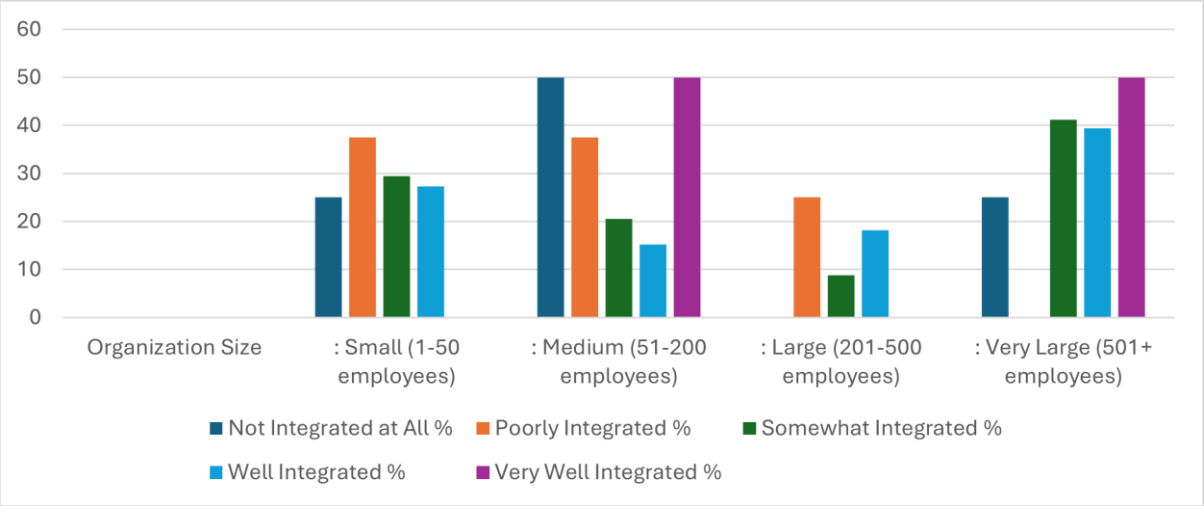

Figure 14. Organization Size vs Current Integration Statistics

For addressing the RO2, Figure 15 data insight indicates critical challenges in integrating KM and OL within organizations. Lack of strategy is the most common barrier in IT industry for integration which shows 64% among the 171 responses from 83 respondents. This indicates that without a well-defined strategy, integration of KM and OL is likely to be ineffective. Inconsistent processes are the second most identified challenge identified by 60% of respondents, indicate different processes in various teams can make it hard to integrate smoothly. 46% of respondents identified lack of skilled personnel as another significant barrier suggesting that the organization may not have enough employees with the necessary skills to effectively implement and manage integrated KM and OL Systems. Insufficient technology integration is identified by 35% of respondents, that present the lack of integrated technological platforms can reduce the operation of KM and OL practices. A small percentage, 1%, mentioned other challenges. To have a better integrated System of KM and OL it is important to address these barriers in the development of the Framework to overcome these barriers.

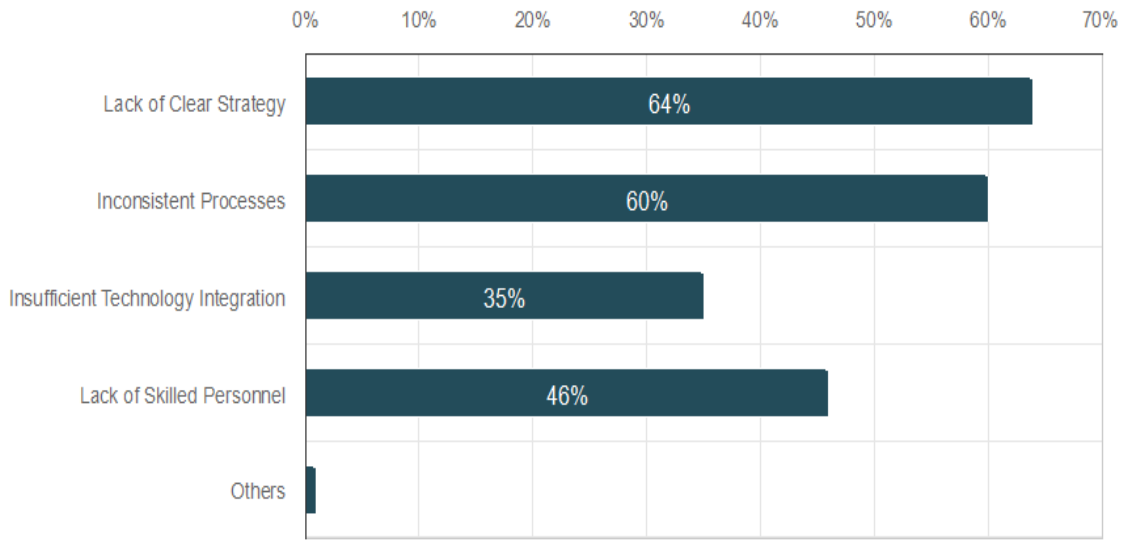

Figure 15. KM and OL Integration Existing Barriers

By understanding these challenges and the current integration trend, the organization can develop strategies to enhance the integration of KM and OL practices that address the RO3. This integrated approach will help in creating a more cohesive and efficient system for managing and sharing knowledge at all levels within the organization.

4.3 Correlation Analysis

This section presents the correlation analysis among survey questions. The objective of this analysis is to identify the strength and linear relations among the various aspects of KM and OL variables. This analysis is intended to identify the important variables that can contribute to framework development.

The Pearson correlation coefficients have been calculated for each variable against all other variables. For presentation purpose Pearson correlation coefficients are considered only where value is equal to 0.50 or more in Table 1 to show the positive connections between variables. Each column and row number of Table 1 refers to the corresponding survey questions number and the survey has been attached in Appendix 1.

