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Knowledge Management in IT: The Impact of Remote Work on Communication

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Master's degree in computer engineering

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October 2024

TECNOLOGIAS
E ARQUITETURA

Department of Information Science and Technology

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To Life and its journeys

Acknowledgements

Over the course of my Master's degree, I've been accumulating my gratitude for what I've received in the various stages of this journey. First of all, I would like to thank my supervisor, PhD Alexandra Marques Fernandes, and especially my co-supervisor, Master António Alves de Almeida, for guiding and supporting my enthusiasm and ideas.

To the teachers and colleagues in my class, with whom I was lucky enough to learn and collaborate, especially Susana and Rodrigo.

To Jerónimo Martins, for their trust in my ability to deliver and study.

To my colleague Duarte, who has always stood by me and believed in me.

To all the friends around me who make my life so much more colourful.

Finally, to the driving force of my life, my children, Catarina and Santiago.

Resumo

O crescimento do trabalho remoto, impulsionado pela pandemia da COVID-19, evidenciou a necessidade de estudos sobre gestão do conhecimento, reconhecida como fonte de vantagem competitiva. A transição para comunicação virtual requer adaptação na interação entre departamentos para que a linguagem e comunicação não se tornem barreiras ao desenvolvimento de projetos.

Esta pesquisa visa validar se a distância física entre departamentos da organização, com foco no departamento de Sistemas de Informação (SI), afeta a definição de requisitos funcionais em projetos. Uma revisão da literatura relevante, de 2012 a 2024, embasou um estudo de caso realizado com colaboradores de uma empresa de retalho sediada em Portugal. O objetivo foi examinar a dinâmica da gestão de conhecimento e comunicação no departamento Sistemas de Informação, analisando os impactos das interações em ambientes presenciais, remotos e híbridos, utilizando uma abordagem mista com dados quantitativos e qualitativos.

A proliferação do trabalho remoto e híbrido é uma realidade permanente. Para que beneficie tanto empresas quanto trabalhadores, é necessário melhorar continuamente as práticas de gestão e políticas organizacionais.

Os desafios incluem a perda de comunicação não-verbal, crucial para compartilhar conhecimento tácito, dificuldades em manter a confiança entre equipas, condições de trabalho desiguais, como acesso à tecnologia adequada, e o isolamento social e profissional. Essas questões complicam a gestão e supervisão de equipes remotas.

Palavras-chave: Transferência conhecimento; partilha conhecimento; disseminação conhecimento; trabalho remoto; trabalho virtual; gestão de conhecimento.

JEL Classification: O32, D83, J24, M15, L86, M1

Abstract

The growth of remote work, driven by the COVID-19 pandemic, has highlighted the need for studies on knowledge management, recognized as a source of competitive advantage. The transition to virtual communication requires adaptation in the interaction between departments so that language and communication do not become barriers to project development.

This research aims to validate whether the physical distance between departments of the organization, with a focus on the Information Systems (IS) department, affects the definition of functional requirements in projects. A review of the relevant literature, from 2012 to 2024, supported a case study carried out with employees of a retail company based in Portugal. The objective was to examine the dynamics of knowledge and communication management in the Department of Information Systems, analysing the impacts of interactions in face-to-face, remote and hybrid environments, using a mixed approach with quantitative and qualitative data.

The proliferation of remote and hybrid work is a permanent reality. In order for it to benefit both companies and employees, it is necessary to continuously improve management practices and organizational policies.

Challenges include the loss of non-verbal communication, crucial for tacit knowledge sharing, difficulties in maintaining trust between teams, unequal working conditions such as access to appropriate technology, and social and professional isolation. These issues complicate the management and supervision of remote teams.

Keywords: Knowledge transfer; sharing knowledge; knowledge dissemination; remote work; virtual work; knowledge management.

JEL Classification: O32, D83, J24, M15, L86, M1

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List of Acronyms	
IT	Information Technology
KM	Knowledge Management
ICT	Information and Communication Technology
SECI	Socialization, Externalization, Combination, and Internalization
HR	Human Resource
SW	Smart Work
U.S.	United States
KW	Key Words
GDPR	General Data Protection Regulation
n.a.	not applicable
NaN	Not a Number
ID	Identifier
F2F	Face to Face work regime
R/H	Remote or Hybrid work regime
SI	Sistemas de Informação

CHAPTER 1

Introduction

The importance of knowledge as a critical resource and competitive advantage for organisations has become increasingly evident (Afshar Jalili, 2020). Consequently, effective management and knowledge sharing have emerged as essential strategies for maintaining this advantage. Intellectual capital, which encompasses human knowledge, constitutes a valuable contributor to the success of organisations (Stewart, 1997). However, its strategic importance, namely knowledge sharing, is subject to communication conflicts (Assudani, 2007; Georgiadou & Siakas, 2012; Reed & Knight, 2010). The term 'knowledge management' is used to describe the practices employed by organisations with the aim of enhancing the storage and capture of knowledge, with a view to improving performance and innovation (Nonaka and Takeuchi, 1995). Tacit knowledge, which is context-specific, personal and difficult to formalise, is an important aspect of this field. This contrasts with explicit knowledge, which is easily documented and transferred (Polanyi, 1966; Lave & Wenger, 1991). The lack of proper communication of tacit knowledge can lead to misalignment and conflict (Georgiadou & Siakas, 2012). In remote and hybrid working environment, reliance on Information and communication technologies (ICTs) can increase the perceived distance between teleworkers and localised workers, highlighting the importance of face-to-face interactions to build and maintain trust, which is crucial for effective collaboration (Taskin & Bridoux, 2010a; Roberts, 2000). This process becomes even more challenging to sustain in geographically dispersed teams (Cheng et al., 2016). The SECI model describes the stages of knowledge conversion—socialisation, externalisation, combination, and internalisation—which are essential for effective knowledge management (Nonaka & Takeuchi, 1995).

The lack of knowledge sharing can give rise to significant challenges for organisations (Lin, 2008; Mosakhani, 2010). Furthermore, remote working has been found to diminish employees' organisational identification, which in turn affects communication and knowledge sharing processes (Wiesenfeld et al., 2001). Despite the advent of new technologies, distance continues to represent a significant obstacle in distributed collaborations (Olson & Olson, 2000). The challenges presented by remote working include the provision of timely information and the willingness of team members to share knowledge (Zielińska, 2022; Manko & Rosinski, 2021), while generational differences and technical skills further influence remote working efficiency (Kaplan & Haenlein, 2010; Bolisani Ettore et al., 2020). Furthermore, the impact of knowledge sharing on teleworkers is complex and intricate (Yajiong Xue et al., 2012) when compared to traditional environments. Effective communication in remote environments necessitates the ability to overcome the challenges of maintaining trust and managing interpersonal relationships at a distance (Malhotra et al., 2007; Kayworth and Leidner, 2000). The establishment of trust within virtual teams is a more challenging and less structured process

than in face-to-face environments (Kuo & Yu, 2009; Robert et al., 2009). The lack of non-verbal cues in computer-mediated communication results in a more formal and less effective interaction compared to face-to-face settings (Gressgård, 2011; Berry, 2011), restricting informal exchanges of knowledge and potentially intensifying coordination challenges (Medsker et al., 1995; Chiravuri et al., 2011). Additionally, computer-mediated feedback may be perceived as less impartial, which can influence team dynamics (Alder et al., 2006).

Prior to the advent of the global pandemic, remote working was still in its infancy and undergoing a period of adaptation (Wang & Haggerty, 2009), subsequently experiencing a rapid ascent, transforming traditional paradigms of location and worked hours (Saksilapachai et al., 2019) and resulting in the mass adoption of remote working. This shifts a significant impact on organisational operations, presenting complex challenges for both employers and employees (Gottlieb et al., 2020) emphasising the necessity to evaluate its impact on organisational functionality and employee well-being (Yawson, 2020; Jackowska & Lauring, 2021). This entails transcending geographical limitations and reconfiguring physical spaces into virtual environments (Golden, 2009; Saksilapachai et al., 2019), which has the potential to reshape organisational structures, communication patterns, corporate culture and working relationships (Bolisani Ettore et al., 2020). Information and communication technologies (ICTs) have been instrumental in maintaining business continuity during the pandemic (*The World Economic Forum_Annual Report*, 2019_2020; *World Health Organization_Digital Technology for COVID-19 Response*, 2020), with virtual teams being able to collaborate effectively to achieve common goals despite geographical dispersion. However, they have encountered challenges in terms of communication and cohesion (Jones et al., 2005; Valacich et al., 1994; Leenders et al., 2003). Factors such as flexible working hours and reduced commuting stress contribute to this improvement (Gajendran et al., 2015; Westfall, 2004), but remote working also presents significant challenges, including professional isolation, difficulties in building trust and an impact on non-verbal communication (Golden, 2009; Baruch and Nicholson, 1997;Gifford, 2022a).

Throughout this work, it is exploited how physical distance influences communication between a company's employees and the IT department, as well as its implications for organizational knowledge management. The main objective is to understand the complex dynamics that arise in the context of remote/hybrid work, focusing particularly on the challenges and opportunities that this configuration presents for effective communication and collaboration. This study attempts to identify how geographic separation and lack of face-to-face interaction impact the exchange of information, problem solving, and the dissemination of knowledge among employees, particularly with IT elements. In addition, the research aims to analyse the knowledge management practices used to mitigate the negative effects of distance, as well as the strategies that promote knowledge sharing in remote or hybrid environments. Specifically, the communication barriers that arise in telecommuting

environments will be examined, the effectiveness of digital tools in facilitating collaboration, and how these dynamics influence overall performance and innovation within teams. By addressing these issues, the work aims to offer valuable insights into adapting knowledge management practices to support remote work, ensuring organizational continuity and growth.

The literature on remote working remains limited, especially regarding its long-term implications, despite the increase during the COVID-19 pandemic and its prevalence afterwards. Previous studies have mainly focused on temporary virtual teams rather than permanent ones, ignoring the unique challenges that permanent teams face in knowledge management (KM). The pandemic has highlighted the critical importance of collaboration and communication, which are essential for effective KM. Employees reported various communication difficulties with the IT department, categorized into Language (20%), Business Disconnect (17%), Communication (15%), and Response Time (13%). These issues are interrelated and often stem from linguistic barriers and misalignment between the IT department's understanding of business needs and the operational priorities of other areas within the company. Furthermore, the shift to remote work has exacerbated communication challenges, as virtual interactions limit opportunities for informal exchanges and the organic sharing of knowledge. Despite the benefits of remote work, such as flexibility and reduced costs, the drawbacks, including diminished non-verbal communication and the potential for social isolation, pose significant challenges. The effectiveness of IT project outcomes can be compromised due to this isolation, making clear communication essential for defining functional requirements.

A review of the literature highlights the need for a new strategic approach to managing disruptions, especially those exemplified by the COVID-19 pandemic. Companies had to quickly adapt their operations to remote or hybrid models, which requires more than just problem-solving. It calls for a multi-level perspective that addresses individual, organizational, and institutional dynamics. Trust has been maintained among long-established remote and local employees, but new team members face integration challenges without initial face-to-face interactions. To ensure the long-term success of remote or hybrid work, ongoing efforts to refine management practices and organizational policies are crucial. As this trend continues, organizations must navigate the complexities of remote work to foster effective collaboration and knowledge sharing.

The methodology used to develop the State of the Art included the selection of keywords searched in the electronic databases B-On and Scopus, followed by the screening of articles to determine their inclusion or exclusion based on their relevance to the central themes of the thesis and the quality of the studies presented, using PRISMA Flow to number and identify the articles. In addition to the literature review, the methodology of this dissertation included a case study. The aim of the case study was to provide a more detailed and in-depth investigation, allowing for a contextualised understanding of the issues under analysis. This approach was intended to explore the challenges in a specific context

and to enrich the overall analysis of the data collected. A questionnaire of twenty-four questions was developed, thematically grouped into four sections, focusing on the dynamics of remote/hybrid and face-to-face work.

CHAPTER 2

State of the Art

2.1. Literature review

2.1.1. Knowledge - A definition

Over the last two decades, knowledge has been recognised as a critical resource for organisations and has emerged as a key competitive advantage (Gelard et al., 2014; Philsoophian et al., 2016). This recognition makes it almost imperative for organisations to effectively manage and share this resource (Afshar Jalili, 2020). Furthermore, intellectual capital, which encompasses the knowledge and intangible resources of an organization, such as human, structural, and relational knowledge, also plays a crucial role in contributing to its competitive advantage (Stewart, 1997).

Undoubtedly, over the last twenty years, knowledge has been recognised as a vital resource for organisations and a key competitive advantage (Gelard et al., 2014; Philsoophian et al., 2016). However, despite its strategic importance, knowledge sharing in organisations faces a number of barriers, with research in organisational theory and strategic management identifying factors that can both facilitate and hinder this process (Assudani, 2007). Throughout the years, classical concepts of organisational knowledge have been validated and are still relevant in the current literature (Waight et al., 2022a) , in particular, Hall's concept of high-low context (1967); Nonaka (1994) Nonaka and Takeuchi (1995) and the concept of organisational knowledge (1994); Hansen's concept of knowledge networks (2002) and which refer to definitions such as knowledge management involves processes and practices aimed at creating, capturing, storing, sharing and using knowledge within an organisation in order to improve its performance and capacity for innovation (Nonaka and Takeuchi, 1995); Organisational culture, in turn, is described as a system for creating, transmitting, storing and processing information, where context plays a crucial role in communication between individuals (Hall and Hall, 1990); Tacit knowledge and explicit knowledge and their distinction are also fundamental, the former being difficult to formalise and communicate as it is context specific, personal and subjective, while explicit knowledge can be easily documented and transferred (Polanyi, 1966). The lack of adequate communication of this tacit knowledge can lead to misalignment and conflict (Georgiadou & Siakas, 2012; Reed & Knight, 2010), as well as the specific demands in different domains that remote and hybrid working places on organizations (Gifford, 2022b).

The current context of remote and hybrid working imposes new demands on human resource managers, as interactions mediated by information and communication technologies (ICT) can create distance and increase the labour intensity of relationships between teleworkers and non-teleworkers. This situation underscores the importance of face-to-face interactions for building and maintaining the widespread necessary for effective knowledge exchange (Taskin & Bridoux, 2010a; Roberts, 2000). The

reliance on ICT for interactions often results in a perceived increase in distance and labour intensity between teleworkers and their in-office counterparts, highlighting the crucial role of direct, personal interactions in fostering trust (Taskin & Bridoux, 2010a; Roberts, 2000). Trust, defined as the willingness to expose oneself to vulnerability in the face of the attitudes of others (Mayer, Davis, & Schoorman, 1995), based on the conviction that the actions of others will not have negative consequences (Robinson, 1996), becomes even more critical in global and geographically dispersed teams (Cheng, Fu, & Druckenmiller, 2016; Cheng, Fu, Sun, Han, & Shen et al, 2016). Promoting trust in these teams is challenging due to the absence of the solid, personal connections that are more natural in face-to-face work environments (Cheng, Yin, Azadegan, & Kolfschoten, 2016; Jarvenpaa, Knoll, & Leidner, 1998). Communities of practice are groups of people who share a common interest or passion in a particular area and who work together on a regular basis to learn, solve problems, and develop knowledge (Wenger 1998). This collaborative environment is closely tied to organisational learning, as mentioned earlier, which involves the continuous process of acquiring, sharing, and applying knowledge to enhance an organisation's effectiveness and adaptability (Senge, 1990). At the core of both these concepts is the understanding that knowledge itself is a complex mosaic of experiences, values, contextualised information, and expert perceptions. It is like an incessant stream that flows through the minds of knowers, shaping their perceptions and providing essential foundations for evaluating and assimilating new experiences and information. Knowledge is the vital source of insights and understandings that drive innovation and adaptation, shaping the course of actions and decisions in an ever-changing world (Golden & Raghuram, 2010a; Davenport and Prusak 1998). As discussed above, this knowledge can be categorized into tacit and explicit. Tacit knowledge embodies the intuitive and personal essence inherent in individuals, manifested through their experiences, skills, intuitions, and emotions. It is deeply rooted in daily practices, rituals, and core values, and intertwines with individual feelings and commitments. Often, it is challenging to articulate verbally, but it plays a crucial role in shaping daily decisions and activities, enriching them with unique personal perspectives (Nonaka, Toyama and Konno 2000). This understanding is captured in the phrase “we may know more than we can tell”, highlighting the distinction between tacit and explicit knowledge (Polanyi M 2009; Lubit R 2001; Green et al., 2007). The term tacit knowledge, sometimes referred to as subjective knowledge, encompasses the practical and experiential nuances of the work environment. It is the intimate and intuitive understanding that individuals acquire through practice, experimentation, and immersion in everyday activities. This type of knowledge is not easily articulated verbally or formalised in manuals, but it is essential for guiding actions and decisions in the professional context. It reflects the wisdom accumulated over time and includes the personal insights that shape the way individuals deal with the specific challenges and demands of the job (Green et al., 2007). On the other hand, the explicit dimension of organisational knowledge has been defined as being represented by structured

information that is communicated in a formal and systematic way. This information is classified, stored, and processed through libraries, archives, computer systems and databases, and accessed in a sequential and organised manner (Nonaka 1994). This type of knowledge can be easily articulated and communicated in a clear and objective language, enabling direct and efficient communication between members of the organisation (Waight et al., 2022b) . By grouping the classical classifications in terms of tacit and/or explicit knowledge; explicit knowledge can be formalised in documents, databases accessible online and other tangible forms, while tacit knowledge, on the other hand, is more difficult to express or record due to its subjective and contextual nature (Lave & Wenger, 1991; Nonaka & Takeuchi, 1995; Polyani, 1962), i.e. Tacit knowledge includes implicit understandings, accumulated wisdom and experience, and judgements about the use and value of information that are spontaneously shared during interactions with others (Brown & Duguid, 1991; Lin, 2006; Nonaka, 1994).

In short, while explicit knowledge can be stored and easily accessed on corporate intranets, the sharing of tacit knowledge depends heavily on interpersonal relationships and tends to be more complex. This is due to social and cognitive constraints that require a deep understanding of the context, and the people involved (Golden & Raghuram, 2010b). Explicit knowledge is objective and rational, with various forms of expression; in the form of data, scientific formulae, specific procedures, and manuals; tacit knowledge is subjective, experiential, and difficult to formalise, consisting of beliefs, mental schemata, and practical skills (Nonaka, Toyama and Nagata 2000; Taskin & Bridoux, 2010a). This distinction underscores the emergence of organizational knowledge, which is generated and developed through the dynamic interactions and connections between workers in the workplace (Nonaka 1994; Tsoukas 1996). Organizational knowledge arises from the integration of both tacit and explicit knowledge through structured methods established by the organization to acquire, organize, and transfer knowledge among employees with the goal of enhancing efficiency and productivity (Alavi M, Leidner DE. Mar 2001). However, the dissemination of this knowledge often encounters obstacles due to its highly selective nature, especially regarding the more tacit and less articulated aspects (Golden & Raghuram, 2010b).

