Knowledge Sharing and Protection Mechanisms in Hybrid and Remote Work Settings

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Abstract: Organizations can increase their competitive advantage by sharing knowledge. On the other hand, mechanisms are needed to protect this knowledge from leaking. Although there is a growing body research on hybrid and remote working, few studies have looked at the adoption of knowledge protection (KP) mechanisms in these work models. This study seeks to address this gap by analysing KP and knowledge sharing (KS) mechanisms in hybrid and remote work environments in information technology (IT) companies. The research method adopted was qualitative, exploratory, and cross-sectional, with data being collected through twenty semi-structured interviews conducted with professionals working in either hybrid or remote environments in IT companies. Regarding the interviewees' characteristics, the male-female ratio was 60% - 40%, with an average age of 36 years, average time in the same company of 4.5 years, and around 2.5 years in the same position. The content analysis technique was adopted in the data analysis. As there is no standardization of days and times in the hybrid system, KS is hampered by the lack of face-to-face interaction between employees. The KS mechanisms mentioned are training, formal meetings, mentoring, and content available on the organizational intranet or platforms, among others. Not all organizations see KP as being important, and some even allow employees to use their own equipment, which may be potentially damaging for the company. This article presents theoretical contributions, such as the identification of sharing and protection mechanisms used in the hybrid and remote environments, and practical contributions, such as a list of mechanisms that can be used by companies. This research also highlights opportunities for future research, such as the identification and analysis of mechanisms in other segments of the economy, as well as research on the role of organizational culture in protecting knowledge.

Keywords: Knowledge Protection; Knowledge Sharing; Mechanisms; Hybrid; Remote.

1. Introduction

Remote working is widely considered one of the most significant changes in recent times, both for workers and companies (Ganguly *et al*., 2022). It can be defined as a regime whereby employees work from their homes or other locations while connected to their workplace through information technology (IT) (Beno, 2022). Several terms are used in research as synonyms for remote work, including: hybrid work, flexible work, work from home, telecommuting and virtual work. Despite their often interchangeable usage, these terms encapsulate subtle distinctions. For example, hybrid work entails a division of working hours between on-site and remote settings, allowing employees to spend some time physically present in the workplace, with schedules either determined by the individual or the company. In contrast, remote work implies that employees operate entirely outside the confines of the traditional office environment (Beno, 2022). This study aims to explore both hybrid work and remote work in depth.

The rise in the adoption of hybrid or remote working has sparked a surge in research attention towards this subject. Recent studies (Beno, 2022; Yang *et al.,* 2022) have looked into the dynamics of hybrid and remote work, examining both their benefits and drawbacks. Notably, among the identified disadvantages is the challenge of maintaining effective communication among employees and a subsequent decline in knowledge sharing (KS) and innovation, primarily attributed to the prevalence of asynchronous communication methods (Yang *et al.,* 2022).

The growing number workers engaged in hybrid and remote work arrangements has underscored the importance of safeguarding knowledge within these settings (Abbas and Alghail, 2023). Understanding how knowledge protection (KP) mechanisms traditionally utilized in face-to-face work contexts can be adapted by companies to sustain this vital aspect within hybrid or remote work environments, while retaining the benefits of effective KS, and preventing the leakage of knowledge assets, has become a pressing concern for organizations (Beno, 2022).

Despite the growing body of research on remote and hybrid work, a notable gap persists concerning the integration of KP mechanisms within these work models, a topic of significance due to its intrinsic link with effective KS (Singh *et al*., 2021). KP plays a pivotal role in mitigating knowledge leakage, which occurs when a company's proprietary knowledge is inadvertently or deliberately acquired by external parties (Ahlfanger *et al*., 2022).

In light of the aforementioned factors, including the growing significance and prevalence of hybrid and remote work setups within IT companies in Brazil, coupled with the imperative for organizations to safeguard their knowledge assets, this study posits the following research question: **What KP and KS mechanisms are employed by IT companies in hybrid and remote work**?

This study aims to analyse the KP and KS mechanisms in hybrid and remote work environments in IT companies. In addition to this introduction, this article has the following sections: 2) literature review on KS and KP, considering remote and hybrid work arrangements; 3) research methods; 4) analysis and discussion of the results; and 5) conclusions, limitations, and suggestions for future research.

2. Literature Review

2.1 Knowledge Sharing

KS is a key process within Knowledge Management, being distinguished by its capacity to disseminate, transmit, or transfer knowledge among individuals and organizations (Le and Lei, 2018). Consequently, KS emerges as a significant source of competitive advantage for organizations (Chen *et al*., 2018), underlining its pivotal role in fostering innovation and growth. Moreover, the proactive engagement of employees in facilitating KS endeavours is crucial to the sustained development of the company (Fauzi *et al*., 2023).

The departure of specialized and experienced personnel from a company poses an elevated risk of knowledge loss or leakage, potentially compromising its competitive advantage (Joe *et al*., 2013). This risk is particularly pronounced within the realm of IT professionals, given the inherently knowledge-intensive nature of their work (Borges *et al*., 2018).