	6	7	8	9	13	14	15	16	18	20	21	22	25
6	1	0.39	0.43	0.31	0.51	0.3	0.3	0.3	0.38	0.26	0.13	0.26	0.43
7	0.39	1	0.44	0.62	0.51	0.49	0.55	0.33	0.25	0.19	0.38	0.45	0.39
8	0.43	0.44	1	0.34	0.55	0.35	0.26	0.31	0.34	0.36	0.25	0.21	0.31
9	0.31	0.62	0.34	1	0.32	0.45	0.5	0.29	0.18	0.21	0.34	0.33	0.33
13	0.51	0.51	0.55	0.32	1	0.45	0.32	0.3	0.29	0.3	0.29	0.42	0.39
14	0.3	0.49	0.35	0.45	0.45	1	0.43	0.44	0.48	0.25	0.4	0.42	0.51
15	0.3	0.55	0.26	0.5	0.32	0.43	1	0.53	0.2	0.4	0.35	0.37	0.38
16	0.3	0.33	0.31	0.29	0.3	0.44	0.53	1	0.36	0.57	0.39	0.36	0.44
18	0.38	0.25	0.34	0.18	0.29	0.48	0.2	0.36	1	0.3	0.37	0.49	0.53
20	0.26	0.19	0.36	0.21	0.3	0.25	0.4	0.57	0.3	1	0.27	0.37	0.24
21	0.13	0.38	0.25	0.34	0.29	0.4	0.35	0.39	0.37	0.27	1	0.5	0.45
22	0.26	0.45	0.21	0.33	0.42	0.42	0.37	0.36	0.49	0.37	0.5	1	0.43
25	0.43	0.39	0.31	0.33	0.39	0.51	0.38	0.44	0.53	0.24	0.45	0.43	1

Table 2. Pearson correlation coefficient

Key Findings (From Table 1):

1. Effectiveness of Current KM Practices and Capturing Tacit Knowledge (Q6 and Q13): A moderate positive Pearson correlation coefficient 0.51 is identified between these variables. This indicates that organizations that capture tacit information can have better effectiveness of KM practices. Capturing tacit information is vital for a better effective KMS.

2. Frequency of KMS Updates and Capturing Tacit Knowledge (Q7 and Q13): A positive correlation exists between these variables; Pearson correlation coefficient is 0.51. Continuous updating of the KMS have a positive impact on the tacit information storing.

3. Frequency of KMS Updates and Encouragement of Knowledge Sharing (Q7 and Q9): The moderate Pearson correlation coefficient of 0.62 points out the link between the KM organization's frequent updates and the encouragement of information exchange among employees. Regular updates of KMS encourage an organization in exchanging information and cooperation.

4. Frequency of KMS Updates and Organization Learning Opportunities (Q7 and Q15): The Pearson correlation coefficient of 0.55 indicates moderate positive relation between these two variables. Organizations that regularly update their KMS, offer better learning opportunities within organization.

5. User-Friendliness of KMS and Capturing Tacit Knowledge (Q8 and Q13): The Pearson correlation coefficient of 0.55 represents a positive connection between user-friendly KMS and capturing tacit information. The organization with better user friendly KMS, offer more opportunity to capture the tacit data.

6. Encouragement of Knowledge Sharing and Learning Opportunities (Q9 and Q15): A positive Pearson correlation coefficient of 0.50 has been found between these two variables. This indicates companies that encourage knowledge sharing provide more learning opportunities to acquire knowledge and demonstrate a coherent approach to KM and OL procedures.

7. Impact of KM techniques on the business performance and integration of KM and OL (Q14 and Q25): A moderate Pearson correlation coefficient of 0.51 indicates that the impact of KM techniques on business performance is closely related to the integration of KM and OL. Professional integration enhances the overall performance and efficiency of organizations.

8. Frequency of Learning Opportunities and Supportive Learning Culture (Q15 and Q16): A moderate Pearson correlation coefficient of 0.53 is found between these two variables. Organizations which have frequent training opportunities tend to have a more supportive learning culture, promoting the awareness of continuous development and evolution.

9. Supportive Learning Culture and Management Support (Q16 and Q20): The Pearson correlation coefficient of 0.57 points out that good management supports learning

culture within the organization. Management responsibility is to promote acquiring knowledge environment is essential to construct a constructive KMS.

10. Effectiveness of Training Programs and Integration of KM & OL (Q18 and Q25): A Pearson correlation coefficient of 0.53 suggests that the successful integration of KM and OL techniques provides a better effective training programs platform. To maximize the benefits of effective training programs a better integrated system is important.

11. Application of New skill and Measurement of Program Effectiveness (Q21 and Q22): The Pearson correlation coefficient of 0.50 indicates a moderate positive relation between these two variables. The examination shows that application of new skills has positive impact of program effectiveness measurement. Thus, organizations can utilize the investment of new learned skills by applying and improving its measurement.

The Pearson correlation coefficients indicate that there are many essential perceptions in between different variables of KM and OL. From the analysis it is found that capturing tacit knowledge, frequently updating the KMS, user friendly system, integrated of KM and OL system, supportive management for learning are important factors which have dynamic impact on organization performance.

4.4 Thematic Analysis

The thematic analysis section presents the key suggested themes from the professionals for the improvement of the integrated system and some key issues that can be addressed in the integrated system. There were two questions added in the survey for recommendations from the industry professionals and barriers that could be solved in the framework. The assessment underlines the prospects of improving the standard architecture system of the organization by promoting cooperation, performance, and long-term management planning.

The analysis of recommendations thematic analysis based on the survey responses is divided into two parts (most frequent and least frequent), in terms of theme's numerical value found from the analysis. Figure 16 shows the most frequent themes found from thematic analysis based on the recommendations from IT professionals. Firstly, to enhance the integration of KM and OL a focus on centralized systems and tools is essential mentioned by the professionals. This is the highest number of recommendations accounted for all the themes. According to one respondent suggests "implementing a centralized knowledge repository with easy access and regular updates, alongside fostering a culture of continuous learning through collaborative workshops and cross-departmental knowledge sharing". Developing a centralized system for KM and OL can be solved by connecting the database into the framework and making it accessible for all levels depending on the background.

Encouraging knowledge sharing and collaboration across teams is equally vital as centralized system found from the analysis. One respondent mentioned that "Organizations should have knowledge management guidelines and regularly organize activities that promote knowledge sharing among the employees". Organizing events that promote cross-functional learning is a must from the organization through regular in-person and virtual training sessions. Moreover, establishing clear and well-defined learning strategies aligned with industry standards provides direction and focus, ensuring training initiatives stay relevant and impactful.