When analysing communication and knowledge sharing in an organization, it is important to also consider the conceptual approach of knowledge networks, which explains the process of knowledge transfer at the project level (Wiewiora, Liang and Trigunarsyah, 2010). Knowledge networks have been defined as "a set of nodes - individuals or higher-level collectives that serve as heterogeneous repositories of knowledge and agents that seek, transfer and create knowledge - connected by social relationships that enable or constrain the nodes' efforts to acquire, transfer and create knowledge" (Phelps, Heidl and Wadhwa 2012, p. 1117). The effectiveness of knowledge networks has been found to have a significant impact on knowledge transfer in organisations. These networks encompass both

the formal knowledge present in business units and the direct and indirect relationships between these units, through regular informal interactions between members of organisations (inter-unit relations), the different units of a company can use and access knowledge in a consistent way. Within a company, knowledge networks manifest themselves in two different ways: 'short paths' and 'long paths'. In the short paths, connections are made through direct relationships with few intermediaries, resulting in more efficient knowledge acquisition. These direct links facilitate the transmission of information relevant to the organisation, thus promoting better interaction and knowledge sharing. On the other hand, connections over long distances involve a greater number of intermediaries, which can lead to knowledge distortion. In these cases, less direct interaction between employees and less frequent exchange of information can affect the quality of knowledge creation and transfer in the organisation (Hansen, 2002).

2.1.2. Impact of distance on knowledge transfer and communication

In the era of the knowledge economy and knowledge management, it is of the utmost importance to optimise and efficiently share existing knowledge to ensure organisational effectiveness and success. In the context of multinational corporations or large, geographically dispersed organisations, a number of factors can impede the transfer of knowledge between employees, potentially leading to the emergence of informational disparities among certain members. These factors include geographical, structural and social barriers. With the rise in popularity of remote and virtual work, the importance and impact of these issues on organizations are becoming more evident (Choudhury, 2022; Mickeler et al., 2023).

The sharing of knowledge has the potential to result in significant improvements within organisations. Conversely, the absence of such sharing can lead to the emergence of serious problems (Lin, 2008; Mosakhani, 2010). The working of individuals in geographically dispersed locations has been found to result in a reduction in their identification with the organisation in question (Wiesenfeld, Raghuram, & Garud, 2001). This has been identified as having a negative impact on effective communication and knowledge-sharing processes. An analysis of geographically distributed collaborations has revealed that, despite advances in communication technology, distance remains a significant obstacle (Olson & Olson, 2000). The conversion of knowledge and its propagation can be schematised through the SECI model, which outlines four stages: socialisation, externalisation, combination and internalisation. Socialisation occurs when tacit knowledge is shared through common experiences. In the externalisation stage, tacit knowledge is shared in a systematic and logical language. The combination stage involves the systematisation of concepts and documents, as well as the generation of new knowledge. Finally, in the internalisation stage, explicit knowledge is formed from tacit knowledge (Nonaka I, Takeuchi H 1995).

The literature indicates that while the provision of technologies and technical support for remote work is of paramount importance, ensuring that remote workers have timely access to the necessary information can present an additional challenge (Zielińska, 2022). The efficacy of information utilisation is contingent upon the willingness of team members to disseminate knowledge (Manko & Rosinski, 2021). This process entails the exchange of ideas, information, comprehension and connections between individuals, and is recognised as a contributory factor to organisational performance (Olan, 2022). Organisations are starting to deal with new discrimination factors due to different skills and types of roles. For some, it's because they can't work with the same autonomy; for others, it's because they are unfamiliar with computer technologies and/or have difficulty maintaining favourable or comfortable relationships at a distance and can be much less productive when teleworking (Bolisani Ettore et al., 2020). Generational differences can also be addressed differently by workers using electronic media, as can the type of technical specialisation of each worker (Kaplan & Haenlein, 2010).

Despite the paucity of research examining the impact of knowledge sharing on teleworkers, both in terms of interactions between them and their localised colleagues and in comparison, to traditional work environments, it is evident that this process is considerably more intricate (Yajiong Xue et al., 2012). The processes of knowledge transfer and communication are inextricably linked. In the absence of communicative exchanges, knowledge remains confined to the individual who possesses it, rendering it inaccessible to others (Reis, 2016). In the context of telework, social construction events, such as connection and relationship, encompass independent and self-regulated mechanisms and organisations that corporate managers are often unable to structure (Waight et al., 2022a).

Communication management emerged with the objective of enhancing performance and mitigating the adverse effects on employees in virtual work environments. To achieve this, it is essential to focus on key elements such as work-life balance, social interaction, effective communication, and knowledge sharing (Saksilapachai et al., 2019). Nevertheless, the effective management of knowledge and the sharing of information represent pivotal aspects of the modern workplace. While obstacles to the dissemination of knowledge are apparent, the advent of new challenges for those in managerial roles is also evident. In organisational contexts characterised by the presence of geographically dispersed teams, the efficacy of leadership is contingent upon the quality of interpersonal interactions, which are inherently more challenging to facilitate from a distance (Malhotra, Majchrzak & Rosen, 2007). The effectiveness of different leadership styles in geographically dispersed environments was evaluated, resulting in disparate conclusions. For example, studies have demonstrated that hierarchical leadership approaches are less effective in teams with telecommuting employees than in teams with localised workers (Hoch & Kozlowski, 2014). Therefore, it is upon leaders of telecommuting teams to ensure that teamwork is a priority, given the inherent challenges

associated with this context (Kayworth & Leidner, 2000, 2002). Furthermore, the fostering and sustaining of trust represents a pivotal and challenging aspect of leadership in teleworking teams (Malhotra et al., 2007), which is in addition to monitoring progress and enhancing the team's visibility within the organisation (Eisenberg & Krishnan, 2018a). Moreover, to the communication challenges inherent to dispersed teams, the establishment of trust within these teams presents a unique set of difficulties. The establishment of trust in face-to-face teams or those that share the same physical space follows a structured and sequential progression. In contrast, the process in geographically dispersed teams tends to be more improvised, which makes it more challenging to anticipate and control (Kuo & Yu, 2009). Indeed, teams that collaborate virtually were found to be less likely to develop trust (Robert, Denis, & Hung, 2009). Additionally, the frequency of interactions was identified as a significant factor influencing the formation of trust, which presents a challenge in dispersed environments (Zolin, Hinds, Fruchter, & Levitt, 2004).

Communication effectiveness is linked to the utilisation of effective communication styles, which encompass the capacity to comprehend and respond in an appropriate manner to interactions initiated by colleagues or individuals affiliated with the same organisational structure (Daft & Lengel, 1986). Furthermore, this effectiveness is influenced by the levels of interdependence, organisational structure and communication systems, as well as the diversity of available means of communication, which range from face-to-face contact to the exchange of documents (Klitmøller & Lauring, 2013). Computer-mediated communication differs significantly from face-to-face communication due to the absence of social cues and the lack of access to nonverbal behaviours such as smiling and nodding. This makes it more challenging to manage and adapt interactions when necessary (Gressgård, 2011). Virtual communication is typically more formal than communication in physically located environments, with a greater focus on work-related issues. This is due to the limited opportunities for informal and unintentional information exchanges, which often occur in informal settings such as the canteen, corridors, parking lots, or even when going to the café (Berry, 2011). The curtailment of informal discourse and deliberation among geographically dispersed employees, in turn, compromises their capacity to disseminate and exchange knowledge (Gressgård, 2011). Team members often use their own methods of handling information, which are subject to individual biases and preferences (Kayworth & Leidner, 2002). Coupled with the absence of face-to-face contact, these individual differences can amplify the challenges of coordination at work (Medsker, Tan, & Turban, 1995), making the task of generating and capturing the knowledge of team members more complex (Chiravuri, Nazareth, & Ramamurthy, 2011). This scenario contributes to the challenge of sharing knowledge in geographically dispersed work contexts. In addition, computer-mediated feedback is often related to reduced perceptions of fairness compared to a face-to-face response, which increases the likelihood

that virtual team members will perceive injustices that may influence their decisions (Alder, Noel, & Ambrose, 2006).

2.1.3. Framework

The growing trend of remote working has become more pronounced, leading to a shift away from office location and even working hours (Saksilapachai et al., 2019). The evolution of the modern workplace has been marked by the emergence of 'virtual working', a growing practice that is redefining traditional paradigms of the workplace and working hours. This revolutionary concept is a way of working that allows easy access to software, databases and communications equipment at a distance, thereby overcoming geographical barriers between workers (Golden, 2009). It also reconfigures physical spaces into virtual environments and changes the way people communicate and collaborate through online technologies (Saksilapachai et al., 2019). What is beyond doubt is that knowledge has emerged as one of the most important organisational resources in the last two decades, standing out as a key competitive advantage (Gelard et al., 2014; Philsoophian et al., 2016), making its efficient management and sharing imperative (Afshar Jalili, 2020). The increasing failure rate of information technology projects has led to a decline in the delivery of value to companies (Marnewick & Langerman, 2018; Khoza, 2019). This failure is due to the reluctance of employees to share their knowledge, with incentives or motivation cited as reasons for doing so (Khoza & Pretorius, 2017:8).

The global impact of the pandemic led to unprecedented lockdowns, affecting nearly 3 billion people worldwide, particularly in Europe, The World Economic Forum (*Nearly 3 Billion People around the Globe under COVID-19 Lockdowns*, 2020). These measures severely disrupted the global economy, with consequences so dire that they drew comparisons to the Great Depression, World Economic Forum 25 June 2020 (*A U.S. Recession?*, 2020). As a result, remote working was rapidly adopted on a massive scale, fundamentally altering organisational operations and necessitating a swift transition to telework. The sudden shift in work dynamics introduced a host of complex challenges for both employers and employees, highlighting the need for in-depth analysis of this new reality. Before the pandemic, remote working was limited to specific occupations and was still in a phase of adaptation (Wang & Haggerty, 2009). However, the global crisis forced companies, educational institutions, and government agencies worldwide to implemented remote working policies, also known as 'teleworking', 'remote working' or 'smart work (SW)' (Brynjolfsson et al., 2020; Gottlieb et al., 2020; Bolisani Ettore et al., 2020). This abrupt transition created unprecedented challenges for both employers and employees (Bapuji et al., 2020; Carnevale and Hatak, 2020; Yawson, 2020), making it essential to carefully examine its potential impacts, not only on organisational operations but also on employee well-being and productivity (Jackowska & Lauring, 2021).

The widespread adoption of teleworking has the potential to fundamentally reshape organisational structures, communication patterns, working relationships, and even corporate culture

(Bolisani Ettore et al., 2020). Central to this transformation are information and communication technologies (ICTs) and, in particular, the information technology (IT) departments within companies, which played a crucial role in maintaining business continuity and enabling communication during the Covid-19 pandemic (*World Health Organization_Digital Technology for COVID-19 Response*, 2020). Building on this foundation, teleworking has emerged as a key element in sustaining economies during the pandemic. However, its overall efficiency still requires further investigation. Typically, telework involves virtual teams, groups of individuals who, despite being geographically dispersed, collaborate towards a common goal through electronic communication platforms (Jones et al., 2005). The globalisation of communication and companies has also influenced the practice of outsourcing, which has reduced the cost and increased the safety of business travel (Aspray et al., 2006). On the other hand, the ease with which any individual can work remotely from any location has created competition for talent. However, the continuity and scale of this type of work raises questions about the differences between virtual project teams and traditional project teams in the same space (Reed & Knight, 2010). The ability to work collaboratively and productively in this new virtual environment has become essential for professional success, highlighting the critical role of effective communication. This communication is a key factor in the success of remote working, as it ensures that team members remain connected and aligned, despite the physical distance (Saksilapachai et al., 2019). The availability of information in electronic communication is almost total for members of a distributed team (Bradner et al. 2005), but this communication is not without its own challenges and in terms of group bonding (Valacich et al., 1994; Leenders et al., 2003; Martins et al., 2004; Lowry et al., 2006; Alnuaimi et al., 2010).

Telework can boost productivity, improve performance and reduce absenteeism. Studies point that teleworkers are an average of 35-40% more productive than their office counterparts and have measured an output increase of at least 4.4%. With stronger autonomy via location independence workers produce results with 40% fewer quality defects. Because workers are more engaged, absenteeism is also down 41%." ('Benefits of Maintaining Telework Policies', n.d.). Various reasons have been put forward to explain the improved performance of professionals who adopt telework. Among these factors, the ability to work during the hours of maximum personal efficiency stands out, allowing everyone to adjust their schedule according to their peak productivity. The reduction in anxiety caused by not having to commute to work each day is also highlighted as an important element. The willingness to devote more time to work to compensate for the unique benefits of teleworking is also highlighted as a relevant aspect. In addition, the familiar and comfortable environment offered by teleworking is conducive to increased concentration and, consequently, efficiency in the performance of professional tasks (Gajendran, Harrison, & Delaney-Klinger, 2015; Westfall, 2004).

Analysing the data in the light of previous research, the pre-Covid literature, validates some previous conclusions and provides new perspectives on the topic. It reinforces the idea that telework can be a viable alternative for a significant proportion of the working population, particularly those who have a high degree of autonomy in their work, such as knowledge workers. While teleworking may not be universally ideal, it presents a potentially advantageous option, or at the very least, a non-detrimental one for specific professional profiles (BOLISANI et al., 2020). Supporting this perspective, a 2020 survey by Global Workplace Analytics (*The World Economic Forum_Annual Report*, 2019_2020) found 77% of office-based workers were working from home five days a week, a significant increase from the 9% before the pandemic. Nearly 75 million U.S. employees, or 56% of the workforce, had the capacity to work from home, up from just 5 million (3.6%) in 2018. However, it is important to recognize that these findings often reflect a biased view that considers the teleworker as an independent entity (Moore, Rhodes, & Stanley, 2011). This approach does not accurately represent the reality for most teleworkers (van der Meulenet al., 2019), who are frequently described as knowledge professionals characterized by interdependence (Davenport, 2005). Instead of working in isolation, these individuals operate within complex ecosystems of production and interconnectedness, where information sharing, and collaboration are crucial. Understanding this distinction is essential for fully grasping the current impact and dynamics of teleworking (Peters & Batenburg, 2015).

In this context of interdependence, the distance imposed by teleworking emerges as a potential threat to performance. Smooth integration between different domains and professionals is crucial for operational efficiency and the achievement of common goals. However, physical separation between team members can undermine this constructive collaboration, jeopardising cooperation, knowledge sharing and overall efficiency. Rather than strengthening the bonds between workers, physical distance can create barriers to communication and collaboration, affecting collective performance and efficient task completion (van der Meulen et al., 2019). This physical separation in the transition to remote working caused by the COVID pandemic has had the effect of suppressing informality and non-verbal communication, thereby limiting tacit knowledge sharing and transforming the unplanned experience of connecting and relating into an always planned experience (Waight et al., 2022a).

The interplay between globalisation and virtual collaboration has reached a crescendo, allowing multinational companies to establish a variety of beneficial mechanisms that provide access to expertise at often reduced costs. Virtual work provides companies with unique opportunities to bring together people from different geographical locations, especially employees (Hong & Vai, 2008). However, experiences in different locations have shown that there are difficulties associated with knowledge sharing (Eisenberg & Mattarelli, 2017a). The virtual organisation or virtual workplace has been defined as a work environment in which people work remotely, where time, location and/or organisational boundaries may be different (Townsend et al., 1998). It has been highlighted as distinct

from traditional work, which uses a variety of technologies to replace face-to-face communication, both for communication and work coordination (DeSanctis & Monge, 1999; Lipnack & Selos, 1999; Wang & Haggerty, 2009). Several benefits have been identified related to remote work: teleworkers enjoy greater flexibility, being available to respond to family needs, whether urgent or occasional, or being present for family medical appointments (Riley and McCloskey, 1997; Guimarães and Dallow, 1999). It has been suggested that teleworkers experience less anxiety, not only because they are able to meet family demands, but also because of the time saved in travelling to the office and the inconvenience of commuting, as reported by colleagues who commute to the office (Golden, 2009; Baruch, 2000). The benefits of teleworking are considerable, and the rapid reduction in costs and widespread availability of technology are driving its growth (Gifford, 2022a). Quality and speed are severely compromised when working from home and our entire output depends on being connected (Koppman & Gupta, 2014). On the other hand, despite the various benefits associated with teleworking, it is crucial to acknowledge the significant challenges it presents. Among the various issues, professional social isolation stands out, as it can hinder the building of trust and camaraderie among teleworkers and negatively impact effective working relationships for certain tasks (Golden, 2009). The distance from other people and the office makes teleworkers feel excluded from communication and isolated (Baruch and Nicholson, 1997; Vega and Brennan, 2000; Shellenbarger, 2006). This physical separation can have an inherent psychological separation, not least because it is associated with lower work performance (Golden et al., 2008). Another important aspect is the change in the social and psychological ties to the company that promote employees' attachment to the organisation, and the nature of these ties is changed by teleworking (Wiesenfeld et al., 1999, 2001; Thatcher and Zhu, 2006). It has been described that remote working is likely to have a strong relationship with workload, as well as the relationship between long working hours and an increased risk of work-related mental health problems that has been demonstrated in the literature (Gifford, 2022a; Ng and Feldman 2008; Virtanen et al. 2011). This lack of physical interaction has exacerbated the negative effects of poor knowledge sharing, particularly for new workers who are unable to acquire sufficient explicit knowledge for their jobs (Law & Koh, 2023). It is necessary to validate the problems that can be added by the difficulty of implementing telework and the negative impact on work-life management (BOLISANI et al., 2020; Richardson et al., 2006).

The main problem with teleworking in a knowledge-based economy, where intellectual assets are seen as strategically vital resources capable of giving organisations a lasting and sustainable competitive advantage (Moustaghfir, 2009), are the challenges inherent in sharing knowledge in international work environments, such as time differences, lack of face-to-face interaction, cross-functional and cultural barriers (Hong & Vai, 2008; Killingsworth et al., 2016). To date, the factors that influence online knowledge sharing are not well understood (Yajiong Xue et al., 2012; Ardichvili, 2008).

There is a noticeable reduction in the parallel and informal conversations that often take place before and after face-to-face meetings (Eisenberg & Krishnan, 2018b), and we have unequal access to remote work (Barrero, Bloom and Davis 2021), there are gaps in workers' desires to match the amount of remote working that is reserved for certain functions (Gifford, 2022a), so teleworkers may lose informal communication, affecting the construction of mental schemas and shared meanings with non-teleworking colleagues (Taskin & Bridoux, 2010b).

Knowledge sharing at a distance faces challenges in terms of both quality and quantity, due to the different boundaries related to identity within subgroups. The quality of knowledge refers to the originality and potential impact of the ideas, information and fragments of knowledge that are shared (Rosen et al., 2007). The quantity of knowledge refers to the number of ideas, information and fragments of knowledge shared between subgroups (Rosen et al., 2007; Eisenberg & Mattarelli, 2017b). In the absence of common ground, it is plausible that tacit, individual, and inherent knowledge, which is very much rooted in individual experience (Polanyi, 1966), remains unshared (Nonaka and Takeuchi, 1995). This lack of sharing makes it difficult to exchange diverse ideas, which is fundamental to effective problem solving (Burt, 2004). Therefore, it is in environments that encourage the free exchange of preconceived ideas, such as informal office meetings or collaborative sessions with creative debates, that problem solving finds more fertile ground to flourish (Hargadon and Bechky 2006; Osborn 1953; Sutton and Hargadon 1996; Nonaka and Takeuchi 1995; Koppman & Gupta, 2014).

