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Title
Key factors for knowledge transfer in cloud computing projects

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Master in,
Information Systems Management

Supervisor:
Dr. Luís Filipe Rodrigues, invited assistance professor.
ISCTE - Lisbon Institute University

May 2024

TECNOLOGIAS
E ARQUITETURA

Department of Information Science and Technology

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Resumo

O conhecimento faz parte do capital da empresa. Entre as diversas fases da Gestão do Conhecimento, a transferência de conhecimento é aquela que tem como foco o compartilhamento de informações entre as pessoas e toda a empresa. Em relação a este processo nos projetos, é fundamental que haja comunicação entre as partes interessadas para partilhar informações e utilizá-las para criar valor no final. Neste contexto e principalmente em projetos de computação em nuvem, compreender o porquê das decisões tomadas e os aspetos técnicos dos elementos do ambiente de TI da empresa é importante para a inovação e resolução de problemas. Este estudo visa discernir os fatores mais impactantes que influenciam a transferência de conhecimento em tais projetos, contribuindo com recomendações para empresas que procuram maximizar os benefícios derivados dos seus ativos de conhecimento. Como abordagem metodológica, após revisão bibliográfica, foram realizadas entrevistas com perguntas abertas e fechadas. Quanto às primeiras, analisou-se qualitativamente a partir da ferramenta Leximancer, e as fechadas por meio do SPSS e Microsoft PowerBI. Os resultados de 35 entrevistas mostraram cinco temas principais: conhecimento, nuvem, ferramentas, cliente e dados. Além disso, a partir da análise quantitativa, os principais temas foram fatores culturais, ferramentas de gestão do conhecimento e métodos de transferência de conhecimento. A conclusão é que o fator mais importante é a cultura organizacional. Este estudo contribui para a teoria com um modelo de conceitos relevantes para a transferência de conhecimento em projetos de computação em nuvem e contribui na prática para a identificação de como melhorar esse processo.

Palavras-Chave: Gestão do conhecimento, Computação em nuvem, Gerenciamento de projetos de TI, Transferência de conhecimento, Fatores culturais.

Abstract

Knowledge is part of the company's capital. Among the various phases of Knowledge Management, knowledge transfer is the one that focuses on sharing information between people around and the entire company. About this process in projects, it is crucial to have communication between interested parties to share information and use it to create value in the end. In this context and especially in cloud computing projects, understanding the reason for the decisions made and the technical aspects of the elements in the company's IT environment is important for innovation and problem-solving. The current study aims to discern the most impactful factors that influence knowledge transfer in such projects, contributing recommendations for companies seeking to maximize the benefits derived from their knowledge assets. As a methodological approach, after a literature review, interviews with both open and closed questions were conducted. The open questions were analyzed qualitatively using the Leximancer tool, while the closed questions were analyzed using SPSS and Microsoft PowerBI. The results from 35 interviews showed five main themes: knowledge, cloud, tools, client, and data. Also, from the quantitative analysis, the main topics were cultural factors, Knowledge management tools, and knowledge transfer methods. The conclusion is that the most important factor is the organization's culture. The present study contributes to theory with a model of relevant concepts to transfer knowledge in cloud computing projects and contributes in practice to the identification of how to improve this process.

Keywords: knowledge management, cloud computing, IT project management, knowledge transfer, cultural factors.

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List of abbreviations

KM – Knowledge management.

CMDB – Configuration Management Database.

IaC – Infrastructure as a Code.

KS – Knowledge sharing.

KT – Knowledge transfer.

IT - Information Technology.

R&D – Research and Development

MS - Microsoft

Chapter 1 – Introduction

1.1. Topic context

In a dynamic business world, knowledge management is key to organizations staying competitive, creating prosperity, and improving performance (Li et al., 2020). Therefore, knowledge needs to be created, shared, stored, and applied to innovate (Fakhar Manesh et al., 2021). Regarding knowledge transfer (KT), this is part of the company's daily routines to reduce R&D costs, mitigate risks, facilitate the creation of new knowledge and innovation; and complement capacities (Majuri, 2022).

To enjoy the benefits of KT, it is important to understand what to do with the employees sharing their knowledge with others and the entire organization. The literature mentions the main factors as organizational culture (Sharovara et al., 2022); if there is some training and their characteristics (Chelagat et al., 2019); the structure of the knowledge transfer platforms (Zackarias et al., 2022) and team diversification (Zhou et al., 2023).

Within this broad theme of factors that influence knowledge transfer, the present study will focus on cloud computing projects. The reason for that is whether small or large, every project creates knowledge. During the project's entire duration, a substantial volume of data is gathered, assessed, and converted. The project data originates from diverse processes and is exchanged among the project team members. The gathered data are then examined in their respective contexts, combined, and processed to evolve into project information through different procedures. This information is disseminated either through spoken communication or stored and distributed in various reporting formats (PMI, 2017).

Furthermore, projects play a crucial role in generating value and advantages within organizations (Iriarte & Bayona, 2020). In the contemporary business landscape, organizational leaders must adeptly navigate constraints such as reduced budgets, shorter timeframes, limited resources, and swiftly evolving technology, all within a dynamic environment characterized by a rapidly accelerating pace of change (PMI, 2017).

Improvements and implementations of IT infrastructure are carried out through projects. An IT project encompasses managing IT infrastructure, information systems, or computers to provide an IT solution within a designated period (Jayakody & Wijayanayake, 2021). It also includes project management, which utilizes knowledge,

skills, tools, and techniques in project activities that aim to fulfill project requirements. This encompasses stakeholders, process groups, knowledge areas, as well as various tools and techniques (Al Swaidi, 2023). It is an important area to make sure that the IT infrastructure will be well implemented according to the budget and technical requirements.

To enhance competitiveness, companies must continually innovate and enhance their Information Technology (IT) infrastructure, given the escalating reliance on technology, increasing data, and expanding applications over the years (Korczak & Janiszewska, 2022). A popular approach is to migrate or increase IT infrastructure capacity through cloud computing. Cloud computing is a technology that enables users to access shared computing resources over the Internet as needed, offering a pay-per-use model for managing, storing, and processing data (Patil, 2021). It is a service model where organizations can have high performance and scalability by paying just what they use (Wang et al., 2020).

Knowledge sharing in IT projects can improve the performance and overall cooperation of the project teams (Du et al., 2019). Besides that, it also has the potential to minimize redundant tasks (Kazemi et al., 2020). On the other hand, when it doesn't happen, a project team leader loses the ability to integrate the various benefits offered by stakeholders, such as extensive experience, robust organizational management skills, and adept information processing capabilities. This integration is essential for the efficient and effective execution of large and complex projects (Du et al., 2019) .

In summary, the modern business landscape demands a robust IT infrastructure for operational optimization and a competitive edge. Cloud computing is strategically adopted for scalable solutions with a pay-per-use model. Project management plays a crucial role in executing IT infrastructure improvements within specified timelines and budget constraints. Knowledge transfer within projects is vital, offering significant advantages. To maximize these benefits, organizations should promote a culture of knowledge-sharing, considering factors like organizational culture, training programs, knowledge transfer tools, and team diversification. Therefore, knowledge transfer in cloud computing projects is the key to organizational success in the competitive market environment.

1.2. Motivation and topic relevance

The choice of this theme is motivated by the unexpected costs and delays in problem resolution during infrastructure maintenance, which are some of the consequences of the absence or inadequacy of knowledge management in cloud computing projects. As explained by Bayes et al., 2014, p. 22, "*If cloud computing is not fully understood, an organization can find itself building yet another collection of IT-silo-based software solutions that never delivers on its promises to the business.*". Besides that, based on personal experience, these projects are delivered after a migration without a clear understanding of what has been implemented in a cloud provider.

Knowledge needs to be considered a strategic asset, which implies that it should be integrated into the decision-making process throughout the management of change (Priya et al., 2019). Effective knowledge transfers help companies change according with market conditions and stay competitive (R. O. de Castro et al., 2022).In cloud infrastructure projects, they can promote not only cost savings and enhanced troubleshooting, but also improved team performance, innovation, and IT infrastructure optimization.

However, knowledge transfer is just one phase of the Knowledge Management process, and it depends on several environmental conditions. Multiple articles analyze these and how to improve the process inside the organizations. The contribution of the current investigation is to focus on cloud computing projects, such as Iriarte & Bayona, 2020 mentions in their article that the unique characteristics of each project affect its success.

Therefore, the present research has a main goal to contribute to the understanding of knowledge transfer in the context of cloud computing projects and provide practical insights for professionals and researchers in this field. Besides that, this investigation is also useful for Knowledge Management enthusiasts including project managers, IT managers, and KM managers since it can assist them in the decision-making process contributing to a better knowledge transfer in their projects.

1.3. Questions and research goals

The importance of the knowledge being shared during and after the end of cloud computing projects inspired the present study, which aims to analyze what are the impacted elements that can help share more information between the stakeholders involved. With this in mind, the following research question was established: **How is the knowledge transfer process experienced and perceived within cloud computing projects?**

The answer to this question goes through the main goals:

1. To explore and analyze the **cultural factors** influencing knowledge transfer.
2. To investigate how a **knowledge management tool** contributes to facilitating knowledge transfer.
3. To rank the **most effective methods, channels, and tools** for knowledge transfer.
4. Identify and **rank the factors** that significantly impact knowledge transfer in cloud computing projects.
5. Identify what are the **factors that influence** the knowledge transfer process within cloud computing projects.

There are studies indicating that the effective functioning of knowledge management practices relies significantly on organizational factors such as leadership style, organizational structure, corporate culture, and the availability of information and communication technology facilities (Priya et al., 2019). Therefore, objective 1, seeks to gain a deeper understanding of (i) the potential implications of disparities in different hierarchical roles and key stakeholders, such as Cloud Architects, project managers, IT managers, and Support Engineers; (ii) the impact of the leadership posture to encourage knowledge sharing; (iii) the common feeling from the employees regarding the cultural values be favorable or not to the knowledge transfer; (iv) the hybrid work environment if they are working together in the same office, or not and the impact of each scenario.

Furthermore, this investigation aims to evaluate the role of a knowledge management tool in these projects. We will examine whether the presence and use of this tool correlate with more knowledge transfer. In a study conducted in organizations in Southern Serbia, it was validated a positive influence by the application of knowledge management tools (Mihajlović & Apostolovska, 2020) It is important to highlight that knowledge management tools can be considered a community of practice, coaching, and knowledge repositories (Mazorodze & Buckley, 2020); Internet tools and platforms (Li & Li, 2021); communication tools and meetings (Matošková, 2020).

The present dissertation aims to enhance knowledge transfer in cloud computing projects through a comprehensive approach. It uses the Leximancer tool for semantic analysis to gain qualitative insights from open interview questions, uncovering factors influencing knowledge transfer that are not captured by questionnaires. Additionally, it

analyzes these factors quantitatively and ranks the most effective methods, channels, and tools for knowledge transfer based on closed-question questionnaire responses, identifying the most successful strategies according to respondents. Therefore, this current study comprehensively investigates the cultural and organizational factors, the role of knowledge management tools, and the most effective strategies to enhance knowledge transfer in cloud computing projects through both qualitative and quantitative analyses.

1.4.Methodologic approach

Following Figure 1, the present dissertation used a methodology comprised in seven steps, namely choice of theme, problematic's definition, research question, literature review, interviews with the experts, analysis of the results and discussion of them. To evaluate the results produced, will be adopted a mixed approach with the aim of obtaining a comprehensive and in-depth understanding of the factors impacting knowledge transfer in cloud computing projects. The qualitative method's openness facilitates unrestricted data collection, unconstrained by predetermined analysis categories, thereby allowing for a depth and detail that quantitative methods cannot offer (Mukhtar et al., 2020). On the other hand, quantitative research provides the advantage of producing measurable and comparable data that can be statistically analyzed to identify patterns, trends, and the effectiveness of different knowledge transfer methods and tools (Mohajan, 2020).

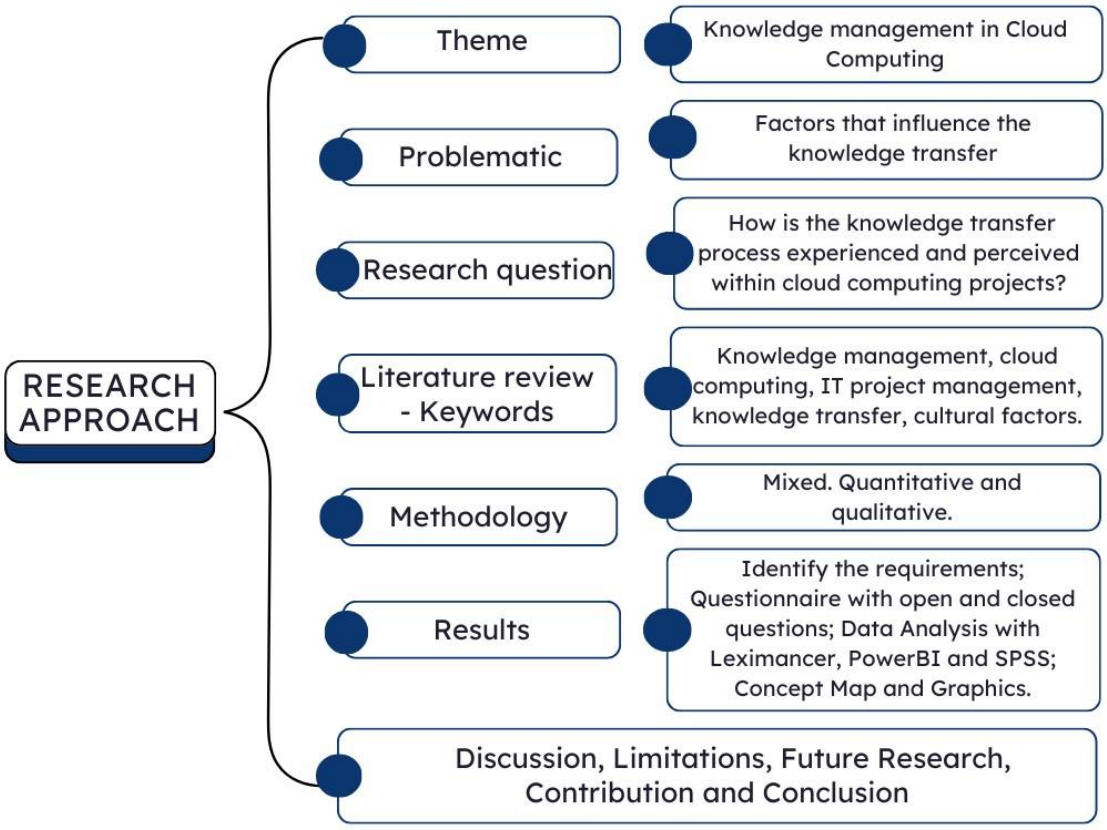


Figure 1. Research approach.

In the first step, a literature review was performed focusing on four main concepts: knowledge management, IT infrastructure, IT project management, and cultural factors. The literature search used keywords such as **knowledge management, cloud computing, IT infrastructure, IT project, project management, knowledge transfer, and cultural factors**. The articles and books were selected following the criteria: (i) main articles from the last five years; (ii) articles related to projects or IT in the knowledge management area; (iii) articles available to download. More than 80 articles and books were selected using this approach.

Using the concepts obtained from the literature review, it was elaborated on interview guidelines and assembled a sample of Cloud Architects, project managers, Chief Technology Officers (CTO), and IT directors for interviews. The focus of the interviews was identifying the main factors that impact knowledge transfer in the context of the projects related to cloud computing. The participants were selected from referrals by initial recruits and through calls using LinkedIn. In total, 35 professionals were interviewed. They are from different locations, for example, Portugal, Brazil and the United States and work for a variety of companies. Some are also internal and other

consultants. The interview was focused on the following areas: cultural factors, knowledge management tools, and processes to transfer knowledge.

These interviews enabled a detailed exploration of participants' perceptions and experiences, enriching their understanding of the cultural, structural, and collaborative aspects involved in knowledge transfer. The interviews were recorded using Zoom/Microsoft Teams and transcribed. The data obtained was analyzed using Leximancer software, which highlighted keywords.

Leximancer is a text mining tool that uses co-occurrence techniques to conduct semantic and relational analyses on text corpora, intending to uncover concepts, themes, and their interconnections (Lemon & Hayes, 2020). Leximancer involves an unsupervised and iterative process, free from preconceptions, to assess the frequency and relationships of concepts in the text. It identifies main concepts based on word interdependence, automatically inferring patterns and themes from the data. This approach helps to overcome the inherent biases and potential errors associated with manual coding and rule definition in classification processes, particularly by researchers (Smuts & Van der Merwe, 2022).

After the results were provided by Leximancer through the interview data, there was a discussion analyzing and interpreting the findings obtained. This section went to the meaning of the results, exploring their implications, and relating them to the research question and goals. Besides that, it also correlated with the existing literature presented in Chapter 2, highlighting areas of agreement and divergence. This discussion includes the research’s contributions, its limitations, and the opportunities for future research. Most importantly, it provides practical recommendations for the IT project stakeholders to improve the knowledge transfer in cloud computing projects.

The discussion was also complemented by the data obtained from the closed questions. For the data analysis, it was utilized by MS Power BI due to its robust capabilities as a cloud-based analytical tool that supports self-service business intelligence. It enables users to perform data slicing, extraction, and conversion into a variety of visualizations, which are essential for generating actionable insights. Power BI's components, such as Power Query Editor, Power BI Desktop, and Power BI Service, facilitate the processing and analysis of large datasets from various sources, ensuring data quality and providing a platform for interactive visual analytics. Its widespread use among researchers for effective business decision-making and its ability to handle enterprise-level data make it

an ideal choice for the study's quantitative analysis needs (Khalwadekar & Gogate, 2022). Finally, the SPSS tool was utilized just to build the sample description Table.

In summary, this dissertation employed a comprehensive methodological approach, integrating both qualitative and quantitative analyses to gain a thorough understanding of the factors impacting knowledge transfer in cloud computing projects. The qualitative insights derived from expert interviews and analyzed using Leximancer provided depth and detail, while the quantitative data processed through Power BI offered measurable and comparable results. This mixed methods approach not only highlighted key influences on knowledge transfer but also provided actionable recommendations for IT project stakeholders, contributing valuable findings to both the academic field and practical applications in cloud computing.

1.5. Structure and organization of the dissertation

The present study of the factors that influence the knowledge transfer process within projects related to cloud computing is organized into six chapters. The investigation goes through a theoretical analysis to collect what has been discussed in the literature, and after that, go to the people who work in this area to better understand what the most impactful factors are. At the end, this investigation aims to provide some recommendations to companies to improve the knowledge transfer process.

In this first chapter, it is explained what the context of the subject is, providing a summary about each concept that will be analyzed in the next chapters. Also, the relevance and motivation of the matter is highlighted. Finally, the methodologic approach for the research is mentioned.

Chapter 2 provides a comprehensive literature review on key topics related to the main question, covering knowledge management, IT project management, IT infrastructure management, and cultural factors. It begins by defining knowledge, distinguishing its types and levels, and discussing knowledge management concepts, models, challenges, and benefits. The IT project management section explores the definition of a project and its connection to knowledge management. The IT infrastructure section introduces basic concepts, leading into a detailed discussion on cloud computing and its deployment models. Finally, it examines cultural factors that could impact knowledge transfer.

Chapter 3 details the research methodology, outlining the design, goals, hypotheses, and the process of developing interview questions, along with the selection of the

population and sample. It also describes the methods of data collection and analysis. Chapter 4 presents the interview results, analyzed using Leximancer software and Microsoft Power BI. Chapter 5 discusses the themes and graphics. Chapter 6 concludes the dissertation with a summary of findings, offering recommendations for improving knowledge transfer and highlighting contributions to both the scientific and business communities.