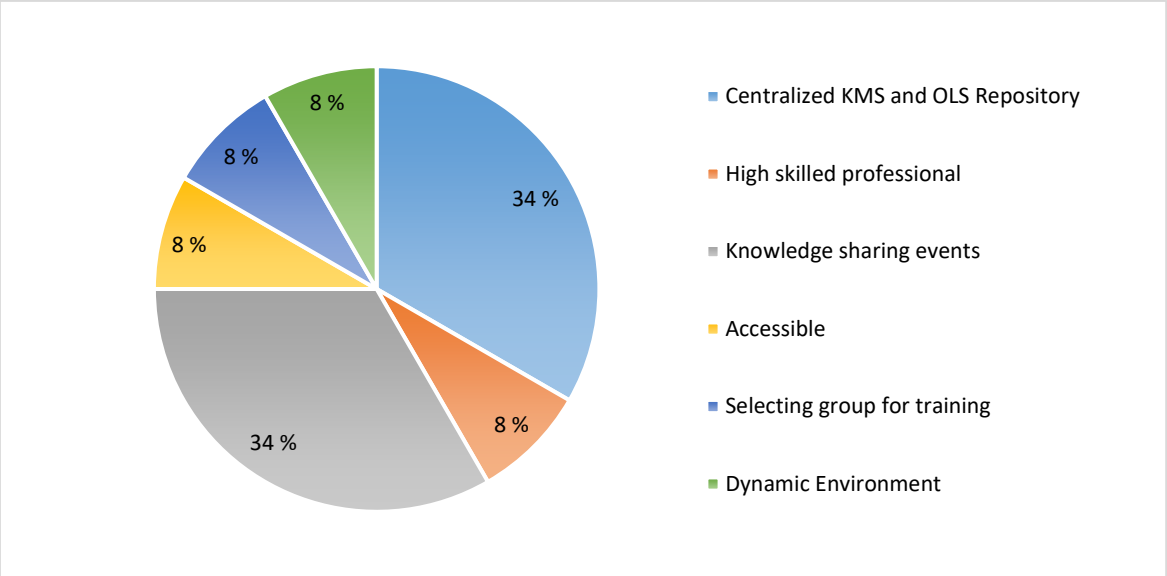

Figure 16. Thematic Analysis of Most Frequent Themes of Recommendations

Among all other most frequent themes, it is found that highly skilled professionals, dynamic environment, accessible system, identifying group for training are equally important (8%) according to the respondent's feedback. It is essential to structure the learning capacity to produce highly skilled professionals through training and important to include highly skilled professionals in the management. At the same time employees should have access to the system so that they can learn at any time. Identifying a group of people is also vital for better efficiency and reducing the company costs. Finally, a dynamic environment is a very important factor for better performance and growth of organizations.

The least frequent themes, each representing equally mentioned in the survey responses highlight critical recommendations for improving KM and OL System (as shown in Figure 17). These include promoting better communication to enhance collaboration, utilizing AI for personalizing the system according to the user needs and developing clear strategy. Additionally, prioritizing in-person training, allocating time for learning, and ensuring a budget for learning are essential for growth. Capturing tacit knowledge, following industry standards, encouraging contributions to the system, and providing regular

updates collectively emphasize the need for structured, inclusive, and adaptive learning practices within the organization.

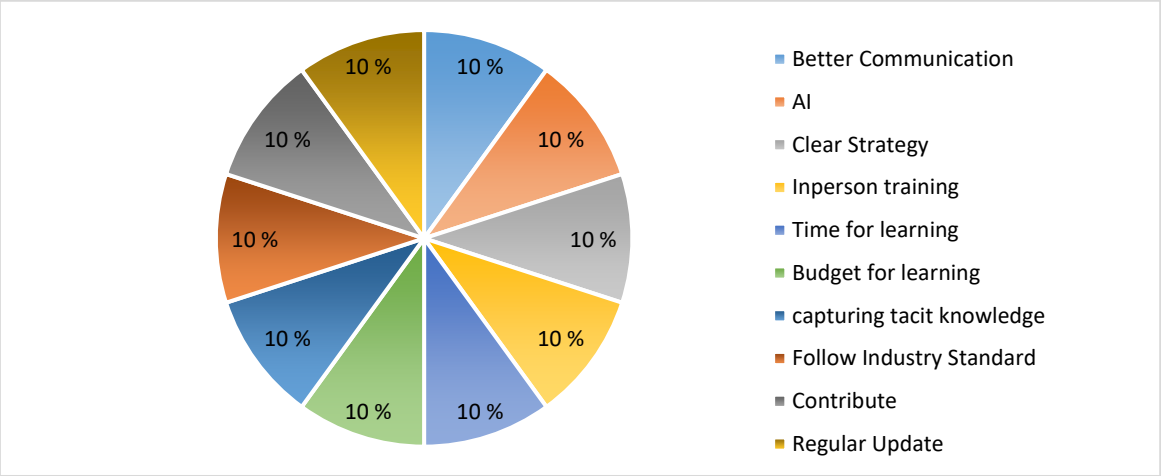

Figure 17. Thematic Analysis of Least Frequent Themes of Recommendations

Secondly, the respondents mentioned in the survey the challenges that can be solved through a framework. Figure 18 reveals many fundamental obstacles/themes that the recommended system could overcome from thematic analysis.