CHAPTER 3

Methodology

The literature review for this dissertation was conducted using explicit, systematic and responsible methods (Gough et al., 2012). This process involved two main stages: the selection of keywords and research sources, followed by article screening. In the first stage, relevant keywords and widely used electronic databases in the field were identified to ensure a comprehensive search of major literature sources and provide a solid foundation for the analysis. In the second stage, the articles identified were subjected to a rigorous screening process to determine their inclusion or exclusion, based on their relevance to the central themes of the dissertation and the quality of the studies presented.

The lack of clarity in the review methods can lead to over-generalisations and simplifications, resulting in the inappropriate application of terminology. In addition, criticism of the applicability of systematic reviews exclusively to empirical quantitative research further complicates terminological and conceptual issues (Gough et al., 2012). A clear typology of review methods is needed to avoid limitations and to better understand and apply the different forms of reviews. Tools such as PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) and PROSPERO have been developed to improve communication, transparency, and critical appraisal of reviews (Gough et al., 2012). In this study was used PRISMA Flow to number and identify the articles in the appendices.

Figure 13 - PRISMA Flow summarizes article counts during the process. A methodological review requires searching multiple databases. The ability to systematise and have a transparent method for formulating a well-structured review question, as well as search strategies or filters to help distinguish relevant studies from irrelevant ones. It is necessary to employ replicable, evidence-based research procedures that can be refined and adapted for each review (Booth, 2016). To this approach, the keywords ('knowledge transfer' OR 'knowledge sharing' OR 'knowledge exchange' OR 'knowledge dissemination') AND ('remote work' OR 'virtual work' OR 'telework' OR 'work from home') AND (knowledge management) were searched in B-ON and Scopus, which are interdisciplinary databases of scientific content (Booth, 2016).

The keywords were searched in the 'Abstract' and the limiters used were 'peer review' articles, English and Portuguese language, date 2012-2024, to be justified later, resulting in Table 1 for B-On and Table 2 for Scopus. This search was carried out on 20 February 2024.

Table 1 - B-On research

B-On 20 February 2024	**KEY-WORDS**			
	“Knowledge transfer” OR "knowledge sharing" OR "knowledge exchange" OR "knowledge dissemination" AND	"Remote work" OR "virtual work" OR "telework" OR "work from home"	AND	knowledge management
	Limiters		**Articles**	**Publication dates**
	Search in the Abstract		248	1982 - 2024
	Peer-review		171	2001 - 2024
	Language		170	2001 - 2024
	Date		119	2012 - 2024

Table 2 - Scopus research

Scopus 20 February 2024	**KEY-WORDS**			
	“Knowledge transfer” OR "knowledge sharing" OR "knowledge exchange" OR "knowledge dissemination" AND	"Remote work" OR "virtual work" OR "telework" OR "work from home"	AND	knowledge management
	Limiters		**Articles**	**Publication dates**
	Search in the Abstract		14	
	Peer-review		0	
	Language			
	Date			

The original limit of 2012-2024 was exercised because of the increase of studies about the subject, but the following analysis confirms that the starting year should be 2007, according to the peak recorded in Table 3.

Table 3 - publication summary

	Cumulative	**Published in the year**	**All languages**
2000	0	0	0
	1	1	1
2002	1	0	1
	3	2	3
2004	4	1	4
	4	0	4
2006	8	4	8
	16	8	16
2008	18	2	18
	22	4	22
2010	26	4	26
	29	3	29
2012	33	4	33
	34	1	34
2014	36	2	36
	39	3	39
2016	41	2	41
	46	5	46
2018	48	2	48
	93	45	93
2020	95	2	95
	111	16	111
2022	137	26	138
	167	30	168
2024	170	3	171

Figure 1, which reproduces Table 3 as a graph, confirms that 'accumulated' and 'all languages' almost overlap, as English clearly dominates the publications surveyed.

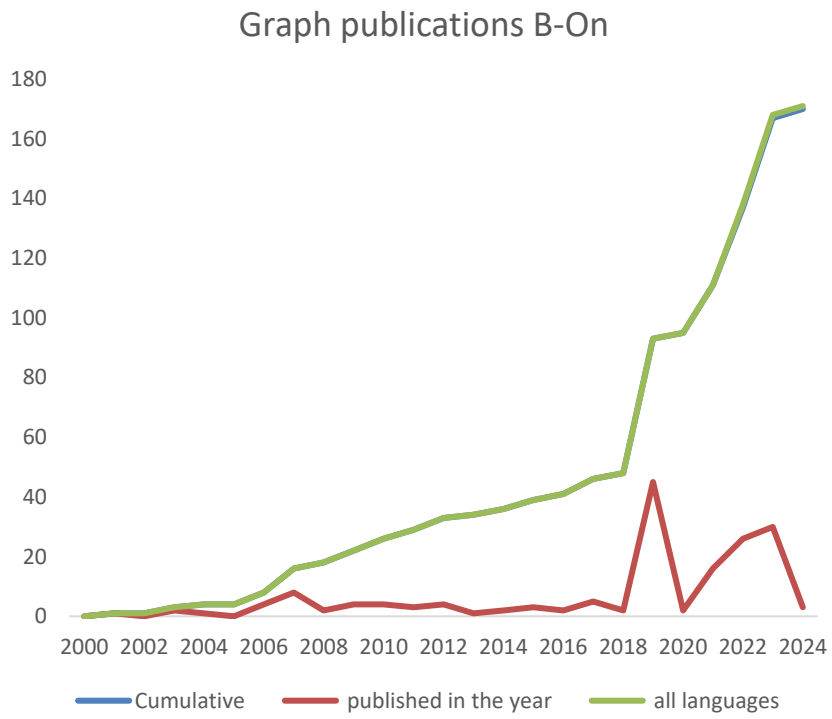

Figure 1 - Graph publications.

The data presented in the graph in the Figure 1 highlights a significant increase in the volume of publications related to knowledge management in workplace environments over the years. This upward trend underscores the growing importance and relevance of research in this field within the scientific community. Starting from the early 2000s, the number of published articles demonstrates a gradual rise, culminating in a notable surge in recent years. The peak in publication volume around 2022, with 167 cumulative articles published, indicates a heightened scholarly interest and a burgeoning body of work focused on knowledge management practices and their implications in modern workplaces. This surge is particularly evident with the sharp increase from 2020 to 2022, reflecting intensified research activity and possibly the emergence of new trends and challenges in this domain. The observed trend emphasizes the critical need for continuous investigation into how knowledge management strategies can be optimized to enhance organizational performance and adapt to evolving work environments. The growing body of literature signifies not only the academic interest but also the practical relevance of this research, as organizations increasingly recognize the value of effectively managing knowledge to drive innovation and maintain competitive advantage.

By situating my study within this context, it becomes evident that my research addresses a pressing and timely topic. The increasing number of publications indicates a robust and expanding field of inquiry, providing a solid foundation for further exploration and contributing valuable insights to the ongoing discourse on knowledge management in workplace settings. This alignment with current research trends enhances the significance and potential impact of this study, ensuring its relevance and contribution to both theoretical understanding and practical applications in the field.

The literature search was initiated at the peak year of 2007, resulting in a total of 151 articles from 2007 to 2024, all sourced from B-On. After removing duplicates, 91 articles remained, although some repetitions persisted due to variations in how authors' names were stored (e.g., first name and surname versus surname and first name). Following a review of the abstracts, 8 articles were discarded, and 9 were inaccessible. Of the 78 articles that were eligible, 41 were excluded based on their topic and approach. The most common themes and reasons for exclusion included sociological, social, health, productivity, online leadership, platform types, organization types, virtual team performance, and creativity.

In the final selection phase, the well-defined boundaries of the topic began to dissolve, and it was the approach to the topic in a complete reading that weighed on the choice.

The result was 37 articles, 27 of which were included in the dissertation and which in relation to KW and geographic origin have the following distribution in table 4 distribution by family of key words, table 5 count of families of key words and table 6 distribution of articles by country:

Table 4 - Distribution of KW per family

KW1 family	KW2 family	KW3 family
knowledge transfer or "knowledge sharing" or "knowledge exchange" or "knowledge dissemination"	"Remote work" or "virtual work" or "telework" or "work from home"	knowledge management

Table 5 - Count of KW families

Count		
KW1 family	KW2 family	KW3 family
18	19	4

Table 6 - Distribution of articles by country

Country	Count
Amsterdam, The Netherlands	1
Brazil	1
Canada	1
China	2
Denmark	1
EUA	8
Finland	1
Germany	1
Greece	1
Iran	1
Italy & Denmark	1
Japan	1
Johannesburg, South Africa	1
London, UK	1
Macau, China	1
Poland	1
Thailand	1
USA	2
Total	27

In the appendix, the table 40 summarize the articles by Author, country and KW.

3.1. Case Study Methodology

This dissertation employs a case study methodology, which is particularly suited to the investigation of complex issues in their real-world contexts (Yin, 2018). The objective is to examine the dynamics of knowledge management and communication in the IT department, with a view to analysing the impacts of interactions in face-to-face, remote and/or hybrid work environments because each environment presents unique challenges that influence communication effectiveness in different ways. The case study methodology enables an examination of the linguistic challenges encountered by IT teams and their interlocutors from diverse sectors, with particular focus on the processes of requirements gathering and software solution delivery.

The "analysis units" are the employees of the international group based in Portugal, distributed across different sectors and hierarchical levels. The group, with over 230 years of experience in the

food sector, has a primary focus on food distribution and operates in multiple countries, with its largest market being in Poland, where it has undergone continuous expansion into Slovakia. The company operates in a number of market segments, including supermarkets, proximity and beauty stores, and both online and physical sales channels. In addition to developing activities in the agri-food sector in Portugal and Morocco, the central point of investigation is the complexity of communication between IT and other departments. The full survey is included as an appendix to this dissertation.

The "sample" group consisted of 60 employees from a variety of departments, thereby providing a comprehensive overview of interactions with information technology. The selection of the questionnaire as a data collection instrument was justified by its capacity to capture perceptions from a larger sample in an efficient and anonymous manner. The triangulation of quantitative and qualitative data afforded a more comprehensive understanding of communication issues, enabling a deeper examination of the variables under investigation and confirming that language barriers and misalignment with business requirements represent pivotal challenges (Yin, 2018).

The methodology was validated with employees from the Data Privacy, IT and Ombudsman departments, ensuring compliance with the General Data Protection Regulation (GDPR). The questionnaire was structured in four thematic sections: sociodemographic data; dynamics in face-to-face work; dynamics in remote/hybrid work; and feedback on interaction with the IT department. This approach provided a detailed view of employee perceptions and interactions between different departments, allowing the identification of critical points of communication, which are analysed in the following sections.

The quantitative data analysis was conducted using Python libraries, including, pandas, seaborn, and matplotlib, chosen for their flexibility in data manipulation and visualization. The primary goal of the quantitative analysis was to calculate correlations between variables, providing insights into the relationships between different aspects of communication and operational dynamics within the IT department. The pre-processing phase involved essential steps; cleaning column names, replacing missing values with NaN, removing the ID column, and converting categorical variables to numeric codes for consistency. A correlation matrix highlighted both positive and negative relationships, with particular attention to strong correlations (values over 0.8), which offered insights into communication clarity and requirement details across different work contexts. Each correlation was interpreted in light of communication challenges, such as gender-based variations in communication style, with further statistical tests considered to validate these findings.

The qualitative analysis, based on the thematic coding of the open-ended responses, yielded four main categories. The key areas of focus were communication, technical language, business disconnection and response time. The difficulty in understanding the technical language used by IT was a recurring complaint, especially in the context of remote work, where the absence of non-verbal

communication accentuates misunderstandings. Employees expressed: "The language used between IT and other departments is not the same" and "Sometimes, it is too technical for a 'normal' person to be able to communicate". These observations highlight the necessity for a more effective communication strategy, with the adaptation of technical language to ensure clear and efficient communication between IT and other departments.

CHAPTER 4

Data analysis

The analysis of data in this case study was conducted by examining both quantitative and qualitative variables to identify key patterns and trends (Yin, 2018). The correlation matrix revealed significant interdependencies, including a strong correlation of 0.878923 between "Explanation of Solutions" and "Detail of Requirements" in face-to-face environments. This suggests that clarity in communication is linked to accuracy in the requirements provided. In remote or hybrid settings, a similarly significant relationship was observed, though slightly weaker at 0.811453, indicating that clarity remains critical across different work environments. Additionally, minor negative correlations suggested gender-based differences in perceptions of support, possibly due to varied communication styles.

The analysis of the questionnaire was structured in four sections, each directed towards a specific aspect of the work experiences and interactions of employees with the Information Systems department. The initial section comprises eight sociodemographic inquiries, which serve to contextualise the company, the nature of the work conducted, and the extent of involvement with the Information Systems department. The length of time spent at the company is a notable factor, given that the department was physically separated from other colleagues in 2014. The demographic data have been categorised for ease of reading and interpretation, thus facilitating the analysis of the relational aspects of the participant profiles.

The second section is concerned with the experiences of employees in a face-to-face environment. It comprises six questions which seek to explore a number of different aspects of work conducted in this way. The third section is concerned with hybrid and/or remote work and comprises five questions designed to elicit information about the dynamics of such environments. The fourth section is devoted to the assessment of communication and interaction with the Information Systems Department. It comprises six questions, four of which employ a Likert scale, while the remaining two are open-ended. The penultimate question is of great importance, as it aims to identify the primary challenges encountered by employees when communicating with the IT department. The data collected is presented using a mixed approach, comprising tables in the sociodemographic section to facilitate comparison and readability, and graphs in the subsequent sections to visually represent variations and relationships. This approach offers several advantages, including visual homogeneity, comparison, and focusing on the most relevant information.

4.1. Survey

4.1.1. Section 1 - Sociodemographic data

The first section presents the socio-demographic data of the 60 employees who participated in the study. This is essential to understand the profile of the participants and to analyse how different demographic characteristics may influence their perceptions and experiences of work in both the face-to-face and hybrid/remote systems. The information gathered through the structured survey included age, gender, department, length of service, working arrangements and involvement with the Information Systems (IT) department. The following tables show the distribution of participants by each of these categories.

Age - Table 7 shows the distribution of participants by age group. The age of the participants was categorised as follows: Under 30 years old; Between 30 and 39 years old; Between 40 and 50 years old and Over 50 years old and. Most employees are between 30 and 50 years old, with a smaller representation of people under 30 and over 50.

Table 7 - Age group

Age group	**Count**	**Percentage (%)**
Less than 30 years old	5	8
Between 30 and 39 years old	18	30
Between 40 and 50 years old	20	33
Over 50	17	28
Total number	**60**	**99**

Gender - Table 8 shows the distribution of participants by gender. There is a slight predominance of women over men, although this is not very significant.

Table 8 – Gender

By gender	**Count**	**Percentage (%)**
Female	33	55
Male	27	45
Total number	**60**	**100**

Department - Table 9 shows the distribution of participants across the different departments of the company. The most represented departments are Human Resources and Information Systems.

Table 9 - Department

Department	Count	Percentage (%)
Information Technology	15	25
Human Resources	13	21,66
Finance	8	13,3
Supply Chain	4	6,6
Health and Safety	2	3,3
Quality	2	3,3
Ombudsman	2	3,3
Legal	2	3,3
Others	12	20
Total number	**60**	**99,76**

Time at the company - Table 10 shows the distribution of participants according to the length of time they had worked for the company. The length of service was categorised as follows: Less than 1 year; Between 1 and 5 years; Between 5 and 10 years; More than 10 years and. Most employees have more than 10 years' experience in the company.

Table 10 - Time at the company

Time at the company	Count	Percentage (%)
Less than 1 year	2	3
Between 1 and 5 years	14	23
Between 5 and 10 years	9	15
More than 10 years	35	58
Total number	**60**	**99**

Face-to-face work (F2F)- Table 11 shows the distribution of participants according to the amount of time they spent working face-to-face. The time spent working face-to-face for the company was categorised as follows: Less than 1 year, Between 1 and 5 years; Between 5 and 10 years; More than 10 years and.

Table 11 – Time working face-to-face

Face-to-face work	Count	Percentage (%)
Less than 1 year	7	12
Between 1 and 5 years	10	17
Between 5 and 10 years	7	12
More than 10 years	36	60
Total number	**60**	**101**

Remote_Hybrid (R/H)- Table 12 shows the distribution of participants according to the length of time they have worked in a hybrid/remote arrangement. The length of time spent working in a hybrid/remote arrangement in the organisation was categorised as follows: Less than 1 year; Between 1 and 5 years; Between 5 and 10 years and more than 10 years and.

Table 12 – Remote_hybrid working time

Remote_Hybrid Work	**Count**	**Percentage (%)**
Less than 1 year	14	23
Between 1 and 5 years	42	70
Between 5 and 10 years	3	5
More than 10 years	1	2
Total number	**60**	**100**

IT involvement – Table 13 shows the distribution of participants according to their level of involvement in the information systems department.

Table 13 - Involvement with the IT

Involvement with IT	**Count**	**Percentage (%)**
No contact	6	10
Have contact with the IT Department	39	65
Works in the IT Department	15	25
Total number	**60**	**100**

4.1.2. Section 2 - Communication and interaction with the IT department (F2F)

In this section we explore the dynamics of communication between employees and the Information Technology (IT) department during the face-to-face (F2F) work regime. Effective interaction with the IT department is essential for the ongoing support of the organisation's operations (*World Health Organization_Digital Technology for COVID-19 Response*, 2020). Questions 8 to 12 are accompanied by detailed tables and bar charts in the appendix. The tables provide a precise numerical overview of employee responses in each category of the Likert scale, while the bar charts provide a visual representation of the distribution of responses, making it easier to quickly understand the general patterns and trends observed.

How did / do you contact the IT department? (multiple choice) - Table 14 shows the distribution of the means used by employees to communicate directly with the IT department.

Table 14 - Means of contact used (F2F)

Means of contact used (F2F)	Count
Face-to-face contact	29
Email	41
Telephone	38
Internal communication tool - Skype; Teams; Service Desk	40
Other	14

Was/is it easy to understand or explain IT needs? - Table 15 shows, on a Likert scale, how employees rated the ease of explaining their needs to the IT department on a face-to-face basis.

Table 15 - Was/is it easy to understand or explain IT-related needs? (F2F)

	Explaining needs (F2F)	Count
1	Strongly agree	8
2	Agree	29
3	Neither agree nor disagree	11
4	Disagree	9
5	Strongly disagree	3
Total number		**60**

Were your requests answered in a timely manner? – This question explored how quickly employees' IT needs were or are met in face-to-face work. The table 16 summarises employees' perceptions on a Likert scale.

Table 16 - Response time (F2F)

	Response time (F2F)	Count
1	Strongly agree	4
2	Agree	28
3	Neither agree nor disagree	14
4	Disagree	14
Total number		**60**

Did you feel/do you feel that your concerns were/are important? - The data in Table 17 reflects employees' perceptions of the importance given to their concerns by the IT department on a personal Likert scale.

Table 17 - Relevance of concerns (F2F)

Relevance of concerns (F2F)		**Count**
1	Strongly agree	7
2	Agree	31
3	Neither agree nor disagree	15
4	Disagree	6
5	Strongly disagree	1
Total number		**60**

Did you feel that your concerns/information were/are considered in the solutions? - This question investigated whether the concerns and information of employees were or are considered in the solutions proposed by the IT department in face-to-face work. Table 18 shows the responses to this question on a Likert scale.