Chapter 2 – Literature review

2.1 Knowledge Transfer Process

2.1.1 Knowledge

The elucidation of the thesis theme initiates with a fundamental concept - knowledge. This basilar concept will guide the understanding of knowledge transfer, and what is important to focus on regarding cloud computing, IT project management and cultural factors. The definition of knowledge relates to multiple fields of study, varying from practical viewpoints to philosophical inquiries, reflecting the complex nature of how humans think and comprehend. In a sentence, knowledge can be understood as the sum of the skills, values, objectives, know-how, that allows each individual to evaluate the context and new knowledge (Du et al., 2019; Vázquez-Ingelmo et al., 2020; Siddhartha Paul Tiwari, 2022).

Considering knowledge as a company asset, it gains in value as it becomes more accessible and formal. To illustrate this process, the dissertation will use the Beckman's Knowledge Hierarchy (Liebowitz & Beckman, 2020), which defines the six levels of knowledge, namely:

- Inputs: language, images, physical sensors, signals.
- Data: text, facts, code, images, sound (raw inputs) captured, digitized, and interpreted.
- Information: data with context and meaning.
- Knowledge: case, rule, process, model Applying information, principles, and experience from a specific field actively guides task execution, decision-making and problem-solving.
- Expertise: fast and accurate advice, explanation and justification of results and reasoning. Use of the knowledge to perform tasks, solve problems, make decisions, and learn new knowledge.
- Capability: organizational expertise, knowledge repository, integrated performance support system, core competence.

Nonaka & Konno, 1998 have categorized knowledge into two main types: tacit and explicit. Tacit knowledge, which is deeply rooted in an individual's experiences, beliefs, personal work, and practices, is challenging to articulate and share. It is practical information held by individuals, challenging to express, and therefore represents a valuable, scarce resource that is hard to replicate or replace (Gubbins & Dooley, 2021).

In contrast, explicit knowledge is readily quantifiable and qualitatively describable. Organizations can share explicit knowledge in different forms, like socialization, externalization, and internalization (Zackarias et al., 2022). Organizational efforts should focus on actively seeking explicit knowledge within various documents and tapping into individuals with the necessary skills for accessing tacit knowledge. Explicit knowledge can be readily accessed and transferred among individuals, whereas tacit knowledge can only be diffused among those who possess this specialized knowledge (Tzavidas et al., 2020).

The focus of this research is to understand how knowledge is externalized and internalized in cloud computing projects assuming all the levels of knowledge mentioned above. As mentioned by Tzavidas et al., 2020, externalization is the process of converting tacit knowledge into explicit forms, such as documents and databases, to facilitate its dissemination within the organization. On the other hand, Nonaka & Konno, 1998 mentions the "learning by doing", which means converting explicit knowledge into tacit ones.

2.1.2 Knowledge management

The domain of Knowledge Management (KM) is a multifaceted field, characterized by diverse definitions, factors influencing success, process models, and varying perspectives that shape its implementation and impact. This literature review sets the stage for an exploration of KM, highlighting the factors influencing KM success, models elucidating KM processes, and perspectives that guide its implementation, ultimately providing a comprehensive overview of this vital field. Additionally, the concept of Intellectual Capital Management is also mentioned, commonly considered a synonym of KM.

According to Kavalić et al., 2021, organizational success hinges on effectively utilizing, sharing, and applying knowledge, making knowledge management essential for leveraging and disseminating organizational expertise and information. Priya is defined as a process that involves developing, storing, retrieving, and sharing information and expertise within an organization to enhance and support its business performance (Priya et al., 2019). In addition to that, Mihajlović & Apostolovska, 2020 mention about the importance of KM to foster transformation and creativity. In resume, it can be defined as

the management of the processes, tools, people, and assets to use the knowledge in favor of the organization, improving its performance and innovating.

There is another concept important in the actual days, Intellectual capital management. Managing intellectual capital entails incorporating elements such as human capital, structural capital, and brand equity into the overall management system of a unified business structure, ensuring a cohesive integration of individual business units (Nifatova & Dudko, 2021).

The benefits of good knowledge management are countless. Kavalić et al., 2021 highlight the sustainability in organizations promoting potential competitive advantage and a circular economy. In the same article, it is also mentioned above that knowledge management be a require surviving in "turbulent business conditions". It also enhances work processes and increases business responsiveness to change, leading to reduced organizational costs and improved learning from experience (Kordova et al., 2022). Organizations capable of handling knowledge effectively will utilize resources more efficiently, leading to greater innovation and improved business operations (Kavalić et al., 2021). Regarding the people, it increases the organizational commitment decreases the turnover rates and improves the employee's performance (Kavalić et al., 2021).

The factors that influence the success of knowledge management have been studied for many years. Nonaka & Konno in 1998 presented the 'ba' concept, regarding the platform where relationships are made, for example, office, email, and shared experiences. Kavalić et al., 2021 remark as the KM infrastructural capabilities of leadership, culture, KM strategy, and technology.

One of the main challenges in knowledge management is transforming the tacit knowledge into an explicit one (Vázquez-Ingelmo et al., 2020). Also, intensifying competition, technological advancements, and the quest for creativity challenge corporations (Polyakov et al., 2020) represents some obstacles for KM. The study in Nepalese financial institutions (Khanal & Mathur, 2020), highlighted the lack of knowledge, sharing culture and insufficient KM infrastructure, including people, leadership, internal infrastructure, and expertise as the main impacts. Finally, in a recent study regarding virtual teams, it is worth noting that, managing the digital communication requires an adaptation over the traditional face-to-face communication for the KM team (Swart et al., 2022).

Knowledge Management (KM) involves a set of processes that effectively manage and leverage a company's accumulated knowledge to attain sustainability and adapt to evolving environmental changes (Fakhar Manesh et al., 2021). Kavalić et al., in 2021 identify the knowledge creation, knowledge sharing, and knowledge application as the main ones. For Khanal & Mathur in 2020, the process includes gathering, organizing, clarifying, sharing, and reusing information within an organization.

To bring it all together, Knowledge Management (KM) emerges as a multifaceted field with diverse definitions, process models, and perspectives shaping its implementation and impact. The review explores factors influencing KM's success, elucidates process models, and highlights perspectives guiding implementation. The benefits of effective KM are numerous, ranging from promoting sustainability and competitive advantage to enhancing organizational commitment and reducing turnover rates. However, challenges such as transforming tacit knowledge and adapting to digital communication in virtual teams underscore the dynamic nature of KM in contemporary business environments.

2.1.3 Knowledge sharing

As mentioned in the previous section, there are several models for the Knowledge Management process. In all of them, there is a phase of knowledge transfer. Some authors mention “knowledge sharing” (KS), or “knowledge distribution”, others as “organizational learning”. Knowledge transfer stands apart from other forms of transactions due to its unique nature, relying on a balanced exchange that ensures both participants derive equivalent benefits from the interaction (Tzavidas et al., 2020).

The present study will focus on this step. Knowledge-sharing holds significance within a project team, as it establishes a connection between team members, reducing costs, and improving overall project performance (Du et al., 2019). Project managers engage in continuous knowledge sharing across diverse stakeholders, departments, and hierarchical levels, emphasizing the growing importance of knowledge throughout the project life cycle, and recognizing knowledge management as pivotal for project success (Teng & Pedrycz, 2022).

Knowledge transfer can be a concept as a process by which one member of a network is influenced by the experiences of another (Majuri, 2022). This experience englobes their knowledge, behaviors, and skills (Zackarias et al., 2022). In the process of knowledge transfer, individuals collaborate and share significant ideas (Mazorodze & Buckley, 2020). KS is a socialization process, and the communication employed for exchanging

knowledge follows a nonlinear and iterative pattern (Lee et al., 2021). Sharing information is essentially a social interaction where individuals exchange knowledge, experiences, and skills they possess, enabling the dissemination and utilization of knowledge for potential enhancements (Rohman et al., 2020).

There are some key steps in the knowledge-sharing process: (1) awareness – identify where to find it, (2) acquisition – the source and receiver meet, (3) transformation – with it, the knowledge is converted into fresh knowledge to advance skills, (4) association – relates the knowledge with the company's needs, (5) application – apply it, and (6) knowledge feedback/externalization – share the knowledge created in the transformation and application to another person and refining explicit knowledge into a practical and accessible form through tasks like report editing, plan development, and market data analysis (Zackarias et al., 2022,Tzavidas et al., 2020)

The SECI model proposed Nonaka & Konno, 1998 designs a spiraling process where the tacit knowledge becomes explicit and vice versa. It is composed of four stages: Socialization, where the individuals share their ideas in the same environment. Externalization is the expression of knowledge in a way that everyone can understand. In Combination, there is a systematization of it and in Internalization, this knowledge becomes an organization's tacit knowledge.

Besides that, knowledge transfer occurs across various dimensions, encompassing interactions between individuals, individuals, and the organization, inter-departmentally, between organizations, and with the community. The basilar level is between the individuals. It is the process of expressing tacit knowledge, which is in the human brain, to another person (Duan et al., 2010). Before focusing on tools, processes, and structure, it's important to understand the culture, the people who are involved in the process of knowledge transfer.

Knowledge-sharing is commonly executed through diverse channels, either internally or externally within an organization, taking the shape of documentation, databases, communication, and group discussions (Du et al., 2019). Certain tools or activities frequently employed encompass communities of practice (CoP), succession plans, coaching, storytelling, knowledge repositories, mentoring, and job rotation, among various others (Mazorodze & Buckley, 2020).

A knowledge-sharing routine can improve work efficiency, innovation, and organizational learning (Du et al., 2019). It also helps to decrease the time for problem-solving (Kazemi et al., 2020) However, for this is necessary trust between the people involved (Majuri, 2022). In the Delphi method research performed by Duan et al., 2010, ten key factors which affect the knowledge transfer in projects were selected. There were the following: relationship and cultural awareness, common language, motivation, knowledge distance, selection of appropriate partners, objectives and focus, transfer channel, trust, and openness.

Therefore, knowledge transfer is vital in cloud computing projects, fostering connections, cutting costs, and improving overall performance. It involves a socialization process and systematic progression, exemplified by models like the SECI model. Using diverse channels and tools enhances efficiency, innovation, and problem-solving.

2.2 IT Project Management

Knowledge sharing is part of the entire organization's department and processes. The focus of this research is knowledge transfer in cloud computing projects. For thare, it’s important to understand what a project and its relevant aspects in the knowledge management subject is. The present study goes through the project concept, more specifically the IT project definition and the project management main topics – concept, project life cycle, the knowledge areas inside it, the challenges and what factors influence in the project success.

The PMBOK Guide concepts a project as a short-term effort aimed at producing a distinct product, service, or outcome (PMI, 2017). It means that a project has specific and measurable goals, which need to be achieved in a defined time range. Jayakody & Wijayanayake, 2021 concept as a non-routine complex with single-time effort limited by time, budget, and resources targeted to achieve stakeholder expectations by developing a product or service is considered as a project. More specifically, an IT project is related to hardware, software, and network development (Jayakody & Wijayanayake, 2021).

With the objectives, the projects change the organizations moving them from point A (current state) to point B (future state). Ideally, all the projects enable business value creation, where this future state is a result of some benefits generated by the project. The benefits are not just tangible as saving costs, increasing revenue but also intangible like brand recognition and better reputation.

Advancements in information technology (IT) are increasingly acknowledged as essential for businesses and personal lives, with organizations in various sectors leveraging IT projects to enhance efficiency, competitiveness, growth, and profit through automation, intelligent analytics, sustainability efforts, and the development of smart enterprises, reflecting a rising trend in ambition. Organizational leaders launch projects to address regulatory, legal, social, stakeholder, business, and technological needs, ensuring organizational viability and adapting strategies accordingly. Vujović et al., in 2020 defines IT project goals that produce an informational product, service, or result, typically realized through the introduction of information systems, new hardware or software, and user training.

In the PMBOK Guide, project management is considered as the utilization of knowledge, skills, tools, and methods in project tasks to fulfill project requirements. It enables organizations to meet business objectives and increase chances of success in their projects (PMI, 2017). To better organize the work in project management it is very common to use the phases described in the project life cycle. The project life cycle consists of the sequential stages a project undergoes from initiation to conclusion (PMI, 2017). There are several models of it, but the PMBOK Guide groups five main categories: initiating, planning, executing, monitoring, controlling and closing.

Implementing a well-established Project Management methodology is essential for successfully executing projects across all fields (Chandrachooodan et al., 2021). IT project methodologies include rigid waterfall models, while flexible methodologies like Agile, Scrum, and Kanban are more widespread and better adapted to rapid changes (Zasornova et al., 2022). The Waterfall model, a sequential project management methodology with six phases, including Requirements, Design, Implementation, Verification, Deployment, and Maintenance, is characterized by its simplicity, ease of understanding, and efficient management of production issues, ensuring budget adherence by emphasizing well-documented requirements before progressing to subsequent project phases (Sinha & Das, 2021).

Agile methodologies align with the Agile Manifesto's values, emphasizing small, regular deliveries through cross-functional teams to facilitate customer reviews and adaptations, promoting responsiveness to market needs, and minimizing the risk of creating irrelevant products in various industries, including IT and software development (Sinha & Das, 2021). Scrum is a collaborative agile development framework designed to address complex compatibility issues, emphasizing teamwork through a set of meetings,

tools, and roles to effectively manage product development and deliver high-value products (Hema et al., 2020).

While IT projects act as catalysts for change and business development (Iriarte & Bayona, 2020), according to the Standish Group's findings, nearly a third of the (31.1%) projects were categorized as failures, meaning they were either abandoned or canceled, while more than half of (52.7%) were finished with exceeded budgets, extended timelines, and/or unfulfilled features. Bourdeau et al., 2022 advocate that the reason for these failures is because the IT projects, beyond introducing just new technological capabilities, have the potential to bring about organizational transformations, encompassing the redesign of business processes, enhanced collaboration, changes in roles and responsibilities, and the establishment of new performance metrics, requiring a distinct focus on the solution's features and a unique change process compared to traditional IT project and organizational change management approaches.

The article of Iriarte & Bayona, in 2020 explores factors influencing the success of Information Technology (IT) projects, emphasizing the need for specialized examination due to unique complexities and risks, identifying key success factors such as top management support, change management, internal communication, and user involvement. Also, researchers support the view that IT project failure and poor performance can be attributed to various issues such as stakeholder resistance, interpersonal conflicts, cross-cultural differences, IT project managers' status reporting behaviors, stakeholders' mutual understanding, integration of fragmented pockets of specialized knowledge, and IT project leadership, rather than methodological or technical issues (Bourdeau et al., 2022).

The utilization of knowledge management tools enhances information flow, control, and knowledge distribution within project teams, incorporating modern IT elements like the Internet, search software, email, and databases to efficiently manage integration and distribution processes, ultimately increasing the likelihood of project success (Mihajlović & Apostolovska, 2020).

Knowledge Management (KM) surfaces as a pivotal success factor for projects, where the team's proficiency in accessing, exchanging, and integrating knowledge directly correlates with improved project capabilities, performance, and budget adherence (Emiliano de Souza et al., 2022). Mihajlović & Apostolovska, in 2020 discovered that ongoing knowledge sharing within a team enhances understanding of unresolved issues and existing knowledge, leading to improved decision-making, error correction, and

ultimately enhancing performance through innovative solutions to business problems. However, ensuring the availability of new knowledge generated in projects beyond their closure is crucial, as the structural separation inherent in projects, when teams disperse, may negatively impact the organization's knowledge processes, and hinder smooth knowledge sharing (Eriksson & Chatzipanagiotou, 2021).

To sum up, using a good project management methodology, like Agile and Waterfall, is important for success. Knowledge management (KM) is a key factor in helping teams understand and make decisions. Even though IT projects can be transformative, they face challenges with things like resistance from stakeholders and leadership issues. Making sure that knowledge from projects lasts, especially after it's done, is important because of the challenges when teams break up.

2.3 IT Infrastructure management

2.3.1 System infrastructure

In Gartner, 2023, the Global expenditures on IT services for banking and investment are projected to reach more than $ 5 billion in 2024. The result of this massive spending is visible daily by observing the business routine, the use of different applications, online meetings, and data analysis. Everything depends on the IT infrastructure. The knowledge transfer in this field can improve the performance in the companies' IT Infrastructure management. The section 2.3 goes deep in the IT infrastructure characteristics and explains the cloud computing strategy to better understand what information is involved in projects in this area.

In the ITIL V4 glossary, IT infrastructure is defined as all the hardware, software, networks, and infrastructure needed to create, test, deliver, monitor, manage, and support IT services (Axelos.com, 2019). Kovacevic et al., 2022 concept as a hardware and software framework, including physical and logical connections and interdependencies among various components. Over time, the evolution of IT infrastructures, driven by the increasing complexity and features of applications such as electronic commerce and big data, has necessitated the development of more sophisticated, scalable, dependable, and available infrastructures (Kolesnik & Rolik, 2021).

Author Sjaak Laan proposes an Infrastructure Model in which processes use information, and this information is stored and managed using applications. Applications need application platforms and infrastructure to run. Various categories of system management manage all of this. In Figure 2, Functional Management refers to the area of

systems management that guarantees the system is set up to carry out the required business functions (Sjaak Laan, 2023). Application management is responsible for the operations and configuration of clients, offices, and business specific applications.

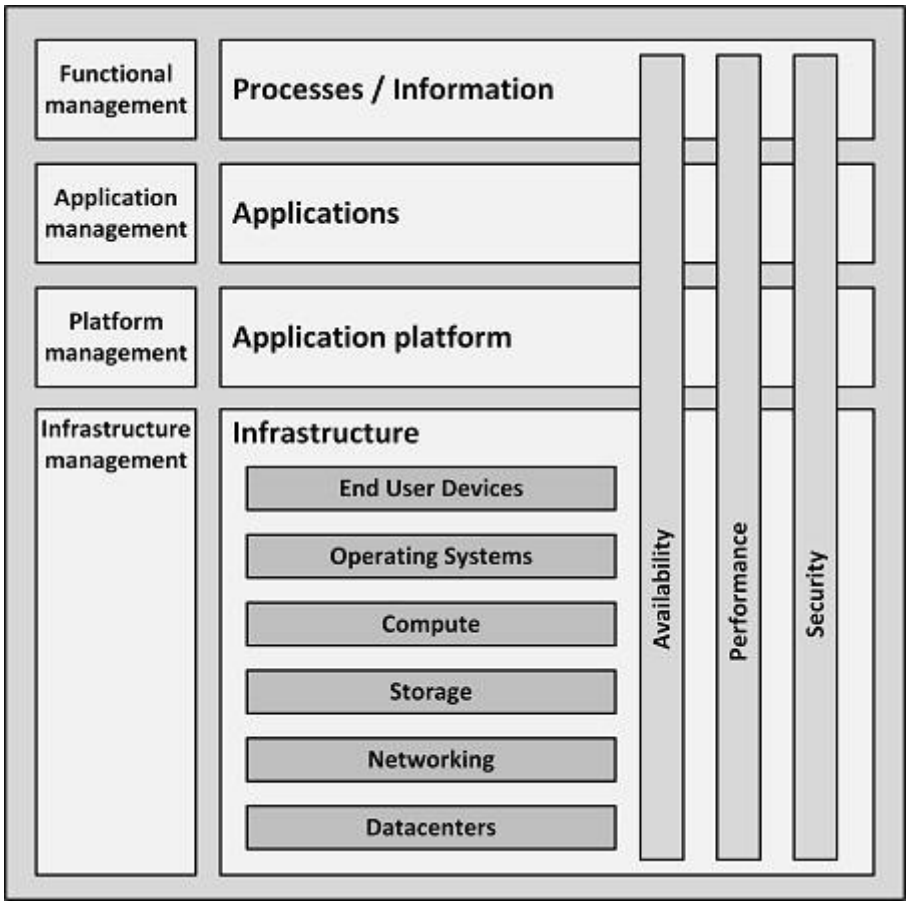


Figure 2. The infrastructure model. Source: Sjaak Laan, 2023.