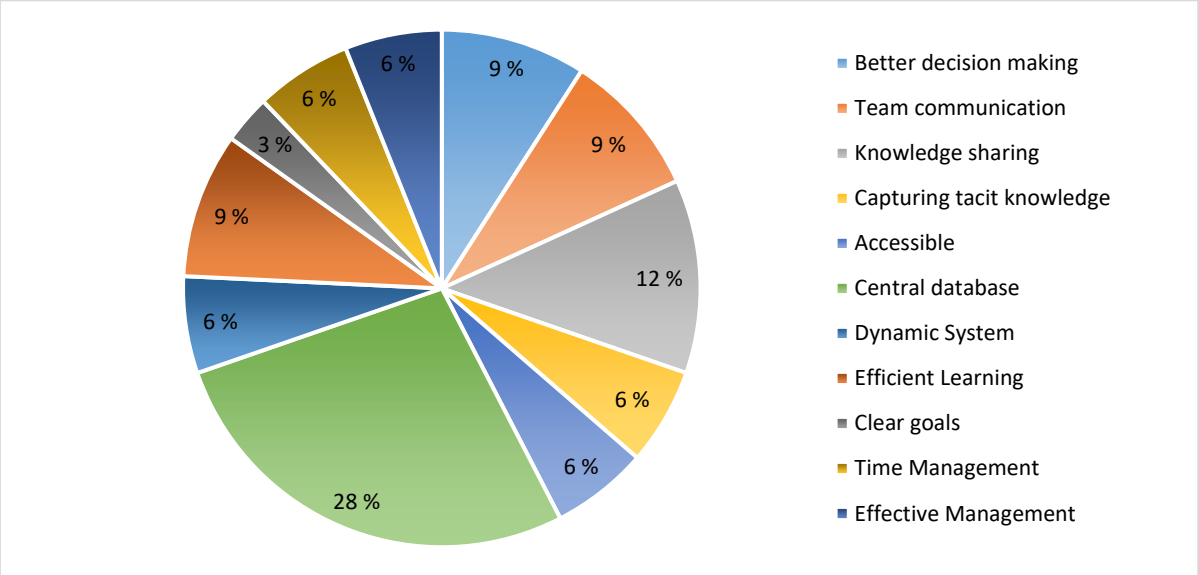

Figure 18. Thematic Analysis of Obstacles to Solve

The main important obstacle that can be solved in the development of a framework, represented by 28% of the responses, is the need for a central database system. According to one respondent “Critical information often gets trapped within individual teams which leads to inefficiencies and repeated mistakes. A Knowledge Management framework would help centralize and share this knowledge, ensuring everyone has access to valuable insights and lessons learned”. A framework that will integrate the company databases in one system is efficient, easily manageable and better for learning.

Knowledge sharing will be the next major challenge alongside 12 %, present the demand for efficient tools and approaches to enhance collaboration. One participant mentioned that “The major challenges include fragmented information, lack of consistent knowledge sharing, and difficulty in accessing relevant expertise quickly. A robust knowledge management and organizational learning framework would streamline information flow, enhance collaboration, and ensure that critical knowledge is easily accessible and retained across the organization”.

Three themes have been found equally important mentioned by the respondents, which account for 9%. The importance of fostering a culture of good communication, better decision making, efficient learning is important, and the framework can solve this problem. Barriers such as the capturing of tacit knowledge, accessibility, dynamic system, time management, and effective management, correspond to 6% by respondents to be solved. These difficulties highlight the importance of an operating system that makes information utilizable to contribute to the system. Lastly, clear goals (3 %) are a less frequently mentioned issue in themes but still relevant, suggesting that organizations can come up with well-defined objectives by utilizing the system.

In conclusion, the thematic study focused on the recommendations and challenges to improve the KM and OL integrated system. A centralized database has emerged as the main precedence, ensuring efficiency, effectiveness and can fulfill all other

recommendations and obstacles. For development of a framework, these recommendations and obstacles are important to design it based on professionals' requirements.

4.5 Framework Development

The development of a conceptual framework for integrating KM and OL within the organization will be significant for the development of knowledge sharing methods and increase corporate performance. The framework is developed by considering all the key elements and recommendations found in the analyses. The framework is developed by the thesis author by putting all essential elements found in analyses. 96% of the respondents agreed that a framework of KM and OL System can improve the efficiency of organization. The current KM techniques, which are beneficial in various aspects, reveal significant insights and challenges that need to be solved for comprehensive growth. Various levels of KM and OL productivity are shown by organizations of varying sizes, together with larger organizations, which have a scope of strong implementation of KMS compared. This insight creates the demand for a personalized approach which helps to address the challenges faced by companies.

The investigation into current KM, OL and integration practices (RO1), within IT businesses, underlines the significant influence on performance. Additionally, it also reveals persistent obstacles preventing optimal information from being utilized. These current practices show that the maximum ratio KM, OL and integrated system is effective, supportive and somewhat integrated. However, there is still a huge scope to improve current system, especially from organization size level and work experience perspectives. Also, it is important to introduce these issues to be solved, especially for early stages of career, as most of the respondents have 0-3 years of experience.

There are many barriers (RO2) at all levels, which require a planned strategy for achieving success in the long run. The common most barriers have been found are lack of time, poor organization culture, inadequate training, lack of clear strategy, inconsistent process, and lack of skilled professional in all levels. Some of the issues can be solved at

framework level and the rest depends on the organization environment together with the integrated system.

To address RO3, developing a framework for integration of KM with OL, it is recommended from respondents that organizations should establish a central database system, offering knowledge sharing events, including enough skilled professional, accessibility to the system, offering dynamic environments, and identify groups who needs to develop their skills. Connecting all these elements is complex that requires in-depth understanding. A framework (Figure 19) of KM and OL integrated system has been developed based on these recommendations and analyses. This framework has been developed by considering elements which depend on the system level. Some factors can’t be solved from application level which has been neglected while designing the system kernel. The focus is to connect the databases of KMS with OLS. This will ensure a robust learning management system by utilizing the organization’s database; thus, it offers a specific unique system for different organizations.