Table 18 - Considered in solutions (F2F)

Considered in solutions (F2F)		**Count**
1	Strongly agree	11
2	Agree	29
3	Neither agree nor disagree	15
4	Disagree	4
5	Strongly disagree	1
Total number		**60**

Table section 2 grouped in percentages - Table 19 groups the responses in section 2 in percentages to make it easier to compare the different information on face-to-face work, allowing quick reading and a clearer comparison with section 3, which has the same type of questions for remote or hybrid work.

Table 19 - Table section 2 Grouped in percentages

Question_ section 2	Answers	Percentage (%)
Means of contact used	In-person contact	18
	Email	25
	Telephone	23
	Internal communication tool - Skype; Teams; Service Desk	25
	Other	9
Explaining needs	1. Strongly agree	13
	2. Agree	48
	3. Neither agree nor disagree	18
	4. Disagree	15
	5. Strongly disagree	5
Response time	1. Strongly agree	7
	2. Agree	47
	3. Neither agree nor disagree	23
	4. Disagree	23
	5. Strongly disagree	0
Relevance of concerns	1. Strongly agree	12
	2. Agree	52
	3. Neither agree nor disagree	25
	4. Disagree	10
	5. Strongly disagree	2
Considered in solutions	1. Strongly agree	18
	2. Agree	48
	3. Neither agree nor disagree	25
	4. Disagree	7
	5. Strongly disagree	2

4.1.3. Section 3 - Communication and interaction with the IT department during remote or hybrid working (R/H).

In this section we explore the dynamics of communication between employees and the Information Technology (IT) department during remote or hybrid (R/H) working regime. Questions 14 to 18 are accompanied not only by detailed tables, but also by corresponding bar charts in the appendix, as in section 2. The tables provide a precise numerical overview of employees' responses in each category of the Likert scale, while the bar graphs provide a visual representation of the

distribution of responses, making it easier to quickly understand the general patterns and trends observed.

How did you/do you contact the IT department? (You can select more than one option) - Table 20 shows the distribution, on a Likert scale, of the means used by employees for remote or hybrid communication with IT.

Table 20 - Means of contact used (R/H)

Means of contact used (R/H)	Count
Face-to-face contact	16
Email	40
Telephone	37
Internal communication tool - Skype; Teams; Service Desk	42
Other	15

Was/is it easy to understand or explain IT needs? - Table 21 shows how employees rated the ease of explaining their needs to the IT department in remote or hybrid working.

Table 21 - Explaining needs (R/H)

Explaining needs (R/H)		Count
1	Strongly agree	7
2	Agree	31
3	Neither agree nor disagree	13
4	Disagree	8
5	Strongly disagree	1
Total number		**60**

Were your requests answered in a timely manner? – This question explored how quickly employees' IT needs are met when working remotely or in a hybrid environment. The table 22 summarises employees' perceptions on a Likert scale.

Table 22 - Response time (R/H)

Response time (R/H)		Count
1	Strongly agree	4
2	Agree	28
3	Neither agree nor disagree	14
4	Disagree	14
Total number		**60**

Did you feel/do you feel that your concerns were/are important? - The data in Table 23 reflects employees' perceptions of the importance given to their concerns by the IT department, whether remote or hybrid, on a Likert scale.

Table 23 - Relevance of concerns (R/H)

Relevance of concerns (R/H)		**Count**
1	Strongly agree	9
2	Agree	33
3	Neither agree nor disagree	9
4	Disagree	8
5	Strongly disagree	1
Total number		**60**

Did you feel that your concerns/information were/are considered in the solutions? - This question investigated whether the concerns and information of employees have been or are being taken into account in the solutions proposed by the IT department for remote or hybrid working. Table 24 shows the responses to this question on a Likert scale.

Table 24 - Considered in solutions (R/H)

Considered in solutions (R/H)		**Count**
1	Strongly agree	8
2	Agree	33
3	Neither agree nor disagree	14
4	Disagree	3
5	Strongly disagree	2
Total number		**60**

Table section 3 Grouped in percentages - Table 25 groups the responses in section 3 in percentages to make it easier to compare the different information on face-to-face work, for quick reading and comparison with section 2.

Table 25 - Table section 3 Grouped in percentages

Question_Session3	Answers	Percentage (%)
Means of contact used	In-person contact	11
	Email	27
	Telephone	25
	Internal communication tool - Skype; Teams; Service Desk	28
	Other	10
Explaining needs	1. Strongly agree	12
	2. Agree	52
	3. Neither agree nor disagree	22
	4. Disagree	13
	5. Strongly disagree	2
Response time	1. Strongly agree	7
	2. Agree	47
	3. Neither agree nor disagree	23
	4. Disagree	23
	5. Strongly disagree	0
Relevance of concerns	1. Strongly agree	15
	2. Agree	55
	3. Neither agree nor disagree	15
	4. Disagree	13
	5. Strongly disagree	2
Considered in solutions	1. Strongly agree	13
	2. Agree	55
	3. Neither agree nor disagree	23
	4. Disagree	5
	5. Strongly disagree	3

4.1.4. Comparing views on face-to-face and remote/hybrid working

To compare the percentages in Tables 19 and 25 in the different sections (face-to-face and remote/hybrid), significant differences and extremes in employee responses were analysed. The comparison for each dataset follows.

Regarding the means of contact used, there are no significant differences between face-to-face and remote/hybrid work, except for some expected variations, such as face-to-face contact, which is significantly lower in distance/hybrid work (11%) than in face-to-face work (18%).

No significant differences were found between face-to-face and remote/hybrid working in terms of explaining needs. The percentages of responses in all categories ('Strongly agree', 'Agree', 'Neither agree nor disagree', 'Disagree', and 'Strongly disagree') are generally similar, indicating consistency in the perceptions of employees in both working contexts. However, it is worth noting that the percentage of employees who selected 'Neither agree nor disagree' was higher in remote/hybrid working (22%) compared to face-to-face working (18%). Additionally, a small decrease was observed

in the 'Strongly disagree' category for remote/hybrid working (2%) compared to face-to-face working (5%).

In terms of response time, all figures are identical between face-to-face and remote/hybrid work, with no significant differences.

When analysing the relevance of concerns, we see that the percentages are generally similar between face-to-face and remote/hybrid work. However, there are differences for 'neither agree nor disagree' and 'disagree'. The 'neither agree nor disagree' category has a percentage of 15% for remote/hybrid work, compared with 25% for face-to-face work. On the other hand, the percentage in the 'strongly disagree' category is 13% for remote/hybrid work compared to 10% for face-to-face work. The other categories ('strongly agree', 'agree' and 'strongly disagree') show minimal differences between the two ways of working.

When analysing the responses relating to the IT department's consideration of solutions, the significant differences in the 'strongly agree' and 'strongly disagree' categories between face-to-face and remote/hybrid working stand out. The percentage of 'strongly agree' responses is lower for remote/hybrid working (13%) than for face-to-face working (18%). On the other hand, the 'strongly disagree' category shows a slight increase for remote/hybrid work (3%) compared to face-to-face work (2%).

To provide a clear and comparable picture of employees' perceptions of the different areas of interaction with the IT department in face-to-face and remote/hybrid work, the responses 'Disagree + Strongly Disagree' and 'Agree + Strongly Agree' have been grouped into percentages in Table 26.

Table 26 - Section 2 and 3 table of grouped answers in percentages

Question_Session2 e 3	Work regime	Disagree + Strongly Disagree (%)	Agree + Strongly Agree (%)	Neither Agree nor Disagree (%)
Was/is it easy to understand or explain IT needs?	Face-to-face	20	61,(6)	18,(3)
	Remote/Hybrid	15	63,(3)	21,(6)
Were your requests answered in a timely manner?	Face-to-face	23,(3)	53,(3)	23,(3)
	Remote/Hybrid	23,(3)	53,(3)	23,(3)
Did you feel/do you feel that your concerns were/are important?	Face-to-face	11,(6)	63,(3)	25
	Remote/Hybrid	15	70	15
Did you feel that your concerns/information were/are considered in the solutions?	Face-to-face	8,(3)	66,(6)	25
	Remote/Hybrid	8,(3)	68,(3)	23,(3)

When it comes to explaining IT needs or requirements, both face-to-face and remote/hybrid work environments show similar patterns in employee perceptions. In the face-to-face setting, 61% of

employees agree ('agree + strongly agree') that it is easy to explain IT requirements, while 20% disagree and 18% remain neutral. In the remote/hybrid context, this level of agreement rises slightly to 64%, with 15% disagreeing and 22% remaining neutral.

In terms of response time, both face-to-face and remote/hybrid work environments show similar levels of agreement.

Regarding the relevance of concerns, in the face-to-face environment, 64% of employees agree that their concerns are important and in the remote/hybrid environment, this perception of importance rises to 70%. Finally, when it comes to addressing concerns in solutions, 66% of employees in a face-to-face environment agree that their concerns are addressed, compared to 68% in a remote/hybrid environment.

4.1.5. Section 4 - Feedback on communication and interaction with the IT department

The final section of the survey analysed staff feedback on communication and interaction with the IT department. Questions 19 to 24 were formulated with the aim of understanding in which working regime employees find it easiest to detail requirements for projects. Two open-ended questions (23 and 24) were included to obtain detailed information on the main difficulties encountered and additional suggestions from employees. Question 23 seeks to identify the main challenges in communicating with IT. The responses to these open-ended questions are aggregated into categories such as communication, language, response time and business disconnect to provide a more accurate and understandable analysis. Question 24 gives employees the opportunity to suggest improvements or highlight aspects not covered in the previous questions. We will find commonalities in the categories, such as the importance of communication, knowledge of the interviewer and connection to the business.

The questions in this section are accompanied not only by detailed tables but also by corresponding bar charts. The tables 27-30 provide an accurate numerical overview of employee responses in each category of the Likert scale, while 31 and 32 group the answers into categories. The bar charts provide a visual representation of the distribution of responses The visual approach allows a quick understanding of patterns and trends in responses, making it easier to identify areas for improvement.

Is it easier to detail requirements in person? - An analysis of employee responses regarding the ease of detailing solution requirements during face-to-face work is presented below. Table 27 shows the distribution of employee responses, providing a detailed overview of their perceptions.

Table 27 - Detailed requirements in the F2F work

Detailed requirements in the face-to-face system		Count
1	Strongly agree	7
2	Agree	17
3	Neither agree nor disagree	17
4	Disagree	14
5	Strongly disagree	5
Grand Total		**60**

The bar chart in the corresponding Figure 2 provides a visual representation of the responses to the ease of communication requirements during the face-to-face regime.

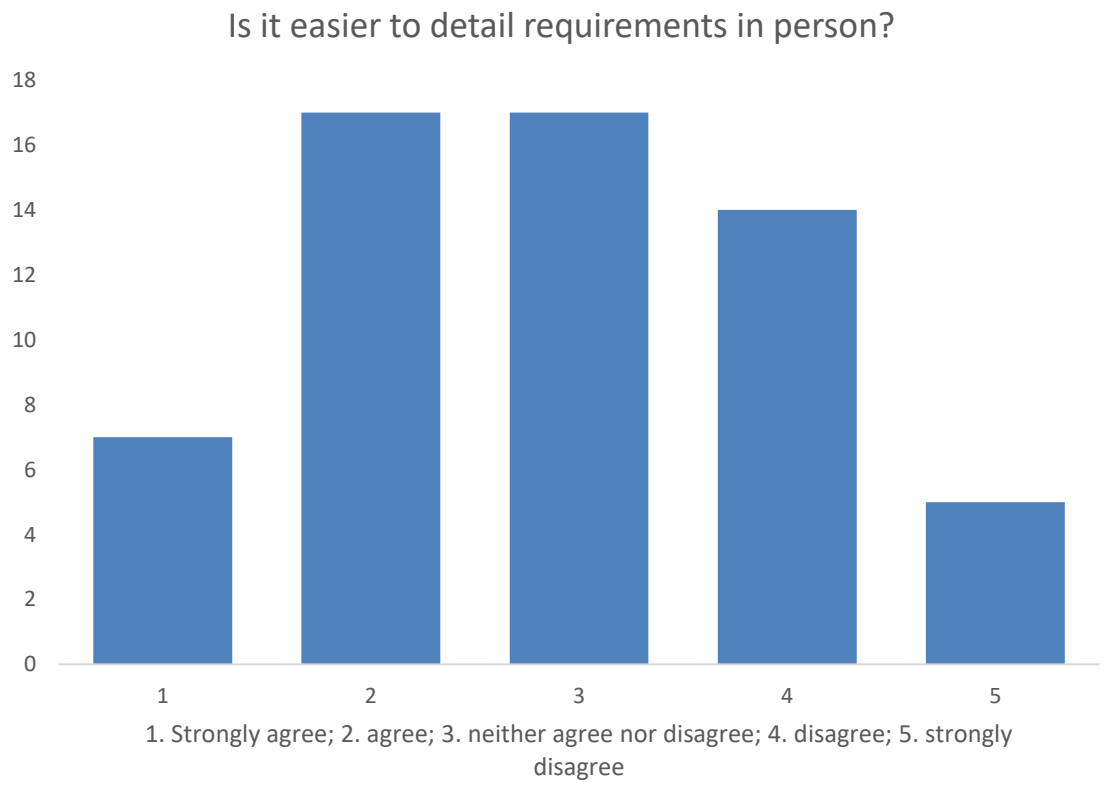

Figure 2 - Detailed requirements in the F2F work graph

Is it easier to detail requirements in remote/hybrid context? - The responses to the ease of detailing requirements for remote/hybrid solutions are shown in Table 28, which shows the distribution of employee responses.

Table 28 - Detailed requirements in the R_H work

Detailed requirements in the remote/hybrid system		Count
1	Strongly agree	3
2	Agree	13
3	Neither agree nor disagree	29
4	Disagree	12
5	Strongly disagree	3
Grand Total		**60**

The corresponding bar chart in Figure 3, which also relates to the ease of detailing remote/hybrid requirements, provides a visual representation of the responses.

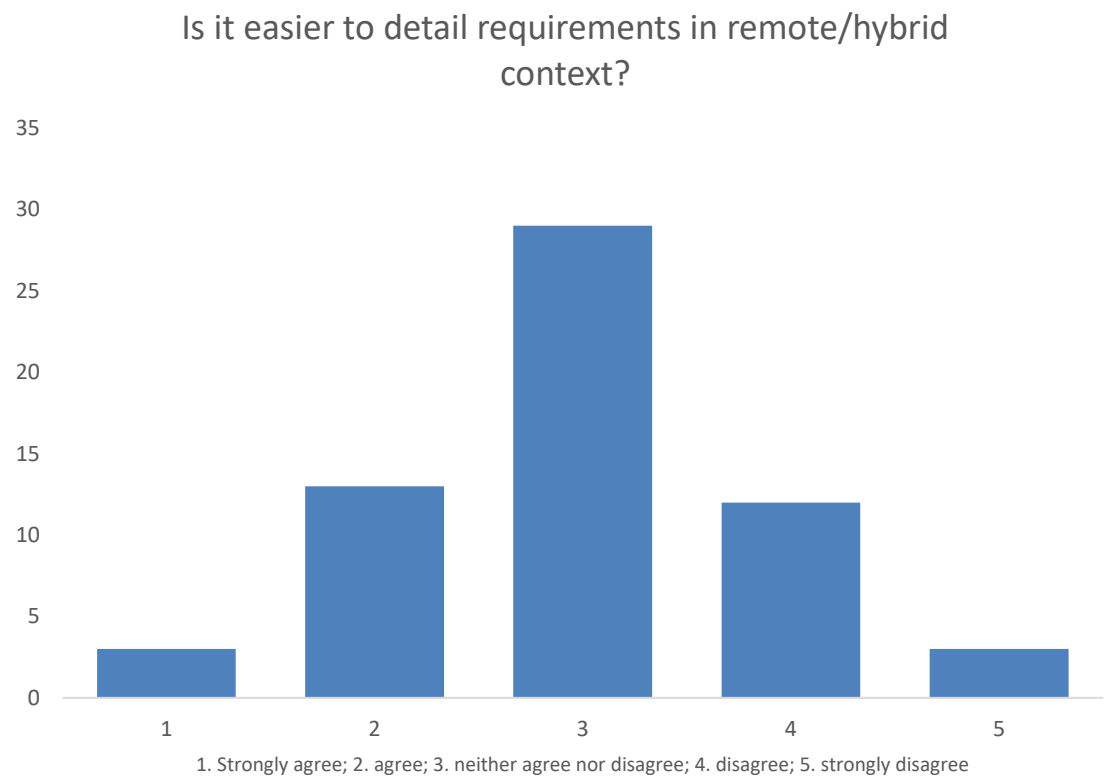

Figure 3 - Detailed requirements in the R_H work graph

Is it easier to explain solutions in face-to-face context? -Table 29 shows employees' responses to the ease of explaining solutions during face-to-face work, with the distribution of responses.

Table 29 - Explain solutions in the F2F system

Explain solutions in the face-to-face system		Count
1	Strongly agree	9
2	Agree	20
3	Neither agree nor disagree	15
4	Disagree	12
5	Strongly disagree	4
Grand Total		**60**

The bar chart in Figure 4 for the question about the ease of explaining solutions in the face-to-face system visually illustrates the distribution of responses.

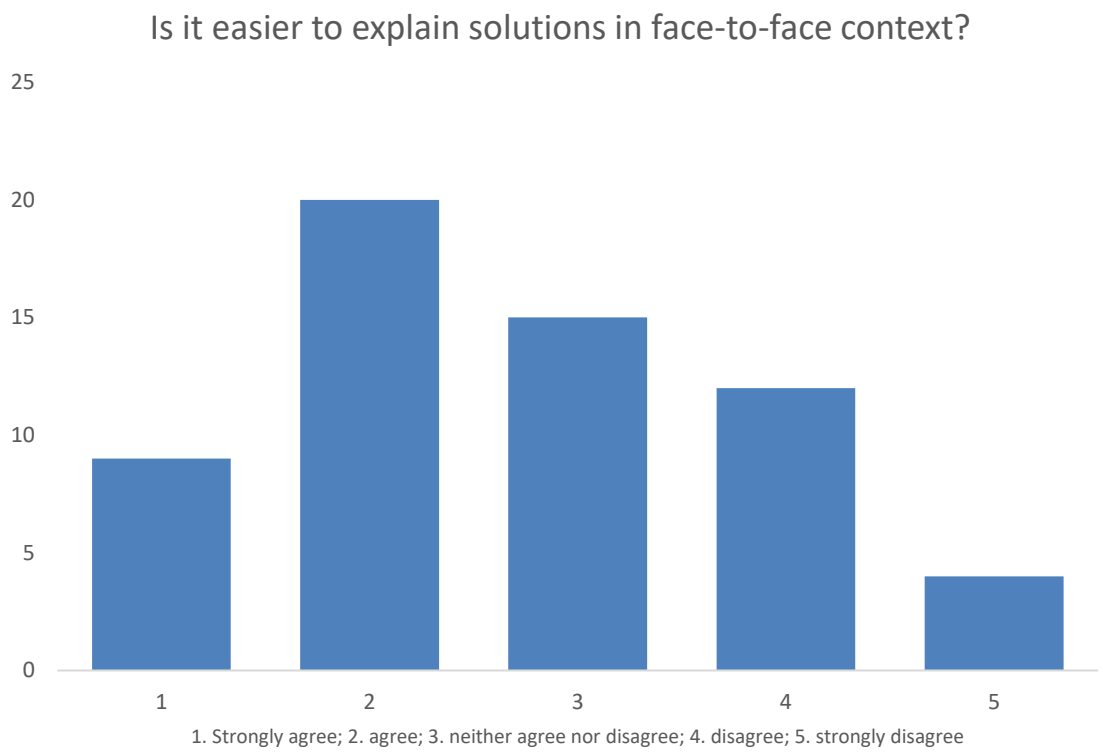

Figure 4 - Explain the solutions in the F2F system graph

Does it explain solutions in the remote/hybrid context? -The responses on the ease of explaining solutions in the remote/hybrid mode are shown in Table 30, which details the distribution of employee responses.