Platform management englobes the components that allow the application to run, namely the connectivity, storage, and servers. the infrastructure building block is composed of end user devices, Operating systems, compute, storage, networking, and datacenters. The servers are divided into end user devices, traditional laptops, and the datacenters, where most of them are located. Inside each computer there is an Operating System, which is a collection of programs to manage it. Storage is the system that stores data, for example hard disks, and the network is responsible for connecting all these components, such as routers and firewalls. Besides that, it also includes processes like ITIL and DevOps, and tools like monitoring, backup, and logging (Sjaak Laan, 2023).

Non-functional and quality attributes include availability, performance, security, reliability, and scalability (Sjaak Laan, 2023). They are indirectly associated with the core

functions of a system, and they can impact directly on the finances and on customer trust. Non-functional attributes are crucial for the effective implementation and operation of an IT infrastructure, yet they often receive less focus than functional services in projects (Sjaak Laan, 2023).

Availability guarantees that users can consistently and promptly access data and IT resources. High availability design involves factors like calculating availability, managing human errors, ensuring infrastructure component reliability, and resilience planning. Performance can be understood as how quickly a system appears to perform its task in a predictable and consistent manner (Sjaak Laan, 2023). Security is related to how the data is protected. Lastly, the system needs to have confidentiality, integrity, and availability.

Focusing on the infrastructure management subject, it can be hosted on-premises, in a private cloud, in a public cloud, or a mix of them, through a hybrid cloud. As an on-premises option, the company is responsible for all components, including location, implementation, and maintenance. A private cloud address offers virtual hardware resources and an integrated system for managing and distributing virtual machines within the organization, utilizing existing infrastructure or new, separate infrastructure to provide Infrastructure as a Service (IaaS) to its users (Bhatia & Al Sulti, 2019).

Public Cloud offers computing, storage, and networking resources to the general public via the internet (Mansouri et al., 2020). Lastly, hybrid clouds, integrating both public and private clouds, offer advantages such as scalability, security, flexibility, and cost reduction, with critical activities handled by the private cloud and non-critical activities by the public cloud (Patil, 2021).

Documenting information about an IT infrastructure is crucial for sustaining a dependable, secure, and efficient IT environment; inadequate documentation may result in the loss of valuable insights into the infrastructure when systems managers depart from the organization (Sjaak Laan, 2023). There are three main forms to document it: Configuration Management Database (CMDB), diagrams and Infrastructure as a Code (IAC) tool. The CMDB is an inventory of the infrastructure components mentioned above with its location and function (Sjaak Laan, 2023). Diagrams, on the other hand, are a visual representation of the topology usually created using Microsoft Visio or Diagrams.net. The most recent option is the IAC tools, which promote handling knowledge and expertise through reusable infrastructure code scripts rather than the

traditional and manual-intensive work of system administrators, which is commonly slow, time-consuming, labor-intensive, and prone to errors (Kumara et al., 2021).

Sjaak Laan, 2023 defines the following minimum requirements for procedural documentation in IT infrastructure: routine tasks, an infrastructure naming convention, an IP addressing plan, a DNS naming convention, a fallback procedure, a disaster recovery plan, and the backup and recovery procedures.

To wrap up, as the business environment undergoes dynamic growth and increased complexity, the IT infrastructure is following the same path. Consequently, enhancing productivity, reducing cycle times, improving customer service, and boosting responsiveness have become crucial (Korczak & Janiszewska, 2022). For this, it's required to have good documentation of IT infrastructure characteristics and cloud computing strategies involved in related projects. Knowledge transfer needs to cover components of IT infrastructure, including functional and non-functional attributes to justify the financial costs.

2.3.2 Cloud infrastructure

The prospective adoption of cloud computing infrastructure, capable of deploying large-scale applications, represents a promising and cost-effective approach (Ahmed et al., 2021).Aligned with that, according to Gartner, 2023, "Global spending on public cloud services is forecast to increase 20.4% in 2024".

Cloud computing is a technology that enables users to conveniently access shared computing resources over the internet, constituting an internet-based approach for managing, storing, and processing data (Patil, 2021). In contrast, Bhatia& Al Sulti, 2019 argument that is more a delivery of computing as a service, than a product. The National Institute of Standards and Technology (NIST) outlines five essential characteristics of cloud computing, encompassing on-demand self-service, broad network access, resource pooling through a multi-tenant model, rapid elasticity for flexible resource scaling, and measured service offering automatic measurement of cloud resource usage (Bhatia & Al Sulti, 2019). From a technical perspective, Cloud computing is a powerful system that provides Information Technology (IT) resources on demand, utilizing virtualization technology to offer multiple virtual resources from the same physical server (Bhatia & Al Sulti, 2019)

Cloud computing offers several advantages, including high security, performance, multi-sharing capabilities, scalability, on-demand self-service, automatic software updates, and a pay-per-use model (Patil, 2021). Cloud computing offers enterprises a unique opportunity to swiftly gain competitiveness and leverage information technology (IT) service-oriented solutions with minimized upfront costs (Agbaegbu et al., 2021).

Cloud computing encompasses an extensive service model, offering optimal online services, with categorizations including Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) (Varshney et al., 2020). IaaS provides virtual machines, networking, and storage, requiring users to handle the installation and maintenance of operating systems and higher layers, illustrated by examples such as Amazon Elastic Cloud (EC2 and S3) and Microsoft Azure IaaS, while PaaS offers developers a scalable programming platform, exemplified by Microsoft Azure Cloud Service and Google App Engine (Sjaak Laan, 2023). SaaS, a service delivery model, revolutionizes the sale, purchase, construction, and utilization of software systems by providing users with web-based online applications that allow access without the need for deployment, installation, or maintenance concerns (Nowrin & Khanam, 2019).

Cloud computing is categorized based on ownership and control into private, public, hybrid, and community clouds, with public clouds provided by large companies to the public, private clouds owned by enterprises, community clouds shared among specific communities, and hybrid clouds combining two or more cloud categories (Bhatia & Al Sulti, 2019).

Cloud services encounter various challenges that require addressing, such as problems arising from insufficient knowledge of cloud resources and service descriptions, security issues, interoperability concerns, and difficulties in service discovery and selection (Agbaegbu et al., 2021). The knowledge transfer in projects related to this subject can be a solution for all these challenges, as the companies will be aware of the risks, the topology, and all the aspects of their cloud infrastructure.

In summary, the adoption of cloud computing infrastructure, capable of deploying large-scale applications, is considered a promising and cost-effective approach. Cloud computing, offering on-demand access to shared resources over the internet, involves categorizations such as Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS), each presenting distinct advantages and technical

aspects. The categorization of cloud services into private, public, hybrid, and community clouds reflects differences in ownership and control, with each type serving specific needs. Despite the benefits, cloud services encounter challenges related to limited knowledge about resources, security, interoperability, and service discovery, highlighting the importance of knowledge transfer to address these issues in the companies.

2.4 Cultural factors

2.4.1 Leadership and Management Support

Leadership is the people who determine the organization's course and goals. Its style can be authority, egalitarian, transactional, and transformational. Depending on it, the leaders help or prejudice the knowledge transfer. Leadership needs to be a role model encouraging the sharing among employees (Rohman et al., 2020). Empowering leadership involves sharing authority and responsibilities with employees to cultivate adaptability and receptiveness. Leaders, armed with exclusive information, guide employee behavior by providing signals and, through competencies and involvement in decision-making, contribute to heightened employee motivation and performance, instilling a belief in and focusing on their own capabilities (Bucher et al., 2022).

Managers must create suitable organizational conditions that facilitate the effective use of knowledge within enterprises (Kavalić et al., 2021). It's their active involvement in them and their engagement that builds the knowledge-sharing routine (Rohman et al., 2020). The neglected passive leadership significantly contributes to knowledge-hiding practices among individuals, and these practices, in turn, diminish creative self-efficacy. An effective leader not only creates essential knowledge for employees but also promotes its use by actively sharing and facilitating it, a trait absent in passive leaders. This underscores the importance of leader-subordinate interactions in reducing knowledge-hiding behaviors (Mubarak et al., 2021).

In the IT project management context, there are two perspectives to mention: (i) the project manager and (ii) the top management team. The effectiveness of project management is profoundly influenced by the pivotal role of the project manager, as scholars highlight the critical leadership position essential for guiding and motivating followers to achieve project goals (Ali et al., 2021). Simultaneously, the concept of top management, comprising senior policymakers such as the CEO, COO, CFO, business segment leaders, and vice president, plays a crucial role as a project stakeholder. Actively engaged in project planning and execution, top management formulates collaborative core values to address environmental impacts and organizational design challenges,

ultimately contributing to the overall effectiveness of project management (Ali et al., 2021). It's important to note that project effectiveness extends beyond the successful accomplishment of valuation operations, focusing on how distinct roles collaborate and synchronize to support organizational missions.

The expansion of computing applications as a strategic move in the IT era presents a challenge for the leadership team, requiring attention to various dimensions of cloud computing offers, especially in reliability and security (Dahooie et al., 2020). Their role is to encourage a new culture of inquiry and shape organizational strategies to align with it (Bhatta, 2021). Decision-making is crucial in modern organizations, especially for managers navigating intense competition and business uncertainty, with the value of information being paramount for success and firm growth. Utilizing management accounting information, covering areas like cost, capacity utilization, and customer satisfaction, supports strategic company growth through cloud computing projects. (Khaliq et al., 2021).

In summary, effective leadership, whether in guiding knowledge transfer, fostering a culture of questioning, or managing IT projects, plays a pivotal role in organizational success and growth, influencing knowledge sharing, innovation, and project effectiveness while addressing challenges in cloud computing offers and decision-making. In the present study, it will be analyzed if the commitment and support from top executives and organizational leaders influence the success of knowledge transfer in cloud computing projects.

2.4.2 Collaboration and Team Dynamics

The knowledge transfer is mainly about people, how they relate, where and when. After all, employees need from make the decision regarding the utilization of their tacit knowledge or not in favor of the enterprises (Kordova et al., 2022). It requires commitment and trust to the organization and among its employees (Rohman et al., 2020). In addition, each individual needs to have the attitude and behavior to share the knowledge they need to see that when they do, their performance increases (Rohman et al., 2020). Effective team collaboration and trust play a central role in knowledge management practices, facilitating the acquisition, sharing, and application of knowledge (Ghosh et al., 2022).

Knowledge givers experience satisfaction in aiding others and may develop a sense of belonging and increased workplace social interaction. Furthermore, when employees share knowledge, recipients often feel a collective social pressure to reciprocate,

perceiving it as a moral obligation, even if they initially did not intend to share knowledge. Active knowledge exchange fosters stronger bonds among employees, leading to mutual assistance in addressing role conflicts and encouraging improved job performance among those with job insecurity (Nguyen, 2023).

The pandemic has reshaped work practices, leading many companies to adopt hybrid models allowing employees to work from home, prompting a surge in active online knowledge sharing through platforms like internal forums. This voluntary exchange of information fosters a collective pool of ideas, social capital, and addresses challenges, contributing to enhanced job productivity among employees (Nguyen, 2023). Online knowledge sharing involves the voluntary exchange of information among employees through organizational online platforms like internal forums, contributing to the creation of a collective pool of ideas and social capital. This practice aids employees in overcoming challenges by sharing skills, experiences, and information, ultimately enhancing job productivity within the organization (Nguyen, 2023).

Communication between the organization members can happen in different ways, person-to-person, during meetings, and through social media. Social media serves as a web-based platform enabling workers to communicate messages either privately to specific colleagues or publicly to the entire organization, facilitating the sharing of information files among members at any time (Marbun et al., 2020). In the article of Marbun et al., in 2020, the authors discovered that there is a positive influence of social media culture on knowledge transfer. Social media technology facilitates both tacit and explicit knowledge transfer, leveraging the ease of knowledge sharing through social networking sites (Marbun et al., 2020).

In summary, successful knowledge transfer relies on good relationships, trust, and a positive sharing culture in a company. The way we work is changing, especially due to the pandemic, leading to more online sharing through platforms like forums, creating a group of ideas and social connections that boost job productivity. Communication through talking, meetings, and social media also plays a big part in making knowledge transfer work well, with social media having a positive impact on the process.

2.4.3 Organizational Culture and Structure

In a dynamic and competitive environment, organizations must continuously reinvent themselves to remain successful. Effective knowledge management, essential for sustaining a competitive advantage, involves creating and disseminating an organization's information and innovative ideas (Kordova et al., 2022). Factors influencing knowledge

transfer include adherence to standard processes, organizational culture, and employee resistance (Alhammadi et al., 2022). To become a learning organization, companies must foster an environment where employees actively exchange knowledge and expertise and emphasize continuous learning from past experiences (Kordova et al., 2022). This knowledge-sharing can enhance innovation (Rohman et al., 2020).

Organizational culture is a fundamental element in knowledge management and can be considered the predominant factor influencing knowledge-sharing effectiveness among employees within an organization (Attar et al., 2018).It can be defined as the common values, beliefs, and standards accepted by the company's members (Rohman et al., 2020). Organizational culture is a distinct subsystem within organizations, separate from other subsystems like business concepts, strategy, and technology (Marbun et al., 2020).This is something unique for each enterprise.

Maintaining the continuity of knowledge and operations poses a significant challenge for organizations. It is crucial for them to understand and manage their business history to avoid compromising the quality of services and products. The departure of a specific employee, whether through retirement, promotion, or other reasons, can lead to the loss of unique knowledge, affecting the overall efficiency of the organization (Kordova et al., 2022).

When each employee perceives a benefit during the exchange of information with others and the company, this increases knowledge-sharing (Rohman et al., 2020). Performance-based programs with the social exchange and social capital support, namely pay raises, bonuses, and promotions, contribute to knowledge transfer among the staff (Rohman et al., 2020).

In practice, knowledge sharing is a learning process (Kordova et al., 2022). The presence of multi-generational workforces, influenced by global crises like the COVID-19 pandemic, necessitates tailored training systems and personalized knowledge retention tools to support efficient productivity in workplaces with diverse generational characteristics (Kordova et al., 2022). As a widely acknowledged human resource strategy and solution for enhancing performance, training is a prevalent organizational practice (Chelagat et al., 2019).

In cross-functional teams, knowledge management between members with various professional knowledge at various stages is essential to ensure effective and seamless implementation (Alhammadi et al., 2022). When individuals are not motivated to interact or work with others of different age groups, knowledge transfer is hindered, preventing

the sharing of current knowledge for organizational continuity and impeding the addition of new knowledge to the collective memory for organizational improvement (Urick, 2020).

Therefore, organizational culture is a key factor in knowledge management, shaping the values and standards embraced by employees. Managing business history is crucial for organizational continuity, as the departure of employees can lead to the loss of valuable knowledge. Employee motivation, supported by performance-based programs, enhances knowledge sharing, while training remains a vital human resource strategy. In cross-functional teams, effective knowledge management is essential for seamless implementation, emphasizing the importance of fostering collaboration among individuals of different age groups for organizational improvement.

Chapter 3 – Research Methodology

3.1. Research design

The present study was designed using a mixed method with qualitative and quantitative approaches to get more insights regarding the factors. In recent years, there's been a push to merge qualitative and quantitative methodologies into mixed methods approaches. Instead of viewing them as opposing strategies, these approaches see them as complementary, aiming for a more comprehensive understanding (Borgstede & Scholz, 2021). Qualitative research is the nature of phenomena exploration, encompassing their quality, manifestations, context, and perspectives, characterized by a focus on words rather than numerical data, as it does not delve into the objectively determined chain of cause and effect (Busetto et al., 2020). Qualitative research is praised for its relevance, flexibility, and ability to explore subjects within their original context, offering in-depth insights and adaptability to research questions (Z. Song, 2023).

This qualitative approach is essential in investigating the factors influencing knowledge transfer in cloud computing projects, as it provides flexibility in exploring and uncovering the reasons behind observed patterns, particularly those that may be invisible or surprising (Busetto et al., 2020). For Lemon & Hayes, qualitative research is valuable for addressing questions about the how or why of phenomena, particularly in understanding process-oriented subjects, as it can clarify unoperationalized topics, offer fresh insights into familiar issues, and provide an in-depth understanding of phenomena by capturing people's actual lived experiences at specific, local levels with an emphasis on native accounts and rich description (Lemon & Hayes, 2020).

Quantitative methods focus on creating accurate mathematical representations of real-world phenomena, often expressed as functional relationships between variables. A key challenge lies in developing valid measures for these variables, which involves constructing numerical representations of the underlying empirical structures (Borgstede & Scholz, 2021). Quantitative research is a systematic, objective approach using numeric data to understand phenomena. It employs experimental or non-experimental designs to gather precise measurements, analyzed with statistical software. Researchers define questions, collect data, and analyze it statistically, emphasizing objectivity and control over variables (Mohajan, 2020).

This research was designed to reach the goals described in section 1.3, and it is composed of the following phases.

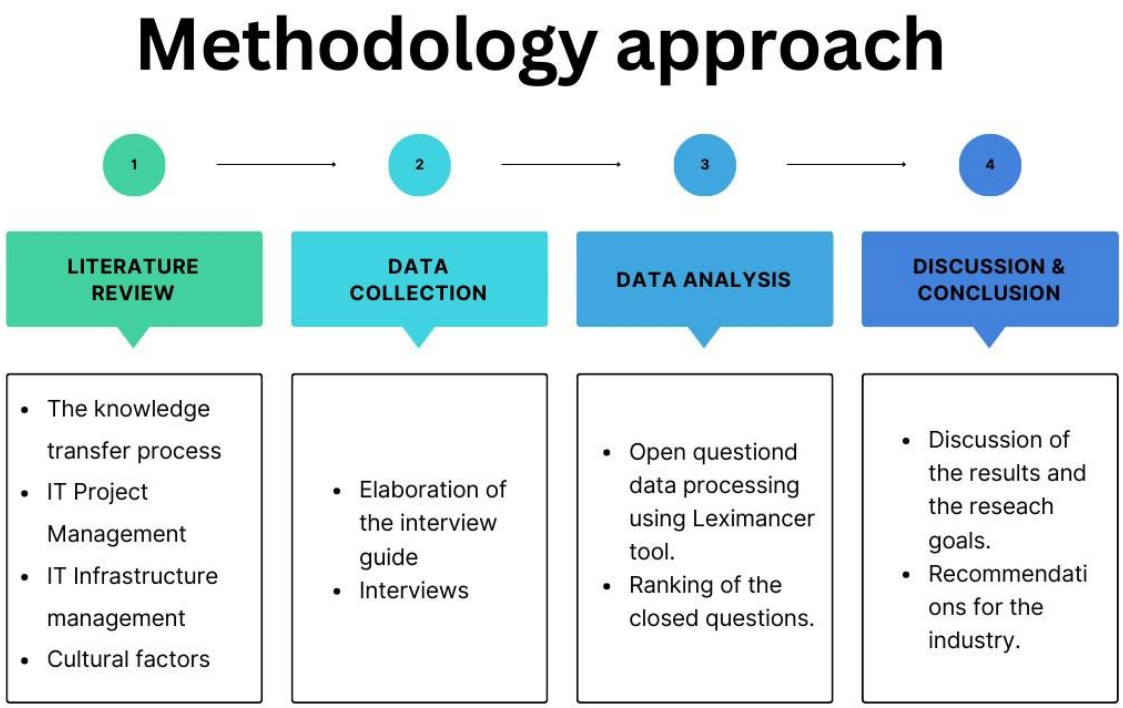


Figure 3. Methodology approach

The first phase consisted of an exhaustive search for scientific papers related to the themes and subthemes using the keywords: knowledge management, cloud computing, IT project management, knowledge transfer, and cultural factors. The search went through academic platforms like B-on, Google Scholar, ScienceDirect, and Scopus to get access to these scientific articles. The majority of them are from the last five years and were published in academic journals.