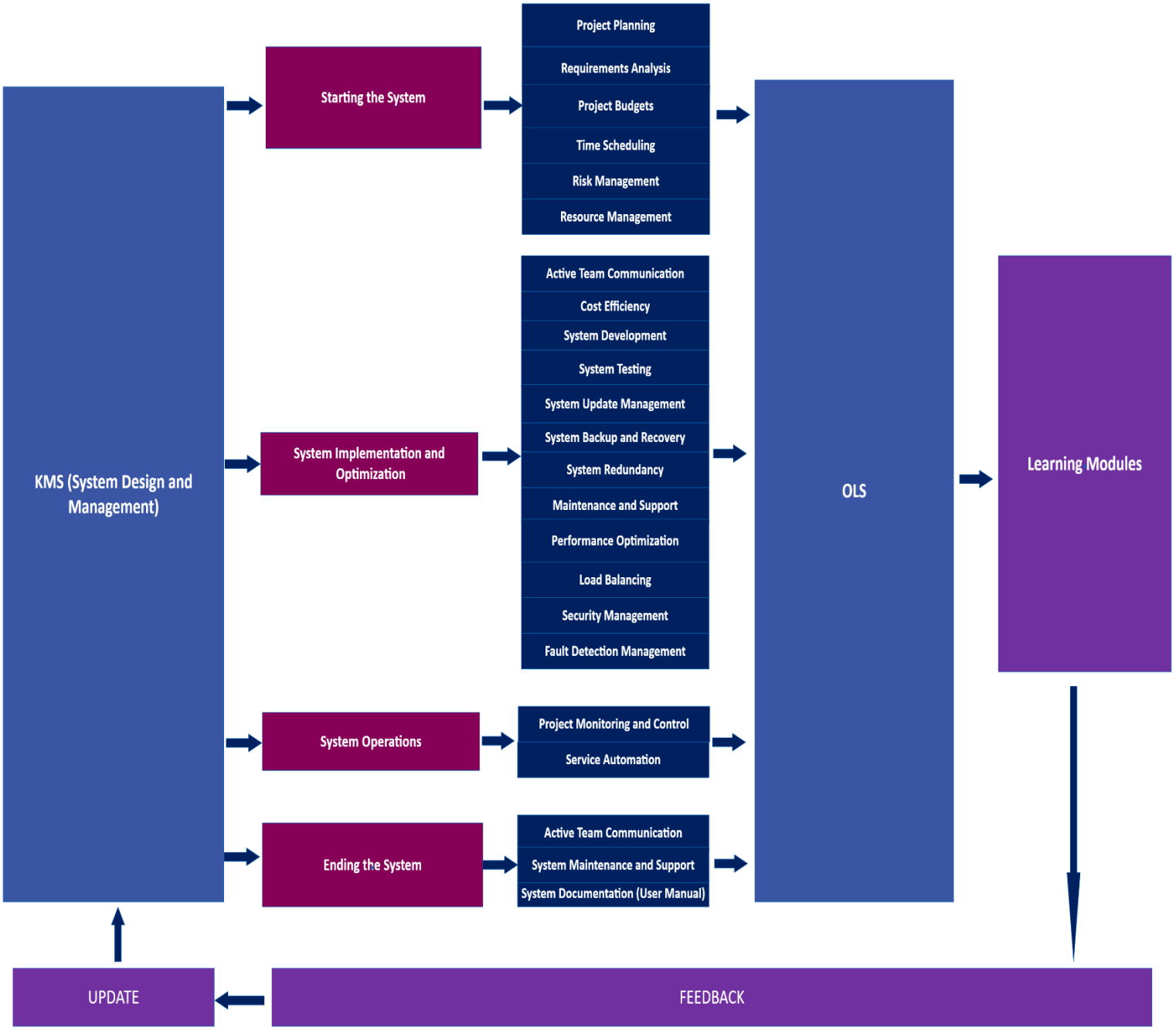

Figure 19. The Framework of KM and OL System (SDM)

As an example, System Design and Management (SDM) is considered as KMS. This framework offers a central database/repository system for KMS, in this stage all the databases are connected to the KMS of SDM. As described in the literature review, SDM are divided into four main parts, each of the parts represent as a sub repository which are the first level categorization within an organization. The sub repositories totally depend on the

organization nature and requirement, it may vary in different cases. From these sub repositories, all clusters can be created based on organization requirements. Figure 19 includes possible all processes of an organization. Clusters are all processes an organization usually have and storing information to corresponding database. These clusters are connected to the OLS. With the help of skilled professionals different learning modules could be created to offer learning opportunities at all levels. For creating the learning modules, OLS gets access to organization databases in organized and categorized format through Application Programming Interface (API). The learning modules are for employees which can help to learn and grow. The learning modules can possibly as a short course on a specific topic, recorded videos/presentations, analyses, documentation, blog, etc., depending on organization. The proposed system is accessible from anywhere, and it can offer many virtual knowledge sharing sessions by targeting a specific group related to the session topic.

The developed framework of this study ensures the contribution of whole lifecycle of SDM. The literature review of SDM indicated all the crucial factors that each of the clusters or processes, and all of these processes can have a systematic approach for each of cluster/process for better functioning and maintenance. The presented framework is dynamic, means that it will be updated in a regular period based on the latest information or feedback from the professionals to make it more user friendly that supports the findings of literature review and survey analyses. The feedback stage can be for a particular learning module, user-friendliness of the OLS, suggestions for new learning modules, etc. Any employees can contribute to the system as highlighted in the SDM literature, which will be reviewed by the senior level professional and can be merged into the central repository system (KMS). The update phase refers to adding the latest information, fixing bugs or issues, improving learning modules quality, modifications based on the feedback, improving User Interface (UI) security update, etc. A generalized version/prototype of the framework has been developed for better visualization.