Table 30 - Explain solutions in the R_H system

Explain solutions in the remote/hybrid system		Count
1	Strongly agree	2
2	Agree	12
3	Neither agree nor disagree	27
4	Disagree	16
5	Strongly disagree	3
Grand Total		**60**

The bar chart in Figure 5 visually illustrates the distribution of responses on the ease of explaining solutions in the remote/hybrid mode.

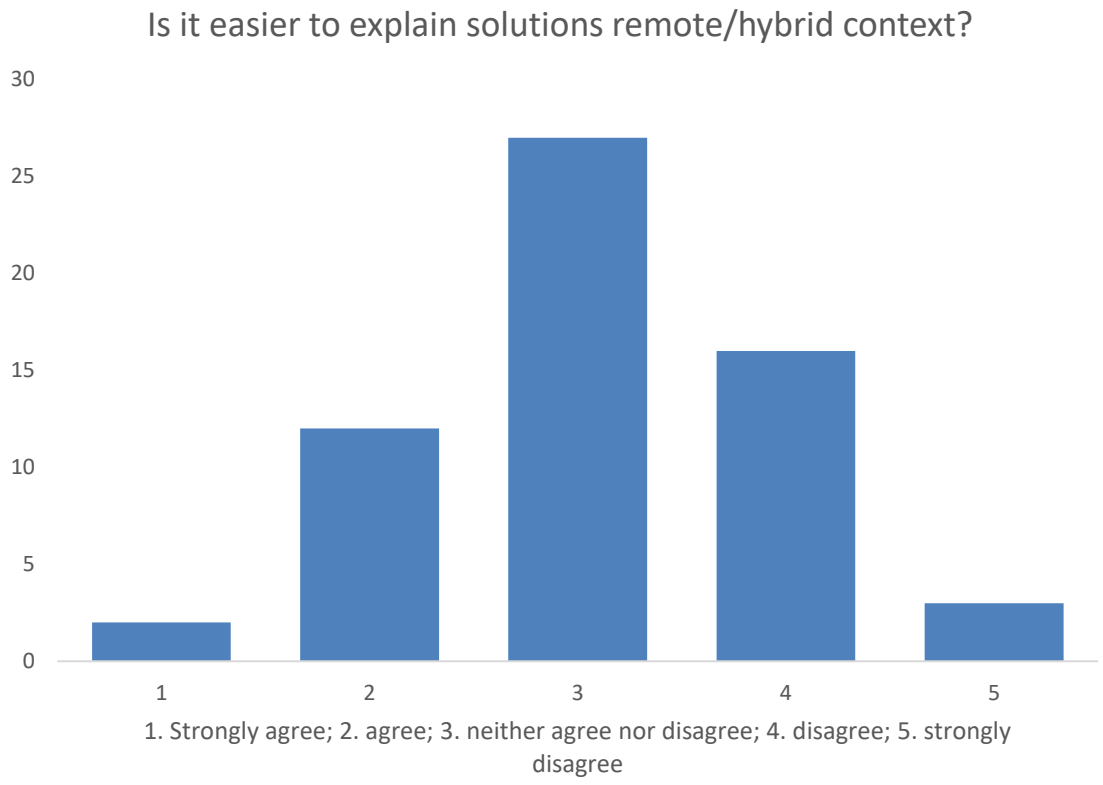

Figure 5 - Explain solutions in the R_H system graph

What is the biggest difficulty in communicating with IT?

To present the responses to question 23, the "main difficulties in communicating with IT" are categorised and presented in Table 31 and the original survey are presented in the Appendix at Figure 41. Table 31 organises the responses into categories as 'No Difficulty', 'Linguistic', 'Business Disconnect (Availability/Knowledge/Needs)', 'Communication', and 'Response Time', providing a clear and structured view of the main challenges faced by employees. The 'No Difficulty' category encompasses responses indicating that there are no significant difficulties in communication. The 'Linguistic' category addresses issues with understanding technical terms, adapting language between different areas, and achieving mutual comprehension. The 'Business Disconnects' category reflects perceptions that IT may not fully understand, prioritize, or be aware of the business needs. The category 'Communication' encompasses difficulties related to the clarity of communication, finding the appropriate person to contact, and adapting the language used between business and IT departments. Finally, the 'Response Time' category highlights problems associated with the speed of responses and problem resolution from IT.

Table 31 - Categories of the main difficulties in communicating with IT

Category	**Description of Difficulties**	**Total**	**Percentage (%)**
No difficulty	Responses indicating that there are no significant difficulties in communication	21	35
Linguistic	Language barriers or use of technical terminology	12	20
Business disconnect (Availability/Knowledge/Needs)	Feeling that there is no knowledge and/or availability of business needs	10	17
Communication	General difficulties in interacting and exchanging information	9	15
Response time	Delays in responding to requests	8	13

The chart in Figure 6 illustrates the categories and percentage distribution of difficulties experienced when interacting with IT.

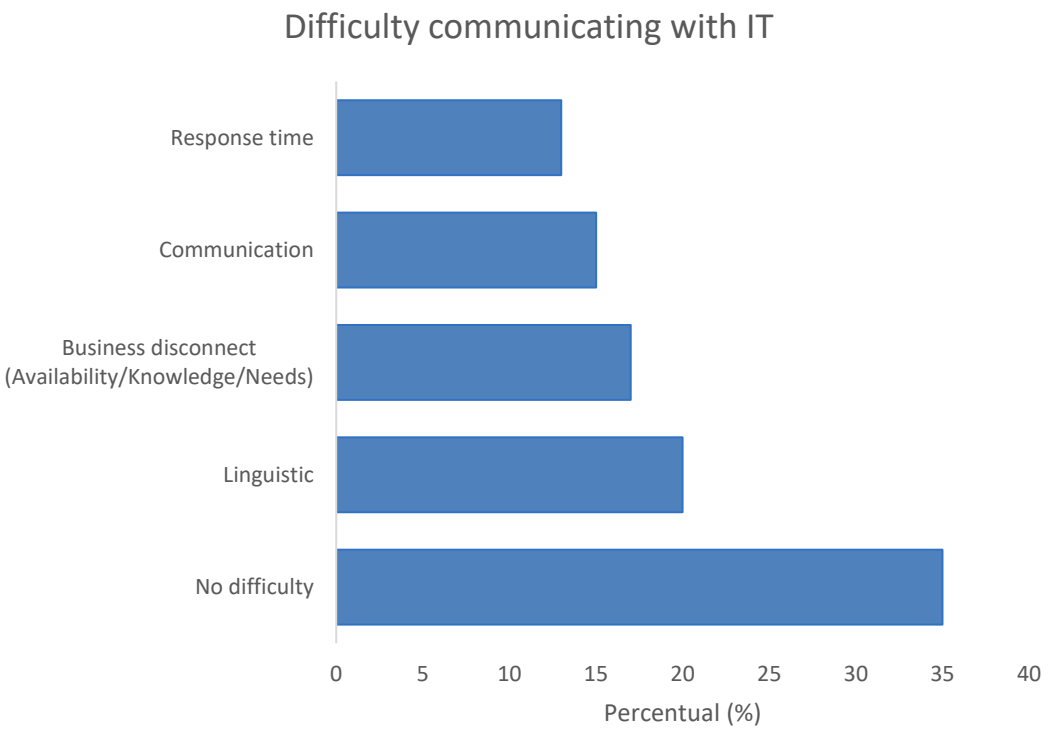

Figure 6 - Categories of the main difficulties in communicating with IT graph

Would you like to add anything to these questions that you think is relevant and/or you haven't seen reflected? - Additional suggestions and comments from employees about communication and interaction with IT are summarised and presented in the table 32, which provides a detailed overview of the areas that employees consider important, and which were not covered in the previous questions.

For question 24, where employees can suggest improvements or highlight aspects not covered, the responses are summarised in a table that organises the comments into similar categories. This table will help to synthesise the suggestions and additional comments and provide a clear view of the areas that employees consider important.

Table 32 - Relevant suggestions

Categories	Comment	Total	Percentage (%)
Communication Interfaces	1 - Quality of communication tools (camera, audio, light); 2 and 10 - Ease/availability of short subjects in the hybrid regime; 7 - Importance of using platforms even in the classroom	4	20
Interlocutors (Communication)	3 - Variations in communication depend on the interlocutors, not the working regime	1	5
Agendas (Availability)	4 - Remote/hybrid working arrangements allow for greater flexibility in scheduling and problem-solving	1	5
Business proximity	8 - Importance of internal customer orientation in IT; 13 - Need to adapt to the needs of others with easier language; 19 - Teleworking makes it difficult to relate to and understand the company's needs	3	15
Answers are not exhaustive	14 - Contextual variables can alter the clarity of answers	1	5
F2F Holds accountable	17 - Differences between remote and face-to-face meetings: commitment and focus are better in face-to-face meetings	1	5
Lack of socialising	20 - Hybrid regime or 100% teleworking harms social interaction (coffee, lunch, happy hour), but is seen as a positive solution for work	1	5
n.a.	5, 6, 9, 11, 12, 15, 16, 18 - No additional relevant comments	8	40

4.1.6. Comparing the views of face-to-face and remote/hybrid workers on communicating and interacting with the IT department

A comparison of the results for the "Detailed requirements" categories in Table 33. A comparable methodology will be employed for the "Explain solutions" category between the face-to-face and remote/hybrid systems in tables 34. This comparison will identify discrepancies in employee perception between the two working systems, highlighting areas for improvement and successes that can be applied to enhance the effectiveness of communication and processes in remote or hybrid environments.

Table 33 - Detail requirements

It is easier detail requirements in F2F or R/H context?		
Rating	F2F	R/H
Strongly agree	12%	5%
Agree	28%	22%
Neither agree nor disagree	28%	48%
Disagree	23%	20%
Strongly disagree	8%	5%

Table 34 - Explain solutions

It is easier detail explain solutions in F2F or R/H context?		
Rating	**F2F**	**R/H**
Strongly agree	15%	3%
Agree	33%	20%
Neither agree nor disagree	25%	45%
Disagree	20%	27%
Strongly disagree	7%	5%

In both comparisons, there is a significantly lower tendency to agree with the effectiveness of the detailed requirements and the explanation of solutions in the remote/hybrid system compared to the face-to-face system.

There is a substantial increase in the proportion of respondents who selected the option "Neither agree nor disagree" in the remote/hybrid system, suggesting a greater degree of neutrality or uncertainty regarding the effectiveness of these systems. Furthermore, the proportion of respondents who selected the option "Disagree" increased in the remote/hybrid system for both comparisons, indicating a perception of less effectiveness in the remote/hybrid environment. Finally, the proportion of respondents who selected the option "Strongly disagree" remained relatively stable, with only minor fluctuations between the systems.

The objective of this phase of the data analysis is to examine the interrelationships between the various variables within the data set to discern patterns and associations that may offer significant insights. In particular, the objective is to ascertain the relationship between communication difficulties with IT and other variables, including age, length of employment, and involvement with IT. Correlation analysis is a powerful statistical tool that enables us to quantify the strength and direction of these relationships. For this phase of the analysis, Pearson's correlation was employed. Pearson's correlation is a statistical measure that assesses the strength and direction of a linear relationship between two continuous variables. Pearson's correlation values range from -1 to 1. Value 1 indicates a perfect positive correlation, whereby an increase in one variable is accompanied by a corresponding increase in the other variable, and this relationship is linear. A value of -1 indicates a perfect negative correlation, whereby an increase in one variable is accompanied by a decrease in the other variable in a linear fashion. A value of zero indicates the absence of a linear correlation between the variables.

Pearson's correlation was chosen for this study due to its suitability for the nature of the data and the specific characteristics it offers. The variables under analysis, such as age, working time, and IT involvement, are continuous, making them appropriate for Pearson's correlation. Additionally, the goal of this analysis is to identify linear relationships between these variables, and Pearson's correlation is

the most appropriate measure for this purpose. It is also straightforward to interpret and calculate, which makes it an optimal choice for identifying both strong and weak associations between variables.

In analysing the results of Pearson's correlation, we will follow certain guidelines. A high positive correlation, indicated by a value close to 1, suggests that the variables in question tend to increase or decrease together. For instance, a high positive correlation between the variables 'age' and 'working time' would imply that as age increases, working time also tends to increase.

A high negative correlation (close to -1) indicates that one variable increase while the other decreases. For example, a high negative correlation between 'difficulty communicating with IT' and 'involvement with IT' would indicate that as difficulty communicating increases, involvement with IT tends to decrease.

A correlation close to zero indicates little or no linear relationship between the variables. This means that the variables do not have a significant linear association.

Considering the correlation values obtained, it would be prudent to compile a top five list of the most significant correlations in each group, with a particular focus on the strong positive correlations, that is, variables that increase or decrease in the same direction. The objective is to ascertain whether there is an underlying cause or a direct interaction between these variables, as well as to identify the underlying causes of the strong negative correlations, which are variables that increase or decrease in opposite directions. The objective is to explore these relationships to identify any potential influencing factors or adverse interactions. The results of this correlation analysis will assist in the identification of significant patterns and relationships between variables, thereby providing a robust foundation for the formulation of data-driven conclusions and decisions.

Table 35 corroborates the hypothesis that the department with the least difficulty in communicating with IT is IT itself, followed by Finance with half the responses. The HR department has four answers as language difficulties. Table 36, 37 and 38 illustrate the distribution of age groups by working time in F2F (face-to-face), R/H (remote/hybrid) environments and by length of working time.

Table 35 - Departments / Difficulty communicating with IT

Difficulty in commun_IT	Business disconnects	Communication	Linguistic	No difficulty	Response time	Total
Finance	1	2		**4**	1	8
H&F		1		1		2
HR	3	2	**4**	2	2	13
IT	3	1	1	**8**	2	15
JMH		1				1
Legal	1		1			2
Logistics	1					1
Master data					1	1
Ombudsman			1	1		2
Others	1	2	2	**4**		9
Quality			2			2
Supply Chain			1	1	2	4
Total	**10**	**9**	**12**	**21**	**8**	**60**

Of the 60 employees, 42 work or have worked for between 1 and 5 years in Remote/Hybrid, which coincides with the lockdown time due to the Covid pandemic. However, we have 1 response of working in R/H for an employee over 50 years old.

Table 36 - age groups working in F2F

W_F2F Years	<30	30-39	40-49	>=50	Total
<1	1	3	3		7
1-5	4	4	1	1	10
5-10		5	1	1	7
>10		6	15	15	36
Total	**5**	**18**	**20**	**17**	**60**

Table 37 - age groups working in R/H

W_R/H Years	<30	30-39	40-49	>=50	Total
<1		4	4	6	14
1-5	5	13	15	9	42
5-10		1	1	1	3
>10				1	1
Total	**5**	**18**	**20**	**17**	**60**

Table 38 - length of working time

W_T	Nº
<1	2
1-5	14
5-10	9
>10	35
Total	**60**

The CRISP-DM methodology was employed to analyse the data, which involved understanding the business and study, gaining insights into the data, and conducting the modelling process, along with visualisation and analysis. The study and data have already been examined and understood in the context of previous phases, and the Pearson correlation was calculated using a Python script, as previously described in the methodology of the case study.

For the presentation, heat maps were generated to visualise all the correlations, the total of which is shown in figure 7, as well as the main positive, negative, and neutral correlations, in figures 8, 9 and 10, using the `seaborn` library.

The data labels have been reduced to make the graph more readable.

'Age': 'Age', 'Gen': 'Gen', 'Depart': 'Depart', 'T_Emp': 'W_T', 'W_F2F': 'W_F2F', 'W_R/H': 'W_R/H', 'IT involvement': 'IT invol', 'difficulty in communicating_IT': 'Diff comm _IT', 'Explaining needs_F2F': 'Expl needs_F2F', 'Response time_F2F': 'Resp time_F2F', 'Relevance of concerns_F2F': 'Rel concerns_F2F', 'Considered in solutions_F2F': 'Cons in solut_F2F', 'Informal IT conversation': 'Inf IT conv', 'Explaining needs_R/H': 'Expl needs_R/H', 'Response time_R/H': 'Resp time_R/H', 'Relevance of concerns_R/H': 'Rel concerns_R/H', 'Considered in solutions_R/H': 'Cons in solut_R/H', 'Detail requirements_F2F': 'Det req_F2F', 'Detail requirements_R/H': 'Det req_R/H', 'Explain solutions_F2F': 'Expl solut_F2F', 'Explain solutions_R/H': 'Expl solut_R/H'.