After the literature review, an interview guide was elaborated using questions mentioned in the articles read. As part of the interview guide, professionals in the roles of Cloud Solutions Architect, IT Project Manager, and IT Director were contacted through social media, namely LinkedIn, to join the investigation. An invite was sent for an interview, and this occurred through the platforms Microsoft Teams and Zoom. The interview, a commonly used qualitative research data collection technique, aims to uncover individuals' experiences and how they interpret these experiences through an interactive process where the researcher poses various questions to gather specific information about a particular subject, involving participants sharing their knowledge, intentions, feelings, and thoughts about the research. The main purpose of the interview technique is to obtain a unique kind of information that cannot be directly observed,

allowing researchers to understand how individuals perceive the knowledge transfer in cloud computing projects and attribute meanings to it (Dursun, 2023).

The third phase is regarding the data processing and analysis of them. The open questions in the interview guide were processed in the Leximancer tool and the end questions were through Power BI. Leximancer is a data-mining tool that utilizes machine learning and co-occurrence techniques to conduct semantic and relational analyses of text, intending to identify concepts, themes, and their connections (Lemon & Hayes, 2020). The choice of this tool is due to its great results in data analysis without bias.

Leximancer, when employed alongside its proprietary algorithms, is utilized to explore the content of text entries by identifying key concepts. It represents a quantitative approach to qualitative analysis, employing various algorithms for different stages. Moreover, this associated software aids researchers in generating an inductive repository of main themes with minimal intervention. The cited program monitors quantitative activities based on Bayesian statistical theory, employing algorithms and nonlinear elements. The approach focuses on three primary components: words, concepts, and themes. Additionally, Leximancer identifies connections between narratives, utilizing associated frequencies to create a visual representation known as a "concept map," with related concepts positioned closely to one another on the map (Arasli et al., 2020).

Regarding Power BI, it is a robust system designed to provide comprehensive business intelligence (BI) solutions, catering to both organizational and individual user needs. Its popularity has surged recently because of its ability to provide high-quality and fast implementation across various processes. It offers robust data protection features for reports, dashboards, and datasets within Power BI, ensuring secure sharing within and outside the organization, including exporting to formats like Excel, PowerPoint, and PDF (Ribeiro Seppe et al., 2023). Microsoft Power BI processes enterprise data by leveraging technologies like data cleaning, modeling, calculation, and visualization to address quantitative, systematic, and automated data analysis challenges. Power BI excels in its systematic, real-time, and monitoring capabilities, connecting over 120 data sources, simplifying data preparation, enabling instant statistical analysis, and generating interactive visual reports. These reports can be accessed via the web and mobile devices, facilitating continuous monitoring of various business operations (Cheng & Gu, 2022).

In the last phase, the results were discussed correlating with the literature review findings. In the end, it was suggested some recommendations for the stakeholders in cloud computing projects. In summary, this dissertation, conducted through a qualitative

approach, delves into the exploration of knowledge transfer in cloud computing projects. The chosen methodology involved an exhaustive literature review, the development of an interview guide based on identified themes, and engagement with professionals in relevant roles. The data collected was processed using tools like Leximancer and Power BI, facilitating semantic and relational analyses. The results, discussed about the literature, offer valuable insights into factors influencing knowledge transfer in cloud computing projects. Recommendations stemming from the findings are provided for stakeholders involved in such projects, emphasizing the significance of qualitative research in uncovering nuanced perspectives and contributing to a deeper understanding of the subject matter.

3.2.Questionnaire

The interviews were conducted using the following guide. It was divided into three phases: (i) control variables to collect demographic information, (ii) open questions to get details about the knowledge transfer process in cloud computing projects and (iii) closed questions to understand the methods, the tools, and cultural factors related to knowledge transfer. The control variables are listed and described in Table 1 below. Regarding the questionnaire, it was elaborated in February 2024 and the interviews during February, March, and April. Before that, there was a pre-validation of the questions with a professional in the field to improve the questions.

Table 1. Control variables

Variable	Description
Age	Number of years interviewed in the following ranges: • 20-30 • 31-40 • 41-50 • 50+
Industry type	The type of industry that the interview works in. • Finance and Banking • IT Consulting Firms • Cloud Service Providers • Healthcare • Manufacturing • Telecommunications • E-commerce and Retail • Education • Government • Energy • Transportation and Logistics • Automotive

Years of experience	The number of years that the interviewed worked in that position is described in the below ranges: • 1-5 • 6-10 • 10-20 • 20+
Location	Country where the interview works.
Scholarship level	Scholarship completed by the interviewee: • Secondary school • Bachelor's degree • Higher education/degree
Current role	Actual role where the interview works. • Cloud Solution Architect • Project Manager • IT Director

In the qualitative research, the second phase was composed of four open questions that were previously validated in the literature review. Besides that, each question is related to a specific goal of the present study as it's described in Table 2.

Table 2. Open questions

Goal	Addressing questions
Cultural Factors - Leadership Support	What are the actions of the organization's management and leadership characteristics which may influence the knowledge transfer in cloud computing projects? Please explain and give examples. (Vrabcová et al., 2022) (Shoeleh et al., 2019)
Knowledge Management Tool	Do you have in your company a structured knowledge transfer strategy for cloud computing projects? If so, how does it work? What tools do you use? Please explain and give examples (Vrabcová et al., 2022)
Standardized project documentation process	What are the practices that facilitate knowledge sharing in cloud computing projects? Please explain and give me some examples (Natu & Aparicio, 2022)
Factors that influence the knowledge transfer process - Knowledge characteristics and type	How do the characteristics of a cloud computing project influence knowledge transfer? Please explain and give examples (Vrabcová et al., 2022).

Moving on to the questionnaire with closed questions, all the questions were also validated by the article cited in the addressing questions. The full version is described in Appendix A. Therefore, for each participant of the research, they went through the control variables, the open questions, and the closed questions in an online meeting.

Chapter 4 – Results

4.1. Data Collection

The results acquired in this research aim to respond to the dissertation's question and the main goals of the scientific investigation. For this, the data gathered was analyzed through scientific data analytics tools, more specifically, Leximancer, Microsoft Power BI and SPSS. The current sample includes 35 interviews. Firstly, the sample was analyzed according to the control variables: age, industry type, years of work experience, workplace, level of scholarship, location, and current role.

Out of the 35 interviews, the majority were Cloud Solutions Architects (54,3%), followed by Project Manager (25,7%) and IT Director (20%). The main industry type is IT Consult firms with 45,7% and the main location is Portugal with 62,9%. Regarding age and years of experience, there is a predominance of senior professionals with more than 20 years of experience (48,6%), but the age is well distributed. Finally, the sample collected most people that have the flexibility to work from home (91,4%). Follow Table 3 for the entire sample description.

Table 3. Sample description

		N	Column N %
Age	20-30	8	22.9%
	31-40	9	25.7%
	41-50	10	28.6%
	50+	8	22.9%
IndustryType	Agriculture	1	2.9%
	Automotive	2	5.7%
	Cloud Service Providers	8	22.9%
	Finance and Banking	2	5.7%
	Government	1	2.9%
	IT Consulting Firms	16	45.7%
	Manufacturing	1	2.9%
	Telecommunications	3	8.6%
	Transportation and Logistics	1	2.9%
Experience	1-5	4	11.4%
	10-20	11	31.4%
	20+	17	48.6%
	6-10	3	8.6%
Workplace	At home	14	40.0%
	At office	3	8.6%
	In hybrid mode	18	51.4%
Scholarship	Bachelor's degree	17	48.6%
	Master's/PhD	10	28.6%
	Secondary school	8	22.9%
Location	Brazil	9	25.7%
	Portugal	22	62.9%
	Saudi Arabia	1	2.9%
	Spain	1	2.9%
	United States	2	5.7%
Role	Cloud Solution Architect	19	54.3%
	IT Director	7	20.0%
	Project Manager	9	25.7%

4.2.Qualitative Phase

The 35 (thirty-five) interviews were conducted through Microsoft Teams and Zoom in standard character, and they were recorded and collected from the transcript. The transcripts were edited to make sure that the data was accurate. This interview compilation represents the initial data treatment and interpretation of the collected and validated information by the participants. In sequence, the data was added to an Excel spreadsheet to be uploaded to the Leximancer tool.

In Leximancer tool version 5, the results were obtained through the following steps (Figure 4). In step 1. Select the document and excel spreadsheet that was uploaded. After that, in 2- Generate Concept Seeds, some concepts were merged or excluded due to not being related to the theme, like generic words, language vices, adverbs, and connectors. Example of concepts merged: ‘project’ and ‘projects’; ‘client’ and ‘clients’, ‘share’ and ‘sharing’. Example of concepts excluded: ‘certain’, ‘interesting’. The last edition was to select three tags to analyze with the themes: Cloud Solution Architect, Project Manager, and IT Director. At the end, the Concept Map was created with Quadrant Report.

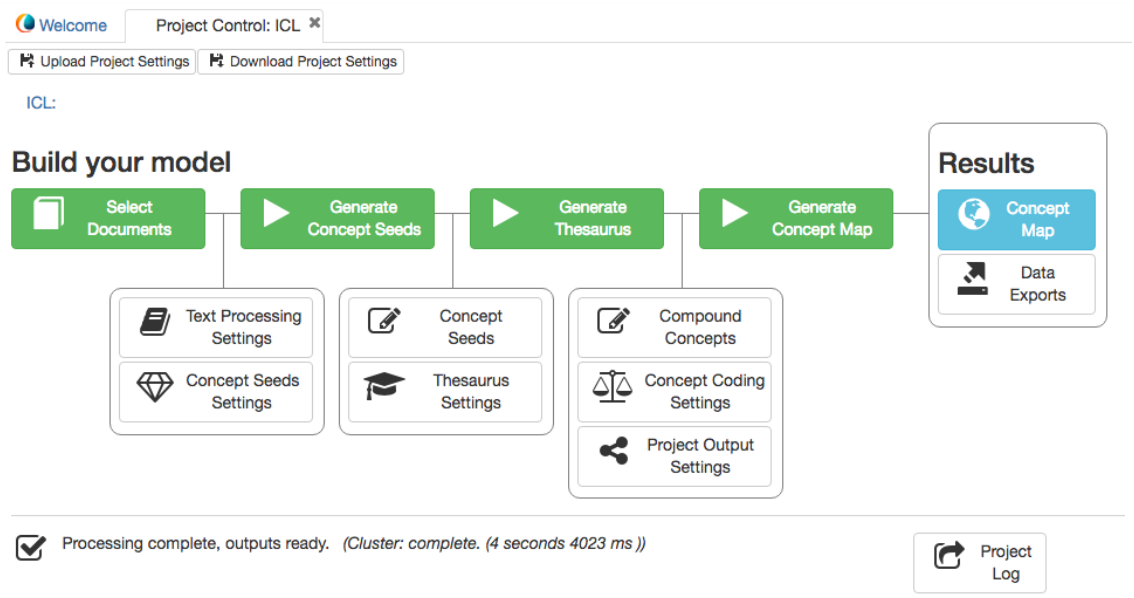


Figure 4. Leximancer Portal

Leximancer identifies recurring word combinations in a text, forming concepts that are then organized into themes (Engstrom et al., 2022). These terms, concepts, and themes will be referred to interchangeably hereafter. It is important to highlight that after each merge of words or optimization of data, a fresh concept map is required by Leximancer. This procedure is essentially semi-automatic, interactive, and recursive, being iterated as many times as necessary until the resulting output, in the form of a concept map, aligns with the research question and the literature review (Rodrigues et al., 2019).

The Concept Map was configured to ‘Concept’ 100%; and ‘Theme Size’ 48% to get five themes: knowledge, cloud, tools, client, and data as it’s showing in Figure 5. All of them will be discussed in the following sections. The concept map visually displays concepts and themes discovered. Themes are shown as larger bubbles, with their size indicating their importance or prevalence. The bubbles are colored to show prevalence:

warmer colors like red, orange, and yellow represent more prevalent themes, while cooler colors like green, blue, and purple represent less prevalent ones (Engstrom et al., 2022).

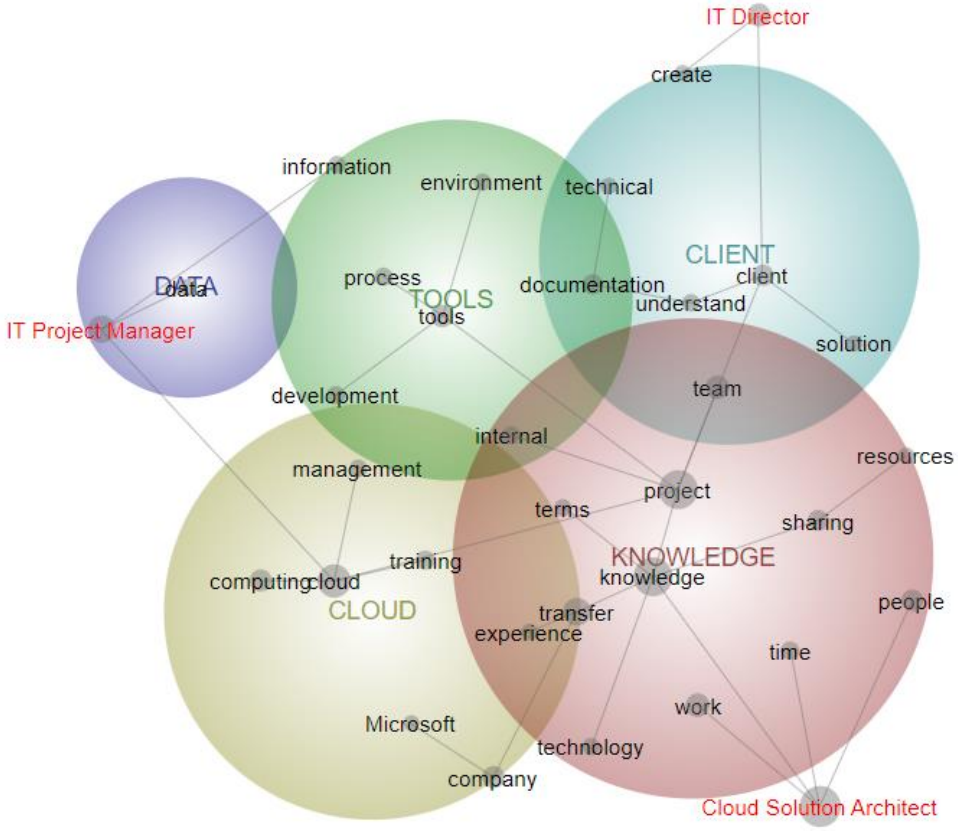


Figure 5. Concept map

The concept map contains 31 concepts and 5 themes: knowledge, cloud, tools, client, and data. The most relevant themes to the interviewees are knowledge and cloud, indicated by the larger bubble sizes and warm colors (red and yellow). The other three themes are less prevalent, shown in cooler colors and smaller bubble sizes. Based on the selected tags—Cloud Solution Architect, IT Project Manager, and IT Director—we can identify the key concepts frequently mentioned by each group. For instance, Cloud Solution Architects often highlight work, knowledge, time, and people. In contrast, IT Project Managers focus on data, cloud, and information, while IT Directors emphasize client and create.

Knowledge is the most cited theme during the interviews. The circles around it are cloud, client, and tools in order of the most correlated. Inside it, there are the following concepts: **knowledge, project, transfer, work, team, people, resources, experience,**

technology, work, terms, internal, sharing, and time. Some of the interviewees mentioned "*I find this transfer of knowledge very interesting; it provides a much closer connection to reality than simply studying technology momentarily. Especially because in the cloud, many technologies, in fact, do not operate independently.*". Additionally, the sharing was mentioned in the following interview excerpt: "*When team members are proactive and share a consensus, it becomes much easier to share knowledge." Recognizing that none of us knows everything and being willing to share with others fosters growth for everyone in the end*" (CSA, Brazil).

The Cloud theme includes the following concepts: **cloud computing, training, management, experience, Microsoft, and company.** It is also important to mention that this theme is highly connected with the knowledge theme and also intercepts the tools circle. A participant reported that "*cloud computing project has a very interesting aspect, which is the optimization of resource utilization. I believe the main driver for migrating to the cloud is cost. Given everything that is already sold, with the idea of bringing it to the cloud, maintenance costs, CAPEX or OPEX, you can optimize a lot of things. However, to achieve the desired cost optimization, a deeper understanding of computational resources is required*." (CSA, Brazil). Finally, Microsoft was one of the most cited cloud providers utilized by the participants, there are others also like GCP – Google Cloud Provider and AWS.

The use of tools was considered essential to transfer knowledge. Some of the tools used were specific for KM, for example, Confluence, Azure DevOps board, GitHub, and others for general purposes, such as meeting with the team through online platforms such as Microsoft Teams. The concepts related were **information, environment, process, documentation, development, and internal**. The documentation was considered crucial for the projects, some of the participants said "*So I think that within the development process, there must be a commitment to documentation, to information repositories, to code so that we can ultimately disseminate it. Because nowadays, a lot of things are not just code*" (Project Manager, Brazil).

Moreover, when asked, "What are the actions of the organization's management and leadership characteristics which may influence the knowledge transfer in cloud computing projects?" one of the participants replied: "*If the company doesn't have a good system for knowledge transfer managed by HR for example, especially the learning and development section in HR and they are following on this, there will be no knowledge transfer*" (CSA, Saudi Arabia). The environment can have a negative influence when not

well designed, as mentioned by one of the interviewees: "*In my work environment, many people end up being distant; it's not that collaborative atmosphere anymore. It has become more robotic; you pick up a task and do it*" (CSA, Brazil).

In contrast, the environmental concept was also used to refer to the cloud infrastructure of each customer. Here, the most important topic was how well the project stakeholders understand the cloud environment, and the better the results in the end. In their words, "*to make everyone aware of how the environment was structured and everything else, a knowledge transfer meeting is held"* (CSA, Brazil).

Others highlighted the importance of training, especially for new hires, and also including external collaborators. They also mentioned internal certification programs, internal workshops, internal centers of excellence for knowledge transfer, team reinforcement, internal meetings, and internal technical community as tools to have a good knowledge transfer process.

The main concern for Project Managers is data. The smallest circle in the Concept Map encompasses only one concept: data. They emphasize the importance of data protection not only during knowledge sharing: "The KT process is defined by the leadership in the organization. They set a series of rules, and regulations that everyone needs to follow. The purpose of these regulations and rules is to ensure quality and to ensure the data is secure. Data leakage is not acceptable, but also a concern related to cloud computing: "*Cloud computing has happened elsewhere, and you don't know where, and obviously that comes with quite an important security, safety, digital safety, and security console*" (Project Manager, USA).