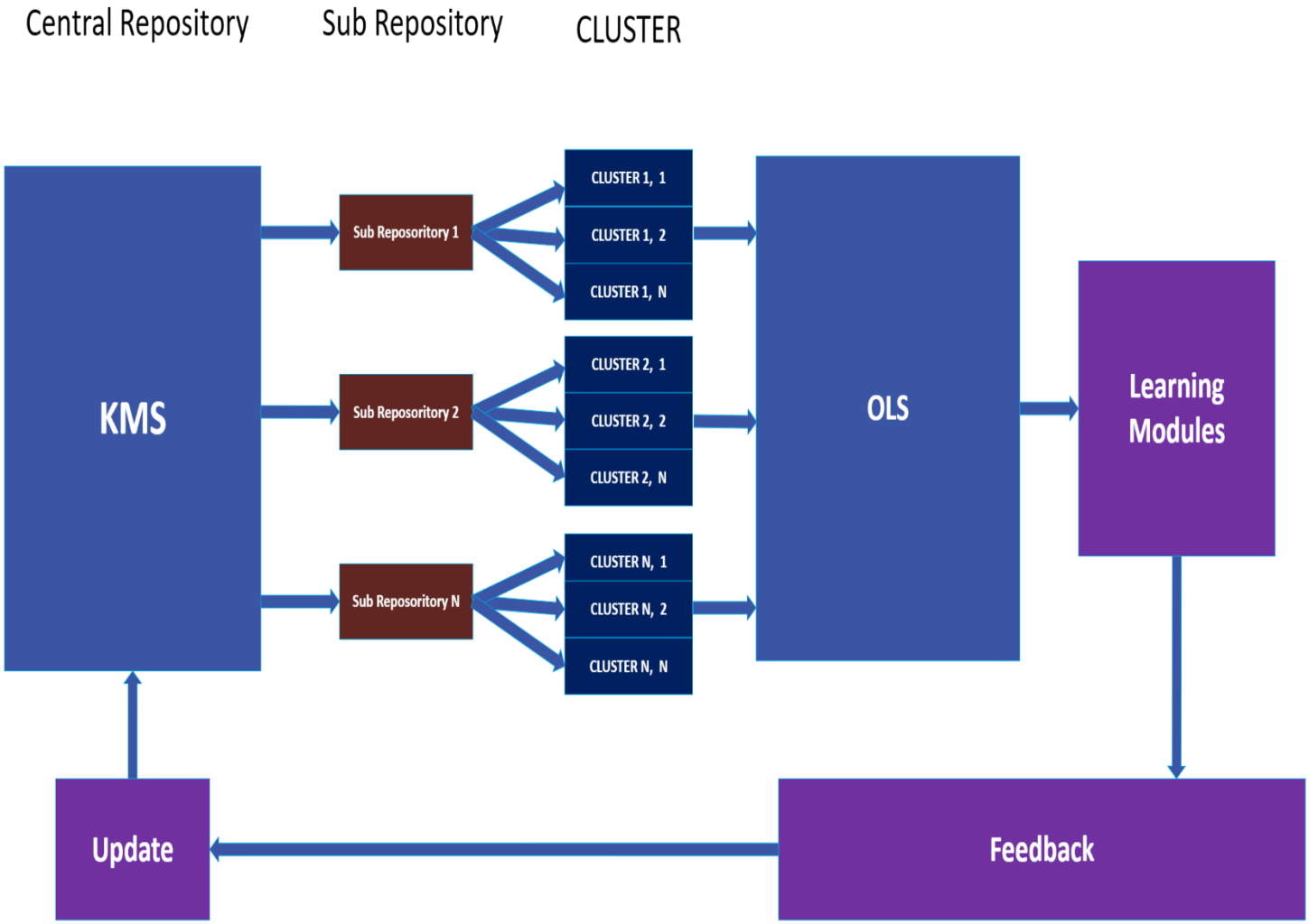

Figure 20. Generalized version of the Framework

The presented framework in Figure 20 covers both aspects found from the literature review and survey data analyses. The framework has the capability of data orientation such as creation, storing, updating, distributing and retrieving from worldwide. By maintaining a well-integrated system, it is possible to convert the raw or tacit data into meaningful assets of an organization. The presented framework is relevant to the study and can be optimized the performance with less effort. One of the key findings from the literature review is seeing KM and OL as entire system, the presented framework considers it as an entire system by connecting two components together with systematic methods. The presented framework can potentially also solve the challenges identified by respondents such as better decision making through well data management system;

efficient learning system through learning modules; knowledge sharing through blog, documentation, virtual events; and strong communication through a better infrastructure, so all the employees are up to date with the required knowledge.

Some of the key factors for this framework that needs to be considered while making an actual software, based on the findings from literature reviews and survey data analyses:

1. Adding Tacit Knowledge functionalities in the database: The importance of adding tacit information is both found from literature and data analyses. This will help the organization to overcome human limitations and utilize this information for better understanding and success.
2. The system needs to be updated in regular period: Both literature review and recommendations from respondents suggest to have updated system for its sustainable performance over time and innovations.
3. The system needs to be user friendly and straight forward: It is found from the data analyses that a user friendly is one of the important factors to gain acceptability and success.

In conclusion, the research has fulfilled all the three research objectives (RO1, RO2, and RO3) and answered the research question that fulfills the study requirements. The development of a sustainable conceptual framework for integrating KM and OL into the IT business involve overcoming existing obstacles, exploring different aspects, and incorporating a planned strategy. Companies can build a more cohesive and effective system for incorporating and sharing the information by focusing on overcoming obstacles such as lack of time, less learning environment within organization, insufficient learning opportunity, and insufficient integration of high technology. The necessary prerequisites for this method are the adaptation of KM and OL Systems in cooperation with organizational objectives and the promotion of the tradition of knowledge sharing and learning. The proposed framework offers the opportunity of changing awareness and organization

sharing knowledge in its branches, driving innovation, development, and extending its success.

5 Conclusions

The presented analyses answer the research question of how can IT business KM and OL Systems framework be developed effectively? A thorough literature review and survey investigation helped to develop a conceptual framework to improve IT organizations' management of processes by integrating two key elements together. The study's findings support the literature on KM, OL, integration of KM and OL, and SDM. It is found that integrating KM and OL can potentially help the organization with innovation, continuous improvement, and organizational performance. The necessity of customized KM strategies tailored to specific organizational needs is also confirmed. Integrating KM and OL of SDM improves system performance, supporting iterative updates and user-centered development. This comprehensive approach aligns with theoretical foundations, justifying the research and demonstrating how integrated KM and OL strategies can improve organizational performance and achievement of success in the long run. The objectives achieved in a systematic manner that provided the solid foundation for investigating the current approach to this system, identified the major barriers and provided sufficient insights that can encourage to adapt a combined approach for KM and OL.

5.1 Summary of Key Findings

RO1: Investigate existing KM, OL, and integrated system practices within IT firms to understand their effectiveness and areas for improvement.

The first objective focused on assessing the existing system of KM and OL practices within IT firms. The findings indicated a diverse perspective that larger organizations generally have a better KMS in comparison to the smaller organizations. The major key aspects identified are effectiveness of KM practices, updating the KMS in regular manner, and organizing knowledge sharing events. In addition, correlation analysis indicated the strong positive correlation coefficient among variables. These analyses suggest the important factors that needs to be taken care of to achieve success. Organizations with frequently updating tacit knowledge into the KMS, tend to have encouragement of

knowledge sharing and utilizing it for better decision making that promotes continuous learning and growth in a specific context.

RO2: Identify barriers to knowledge sharing and learning in IT firms

Through the second objective of the study the major barriers are found that restrict the effective knowledge sharing and learning within IT organizations. Some of the major obstacles identified from the study are lack of time, inadequate organization culture, insufficient training, unclear strategies, inconsistent processes and a shortage of skilled professionals. The identified obstacles are from organization across various levels, that impact on both aspects of adaption and effectiveness of KM and OL practices. Finally, the thematic analysis indicated barriers and suggested to have a centralized system for an organization, better communication system and the support from the management for overcoming the barriers.