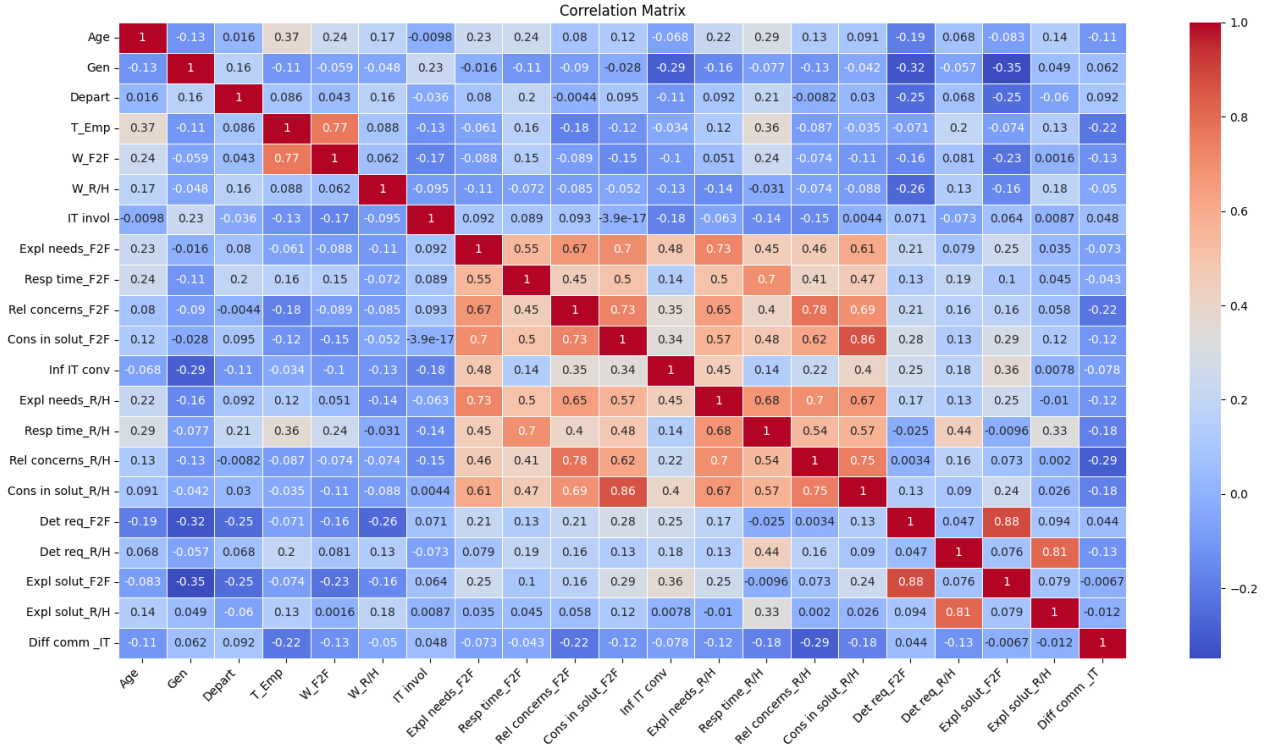

Figure 7 - Heatmap of the total correlation

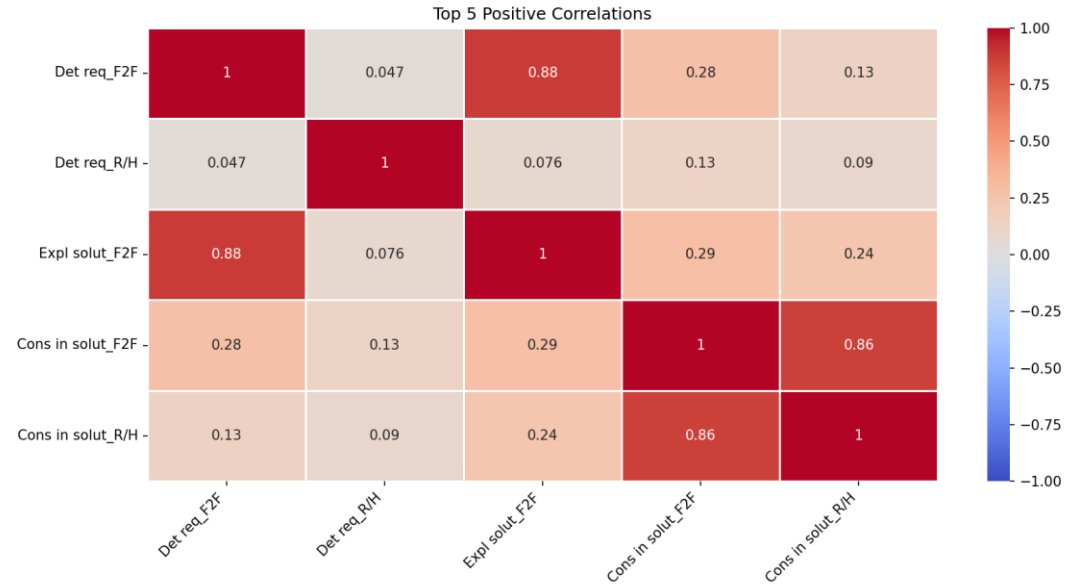

Figure 8 - Top 5 positive correlations

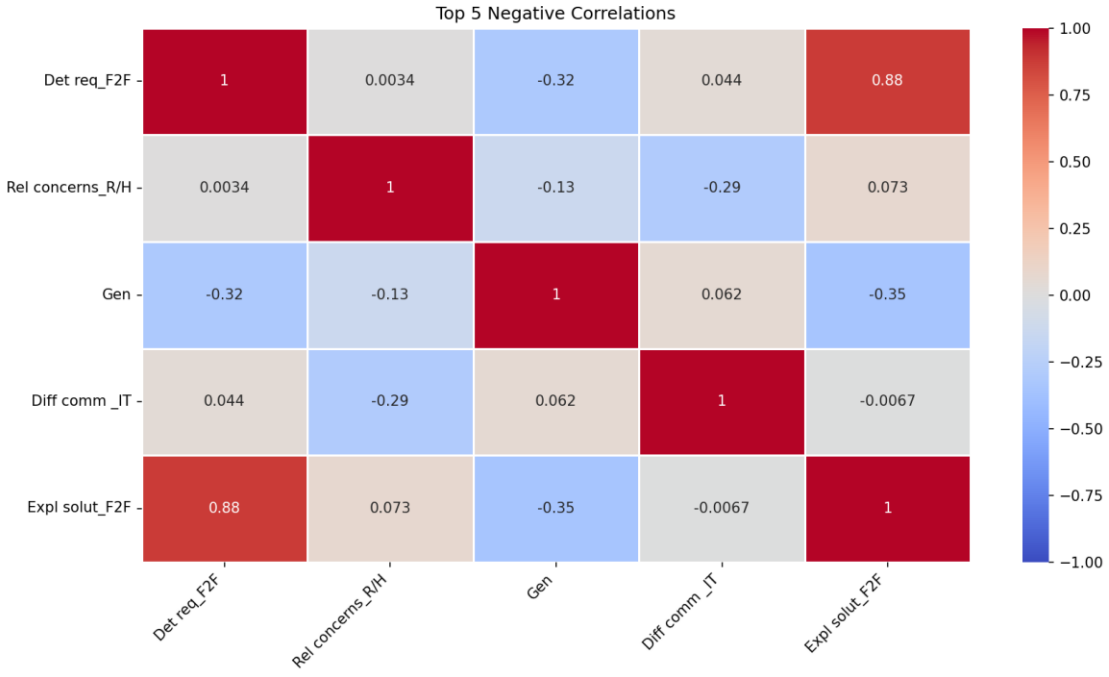

Figure 9 - Top 5 negative correlations

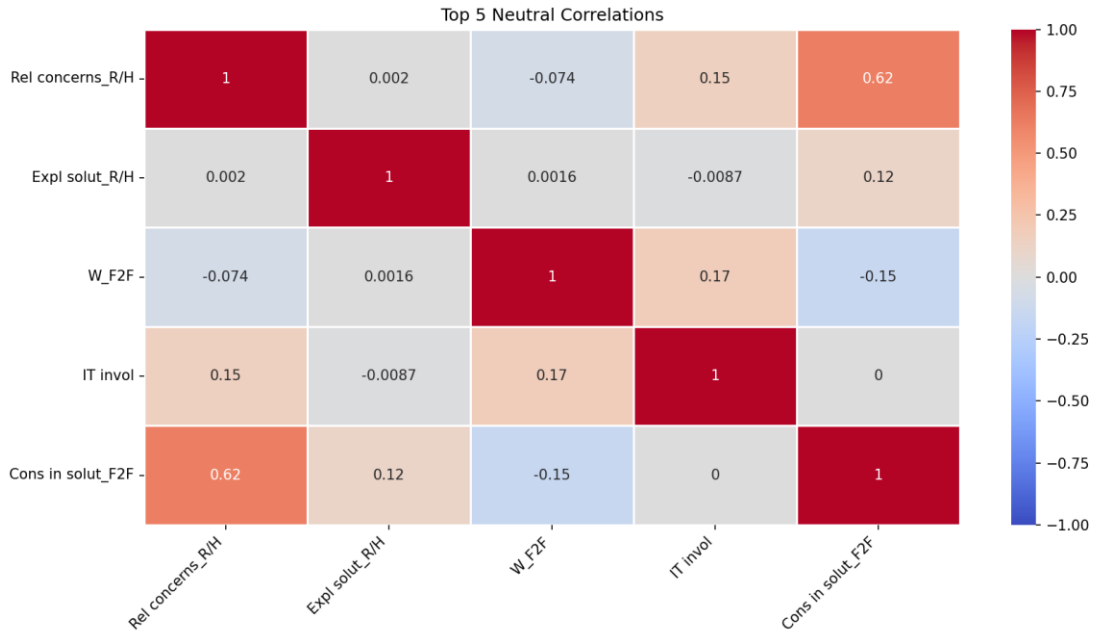

Figure 10 - Top 5 neutral correlations

The positive correlations found indicate a strong relationship between variables that tend to increase together. The highest positive correlation is between the variables "Explain solutions_F2F" and "Detail requirements_F2F," with a value of 0.878923. This means that in face-to-face work contexts, the more detailed the requirements are specified, the clearer the explanation of the solutions, suggesting that these two aspects mutually reinforce each other. This relationship is reflexive, as the correlation between "Detail requirements_F2F" and "Explain solutions_F2F" is also 0.878923, reinforcing the interdependence of these variables. Another pair with a high positive correlation is between "Considered in solutions_R/H" and "Considered in solutions_F2F," with a value of 0.863100. Here, it is observed that regardless of the work environment (remote/hybrid or face-to-face), the perception that solutions take employees' requests into account tends to grow similarly in both contexts. This may indicate consistency in how solutions are valued by IT, regardless of the work environment. Finally, the correlation of 0.811453 between "Detail requirements_R/H" and "Explain solutions_R/H" shows a similar trend to that found in the face-to-face environment, indicating that in remote/hybrid work contexts, clarity in explaining solutions is strongly related to the precision with which requirements are detailed.

The negative correlations found are weaker, with values closer to zero than to -1, indicating that these relationships are inverse, but not strong enough to draw definitive conclusions about consistent inverse growth. The most negative correlation was found between "Explain solutions_F2F" and "Gender," with a value of -0.348315. This suggests a slight tendency for perceptions about explaining solutions in a face-to-face environment to vary according to gender, but the correlation is not strong

enough to indicate a clear inverse relationship. Similarly, the correlation between "Detail requirements_F2F" and "Gender" is -0.318427, which again suggests a small tendency for variation in responses according to gender, without being conclusive.

The correlation of -0.294459 between "Relevance of concerns_R/H" and "difficulty in communicating_IT" indicates a slightly inverse relationship, where, as employees perceive their concerns as less relevant in remote/hybrid work environments, they also tend to report fewer difficulties in communicating with the IT department.

The neutral correlations, as expected, are very close to zero, indicating that there is no perceptible linear relationship between the variables involved. For example, the correlation of 0.000000 between "IT involvement" and "Considered in solutions_F2F" suggests that the involvement of the IT department has no linear relationship with employees' perception of whether their solutions are considered in the face-to-face environment. Similarly, the correlation of 0.001607 between "Explain solutions_F2F" and "Working in F2F" indicates that explaining solutions in a face-to-face environment is not related to the variable "Working in F2F," and the same applies to the other neutral correlations found, such as between "Explain solutions_F2F" and "Relevance of concerns_R/H" with a correlation of 0.001995. These neutral correlations show that, for these variables, there is no direct relationship that can be inferred from the data, which may suggest that other factors not analysed here are more determinant for these specific variables.

The strong positive correlations indicate areas of clear interdependence, especially in face-to-face and remote/hybrid work contexts regarding clarity in explaining solutions and detailing requirements. The strongest correlations, such as between "Explain solutions_F2F" and "Detail requirements_F2F" (0.878923), highlight the importance of clear communication in face-to-face environments. The negative correlations, although weak, suggest the possibility of variation in perceptions based on factors such as gender and the relevance of concerns in remote/hybrid work environments.

In particular, the correlation of -0.294459 between "Relevance of concerns_R/H" and "difficulty in communicating_IT" may reflect a perceived disconnect between business needs and the IT department's responses. This perception may be influenced by the responses of the IT department members themselves, as identified in Table 35 of the data analysis chapter, suggesting that communication difficulties may be perceived differently by those within the department compared to other employees. The neutral correlations indicate the absence of significant linear relationships, which helps focus on other areas for potential improvement.

CHAPTER 5

Discussion and Conclusions

5.1. Discussion

The COVID-19 crisis was unique in that it simultaneously affected the assets, liabilities and face-to-face interaction of the workforce, by leading to adopt remote working (Gopalakrishnan et al., 2024) which reinforced the importance of teamwork. Collaboration and communication become key motivating factors for engaging in knowledge management (KM), promoting the exchange of ideas and mutual trust between members. Social exchange suggests that collaboration and communication in teams increase the perceived benefits of knowledge sharing, reduce costs and promote greater involvement in KM processes (Atapattu & Huybers, 2022). It is imperative to understand this distinction between temporary and permanent teams to contextualise the communication difficulties with the IT department. The dynamics of permanent teams have not yet been fully elucidated; this study addressed precisely these continuous and permanent interactions, highlighting their importance for the definition of requirements and their implications for software engineering.

The difficulties in communicating with the IT department were analysed, revealing distinct categories that are interconnected, reflecting the complexities faced by employees. The main categories identified were Language, Business disconnect, Communication and Response time, which can be closely linked to communication. The "Language" category emerged as the most critical, accounting for 20 per cent of responses. Language barriers or the use of technical terminology are frequent obstacles. Many employees reported that the language used by the IT department is often overly technical, making it difficult to understand and communicate efficiently. This linguistic disconnect can result in misunderstandings and delays in task completion, exacerbating communication difficulties. The "Business disconnect" category was the second most significant, accounting for 17 per cent of responses. This category highlights the perception that the IT department lacks sufficient knowledge of business needs or the availability to meet business demands. This disconnect can be attributed to a lack of alignment between the IT department's priorities and the operational needs of other areas within the company. The perceived lack of availability and understanding of business needs can lead to frustration and a negative view of the IT department's effectiveness. "Communication" category challenges cover general difficulties in interacting and exchanging information, representing 15 per cent of responses. A significant proportion of employees face challenges in their day-to-day communication with the IT department, manifesting as a lack of clarity, barriers in transmitting messages, and difficulties in maintaining efficient and productive dialogue. Lastly, "Response time," with 13 per cent of responses, reflected employee concerns about delays in receiving timely replies to

their requests, further exacerbating frustrations and impacting their overall experience in working with the IT department.

The interconnection between these categories and the perceived lack of knowledge and willingness of the IT department to meet business needs can be a direct result of communication failures and language barriers. Without clear communication and an understanding of specific business needs, the IT department may struggle to prioritize and respond effectively to requests. The absence of physical contact between departments significantly exacerbates these issues. Analysing the data reveals a negative correlation between "difficulty communicating with IT" and "Explaining needs," with this relationship being more pronounced in remote/hybrid environments (H/R: -0.12) than in face-to-face environments (F2F: -0.073). This indicates that in remote/hybrid working contexts, the difficulty in clearly articulating employees' needs is greater, which can exacerbate the barriers created by the lack of face-to-face interaction. With communication predominantly virtual, there are fewer opportunities for the natural permeability of linguistic expressions and the harmonization of terminology between different sectors. Each department tends to develop its own language and jargon in isolation, hindering the spontaneous sharing of concerns and needs. This linguistic isolation can perpetuate misunderstandings and make effective collaboration between the IT department and other areas of the company even more challenging.

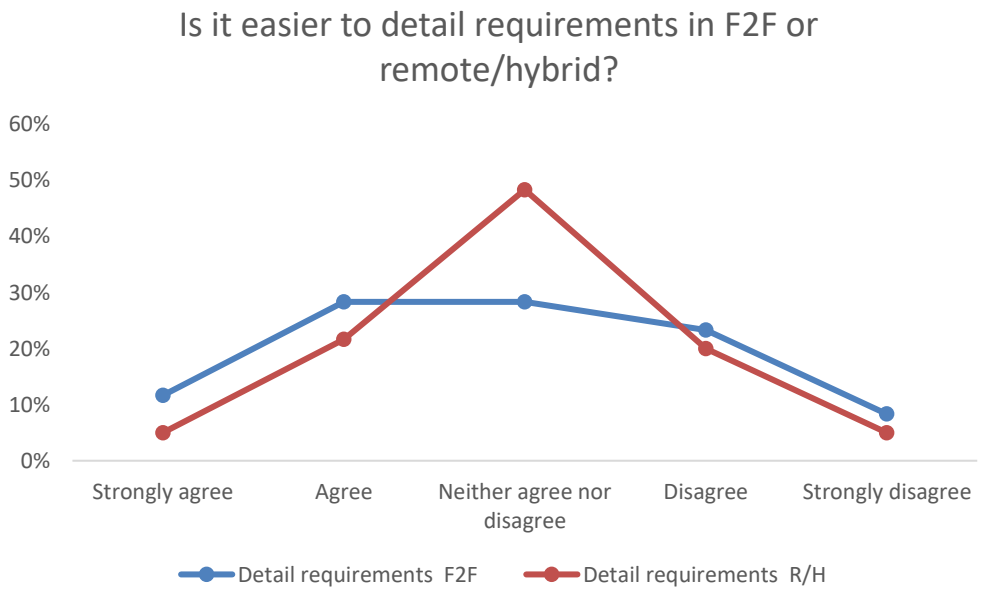

Figure 11 - Is it easier to detail requirements in F2F or R/H context graph

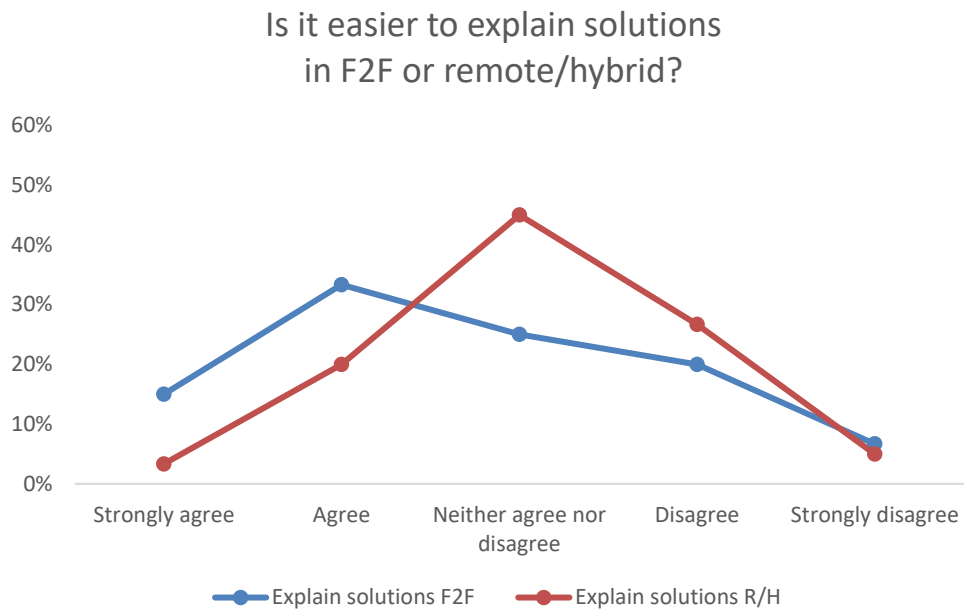

Figure 12 - Is it easier to explain solutions in F2F or remote/hybrid graph

The line graphs illustrating the grouping of responses for detail requirement, Figure 11, and explaining solutions, Figure 12, exhibit a comparable trend. However, they also reflect a heightened indifference to the issues pertaining to the R/H environment, as evidenced by the significantly higher prevalence of the "Neither agree nor disagree" response compared to the F2F environment. Conversely, the responses pertaining to the F2F environment display a greater degree of polarisation and strength, can suggest a heightened level of involvement with the company's issues in that environment.

The existing corpus of scientific literature on this topic is relatively scarce. Although remote working has been a common practice for several years, its prevalence has increased significantly during the 2020 global pandemic. This resulted in a paucity of pertinent literature and a challenging process of selecting appropriate keywords, which entailed a delicate balancing act between sensitivity and specificity.