Also, an interview participant explained that "*we can have a cloud computing project where only infrastructure people are involved or projects that only have people with more development and application knowledge or projects where the team is a truly dynamic team with various people from infrastructure, security, application, and data. So, I think all of this impacts the moment of sharing data because each of these areas involves technology, and each one has different methodologies when it comes to sharing knowledge*" (CSA, Portugal).

Another tool provided by Leximancer for examining and comprehending the data is the Insight Dashboard report as in Figure 6. This feature offers a more quantitative analysis of the data alongside graphical representations. This allows for a broad overview of the data files being analyzed. The graphical representation consists of quadrants

plotting strength (on the vertical axis) and relative frequency (on the horizontal axis). Tables are produced to function as reference aids for evaluating or examining variations. The statistical tables also indicate prominence, derived from strength and frequency scores using Bayesian statistics. One of the main advantages of this application is its accessibility to other researchers and its user-friendly interface, which doesn't require prior knowledge of the software (Gkevrou & Stamovlasis, 2022).

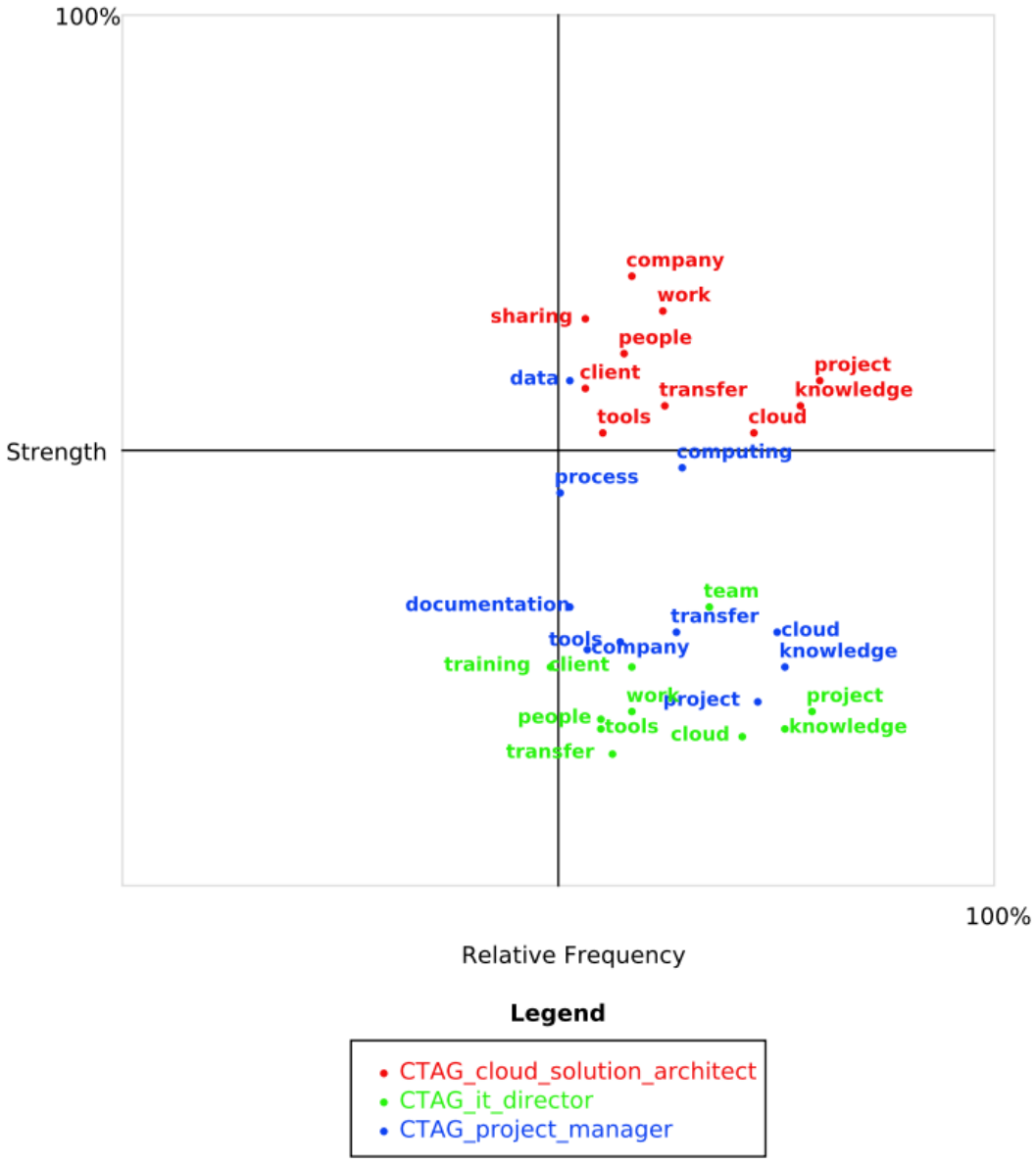


Figure 6. Insights Dashboard

Figure 6 presents the same 31 concepts divided into quadrants. Concepts associated with Cloud Solution Architects (CSAs) are in red, those for IT Directors are in green, and those for Project Managers are in blue. The most frequent and significant concepts, such

as work and company, are located in the top right quadrant. The least frequent concepts, like training, are found in the bottom left quadrant.

Regarding the concepts associated with CSAs, this can be exemplified with the following phrase from one of the interviews: *"So if the guys or the colleagues are stressed and overutilized, how can they make knowledge transfer to others?"* (CSA, Saudi Arabia). Also, about time and work, one interview subject noted: "*In our world with most of the companies trying to do some kind of cost cutting. So, if the project needs 5 resources it just assigns 3 resources or something like that because you don't have enough resources or if they assign 5 resources, the profit will be less"* (CSA, Saudi Arabia).

Another topic that was clear in the interviews was the concern of the Cloud Solution Architect (CSA) about the cloud technical aspects. So, when asking about "How do the characteristics of a cloud computing project influence knowledge transfer?", the CSAs compared a lot with the on-premises and dev projects. They mentioned the ease of sharing knowledge about cloud computing due to everything being available online and on-demand, they can create laboratories to reproduce scenarios and to test without a big impact and there is a lot of public documentation from the cloud providers available.

However, it will depend on the project's complexity. In their words, "*the more complex it is, the more opportunities for knowledge transfer we generate. When something is seen for the first time, and we need to invest more time, study, replicate something, or develop something internally before going to the client or partner to implement, demonstrate, or recommend any kind of process, it becomes a moment where we generate many internal discussions"* (IT Director, Portugal).

The client is central to the focus of IT Directors, a result driven by the executive board's strong commitment to business growth. The client provides the project scope, defines the environment for Cloud Solution Architects (CSAs), and supplies the data involved in the projects. Key concepts within this context include client creation, understanding, technical, documentation, team, and solution. Therefore, the client requires technical expertise to address their needs and deliver a solution, necessitating that the team has comprehensive documentation. About technical solutions, from one of the Cloud Solutions Architects interviewed "[The knowledge transfer strategy for cloud computing projects] *relates to your competencies, you have skills in certain areas, and if there's a need or if you simply want to, you should share that information with the rest of the team or even with people outside the team*" (CSA, Portugal).

For Project Managers, knowledge transfer in cloud computing projects hinges on technical proficiency, alignment between stakeholders, understanding and mapping abstractions between different platforms, managing security challenges, and comprehensive documentation for project continuity. As described by the interviewees, [The knowledge transfer] "*depends on who my clients are. A lot of things here are about compliance, reputation, protecting their data, the organization's data, their customer's data, and partner's data*" (Project Manager, USA).

In summary, this investigation conducted 35 interviews, edited transcripts for accuracy, and analyzed the data using Leximancer. The resulting Concept Map visually represents identified concepts and themes. Additionally, the Insight Dashboard report provides quantitative analysis and graphical representations, enhancing data comprehension. Overall, this iterative process aligns with the research question and literature review, emphasizing the importance of rigorous data analysis for meaningful insights.

4.3.Quantitative Phase

The second section of the interviews consisted of ten closed-ended questions focusing on knowledge transfer in cloud computing projects. These questions were categorized into two types: those using a Likert scale, where interviewees rated their agreement or disagreement with various statements, and those requiring participants to select the two most important options. The primary objective was to identify the key factors, processes, and tools that influence knowledge transfer in cloud computing projects. All the graphs are presented in Appendix D.

In examining cultural factors, four questions from the interview guide address this topic: questions four, five, six, and ten. Question four asked respondents to rank key characteristics of an organizational culture that fosters innovation, learning, and knowledge sharing. The most frequently selected factor was "Encouragement of continuous learning," followed by "Career plan" and "Supportive leadership." For Cloud Solutions Architects and Project Managers, "Encouragement of continuous learning" was the most influential, while IT Directors prioritized "Career plan." Individually, as reflected in question six, the most impactful factor was "Professional development opportunities," with "Positive team dynamics" and "Personal values" coming next. "Recognition and Acknowledgment" and "Trust and autonomy" also had significant, though lesser, impacts, while "Flexibility in work practices" was the least influential.

In question five, which used a Likert scale to assess how well the company overcomes language barriers, physical distance, and national culture in the knowledge transfer process, most respondents either strongly agreed (16, 45.71%) or agreed (13, 37.14%). Four were neutral, one disagreed, and one strongly disagreed. This suggests that knowledge transfer is effectively managed through non-physical methods, such as remote or hybrid work.

Question ten asked about the factors with the most negative impact on knowledge transfer in cloud computing projects. The leading negative factors were "Organizational structure and functions—resistance to change, high turnover rates, and poorly defined roles and responsibilities" and "Knowledge transfer is not a priority," each receiving 19 votes (27.14%). Other notable issues included "Employees/external consultants are not open to sharing knowledge" and "Procedure for knowledge transfer not defined or insufficient documentation to retrieve knowledge," both with 11 votes. "Lack of incentives and clear objectives" had six votes, and "Cultural and Training Challenges"

had four. Analysis by role (see Figure 7) confirms that the primary negative influences are organizational culture and the perception that knowledge transfer is not a priority. Therefore, the most significant factor is the career benefits for employees. If the organization lacks a culture of open dialogue between leadership and staff, and if processes are not well-defined, it can negatively impact knowledge transfer.

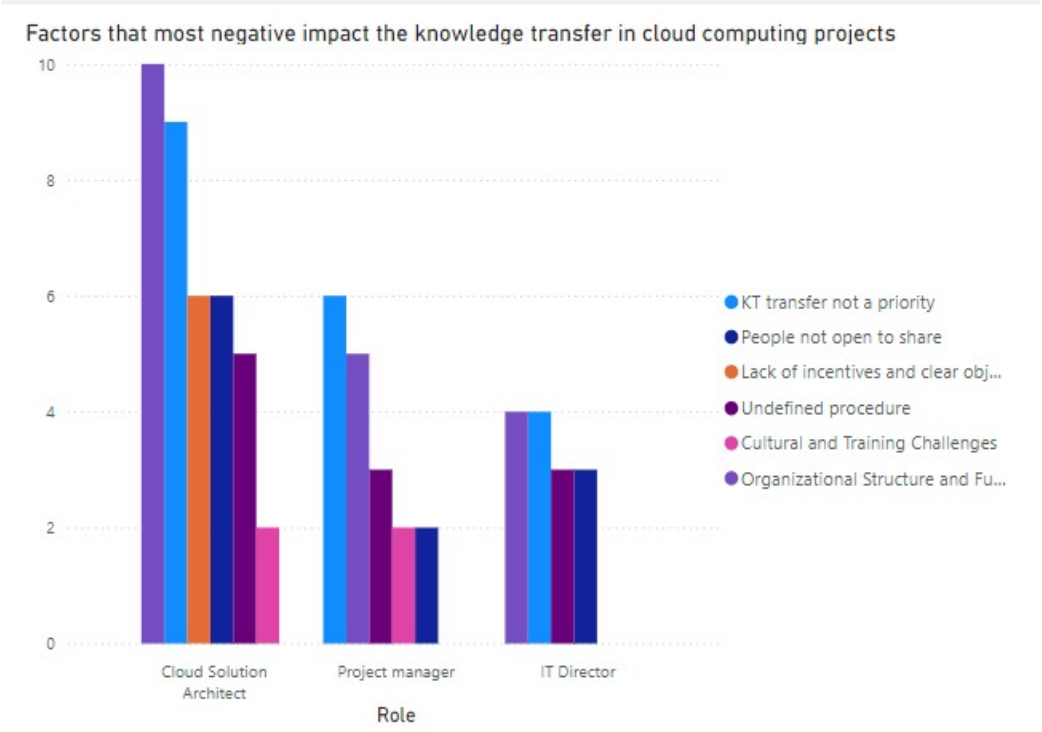


Figure 7. Factors that most negative impact the knowledge transfer in cloud computing projects

Regarding the use of knowledge management (KM) tools, the findings from questions three, seven, and nine provide valuable insights. In response to the statement, "Support software for knowledge management, such as artificial intelligence, should be used to enhance knowledge transfer," opinions were divided among neutral (7 responses), agree (14 responses), and strongly agree (14 responses). This indicates that 80% of respondents believe KM support software can effectively improve knowledge transfer.

Question three explored the channels used for knowledge transfer in cloud computing projects. The most frequently mentioned channels were knowledge management tools and wikis, with 22 responses, followed by team meetings with 16 responses. In contrast, question nine focused on tools used for preserving personal knowledge. Here, knowledge management tools/wikis were also the most common, with 26 mentions. Personal documents followed with 20 responses, while version control

systems and standard company documentation each had 8 mentions. Task management apps received 5 mentions, and digital whiteboards had 3.

From a role perspective, as illustrated in Figure 8, Cloud Solutions Architects showed a notable preference for personal documents over more public tools like KM tools or Git for knowledge conservation. This aligns with the responses from question seven, where the majority of participants (28) supported the use of KM software. When asked about the main KM tools used, options like Confluence, Notion, Azure DevOps Wiki, and SharePoint were most frequently cited. Although knowledge management tools were popular among personal tools as well, there was a significant use of personal documents, suggesting that some knowledge obtained from projects may not be shared with the team.

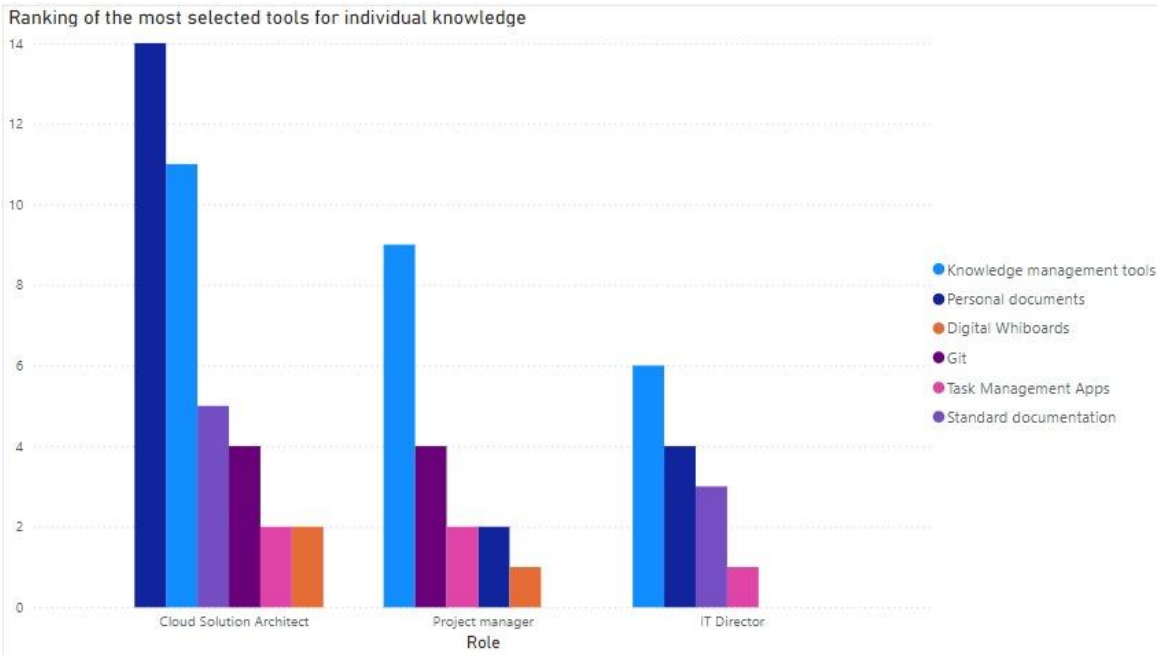


Figure 8. Individual tools

Finally, the analysis of knowledge transfer (KT) methods focused on identifying the most effective strategies for transferring knowledge from senior employees. The results revealed that Shadowing and Mentoring were the preferred methods, with 19 responses, while standardized documents were the least favored, receiving only 4 responses. Analyzing responses by experience level, as shown in Figure 9, Shadowing and Mentoring were identified as the most effective methods by senior employees with over 20 years of experience. In contrast, junior employees with 1 to 5 years of experience also valued Training/Learning sessions equally, with both methods receiving 3 responses each.

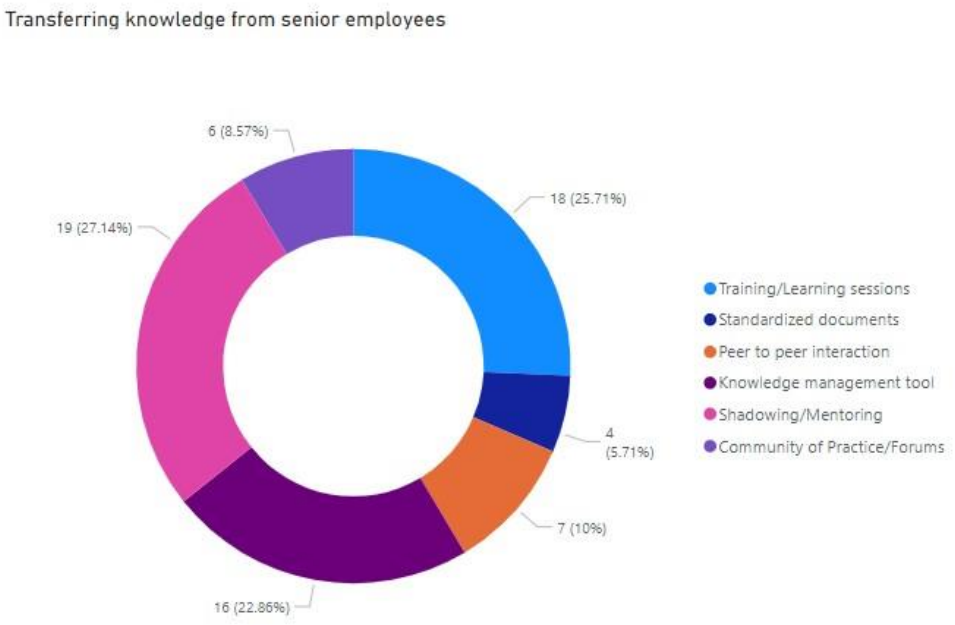


Figure 9. Knowledge transfer from senior employees

Participants also rated several statements using a Likert scale. Regarding the statement, "The disparities in the knowledge of different hierarchical roles and key stakeholders impact the knowledge transfer," most respondents agreed (51.43%), with some strongly agreeing (17.14%). Only 14% were neutral, and 9% disagreed or strongly disagreed.

On the statement, "An organized procedure concerning subjects to transfer and a built-in mechanism (technological tools) is better than in-person interaction," opinions were more divided. A substantial portion of respondents remained neutral (37.14%), while the second most common response was disagreement (34.29%). Agreement was expressed by 14.29%, and 11.43% strongly disagreed, with only one respondent strongly agreeing.