RO3: Develop a conceptual framework integrating KM with OL in IT firms

The final objective of this study aimed to develop a conceptual framework which is dynamic in nature, and it integrates the KM and OL, to address the identified barriers and improve the strength of current situation of the companies. The proposed framework is developed based on first two research objectives findings, key literature reviews, and it includes the idea of centralized database system, regular update plan to keep the KMS and OLS are up to date that ensure the sustainability, user friendly interfaces, and more. This study suggests the need for supportive learning culture, management support, and proper learning plan within an organization. By incorporating all the key findings together, the aim of creating a framework have achieved that offer cohesive and efficient system for organizations for managing and sharing knowledge at all levels.

5.2 Addressing Barriers and Challenges

The presented framework addresses the major barriers identified in this study. The framework adopts the idea of centralizing the KMS and this approach helps to overcome many challenges. Two key features of the framework considered from the survey analyses are regular update plan and making a user-friendly interface in the application level that helps to mitigate the problem of outdated information and bad user experience. Other than framework design factors, key factors like supportive learning culture and management support depend on organization level. It is recommended to develop a positive learning environment within an organization that can help the organization to overcome lack of training and gain success in the long run. A dynamic framework of KM and OL Systems is found as a solution to ensure the companies' goals are relevant and effective.

For instance, oorganizations that face time constraints problems, can implement a central system and make the smooth process of information retrieval, and reduce the time spent searching from unorganized data. In the same manner, organizations can convert employees into experts by training on required tools and technology, enough training promotes learning environment.

5.3 Framework Development

The conceptual framework developed in this study for designing to enhance the organizations' KM and OL practices. The nature of the framework is defined as dynamic system, and the base of the framework on several key components:

Centralized Database System: The framework adopted a central repository of KMS, it stores knowledge assets, accessible to employees based on job roles. This approach is a stable knowledge sharing platform with knowledge creation, retrieval, update and delete if needed. It helps to avoid many manual processing and automate the system.

Regular Updates and Maintenance: Update is an essential part in the current IT field market. The regular update of the KMS offer a more productive system that keep the system relevant with time. One of the functionalities of this process is storing tacit information and converting it into valuable data for learning.

User-Friendly Interfaces: A user-friendly interface is a must for an optimum level efficiency of the KMS for storing and retrieval. The user interface should be straight forward, easy to navigate and engage user in different levels. This factor is more relevant to the design of user interface in the application level.

Supportive Learning Culture: Organization should adapt a culture that values learning as an essential part for success and supporting learning environment. From the OLS, knowledge sharing events can be created virtually to support the knowledge sharing, collaboration and continuous growth in the concentrated field.

Management Support: The framework suggests management support for employees by providing physical and virtual training and other learning-oriented encouragement. The framework can provide functionalities for management to design the different learning modules to train their employees time to time. This factor also depends on organizational level. KMS and OLS, can help leader with suitable resources to be aware with different strategies to nurture the team in right manner.

Structured Learning Strategies: A well-defined and clear strategy is needed to develop according to the organizational objective, it ensures the appropriate initiatives that are relevant and impactful. This part should be included in the OLS from skilled professionals. Some of the activities are virtual training module creation, learning module creation, discussion session, applying new learned skill, selecting group based on their requirements.

Dynamic Environment: This feature makes the system stable and adopt new changes over the time. Through regular feedback, updating KMS database improve user experience and performance. This characteristic is important for involving with the same pace of technological advancements.

5.4 Implications for Practice

The research findings have positive implications for enhancing the KM and OL Systems of IT business firms. The implementation of the proposed framework can lead an organization to several benefits including the improvement of knowledge sharing, increasing employee engagement to the system and overall organization performance. Organizations can create a more agile and innovative environment by promoting the continues learning culture and supporting the KM and OL Systems.

This research also highlighted the importance of the necessary approaches to recognize the requirements and enhance the capability of organizations. The system architecture and user interface may vary depending on the organization size, structure and industry on the application levels, but the main concepts of framework are applicable to all kind of IT organizations. It is suggested that the framework should be adapted in the application development phase to meet the specific context of each organization, to ensure that it addresses the unique requirements and increase its strengths.

5.5 Future Research Recommendations

The research provided a comprehensive insight for framework to integrate KM and OL System of IT firms, and the future studies can explore its application in different industry contexts and geographic locations. Extensive study is needed to examine the longer-term impact of the framework on different aspects of organization to improve performance and developing software of KM and OL Systems. Additionally, it recommended to investigate further the role of emerging technologies like Artificial Intelligence (AI), and Machine Learning (ML) to make the KM and OL Systems more personalized and effective.

In conclusion, this research has successfully addressed the research question of how to develop a framework to integrate KM and OL effectively within IT businesses. By investigating existing practices, identifying barriers, and developing a comprehensive framework, the study provides valuable insights and practical solutions for enhancing KM and OL integration. The proposed framework, emphasizing centralization, regular updates, user-friendliness, supportive culture, management commitment, structured learning, and dynamic adaptation, offers a suitable and stable approach to creating a cohesive and efficient system for KM and OL. Implementing this framework can help IT businesses overcome current challenges, promote a culture of continuous growth, and achieve sustained organizational success in the competitive market.

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Appendix 1. Master's Thesis Survey Questionnaire

Thesis Title: Developing a Conceptual Framework for IT Business Knowledge Management and Organizational Learning Systems

This survey is part of author Master's thesis conducted at the University of Vaasa School of Technology and Innovations in Finland. The survey aims to identify the barriers and challenges IT professionals face in managing knowledge and learning in the development of IT systems.

After analyzing the data, the aim is to develop a conceptual framework and recommendations to address these challenges.

The survey should only take 6-10 minutes to complete. All responses are anonymous and will be used solely for the purpose of this thesis. The thesis project is subject to a research privacy notice linked here to which respondents give their informed consent below.

Thesis Author: Md Sakib Al Emran
Thesis Supervisor: Dr. Inês Peixoto
Thesis Instructor: Lic. Sc. (Tech.) Mats Björkqvist
Thank you for your time and collaboration.

Research Consent

1. I confirm that I have read the research privacy notice above and, according to it, voluntarily consent to participate in this Master's thesis research. *

- Yes
- No

Demographics:

2. Years of Experience in the IT Industry
    - 0-1 year
    - 1-3 years
    - 4-6 years
    - More than 6 years

3. Job Role
    - Software Developer
    - System Engineer
    - Network Engineer
    - Project Manager
    - Others ----------

4. Organization Size
    - Small (1-50 employees)
    - Medium (51-200 employees)
    - Large (201-500 employees)
    - Very Large (501+ employees)

5. Primary Work Setting
    - Office
    - Remote
    - Hybrid

Knowledge Management:

Knowledge Management (KM) is the process of capturing, distributing, and effectively using knowledge within an organization.