The articles were classified according to the subject matter deemed most pertinent, although the majority encompassed all of the listed topics in table 39. Studies show that in the event of a catastrophe, such as COVID-19, the implementation of remote work tends to be relatively quick. However, it still requires substantial support, careful planning, and addressing significant gaps in knowledge sharing, particularly in terms of asynchronous communication. The studies are not comprehensive in their coverage of the subject matter. Some address the transfer of knowledge

between members of virtual teams, but there is a dearth of research on the transfer of knowledge between employees of the same company with different working environments. The studies that do exist advocate hybrid rather than remote working, focusing on the lack of trust and informal conversations without scheduling or forethought.

Table 39 - Classification of articles by theme and subject

Position	Number of Articles
Supportive of Remote Work Implementation	3
Criticisms of the Current Remote Work Implementation	8
Neutral / No direct position	15
Observations:	
Supportive of Remote Work: Articles 7, 12, 23	
Critical of Remote Work: Articles 5, 6, 8, 9, 19, 21, 22, 24 e 25.	
Neutral / No direct position: Articles 1, 2, 3, 4, 10, 11, 13, 14, 15, 16, 17, 18, 20, 26 e 27	

Aspect of Knowledge Management in Remote Work	Number of articles
Difficulties and Challenges	12
Management Solutions and Techniques	9
Impact of Communication and Technology	6
Observations:	
Difficulties and Challenges: Articles 3, 4, 6, 8, 9,14, 17, 21, 23, 24, 25 e 27	
Management Solutions and Techniques: Articles 1, 5, 7, 10, 11, 15, 18, 19, 22	
Impact of Communication and Technology: Articles 2, 12, 13, 16, 20 e 26	

The existing scientific literature on remote working is still limited in many respects, particularly with regard to its long-term implications. Although remote working was already a common practice before the 2020 pandemic, its widespread adoption during the global crisis has accelerated the need for a more rigorous and comprehensive exploration of this phenomenon. In addition, knowledge management in digital organisations takes on specific characteristics that differ significantly from traditional practices, reflecting the evolution of organisational structures in response to digital transformation (Gupta et al., 2023). The management of crises, as demonstrated by the COVID-19 pandemic, requires a new approach that goes beyond mere problem solving, despite this being the critical initial phase. To fully understand the organisational response and its challenges, it is essential to adopt a multi-level and interdisciplinary perspective, encompassing the individual, organisational, and institutional levels (Sharma et al., 2022). The advent of the global pandemic has served as a catalyst for organisations across the globe to rapidly adapt their operational models to accommodate remote working. This abrupt transition has revealed deficiencies in the extant literature, particularly about optimal practices for the effective implementation and management of remote working on a large scale.

A review of the literature revealed that prior to the pandemic, remote working was predominantly associated with fully virtual teams, frequently comprising "knowledge workers" such as programmers.

These professionals were already confronted with considerable challenges in the domain of knowledge management, particularly regarding the sharing of knowledge, which is dependent on informal interactions, non-verbal communication and trust. The transformation of these practices into an exclusively virtual environment demonstrated the challenges inherent in replicating the organic and in-person processes that typically facilitate their achievement.

5.2. Limitations

This study was subject to a number of limitations, which may be classified as pertaining to knowledge, psychology or behaviour, or to the context of the literature research. These will be described in the order in which they occurred.

The preliminary search strategy involved the use of the following keywords: 'knowledge management' and 'remote working' and 'information technology', which yielded 70 articles. Of these, 67 were in B-ON, while only three were available via Scopus. Following an evaluation of the subject matter, 58 were rejected, 12 were recommended for further reading, and one was excluded from the Scopus database due to the absence of visualisation. A review of the articles revealed that the initial approach was inadequate. This necessitated a review and modification of the research method. This reformulation demonstrates that the review and modification of the method were undertaken as a consequence of the inadequacy of the initial approach, following an analysis of the articles.

5.3. Bias

One of the questions included in the survey was excluded from the subsequent analysis of the data because it was pertinent only to the face-to-face working session. There was a preconceived notion that informal conversations are conducted in person. This assumption is supported by the question, “Do you often have informal conversations with IT colleagues?” This inquiry was posed at the conclusion of the in-person section of the survey, after which respondents were asked to indicate the frequency of informal interactions with colleagues in the IT department. The results are summarised on a Likert scale.

It is important to consider other limitations of this study when interpreting the results. Firstly, the sample was limited in terms of size and composition, with all the participants coming from the same company, located in the same geographical area and operating in a context characterised by pre-existing relationships of trust. This trust may have facilitated the sharing of knowledge and experiences between the participants, which may not be replicable in contexts where relationships are still being built or are non-existent. This limits the possibility of extrapolating the results to other organisations or contexts with different team dynamics. Furthermore, although the data was collected in 2024, many participants referred to the lockdown period in their responses, when they faced sudden changes in

their family and professional routines. This factor may have influenced their responses and perceptions. For future research, it would be beneficial to expand the sample to include organisations from different sectors and compare the results with data from other geographies and cultures, in order to assess the consistency of the findings in varied scenarios.

5.4. Conclusion

The primary question this study sought to answer was: "Does remote work affect knowledge management, communication, and the definition of functional requirements in IT departments?" The findings suggest that remote work does indeed impact these areas significantly. IT departments, when working remotely, often become isolated akin to an island disconnected from the usual flow of communication. This isolation reduces permeability to discussions, conversations, and specific jargon from other departments, leading to communication challenges. One of the variables that most demonstrated these difficulties was 'Detail Requirements'. The negative correlation observed between communication difficulty and the definition of detailed requirements in remote/hybrid environments (-0.13) indicates that, without face-to-face interactions, clarity in the definition of requirements decreases significantly. In contrast, the correlation in F2F environments is 0.044, suggesting that face-to-face interactions allow for greater clarity in communication and therefore a better definition of requirements. Furthermore, the relationship between 'Explaining Needs' and 'difficulty in communicating' is more pronounced in remote/hybrid contexts, indicating that the difficulty in clearly articulating employees' needs is greater in these circumstances. This lack of clarity in remote environments can lead to misunderstandings and complicate corporate knowledge management, affecting the effectiveness of IT project results. Communication is a fundamental pillar in the definition of functional requirements; its disruption complicates the overall management of corporate knowledge and affects the efficacy of IT project outcomes.

The studies reviewed highlight a number of advantages associated with remote working, including flexibility and work-life balance, reduced operating costs, business continuity in times of crisis and a contribution to environmental sustainability through a reduction in the need to commute. However, the challenges are also significant and include the loss of non-verbal communication, which is crucial for sharing tacit knowledge; the difficulty in maintaining trust between teams; unequal working conditions, especially in terms of access to appropriate technology; social and professional isolation and the added complexity in managing and supervising remote teams. A frequently emphasised aspect is the importance of personal discipline in the context of remote working, as well as the necessity for regular integration of face-to-face meetings in order to maintain team cohesion and interpersonal connection. These elements are regarded as indispensable for counteracting the adverse effects of isolation and guaranteeing efficacious collaboration.

Currently, many organisations successfully maintain the trust of remote and local employees because they have already established trusting relationships with their colleagues in their pre-remote working environment. However, in the long term, the scenario can be even more challenging with the arrival of new employees who may find it difficult to integrate virtually without an initial bond of trust or familiarity with the organisational culture. The lack of face-to-face interaction can make it difficult to build relationships and make the learning and adaptation process more solitary, creating additional barriers to cohesion and communication flow in the remote environment (Carr & Jooss, 2023).

The literature substantiates the assertion that the proliferation of remote or hybrid work is a phenomenon that is here to stay. Nevertheless, for this practice to be beneficial for both companies and workers, there needs to be a continuous effort to improve management practices and organisational policies.

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Appendix

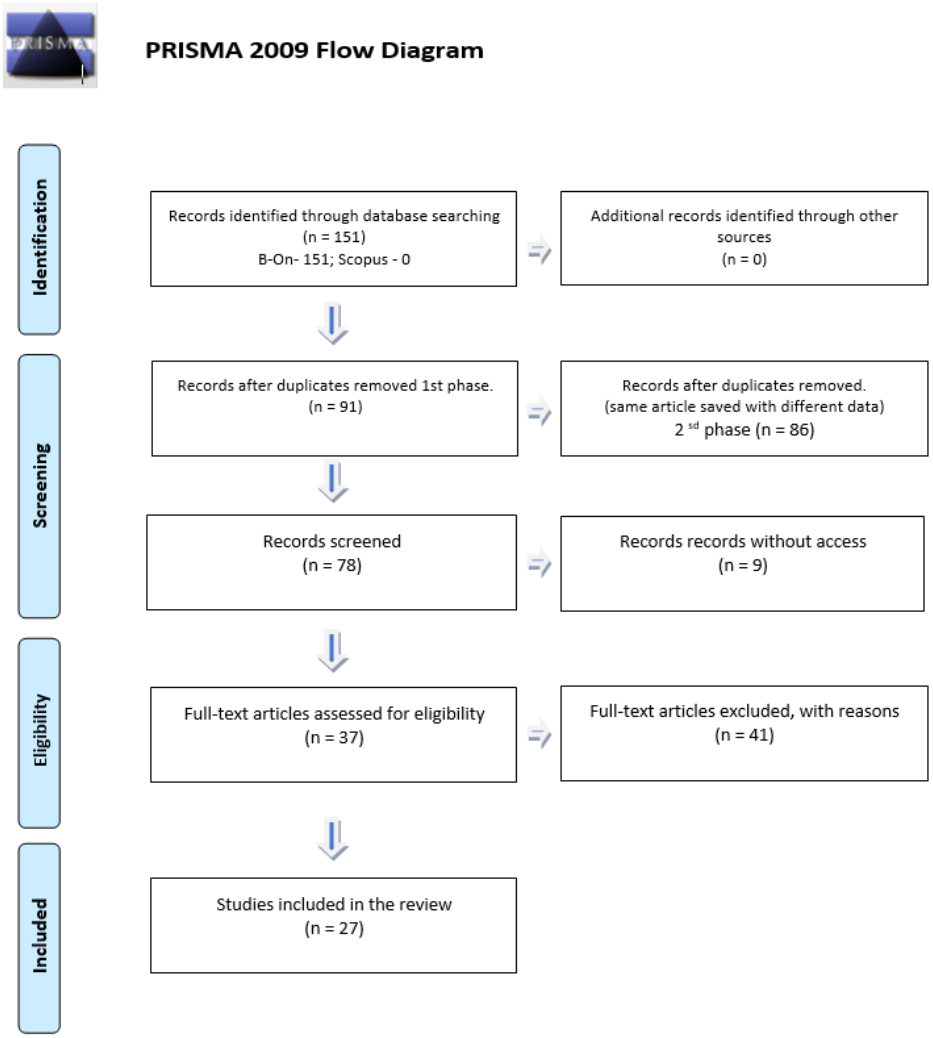

Figure 13 - PRISMA Flow Diagram

Related to section 2 - Communication and interaction with the IT department (F2F) - in Data analysis

The bar chart in figure 14 visualises employees' perception of how easy it is to explain their IT-related needs in person.

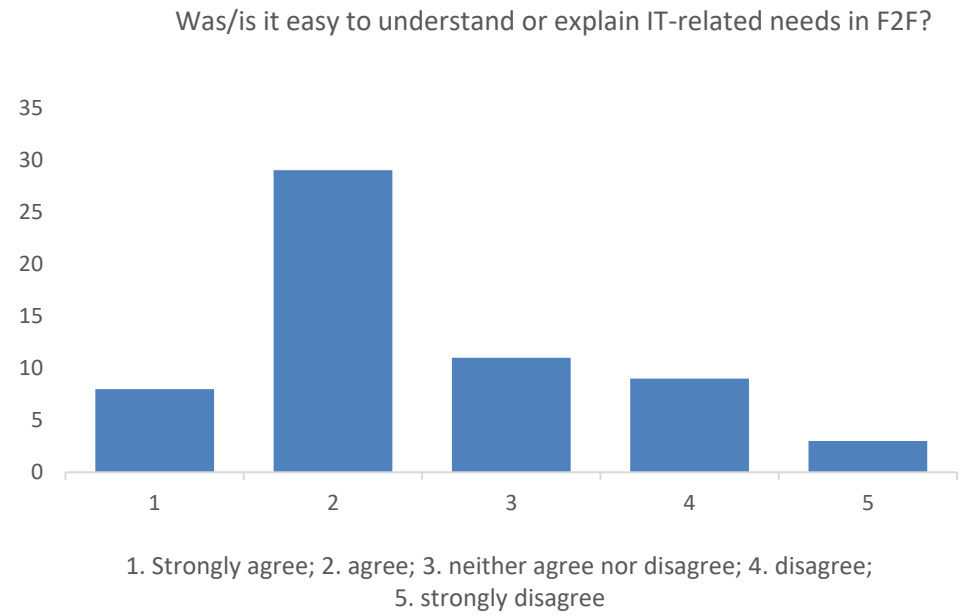

Figure 14 – Face-to-face explaining needs chart

The bar chart in figure 15 shows how employees perceive the responsiveness of the IT department to their personal needs.

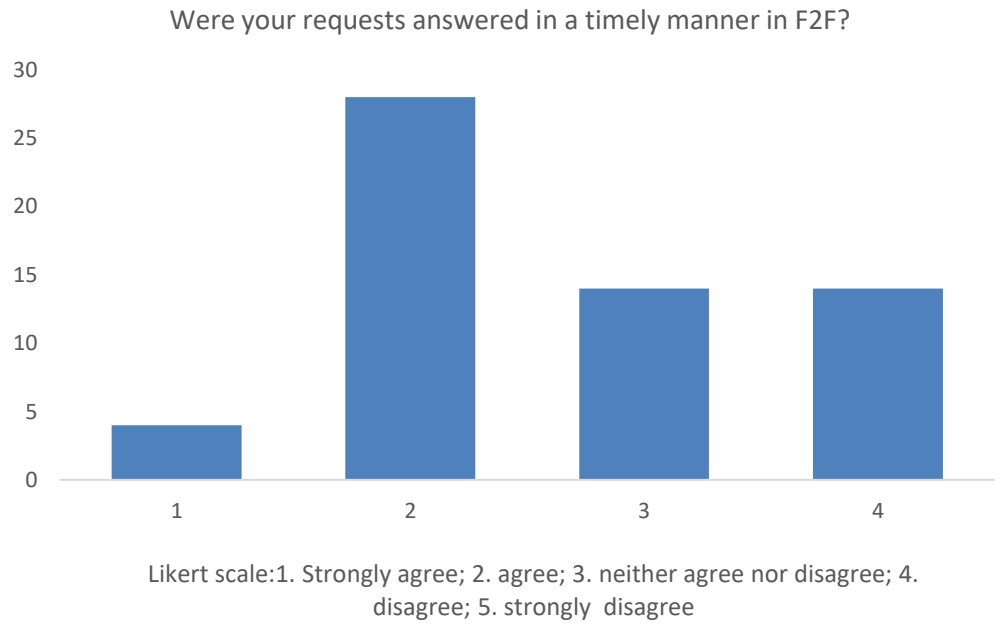

Figure 15 - Face-to-face response time chart

The bar chart in figure 16 visualises employees' perceptions of the importance given to their concerns by the IT department in face-to-face interactions.

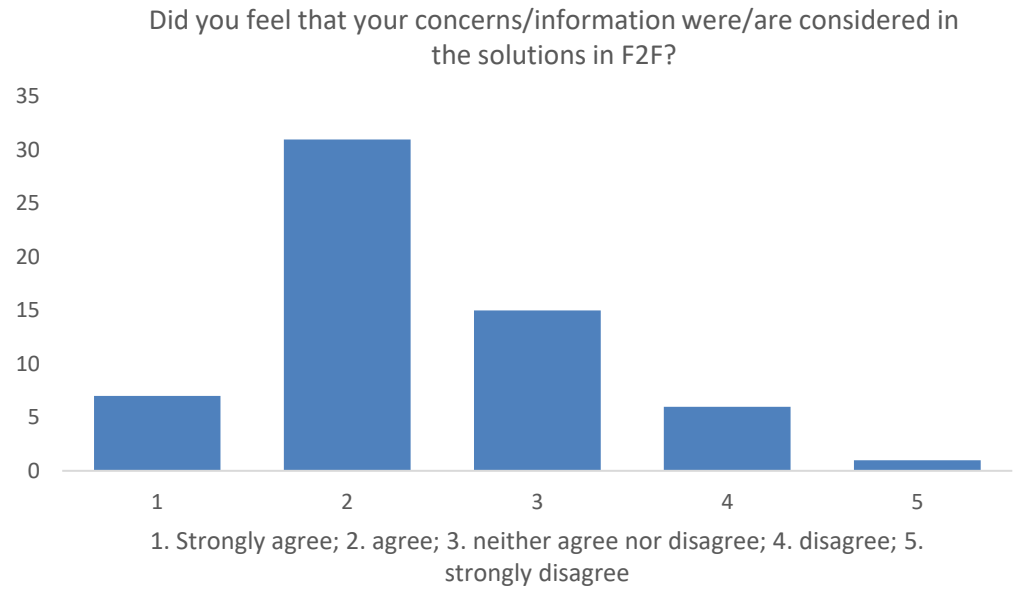

Figure 16 – Face-to-face relevance of concerns chart

The bar chart in figure 17 visualises how employees perceive their concerns to be addressed in face-to-face IT solutions.

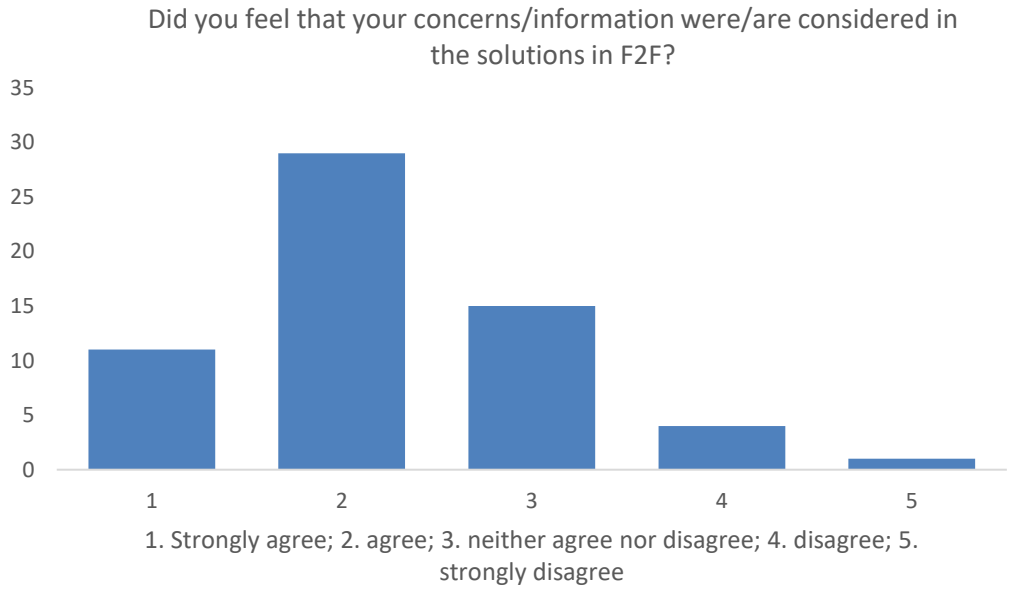

Figure 17 - Face-to-face considered in solutions chart

Related to section 3 - Communication and interaction with the IT department during remote or hybrid working (R/H) - in Data analysis.