In summary, Shadowing and Mentoring emerged as the top choices for effective knowledge transfer, followed by Learning and Training sessions and Communities of Practice. Disparities in knowledge among different hierarchical roles and key stakeholders were seen as impacting knowledge transfer by most participants. Regarding the comparison between technological tools and peer interactions, opinions were predominantly neutral, but when considering only the agreed and disagreed options, a majority of respondents disagreed with the preference for technological tools over in-person interactions.

Chapter 5 – Discussion

5.1.Qualitative phase

5.1.1. Knowledge

A study by Fortune 500 companies estimates that improper knowledge management costs around $31.5 billion annually. Effective knowledge sharing, as highlighted by Davidavičiene et al., in 2020, transforms individual insights into organizational knowledge through social interactions, with its value determined by intrinsic accuracy, contextual relevance, and practical usability.

However, frequent personnel changes and continuous recruitment hinder the development of trust. Consequently, dissatisfaction with the organization's knowledge management practices leads to reduced knowledge sharing and uneven knowledge distribution among employees (Kipkosgei et al., 2020).

The literature indicates that multinationals can improve internal knowledge transfer by cultivating an organizational culture that encourages open dialogue and communication, fostering cooperation and collaboration (R. Castro & Moreira, 2023). According to the literature, the lack of time available for sharing information and identifying individuals who require precise knowledge often acts as a significant barrier to effective knowledge transfer. This time constraint can hinder the flow of crucial information, prevent timely dissemination of expertise, and ultimately impact the overall efficiency and success of organizational knowledge management (L. Song et al., 2022). In summary, their concepts found in the Concept Map (Figure 5) are aligned with the literature highlighting the importance of knowledge transfer and for it, the necessary time and culture.

5.1.2. Cloud

Knowledge sharing within organizations fosters employee development and innovation, with a key aspect being the transformation of tacit knowledge into explicit knowledge, driven by the community's need for interaction, understanding, and problem-solving, supported by social capital and human interactions (Oanţă, 2020). In a healthcare study, cloud technology brings significant advantages, including improved collaboration and information sharing within organizations. Features like computational science and engineering (CSE) enhance teamwork, while cloud strategies reduce costs and provide access to organizational resources from any location. Crucially in healthcare, cloud

technology facilitates timely data exchange among clinical teams, ultimately enhancing the quality of patient care (Sadoughi et al., 2020).

Cloud computing offers cost-saving opportunities for businesses by shifting IT services to on-demand models, but it requires new skills and management approaches. Companies must adapt to disentangle from traditional IT setups and engage with new contractual frameworks. However, a lack of expertise in maximizing cloud benefits poses challenges. Cloud adoption reshapes IT roles and requires a redefinition of business service skill sets. Organizations must acquire new skills and adjust business structures to optimize cloud technology. The shift involves disintermediation, eliminating middle layers in business transactions, and altering software and IT service industries' structures (Cusack & Adedokun, 2021) . Therefore, the interviews and literature show that cloud computing, while offering significant cost-saving opportunities and enhanced collaboration, necessitates new skills and management approaches to optimize its benefits and effectively transform IT roles and business structures.

5.1.3. Tools

Technology has become essential for organizations to manage routine functions such as communication, decision-making, learning, and knowledge management (Kipkosgei et al., 2020). Effective project documentation is a crucial aspect of IT projects, enhancing communication and ensuring project success. Various documentation approaches, including wiki applications, semantic repositories, and dedicated documentation frameworks, improve data structuring, communication, and project management (Gaie et al., 2021).

In particular, knowledge transfer through Wiki systems benefits from features like rapid access, simple editing, convenient linking, and maintainability, which streamline the sharing and modification of information (Hung & Wang, 2020). Additionally, organizational design plays a significant role in shaping knowledge transfer by influencing worker proximity, team structures, and hierarchical relationships, thereby affecting the efficiency of tacit knowledge exchange (Argote et al., 2022).

Furthermore, staff training is vital for internal knowledge transfer, helping employees acquire necessary skills and facilitating effective knowledge sharing. This aspect of an organization's talent development strategy not only improves productivity and competitiveness but also reduces employee turnover. Investing in education, performance evaluations, and incentive systems enables organizations to enhance employee performance and drive overall success (Hung & Wang, 2020).

5.1.4. Client

Client involvement in professional service firms (PSFs), such as consulting, is pivotal for effective knowledge transfer. They are expected to provide firm-specific insights and expertise to the consulting project team. This collaboration, where clients actively share their knowledge about problems and offer suggestions, enhances the consulting team's access to client-specific information and fosters relationships for future engagements. However, such close interactions can also create a dependency on the client for project execution, emphasizing the need for effective resource allocation and skill sharing to ensure successful knowledge transfer (Fu et al., 2023).

Effective communication skills are essential for knowledge sharing in projects, involving clear expression of ideas, understanding participants' reactions, and recognizing their attitudes. Knowledge sharing does not occur automatically but develops through skilled communication, which is particularly important in projects involving stakeholders from various organizations. Good communication helps manage expectations and coordinate efforts effectively (S. Li et al., 2023).

The literature also explores various frameworks and tools for IT project development, including a model tailored for agile management analysis. It highlights the critical role of comprehensive and accurate documentation in agile software architecture, addressing challenges like incomplete or outdated content. Gaie's research advocates for establishing project-specific documentation processes rather than relying on a one-size-fits-all organizational approach, recommending flexible documentation frameworks that meet the unique needs of each project (Gaie et al., 2021).

5.1.5. Data

Cloud data protection in cloud computing presents several challenges, including unauthorized access and privacy concerns. While strategies such as encryption and enhanced monitoring are employed to mitigate these risks, emerging technologies like mobile cloud computing and virtual machine (VM) migration introduce additional vulnerabilities. Solutions like trusted platform modules and natural language processing contribute to improved security, but balancing security with privacy and compliance remains essential(Khan et al., 2022).

Furthermore, cloud computing projects often involve diverse teams, making knowledge transfer critical. Research by Davidavičiene et al., 2020 underscores the importance of knowledge transfer within virtual teams, noting that cultural differences, organizational factors, and technological challenges can complicate this process. Cultural

diversity may lead to miscommunication and conflicts, hindering effective knowledge sharing. Although information and communications technology facilitates the exchange of knowledge, successful collaboration among team members is vital for organizational learning and maintaining a competitive edge.

5.2.Quantitative phase

5.2.1. Cultural factors

Researchers widely agree that organizational culture (OC) is a critical factor in the successful application of knowledge management (KM), with 80% of KM success attributed to cultural factors, as it significantly influences how employees create, share, and use knowledge within an organization (Aichouche et al., 2022). This was also mentioned in the NTB Province study, where the results showed that organizational culture had a positive and significant effect on KT (Wisnuharnowo et al., 2020). The results align with the literature, as management support and the career plan with benefits and salary increases are the main factors that resulted in the questionnaire in Rohman et al., 2020). The culture of knowledge sharing encompasses three essential principles: rewarding contributions based on their value, ensuring tolerance by avoiding unjust criticism or personal attacks, and fostering trust by preventing exploitation or unfair use of contributions (Pietruszka-Ortyl et al., 2021).

The personal investment individuals make in their knowledge, utilizing time, effort, skills, and intellect, often results in a higher valuation of that knowledge, potentially increasing the perceived cost of sharing it; therefore, without adequate compensation or incentives, individuals may be less inclined to share their knowledge, highlighting the importance of trust-based rewards as a motivating factor for knowledge sharing, contingent upon individuals' confidence in receiving benefits for their contributions, as indicated by experimental research (Haesebrouck et al., 2021).

Regarding the language barrier, physical distance, and national culture, some authors argue that the geographical and cultural disparities in virtual teams present significant barriers to knowledge sharing, complicating collaboration, and relationships among team members despite their integration of diverse skills and talents (Davidavičiene et al., 2020). Scholars emphasize not only the quantity but also the quality of shared knowledge. Recognizing that sharing high-quality knowledge online is vital for organizational success (Moser & Deichmann, 2021).

In the previous study, analyzing them by Zackarias et al., 2022 knowledge transfer was overlooked in projects, with organizations prioritizing project completion over

knowledge sharing, as project objectives primarily focused on production, and it impacted in the awareness phase. The study in a cement manufacturing plant in the UK, employing semi-structured interviews and focus groups, revealed several challenges: limited participation in decision-making, chaotic environments hindering sharing, restricted job autonomy and information flow, absence of leadership direction in promoting sharing values, lack of a reward system, encouragement of individualism over collaboration, and a lack of prioritization of knowledge retention among experienced staff (Iheukwumere-Esotu & Kaltungo, 2020), which corroborates with the results of this research.

5.2.2. Knowledge Management Tools

Advanced technologies are frequently employed to boost team performance, increase productivity, and establish conducive environments for knowledge sharing within teams, especially in settings where trust among team members plays a crucial role (Kipkosgei et al., 2020). In the article utilized as the source of questionnaire, all the five collaborators also agreed that (Kordova et al., 2022).

The literature highlights the importance of defining appropriate social networks for employees to use in knowledge transfer, considering usability and familiarity with program updates and functionality. Additionally, the availability and ease of use of ICT infrastructure, alongside tailored training and guidance, are crucial for enhancing knowledge flow and preventing information overload (Shoeleh et al., 2019). Besides that, with the growing Knowledge Management Tools market, there is a shift towards replacing conventional documents with a centralized repository, offering a singular location for comprehensive information retrieval (Kordova et al., 2022).

In knowledge-intensive firms, employees, particularly ICT consultants, may withhold new knowledge due to its perceived value as personal property, leading to demotivation in sharing as it may diminish their sense of power and competitive advantage, creating a social dilemma in knowledge sharing where contributors expect reciprocity but face the risk of non-contributors benefiting without reciprocating (L. Song et al., 2022).

5.2.3. Knowledge transfer methods

Knowledge transfer between younger and older employees is essential for preventing knowledge loss and boosting business success, but it faces challenges due to age and generational differences. While chronological age marks the years since birth, organizational age, which includes career stage, tenure, and expertise, offers a more comprehensive view, highlighting the importance of seniority and accumulated knowledge in facilitating effective knowledge transfer (S. Li et al., 2023). In Kordova's

article, the answers were documents, a good organizational culture, and a mentoring program (Kordova et al., 2022) which matches the perspective of most seniors.

Mentoring relationships focuses on developing positive and empowering connections through regular and reflective dialogues. Over time, these relationships enhance wisdom, enabling mentors and mentees to apply skills, knowledge, and experience to new situations and processes (Hung & Wang, 2020). Furthermore, in response to rapid technological changes and competitive environments, enterprises prioritize knowledge generation and sharing, focusing on both talent recruitment and employee training. Education and training are crucial for transferring knowledge within an organization, enhancing employee performance, productivity, and competitiveness, while also reducing turnover rates and boosting profits through integrated performance appraisals and incentive mechanisms (Hung & Wang, 2020).

Besides that, effective knowledge transfer demands high expertise and significant commitment. Organizations are transitioning to knowledge-based models, recognizing that employee knowledge is their greatest asset. To prevent the loss of key knowledge when employees leave, organizations must create conducive conditions for knowledge transfer (Vrabcová et al., 2022). Additionally, in project-based organizations, effective management and sharing of project knowledge is vital for preventing knowledge loss, addressing common problems, fostering innovation, and ultimately enhancing project success and driving improvements in products and services (S. Li et al., 2023).

Communication facilitates knowledge sharing and expertise development among individuals, fostering collaboration, coordination, and team performance, with altruistic traits playing a significant role, although reluctance to share knowledge may stem from the fear of losing a competitive advantage (Obrenovic et al., 2020). In a study exploring how coworker participation and peer support in training interact to affect motivation and knowledge transfer, the findings showed that social cues from peers in the training environment can significantly impact trainee perceptions, shaping attitudes through overt statements, directing attention to specific information, providing interpretations of environmental cues, and highlighting individual needs, as suggested by the social information processing perspective (Salamon et al., 2021). Therefore, social interaction is an important factor in the knowledge transfer process.

Chapter 6 – Conclusions and Future Research

6.1. Main conclusions

The research sought to answer the question: **How is the knowledge transfer process experienced and perceived within cloud computing projects?** Through an extensive literature review, interviews with open and closed questions and a data analysis utilizing different tools namely, Leximancer, Microsoft Power BI and SPSS, the conclusion is five main themes identified in the semantic analysis, namely knowledge, cloud, tools, client, and data. Furthermore, from the questionnaire, it can be addressed succinctly as: (i) cultural factors as the most important, an organization that embraces and priority the knowledge, including the encouragement for risks taking and the benefits provided by the ones who effectively share their knowledge through a career plan; (2) tools to facilitate and organize the knowledge across projects and teams and (3) processes defined to enable it and time available to apply them, including trainings, community of practices, meetings with the team.

Considering the objective 1 – To explore and analyze the cultural factors influencing knowledge transfer, it was achieved as cultivating a culture of open dialogue, collaboration, and trust is vital for enhancing knowledge management and organizational efficiency in cloud projects. Overcoming age and generational differences in knowledge transfer are critical, with mentoring, training, and social interaction emerging as valuable strategies. Ultimately, fostering collaborative environments that encourage social interaction and knowledge sharing is pivotal for driving innovation and success in cloud computing projects.

While investing in the 2nd objective, the literature review, aligned with the Leximancer results and the rankings obtained from the questionnaire, showed that a knowledge management tool significantly enhances knowledge transfer within organizations by providing efficient platforms for storing, sharing, and retrieving information. Tools like Confluence, Azure DevOps, and Microsoft Teams are crucial for managing decision-making and documentation. These tools ensure structured data management, facilitating project success and improving overall communication. Advanced technologies, such as centralized repositories and wikis, streamline information access and editing, making knowledge sharing more efficient. By leveraging

these technologies, organizations can overcome barriers to knowledge transfer, ensuring that information is effectively disseminated and utilized, thus enhancing overall productivity and collaboration.

Based on the analysis of responses from questions related to knowledge transfer tools, channels, and methods, it is evident that knowledge management tools and wikis are highly effective for facilitating knowledge transfer in cloud computing projects. These tools emerged as highly preferred channels for knowledge transfer. Shadowing and mentoring were identified as the most effective methods, with mentoring relationships facilitating wisdom enhancement and skill application. This comprehensive analysis underscores the significance of knowledge management tools and wikis as effective platforms for knowledge transfer, supported by the preferences and perceptions of the respondents. Moreover, the findings highlight the importance of communication and social interaction in facilitating knowledge sharing and expertise development among individuals.

Through the utilization of the Leximancer tool to analyze interview responses, this study aimed to discern the factors influencing knowledge transfer within cloud computing projects. The findings elucidated several interconnected themes, highlighting the intricate dynamics at play in the knowledge transfer process. Knowledge emerged as a central concern, intertwined with concepts such as cloud computing, client involvement, technology, and data management. Interviews highlighted the pivotal role of effective knowledge sharing for organizational success, emphasizing social interactions and organizational culture. Technology has emerged as crucial for team management and communication enhancement. Client involvement was deemed critical, with effective communication essential for knowledge sharing across diverse stakeholders. Furthermore, Project Managers' focus on data underscored the importance of data integrity and compliance.

Finally, with the analysis of closed-question questionnaires, this investigation aimed to uncover and rank the significant factors impacting knowledge transfer in cloud computing projects. Organizational culture emerged as a critical determinant, with a focus on continuous learning, career planning, and supportive leadership fostering knowledge sharing. Personal investment in professional development was prioritized, highlighting the importance of trust-based rewards for motivating knowledge sharing. Despite geographical and cultural barriers, online platforms played a pivotal role in facilitating

knowledge exchange. Challenges persisted, particularly with organizational structure and project priorities hindering effective knowledge transfer. Knowledge management tools were identified as essential, with popular platforms like Confluence and Azure DevOps Wiki centralizing information. Additionally, mentoring relationships and training sessions were highlighted for their role in transferring knowledge between different generations of employees. Communication and social interaction emerged as crucial factors, with co-workers participation significantly impacting knowledge transfer dynamics. Overall, fostering collaborative environments and prioritizing effective knowledge management practices are crucial for driving organizational success in cloud computing projects.

In conclusion, this research has identified key factors influencing knowledge transfer in cloud computing projects such as knowledge, cloud, tools, client, and data. Organizational culture, knowledge management tools, and effective communication also emerge as critical drivers. Cultural factors, such as continuous learning and supportive leadership, are vital for fostering knowledge sharing. Tools like Confluence and Azure DevOps Wiki facilitate efficient knowledge transfer, while mentoring and training sessions bridge generational gaps. Communication and social interaction play pivotal roles, highlighting the importance of collaborative environments. By prioritizing these factors, organizations can enhance productivity and innovation in cloud computing projects.

6.2.Contributions to the scientific and business community

This dissertation highlights that the knowledge transfer is a key factor to the companies innovate and stay competitive in the market. However, the organizations must be intentional in the matter and promote a culture that incentives the project stakeholders to share what they learned during the project in order to increase the company's intellectual capital and to allow improvements in the products and services. To do that, the results generate the following tips:

1. **Emphasize Effective Knowledge Sharing**: Recognize the critical role of knowledge in organizational success and prioritize effective sharing mechanisms to prevent financial losses and enhance efficiency.
2. **Cultivate a Collaborative Culture**: Foster open dialogue, collaboration, and trust within your organization to enhance knowledge management and overall efficiency.

3. **Adapt Skills and Structures for Cloud Technology**: Acknowledge the transformative potential of cloud computing and adapt skills, management approaches, and organizational structures to effectively leverage cloud technology for improved collaboration, cost optimization, and enhanced data exchange.
4. **Prioritize Training and Development**: Invest in training and development initiatives to enhance skill acquisition, productivity, and competitiveness, ensuring that your workforce remains up to date with the latest trends, technologies, and best practices.
5. **Leverage Advanced Technologies and Knowledge Management Tools**: Recognize the importance of advanced technologies and knowledge management tools, such as Confluence, Notion, and Azure DevOps Wiki, in centralizing information, preventing knowledge loss, and fostering effective knowledge sharing in project-based organizations.

Overall, this investigation underscores the pivotal role of knowledge transfer in driving innovation and maintaining competitiveness in the market. To maximize the benefits of knowledge sharing, organizations must foster a culture that incentivizes stakeholders to actively participate in sharing their insights and experiences. The recommendations provided offer practical strategies for promoting effective knowledge sharing, cultivating a collaborative culture, adapting to cloud technology, prioritizing training and development, and leveraging advanced technologies and knowledge management tools. By implementing these tips, organizations can enhance their intellectual capital, improve products and services, and ultimately achieve long-term success and sustainability.

6.3. Research limitations

The main limitation of this research is the sample size. Due to the limited time for the research, only 35 people were available to schedule the interviews. Also, just part of them were project managers, which may influence the results. There is also a national cultural factor involved as the majority of the participants were from Portugal. Finally, considering 51,4% of the interviewed were working in a hybrid mode, we could not compare the answers according to the workplace flexibility policies. From this perspective, this investigation is of an exploratory nature and should not be generalized in other contexts.

6.4.Future research proposals

For future work, it is recommended to expand the scope of the investigation by augmenting the sample size to encompass diverse geographical regions, thus enhancing

the generalizability and robustness of the findings. By including participants from various countries, we can capture a broader spectrum of perspectives and experiences, enriching the insights into knowledge transfer dynamics within cloud computing projects.