6. How effective are the organization's current knowledge management practices?

- Very Ineffective
- Ineffective
- Neutral
- Effective
- Very Effective

7. How frequently does the organization update its knowledge management system?

- Never
- Rarely
- Occasionally
- Frequently
- Always

8. How would you rate the user-friendliness of the organization's knowledge management tools?

- Not User-Friendly
- Neutral
- User-Friendly

9. To what extent does the organization encourage knowledge sharing among employees?

- Not at all
- Slightly
- Moderately
- Very much

- Completely

10. What are the main barriers to effective knowledge management in the organization? (Select max 3 barriers)

- Lack of Time
- Insufficient Tools/Technologies
- Poor Organizational Culture
- Lack of Management Support
- Inadequate Training

11. How often do employees participate in knowledge management activities (e.g., sharing documents and attending knowledge-sharing sessions)?

- Never
- Rarely
- Occasionally
- Frequently
- Always

12. How accessible is the knowledge management system to all employees in the organization?

- Inaccessible
- Accessible to selected employees
- Accessible to all

13. How well does the organization capture tacit knowledge (unwritten, experience-based knowledge)?

- Very Poorly
- Poorly
- Neutral
- Well
- Very Well

14. How do you rate the overall impact of the organization's knowledge management practices on business performance?

- Very Negative
- Negative
- Neutral
- Positive
- Very Positive

Organizational Learning:

Organizational Learning is the ability of an organization to gain insights and understanding from experience and use that knowledge to improve its practices and outcomes.

15. How often does the organization provide opportunities for learning, improvement, and development?

- Never
- Rarely
- Sometimes
- Often
- Always

16. How would you describe the learning culture in the organization?

- Very Unsupportive
- Unsupportive
- Neutral
- Supportive
- Very Supportive

17. What methods does the organization use to promote organizational and development?

- Formal Training Programs

- On-the-Job Training
- Mentoring and Coaching
- E-Learning Platforms
- Others (Please specify) ----------

18. How effective are the training programs provided by the organization?
    - Very Ineffective
    - Ineffective
    - Neutral
    - Effective
    - Very Effective

19. What are the main barriers to learning and development in the organization? (Select max 3)
    - Lack of Time
    - Insufficient Budget
    - Inadequate Training Programs
    - Resistance to Change
    - Poor Communication
20. How supportive is the management in fostering learning and development?
    - Very Unsupportive
    - Unsupportive
    - Neutral
    - Supportive
    - Very Supportive

21. How often do employees apply new knowledge or skills learned from training?
    - Never
    - Rarely
    - Often

22. How well does the organization measure the effectiveness of its learning and development programs?

- Very Poorly
- Poorly
- Neutral
- Well
- Very Well

23. How important is continuous learning and development in the organization's strategic goals?

- Not Important at all
- Somewhat unimportant
- Neutral
- Important
- Very Important

24. How do you rate the overall impact of the organization's learning and development practices on business performance?

- Very Negative
- Negative
- Neutral
- Positive
- Very Positive

Integration of Knowledge Management and Organizational Learning:

25. How well integrated are knowledge management, learning and development practices in the organization?

- Not Integrated at All
- Poorly Integrated

- Somewhat Integrated
- Well Integrated
- Very Well Integrated

26. What are the main challenges in integrating knowledge management and organizational learning? (Select max 3)

- Lack of Clear Strategy
- Inconsistent Processes
- Insufficient Technology Integration
- Lack of Skilled Personnel
- Others ----------

27. To what extent do you agree that integrating knowledge management and organizational learning improves organizational performance?

- Strongly Disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly Agree

28. How well does the organization's technology infrastructure support the integration of knowledge management and organizational learning?

- Very Poorly
- Poorly
- Neutral
- Well
- Very Well

29. What benefits has the organization experienced from integrating knowledge management, learning and development? (Select max 3)

- Improved Collaboration
- Enhanced Innovation
- Better Decision Making
- Increased Efficiency
- Others (Please specify)

30. What improvements would you suggest for better integration of knowledge management and organizational learning in the organization? Feel free to give examples based on your experience if you wish.

Framework:

31. Do you think that a framework of Knowledge Management and Organization Learning System can improve the efficiency of an organization?

- Yes
- No

32. What is the major challenges in your work that such a framework would help to solve?

Appendix 2. Informed consent – Survey for Master's Thesis

University of Vaasa School of Technology and Innovations

Master thesis in Industrial Systems Analytics

Thesis Title: Developing a Conceptual Framework for IT Business Knowledge Management and Organizational Learning Systems

Thesis Author: Md Sakib Al Emran

Thesis Supervisor: Dr. Inês Peixoto

Thesis Instructor: Lic. Sc. (Tech.) Mats Björkqvist

The thesis project is subject to the research privacy notice below to which respondents give their informed consent:

"I voluntarily consent to participate in this research project. I may withdraw at any stage without stating a reason. I may also withdraw my consent at any stage before the completion of the thesis. If I withdraw my consent, the data I have provided until that point in time may still be used in the thesis project, but new data may no longer be used for research purposes. (NB: It is not possible to omit data related to a single research subject from research results after they have been analysed and published.)"

Information for the research participant

This survey is part of a Master's thesis conducted at the University of Vaasa School of Technology and Innovations in Finland. The survey aims to collect information to identify the barriers and challenges IT professionals face in managing knowledge and learning in the development of IT systems in companies. After analyzing the data, the aim is to develop a conceptual framework and recommendations to address these challenges in companies.

The survey should only take 6-10 minutes to complete. All survey responses are anonymous and will be used solely for the purpose of this thesis.

The open and anonymous survey is implemented online via Webropol which is the platform authorized and recommended by the University of Vaasa to collected thesis data. The responses collected will be stored in secure University servers. The data collected will not be shared with any persons except the thesis author and thesis supervisor, and will not be stored in external cloud-based services. The survey data will be fully deleted from storage after successful completion of the Master's thesis.

Participants can contact the thesis author by e-mail for further information about the results of the thesis or access the thesis in http://osuva.uwasa.fi when published.

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