The bar chart in figure 18 visualises employees' perceptions of how easy it is to explain their IT needs on a remote or hybrid basis.

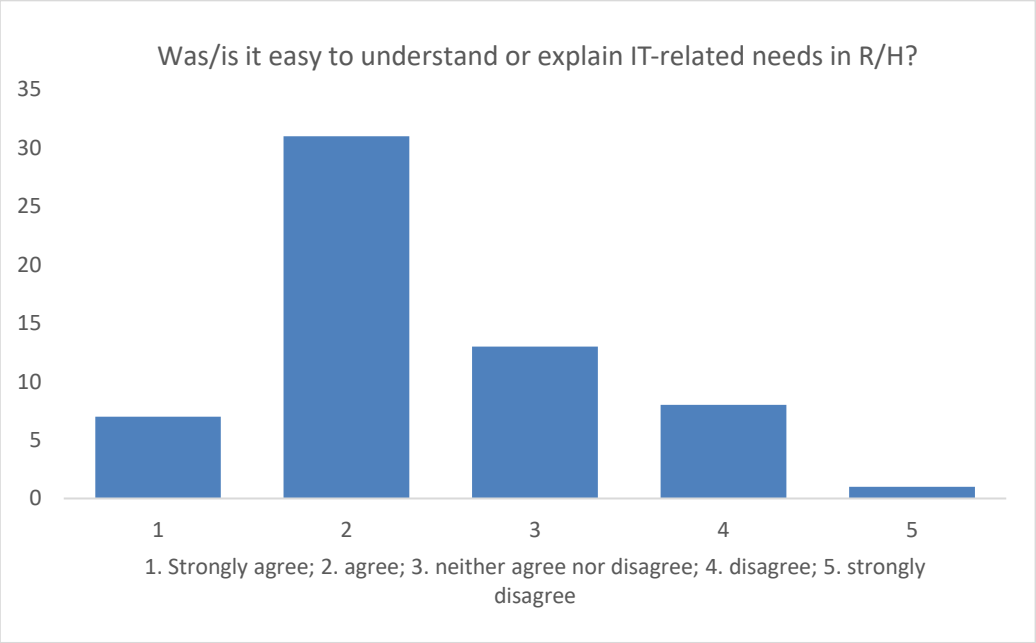

Figure 18 - Remote/hybrid explaining needs chart

The bar chart in the figure 19 shows how employees perceive IT's responsiveness to their needs when working remotely or hybrid.

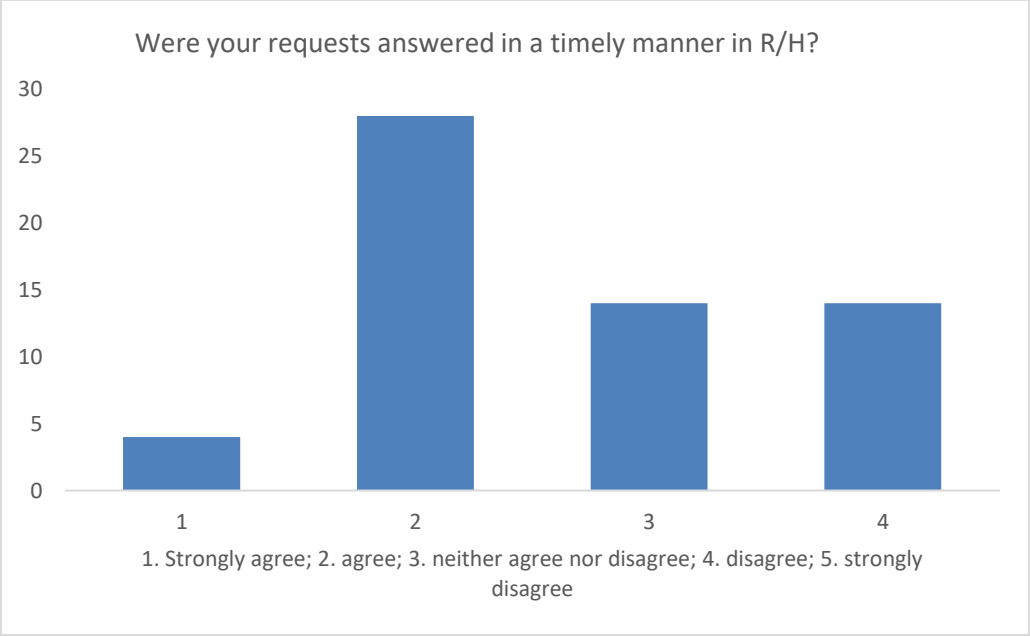

Figure 19 - Remote/hybrid response time chart

The bar chart in Figure 20 illustrates employees' perceptions of the importance given to their concerns by IT when working remotely or hybrid.

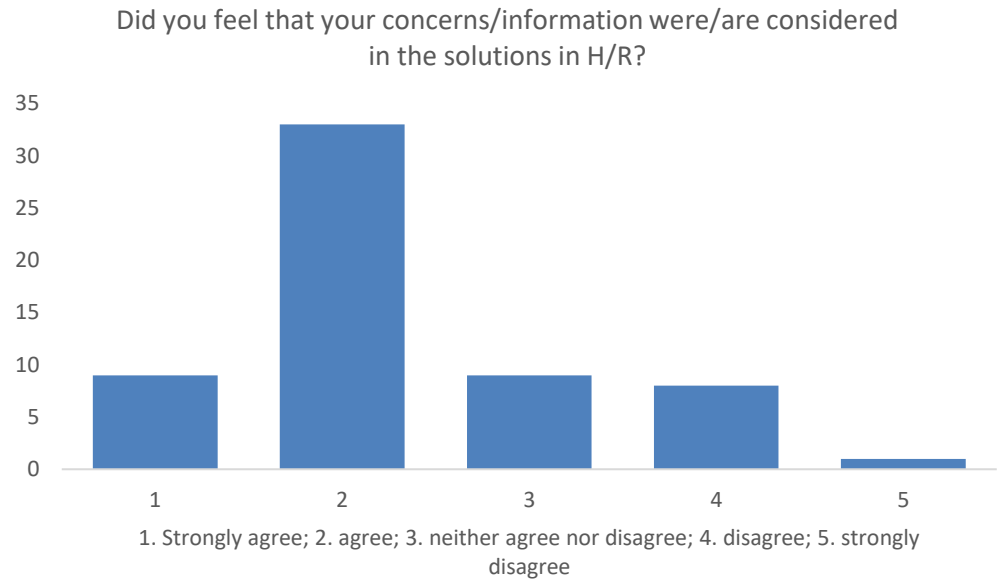

Figure 20 - Remote/hybrid Relevance of concerns chart

The bar chart in Figure 21 shows how employees perceive that their concerns are considered in IT solutions for face-to-face work.

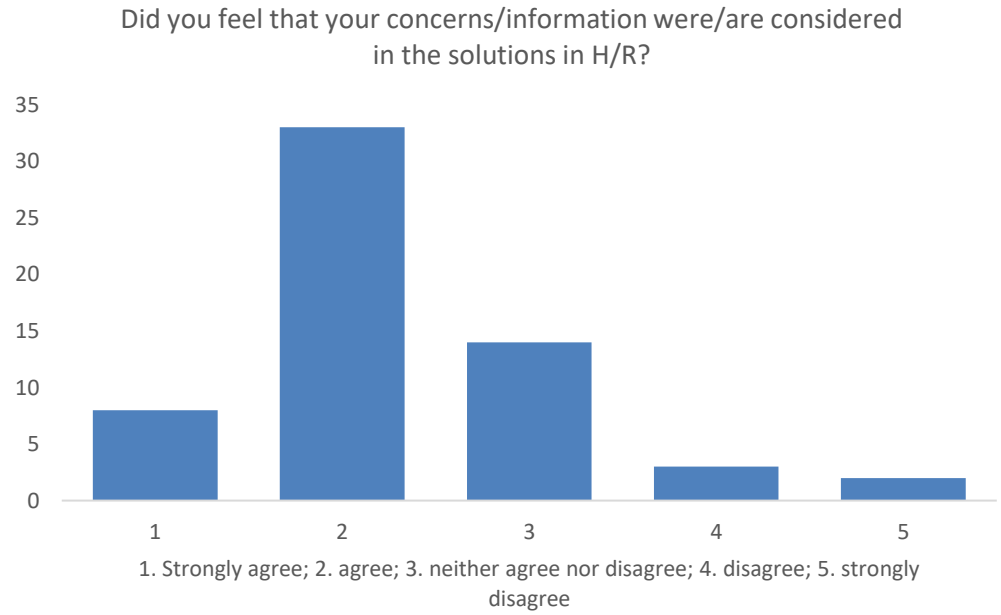

Figure 21 - Remote/hybrid considered in solutions chart

Table 40 - Articles by Author, country and KW

Author	Country	KW1	KW2	KW3
Eisenberg and Krishnan	EUA	Virtual teams		
Yajiong Xue et al.	EUA	Knowledge Sharing	Virtual Teams	
Golden, Timothy D.	EUA		telework, telecommuting*, virtual work	
Eisenberg and Mattarelli	EUA	Knowledge sharing		
Saksilapachai et al.	Thailand		Virtual Work	
Waight et al.	EUA		remote work	
Watanuki and Moraes	Brazil		Virtual team	
Reed and Knight	EUA	Knowledge transfer	Virtual team	
Killingsworth et al.	China	Knowledge sharing	Global virtual teams	
Afshar Jalili	Iran	Knowledge sharing		Knowledge management
Georgiadou and Siakas	Greece	Knowledge sharing	virtual team	knowledge management
Assudani, Rashmi H.	EUA	knowledge exchange		
Mickeler et al.	Germany	knowledge exchange platforms*	virtual work	
Zielińska, Agnieszka	Poland	knowledge sharing behaviours	virtual teams	
Kauppila et al.	Finland	knowledge sharing	virtual teams	
Wang and Haggerty	Canada	knowledge transfer,		knowledge management
Hong and Vai	Macau, China		Virtual work teams	
Khoza, Lucas T.	Johannesburg, South Africa	Knowledge sharing behaviour*		knowledge management processes*
Koppman, Sharon	USA		Virtual teams	
van der Meulen et al.	USA		telework	
Gifford, Jonny	London, UK		remote work	
Taskin and Bridoux	Netherlands	knowledge transfer	teleworking	
Golden and Raghuram	EUA	Knowledge transfer		
Green et al.	China	Knowledge transfer		
Jackowska and Lauring	Denmark	Knowledge sharing	Work from home, Virtual work	
Law and Koh	Japan	knowledge transfer, knowledge sharing	work from home, remote work	
Bolisani Ettore et al.	Italy and Denmark		working from home	

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Impacto do Teletrabalho na Comunicação e Passagem de Conhecimento entre Departamentos

No âmbito da dissertação que estou a desenvolver para o Mestrado em Engenharia Informática do ISCTE-IUL, com a orientação da Professora Doutora Alexandra Fernandes e co-orientação do Professor António Alves e Almeida, na área da gestão do conhecimento sobre o impacto do trabalho remoto na definição de requisitos funcionais, solicitamos a sua participação no preenchimento de um breve questionário, com uma duração total de aproximadamente 10 minutos.

Não existem respostas certas nem erradas, o que interessa é o que pensa e realmente sente.
A participação nesta investigação tem um carácter voluntário, pelo que pode negar ou decidir interromper o preenchimento do questionário, a qualquer momento, se assim o entender. Todos os dados recolhidos são anónimos e confidenciais e tratados como previsto pelo RGPD.
Ao responder a este questionário está autorizar o tratamento dos seus dados para a elaboração da dissertação

* Obrigatória

Dados Sociodemográficos

1. Faixa Etária *

- ◯ Menos de 30 anos
- ◯ Entre 30 e 40 anos
- ◯ Entre 40 e 50 anos
- ◯ Mais de 50 anos
- ◯ Prefiro não responder

2. Género *

- ◯ Feminino
- ◯ Masculino
- ◯ Prefiro não responder

3. Departamento em que trabalha *

- ◯ Administração
- ◯ Comercial
- ◯ Comunicação
- ◯ Financeira
- ◯ Marketing
- ◯ Qualidade
- ◯ Logística
- ◯ Loja
- ◯ Recursos Humanos
- ◯ Sistemas de Informação
- ◯ Outro

4. Há quanto tempo está na empresa *

- ◯ Menos de 1 ano
- ◯ Entre 1 e 5 anos
- ◯ Entre 5 e 10 anos
- ◯ Mais de 10 anos

5. Durante quanto tempo trabalhou/trabalha em regime presencial 100% *

- ◯ Menos de 1 ano
- ◯ Entre 1 e 5 anos
- ◯ Entre 5 e 10 anos
- ◯ Mais de 10 anos

6. Durante quanto tempo trabalhou/trabalha em regime híbrido *

- ◯ Menos de 1 ano
- ◯ Entre 1 e 5 anos
- ◯ Entre 5 e 10 anos
- ◯ Mais de 10 anos

7. Envolvimento com o Departamento de Sistemas de Informação (DSI/IT) *

Qual o seu envolvimento com o Departamento de Sistemas de Informação?

- ◯ Trabalha no Departamento de SI
- ◯ Tem contacto com o Departamento de SI
- ◯ Nenhum

Comunicação e Interação com o Departamento IT

As questões que se seguem, referem-se apenas ao tempo de trabalho em **regime presencial** (em que todos estão presente no mesmo espaço físico).

8. Quais os meios que utilizava/utiliza para contactar o Departamento de IT? (pode escolher mais que uma opção) *

- [ ] Contacto presencial
- [ ] Email
- [ ] Telefone
- [ ] Ferramenta de comunicação interna - Skype; Teams; Service Desk
- [ ] Outro

9. Era/É fácil perceber ou explicar as necessidades relacionadas com o IT? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

10. As suas necessidades eram/são respondidas rapidamente? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

11. Sentia/sente que as suas preocupações eram/são importantes? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

12. Sentia / Sente que as suas preocupações / informações eram/são considerados nas soluções? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

13. Tem frequentemente conversas informais com colegas do IT? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

Comunicação e Interação com o Departamento IT

As questões que se seguem, referem-se apenas ao tempo de trabalho em **regime hibrido/remoto** (em que as interações são em espaços virtuais).

14. Quais os meios que utilizava/utiliza para contactar o Departamento de IT? *

- [ ] Contacto presencial
- [ ] Email
- [ ] Telefone
- [ ] Ferramenta de comunicação interna – Skype; Teams; Service Desk
- [ ] Outro

15. Era/É fácil perceber ou explicar as necessidades relacionadas com o IT? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

16. As suas necessidades eram/são respondidas rapidamente? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

17. Sentia/sente que as suas preocupações eram/são importantes? *

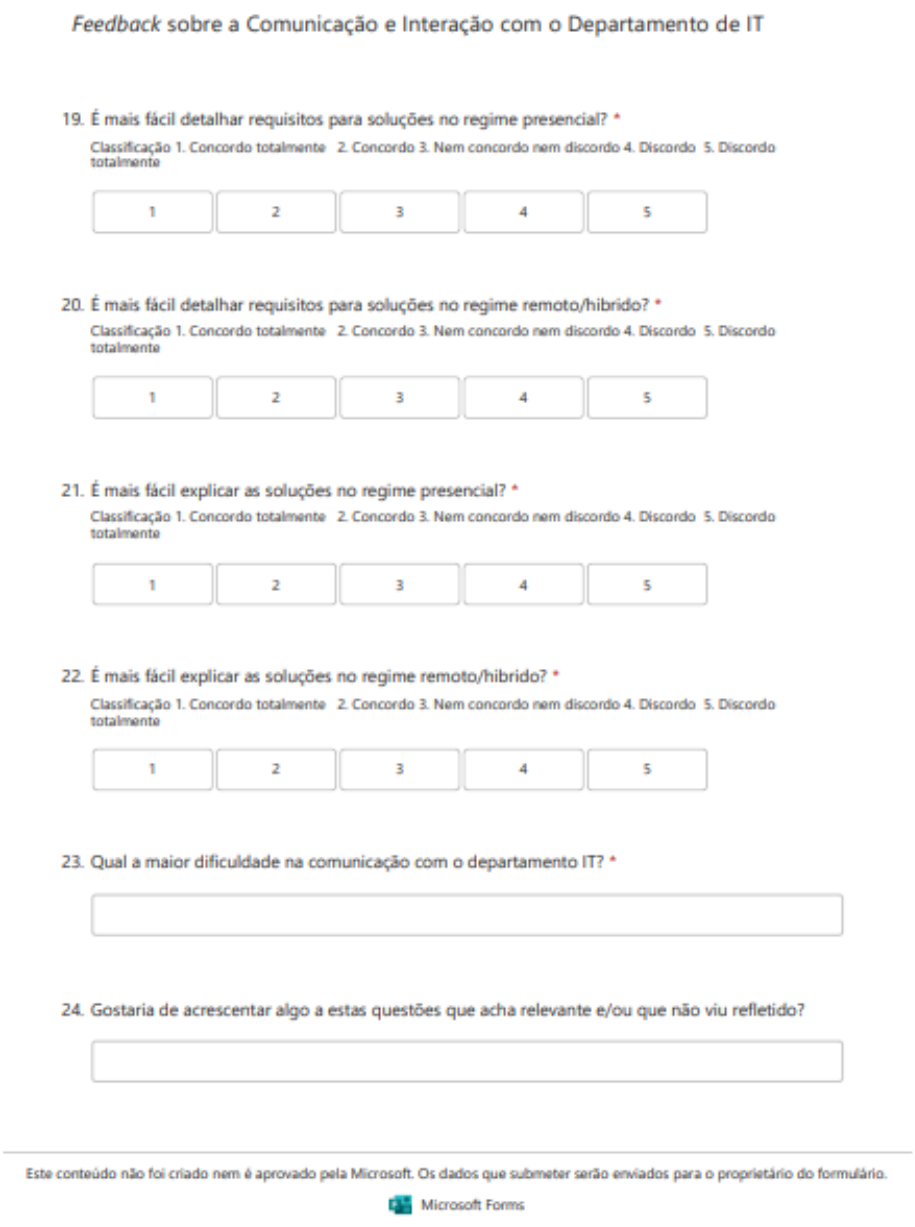
Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5

18. Sentia / Sente que as suas preocupações / informações eram/são considerados nas soluções? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1	2	3	4	5



Feedback sobre a Comunicação e Interação com o Departamento de IT

19. É mais fácil detalhar requisitos para soluções no regime presencial? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1 2 3 4 5

20. É mais fácil detalhar requisitos para soluções no regime remoto/hibrido? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1 2 3 4 5

21. É mais fácil explicar as soluções no regime presencial? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1 2 3 4 5

22. É mais fácil explicar as soluções no regime remoto/hibrido? *

Classificação 1. Concordo totalmente 2. Concordo 3. Nem concordo nem discordo 4. Discordo 5. Discordo totalmente

1 2 3 4 5

23. Qual a maior dificuldade na comunicação com o departamento IT? *

24. Gostaria de acrescentar algo a estas questões que acha relevante e/ou que não viu refletido?

Este conteúdo não foi criado nem é aprovado pela Microsoft. Os dados que submeter serão enviados para o proprietário do formulário.

Microsoft Forms

Figure 22 - Original Survey