Additionally, it is proposed to develop a comprehensive framework tailored specifically for facilitating knowledge transfer within the context of cloud computing projects. This framework would serve as a structured guideline, delineating the processes, mechanisms, and best practices essential for effective knowledge exchange and collaboration in cloud-based environments. By establishing a standardized framework, organizations can streamline their knowledge transfer efforts, mitigate challenges, and maximize the benefits of cloud technology adoption.

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Appendices

Appendix A – Closed questions questionnaire

ID	Goal	Question	Alternatives
1	Cultural Factors - Collaboration and Team Dynamics	Experienced employees acquire tacit knowledge, the internal knowledge that they acquire through their work experience. What are the better options for this knowledge to be transferred, in your opinion? Select 2. (Kordova et al., 2022)	a) Training/Learning sessions; b) Standardized documents; c) Peer to peer interaction/unformal talks; d) Using knowledge management tools like Confluence, Notion, Azure DevOps Wiki, SharePoint.; e) Shadowing/ Mentoring; f) Community of Practice/Forums
2	Cultural factors - Organizational culture and structure	Disparities in the knowledge of different hierarchical roles and key stakeholders impact the knowledge transfer. (Vrabcová et al., 2022)	Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree
3	Knowledge transfer methods	What are the channels that you use to transfer knowledge in cloud computing projects? (Select Main 2) (Shoeleh et al., 2019)	a) Knowledge Management Tool / Wikis: Confluence, Notion, Azure DevOps Wiki, SharePoint.; b) Standard documents provided by the company/customer.; c) Company Communication Channels and Project Management Platforms email, Microsoft Teams, Google Chat, Jira, Asana, and Trello.; d) Text editors – Microsoft Word, Google Docs, and Notepad.; e) Meetings with the team; f) Internal communication and trainings: Workshops/trainings sessions, internal events, webinars, town hall meetings.
4	Cultural factors - Organizational culture and structure	What are the main characteristics, select 2, that are part of an organizational culture that promotes innovation, learning, and sharing of knowledge? (Shoeleh et al., 2019)	a) Career plan that values knowledge sharing, including financial recognition for the most engaged employees.; b) Open and inclusive communication through regular calls/meetings to strengthen team alignment.; c) Guarantee of collaborative work in the same location, promoting ease in the exchange of ideas and knowledge.; d) Encouragement of continuous learning, fostering

			the embrace of risk and experimentation as growth opportunities.; e) Flexible work environment, including the option of remote work for team adaptability.; f) Supportive leadership and transparent decision-making processes, promoting trust and collaboration in the workplace.
5	Cultural factors - Intercultural competencies	Your company overcomes the language barrier, physical distance, and national culture in the knowledge transfer process. (Vrabcová et al., 2022)	Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree
6	Cultural Factors - Collaboration and Team Dynamics	What are the individual factors that most influence the project members be willing to acquire and share knowledge? (Majuri, 2022) (Shoeleh et al., 2019)	a) Alignment with personal values, intrinsic motivation, and curiosity. ; b) Recognition and Acknowledgment; c) Professional development opportunities.; d) Positive team dynamics with constructive feedback and learning from mistakes.; e) Trust and autonomy.; f) Flexibility in work practices
7	Knowledge Management Tool	Support software for knowledge management, such as artificial intelligence should be used and improve the knowledge transfer. (Kordova et al., 2022)	Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree
8	Knowledge Management Tool	An organized procedure concerning subjects to transfer and a built-in mechanism (technological tools) is better than an in-person interaction. (Kordova et al., 2022)	Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree
9	Knowledge transfer methods	How do you conserve your knowledge? What tools do you use? (select main 2) (Kordova et al., 2022)	a) Knowledge management tools and personal wiki platforms, for example, Confluence, Notion, Azure DevOps, SharePoint.; b) Personal documents, including any text editor - Microsoft Word, OneNote, Google Docs, and exclusive access tools.; c) Digital

			Whiteboards: Miro, Microsoft Whiteboard.; d) Version control system: Git.; e) Task management apps such as Todoist and Asana.; f) Standard documentation provided by the company.
10	Factors that influence the knowledge transfer process	What are the factors that have the most negative impact in the knowledge transfer in cloud computing projects? Max 2. (Zackarias, 2022)	a) Knowledge transfer is not a priority. Time constraints for knowledge transfer and ineffective communication channels, including the absence or inefficiency of a knowledge transfer platform.; b) Employees/external consultants are not open to sharing knowledge, fearing obsolescence and the risk of job or business insecurity.; c) Lack of incentives and clear objectives. Misinterpretation of knowledge due to differences in experience and/or frustration from lack of guidance in the past.; d) Procedure for knowledge transfer not defined or insufficient documentation to retrieve knowledge.; e) Cultural and training challenges: cultural barriers, including language and local cultural differences, and inadequate training programs.; f) Organizational structure and functions: resistance to change, high turnover rates, and poorly defined roles and responsibilities.

Appendix B – Concepts by Leximancer

Concept	Kind	Count	Relevance_percentage
Microsoft	NAME GENERAL	72	5
project	WORD	1028	68
knowledge	WORD	972	64
cloud	WORD	812	54
transfer	WORD	480	32
work	WORD	400	26
team	WORD	368	24
tools	WORD	364	24
people	WORD	352	23
company	WORD	316	21
client	WORD	308	20
computing	WORD	300	20
sharing	WORD	268	18
documentation	WORD	244	16
training	WORD	204	13
time	WORD	172	11
process	WORD	168	11
environment	WORD	148	10
information	WORD	148	10
development	WORD	144	10
data	WORD	136	9
internal	WORD	132	9
management	WORD	128	8
understand	WORD	124	8
technology	WORD	116	8
technical	WORD	104	7
solution	WORD	100	7
terms	WORD	96	6
resources	WORD	96	6
create	WORD	84	6
experience	WORD	80	5
CTAG:cloud_solution_architect	TAG VARIABLE	1512	100
CTAG:project_manager	TAG VARIABLE	748	49
CTAG:it_director	TAG VARIABLE	540	36

Appendix C – Themes by Leximancer

theme	hits	hit_text	connectivity	concepts
knowledge	1996	When people know each other, like, "Oh, I know you, we work on the same team, so let's share ideas." I believe management should allocate time for that to happen.	18852	knowledge, project, transfer, work, team, people, sharing, time
knowledge	1996	When people know each other, like, "Oh, I know you, we work on the same team, so let's share ideas." I believe management should allocate time for that to happen.	18852	knowledge, project, transfer, work, team, people, sharing, time
knowledge	1996	When people know each other, like, "Oh, I know you, we work on the same team, so let's share ideas." I believe management should allocate time for that to happen.	18852	knowledge, project, transfer, work, team, people, sharing, time
knowledge	1996	When people know each other, like, "Oh, I know you, we work on the same team, so let's share ideas." I believe management should allocate time for that to happen.	18852	knowledge, project, transfer, work, team, people, sharing, time
knowledge	1996	It would be good to have dedicated time for knowledge transfer among teams and at the same time to have identified who are these people who will do it and what exactly they have to pass on? It's not because I also see that in all the projects I've participated in over the years.	18852	knowledge, project, transfer, work, team, people, sharing, time
cloud	1148	In these cases, providing training is crucial, and typically, cloud computing providers offer this training along with certifications. While these certifications are necessary, they are not sufficient.	8272	Cloud, Company, Computing, Training
cloud	1148	In these cases, providing training is crucial, and typically, cloud computing providers offer this training along with certifications. While these certifications are necessary, they are not sufficient.	8272	cloud, company, computing, training
cloud	1148	In these cases, providing training is crucial, and typically, cloud computing providers offer this training along with certifications. While these certifications are necessary, they are not sufficient.	8272	cloud, company, computing, training
cloud	1148	In these cases, providing training is crucial, and typically, cloud	8272	cloud, company,

		computing providers offer this training along with certifications. While these certifications are necessary, they are not sufficient.		computing, training
cloud	1148	Current-role: cloud_solution_architect LEX_ANONYMOUS_COLUMN_6: cloud_solution_architect COLUMN: do-you-have-in-your-company-a-structured-knowledge-transfer-strategy-for-cloud-computing-projects_-if-so_-how-does-it-work_-what-tools-do-you-use_-please-explain_and_give-examples. We have in a structured way a training department. Which in most cases operates through online courses, so it's the preferred action or if it weren't us, a cloud company, we also have offerings of face-to-face courses, but these are usually done through partners.	8272	Cloud, Company, Computing, Training
tools	568	The tools used included Confluence as an information repository and Github as a code repository, also used as a reference for documentation. Typically, much of the know-how is recorded in code comments and embedded logic decisions.	5824	tools and documentation
tools	568	The tools used included Confluence as an information repository and Github as a code repository, also used as a reference for documentation. Typically, much of the know-how is recorded in code comments and embedded logic decisions.	5824	tools and documentation
tools	568	Whether a project progresses or not, the documentation is comprehensive, serving as a reference for future proposals. Our tools primarily include Microsoft Teams for communication, SharePoint for documentation repository, and Bitbucket for code repository.	5824	tools and documentation
tools	568	Whether a project progresses or not, the documentation is comprehensive, serving as a	5824	tools and documentation

		reference for future proposals. Our tools primarily include Microsoft Teams for communication, SharePoint for documentation repository, and Bitbucket for code repository.		
tools	568	Regarding documentation, the project is usually done by our partners, so they will have their tools, and we rarely do projects directly. We have projects done directly in Portugal, we have them in other countries when they are large-scale projects.	5824	tools and documentation
client	308	In reality, we follow the client's strategy. We don't have a predefined strategy to replicate for clients.	3036	client
client	308	In reality, we follow the client's strategy. We don't have a predefined strategy to replicate for clients.	3036	client
client	308	You establish a page containing various courses, articles, and presentations discussing specific cases and individual clients. People can then access and study this material, not only independently but also be encouraged to conduct their studies.	3036	client
client	308	You establish a page containing various courses, articles, and presentations discussing specific cases and individual clients. People can then access and study this material, not only independently but also be encouraged to conduct their studies.	3036	client
client	308	Current-role: project_manager LEX_ANONYMOUS_COLUMN_6: project_manager COLUMN: what-are-the-actions-of-the-organization_s-management_and_leadership-characteristics-which-may-influence-the-knowledge-transfer-in-cloud-computing-projects_-please-explain_and_give-examples. So it depends on who my clients are. A	3036	client

		lot of my clients are in the financial service industry.		
data	136	Because it essential to know is what type of migration we are undertaking. Are we migrating infrastructure as a service, simply transferring virtual machines with all their components to a data center completely beyond our reach and control?	552	data
data	136	Because it essential to know is what type of migration we are undertaking. Are we migrating infrastructure as a service, simply transferring virtual machines with all their components to a data center completely beyond our reach and control?	552	data
data	136	They set a series of rules and regulations that everyone needs to follow. The purpose of these regulations and rules is to ensure quality and to ensure data.	552	data
data	136	How do we handle data and how do we handle it, how do we secure that data? OK, so everyone is very sensitive and needs to be very careful when handling the data.	552	data
data	136	Data leakage is not acceptable. When it comes to data leakage, everyone hears about the financial penalties.	552	data

Appendix D – PowerBI Graphs

The following graphs were created in PowerBI.

Question 1. Experienced employees acquire tacit knowledge, the internal knowledge that they acquire through their work experience. What are the better options for this knowledge to be transferred, in your opinion? Select 2.

a) Training/Learning sessions;
b) Standardized documents;
c) Peer to peer interaction/unformal talks;
d) Using knowledge management tools like Confluence, Notion, Azure DevOps Wiki and SharePoint.;
e) Shadowing / Mentoring;
f) Community of Practice/Forums

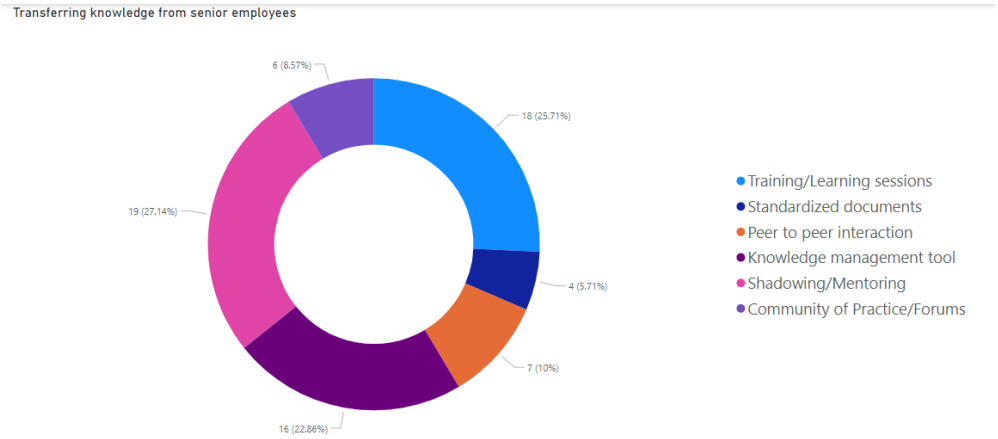


Figure 10. Transferring knowledge from senior employees

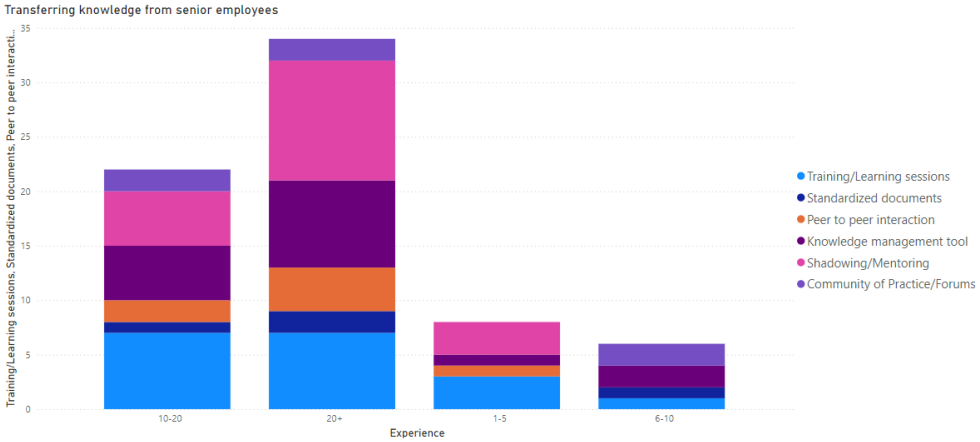


Figure 11. Best methods for transferring knowledge

Question 2. Disparities in the knowledge of different hierarchical roles and key stakeholders impact the knowledge transfer.

Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree.

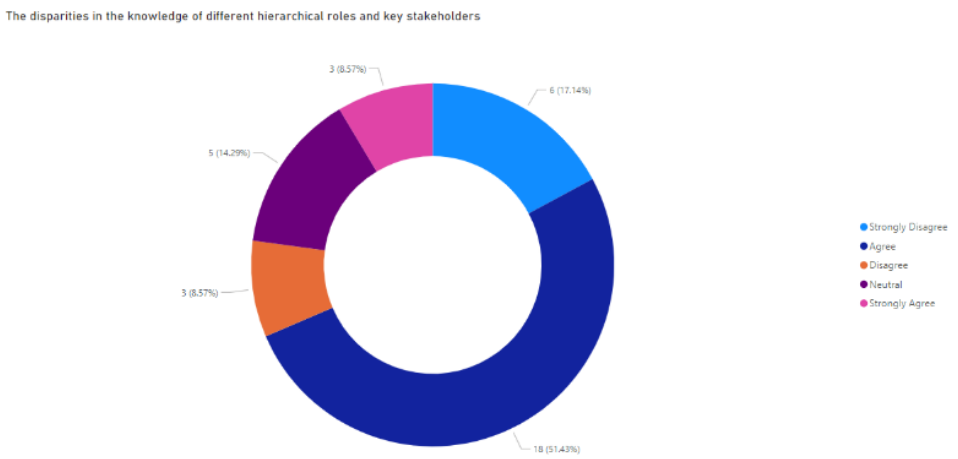


Figure 12. Knowledge disparities

Question 3. What are the channels that you use to transfer knowledge in cloud computing projects? (Select the main 2)
a) Knowledge Management Tool / Wikis: Confluence, Notion, Azure DevOps Wiki, SharePoint.;
b) Standard documents provided by the company/customer.;
c) Company communication channels, Project Management Platforms email, Microsoft Teams, Google Chat, Jira, Asana, and Trello.;
d) Text editors – Microsoft Word, Google Docs, and Notepad.;
e) Meetings with the team;
f) Internal communication and trainings: Workshops/trainings sessions, internal events, webinars, town hall meetings

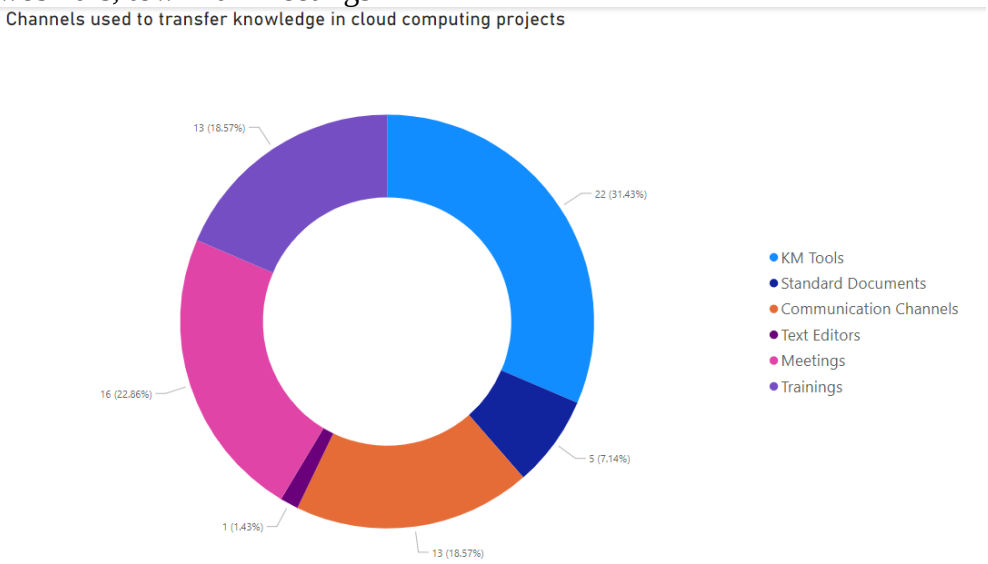


Figure 13. Best channels

Question 4. What are the main characteristics, select 2, that are part of an organizational culture that promotes innovation, learning, and sharing of knowledge?
a) Career plan that values knowledge sharing, including financial recognition for the most engaged employees.;
b) Open and inclusive communication through regular calls/meetings to strengthen team alignment.;

c) Guarantee of collaborative work in the same location, promoting ease in the exchange of ideas and knowledge.;
d) Encouragement of continuous learning, fostering the embrace of risk and experimentation as growth opportunities.;
e) Flexible work environment, including the option of remote work for team adaptability;
f) Supportive leadership and transparent decision-making processes, promoting trust and collaboration in the workplace.

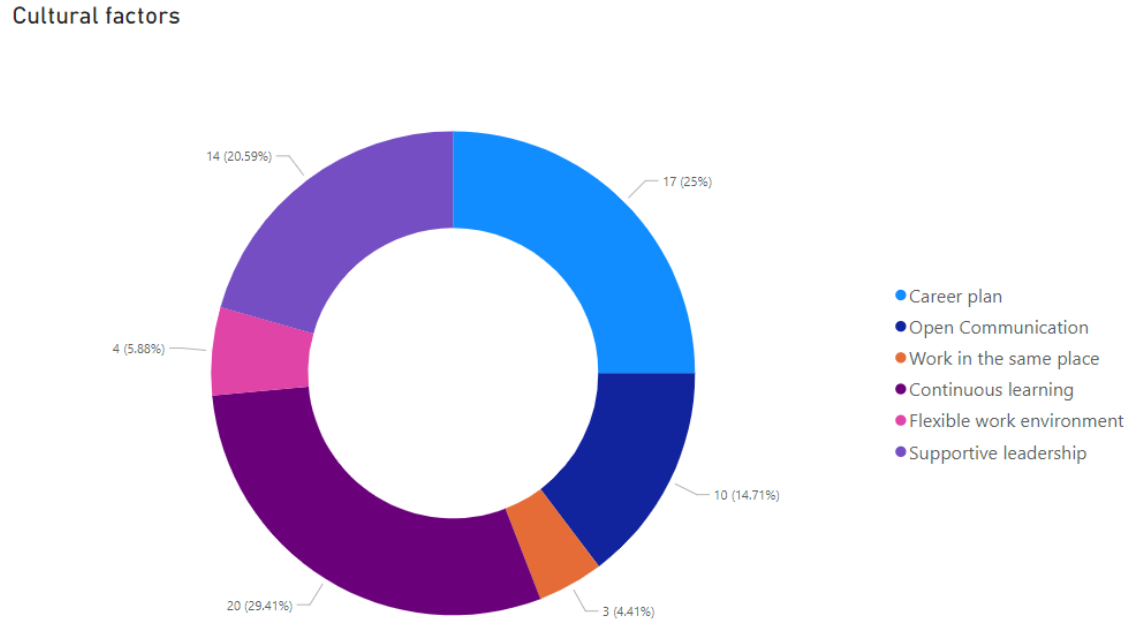


Figure 14. Cultural factors

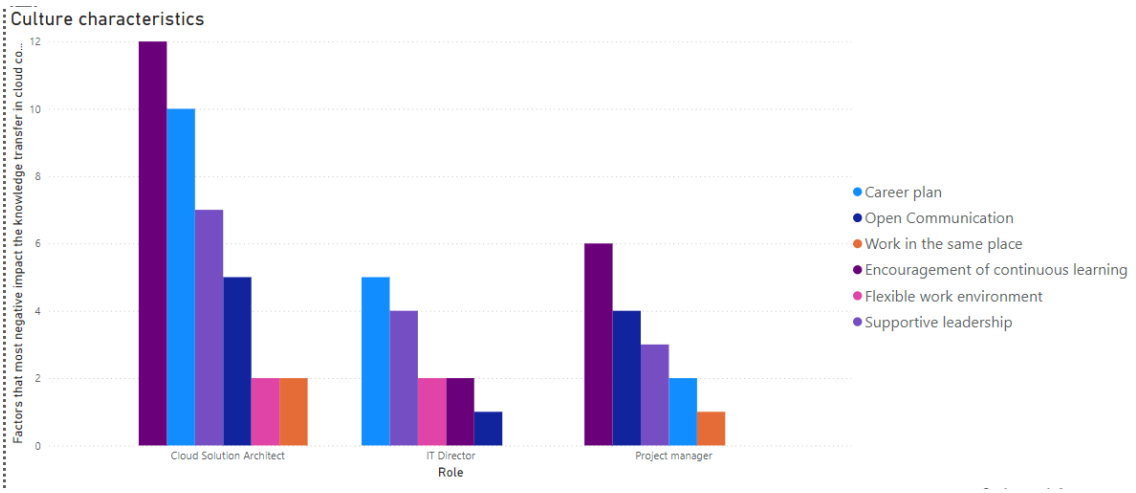


Figure 15. Cultural characteristics

Question 5. Your company overcomes the language barrier, physical distance, and national culture in the knowledge transfer process. Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree.

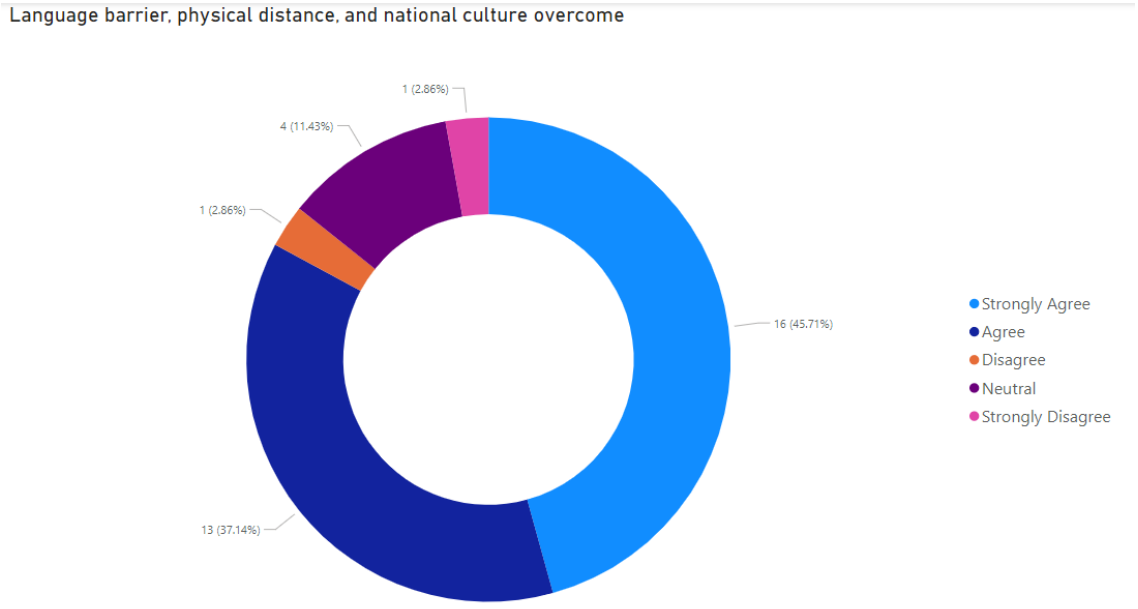


Figure 16. Language barriers, physical distance, and national culture overcome

Question 6. What are the individual factors that most influence the project members be willing to acquire and share knowledge?
a) Alignment with personal values, intrinsic motivation, and curiosity;
b) Recognition and Acknowledgment;
c) Professional development opportunities.;
d) Positive team dynamics with constructive feedback and learning from mistakes.;
e) Trust and autonomy.;
f) Flexibility in work practices

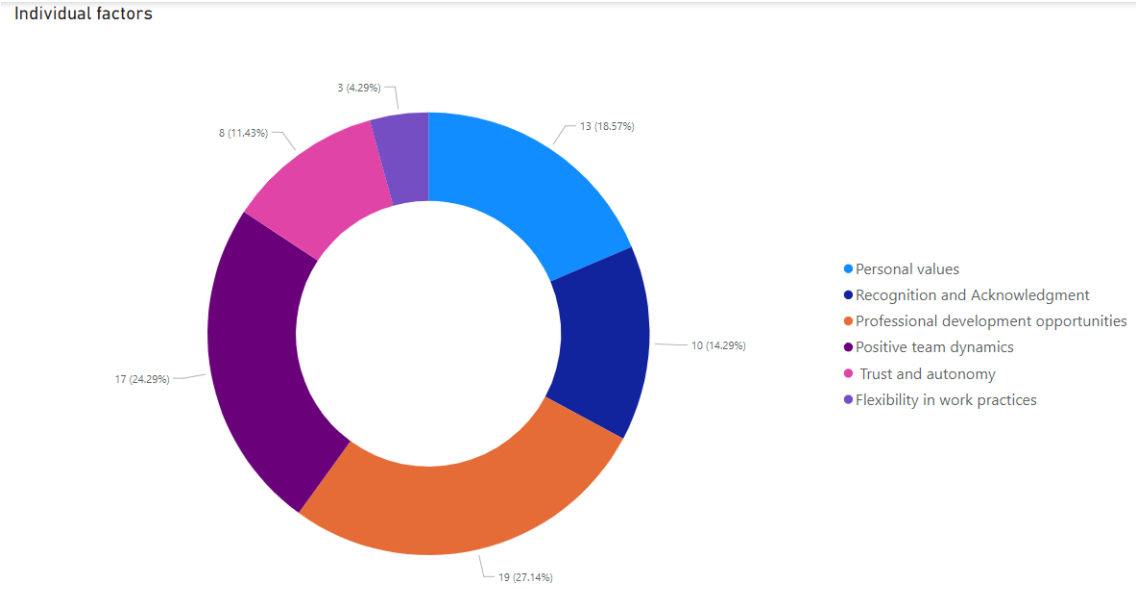


Figure 17. Individual factors

Question 7. Support software for knowledge management, such as artificial intelligence should be used and improve the knowledge transfer. Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree.

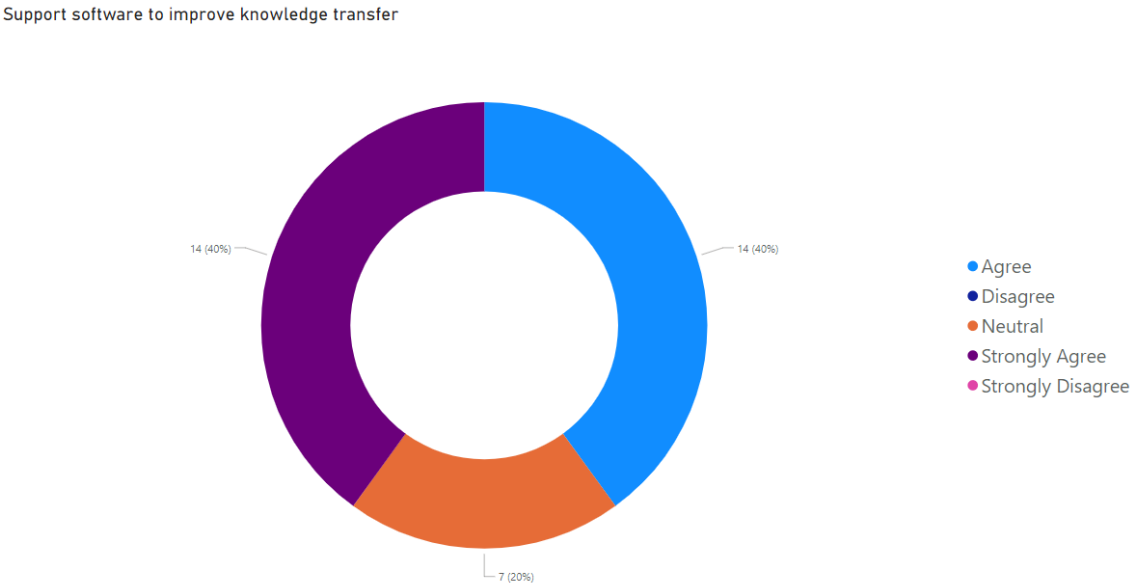


Figure 18. Support software to improve knowledge transfer

Question 8. An organized procedure concerning subjects to transfer and a built-in mechanism (technological tools) is better than an in-person interaction. Please indicate the extent to which you agree or disagree with the statement by selecting a number on a scale from 1 to 5, where: 1. Strongly Disagree; 2. Disagree; 3.Neutral; 4. Agree and 5. Strongly Agree.

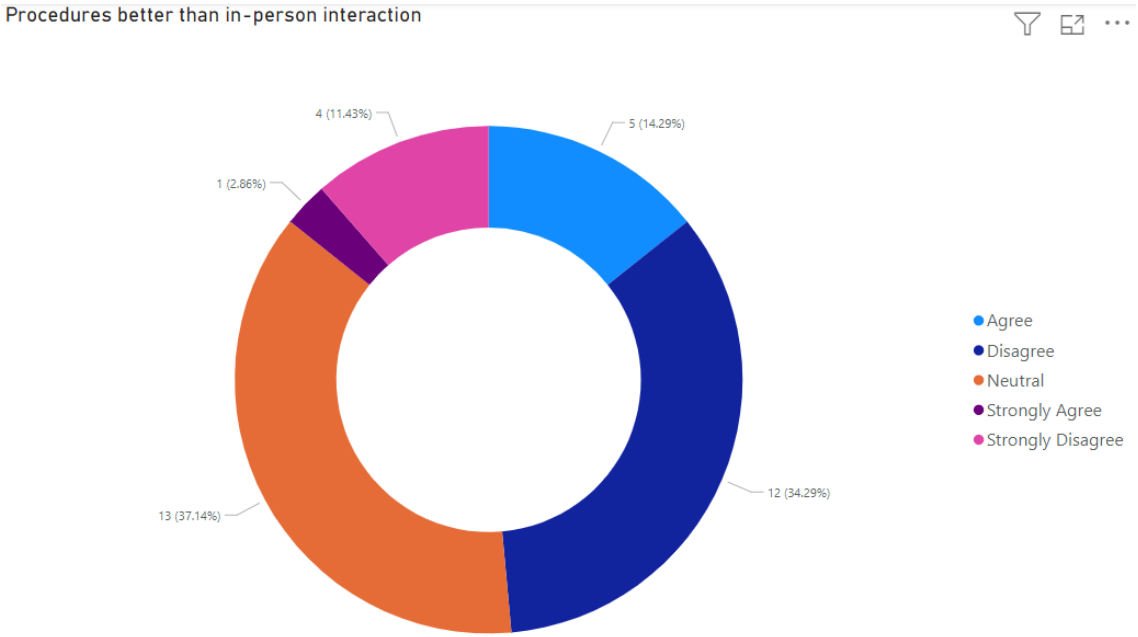


Figure 19. Procedures better than in-person interaction

Question 9. How do you conserve your knowledge? What tools do you use?
a) Knowledge management tools and personal wiki platforms, for example, Confluence, Notion, Azure DevOps, SharePoint.;
b) Personal documents, including any text editor - Microsoft Word, OneNote, Google Docs, and exclusive access tools.;
c) Digital Whiteboards: Miro, Microsoft Whiteboard.;
d) Version control system: Git.;
e) Task management apps such as Todoist and Asana.;
f) Standard documentation provided by the company.

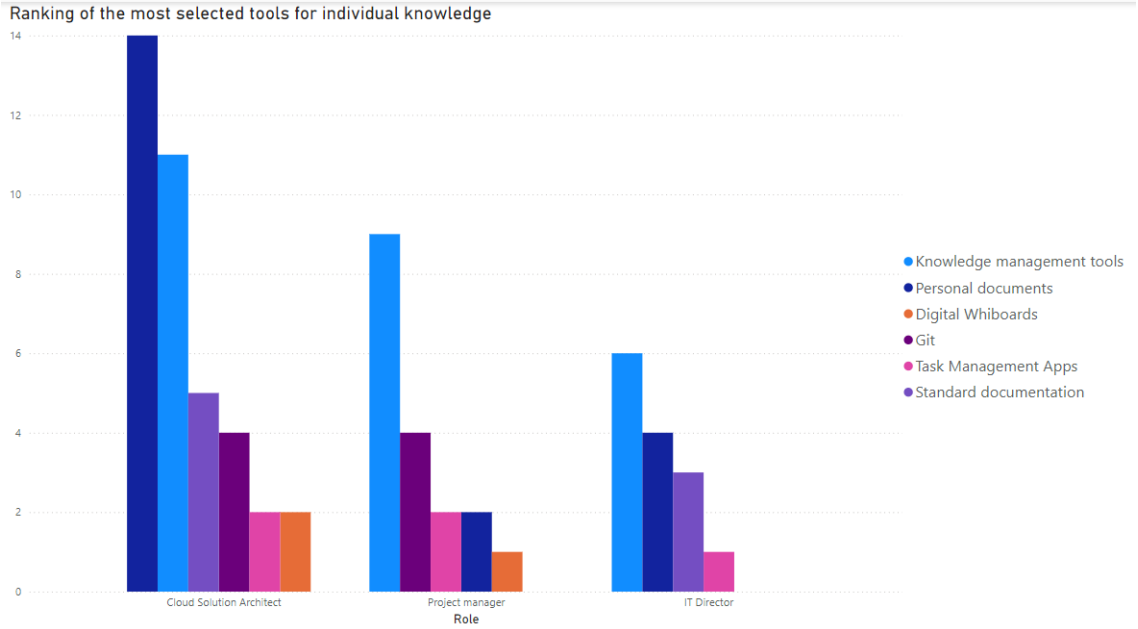


Figure 20. Ranking of the most selected tools for individual knowledge

Question 10. What are the factors that have the most negative impact in the knowledge transfer in cloud computing projects? Max 2
a) Knowledge transfer is not a priority. Time constraints for knowledge transfer and ineffective communication channels, including the absence or inefficiency of a knowledge transfer platform.;
b) Employees/external consultants are not open to sharing knowledge, fearing obsolescence and the risk of job or business insecurity.;
c) Lack of incentives and clear objectives. Misinterpretation of knowledge due to differences in experience and/or frustration from lack of guidance in the past.;
d) Procedure for knowledge transfer not defined or insufficient documentation to retrieve knowledge.;
e) Cultural and training challenges: cultural barriers, including language and local cultural differences, and inadequate training programs.;
f) Organizational structure and functions: resistance to change, high turnover rates, and poorly defined roles and responsibilities.

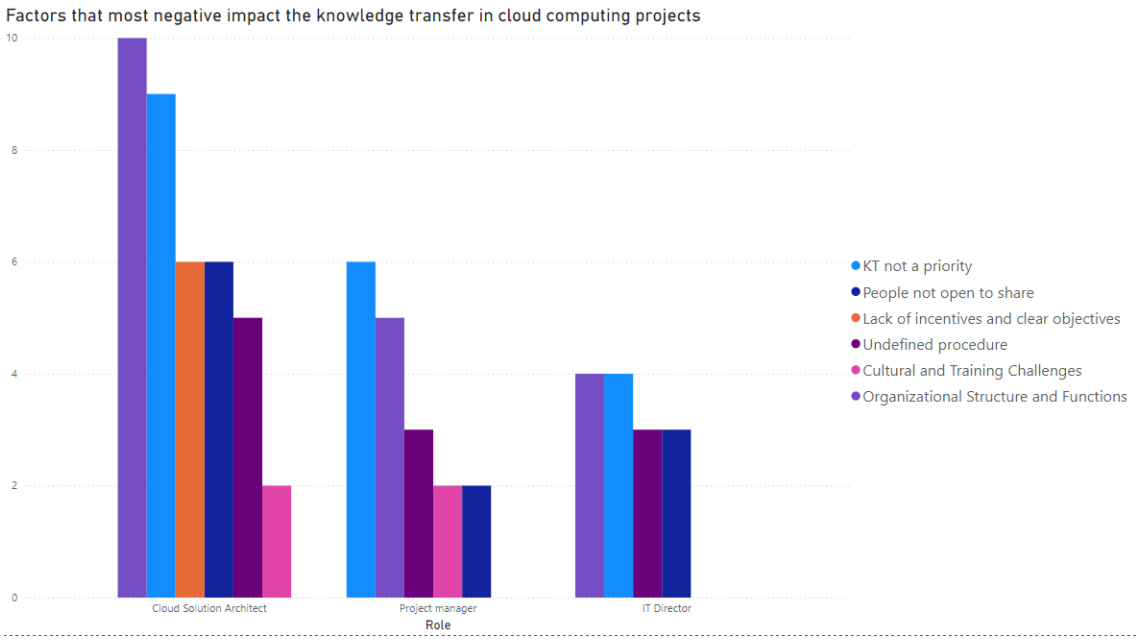


Figure 21. Factors that most negative impact the knowledge transfer in cloud computing projects