Yap and Lock (2017) outline various mechanisms aimed at facilitating KS, categorizing them as either technological or non-technological. Their research conducted in Malaysia identified face-to-face interaction, mentoring, and documentation as the preferred mechanisms for KS among professionals.

2.2 Knowledge Protection

KP encompasses "*the array of potential approaches, methods, or tools employed to safeguard not only the tangible results of knowledge exploration but also the knowledge itself*" (Bolisani *et al*., 2013, p. 194). Organizations have to weigh the risks and benefits when determining the nature and scope of their engagement in KS activities (Thalmann *et al.,* 2024). Effective KP mechanisms bolster a company's competitive capabilities within its product market domain, ultimately driving superior sales growth compared to rivals (Nguyen *et al*., 2023).

To safeguard their knowledge assets, organizations must deploy mechanisms capable of averting knowledge leakage and the subsequent erosion of competitive advantage (Guo *et al.,* 2020). Such KP mechanisms typically fall into two categories: formal and informal (Olander *et al*., 2014). Formal mechanisms hinge on legal measures, such as contractual agreements, and may necessitate external resources such as specialized software (Olander *et al*., 2014). Conversely, informal mechanisms rely predominantly on interpersonal relationships and trust, often being favoured by small and medium-sized enterprises with relatively limited resources (Gast *et al*., 2019). Knowledge-intensive enterprises typically adopt a blend of formal and informal mechanisms tailored to their specific needs and contexts (Thallmann *et al*., 2024).

Formal KP mechanisms commonly employed include contracts, non-disclosure agreements (NDAs), and intellectual property safeguards such as copyright, patent registration, and trademarks. However, informal KP mechanisms can be particularly valuable in situations where formal measures like intellectual property protection are not applicable (Olander *et al*., 2011). One prevalent informal method of KP is maintaining secrecy, which involves limiting the number of individuals privy to strategic projects as well as controlling access to specific company facilities or projects (Hurmelinna-Laukkanen and Puumalainen, 2007).

2.3 The Relationship Between KS and KP in Remote and Hybrid Work Settings

A few authors have examined the relationship between KS and KP (Foege *et al*., 2019). This relationship typically exhibits an antagonistic aspect: while companies benefit from KS through enhanced innovation, cost reduction, and increased value of products and services (Gast *et al*., 2019), they also have to ensure against undesirable outcomes such as knowledge leakage and unauthorized appropriation of intellectual property (Ritala *et al*., 2015). Thus, striking a balance between promoting effective communication and protecting valuable knowledge assets remains a critical challenge for organizations.

The sharing of specific knowledge pertaining to innovations, experiences, or confidential information tends to be more restricted and rigorously protected compared to that of more generalized knowledge concerning factories, sectors, or markets (Gast *et al*., 2019). This selective approach inhibits deeper collaboration between companies, as each entity tends to limit the sharing of information to what it deems non-essential.

Remote or hybrid work arrangements introduce novel scenarios wherein employees operate either entirely or on certain days from locations external to the company's physical office space. This necessitates adjustments in the interaction and communication patterns among colleagues and managers. Hybrid and remote work models pose fresh challenges and opportunities for coordinating effective KS within organizations (Kaiser *et al*., 2022).

3. Research Method

To achieve the research objective, a qualitative approach was adopted. The research is characterized as exploratory, being aimed at discovering more about the phenomenon under study to enhance the understanding of underlying issues (Saunders *et al*., 2009). Additionally, the research is classified as cross-sectional, since it focuses on the specific phenomenon at a particular point in time. It encompasses describing the incidence of the phenomenon while elucidating how various factors interrelate across different organizations (Saunders *et al*., 2009).

Data collection was conducted through semi-structured interviews, in accordance with the methodology outlined by Saunders *et al*. (2009). This approach involves utilizing a preliminary script while allowing for the inclusion of additional questions during the interview process, thus increasing the potential to uncover valuable insights pertinent to the research objective (Saunders *et al*., 2009).

The authors drew upon insights from prior studies (Abbas and Alghail, 2023; Beno, 2022; Ganguly *et al*., 2022) to inform the design of the interview questions and their arrangement. The semi-structured interview script was organized into four parts: 1) gathering sociodemographic information about the respondents; 2) exploring their experiences with hybrid and remote work settings; 3) probing into their perspectives KS in the context of those settings; and 4) examining their perceptions regarding KP in those same settings. Following this, the script underwent a rigorous review process, encompassing content validation by two subject matter experts and face validation by a professional possessing the profile of the interviewees. The suggested modifications were duly incorporated into the instrument prior to commencing data collection.

The unit of analysis for this study encompasses the KS and KP practices among employees within information technology companies situated in Brazil. These companies are known for their intensive use of knowledge (Jackowska and Lauring, 2021), with effective communication recognized as a crucial determinant of their success (Ginting, 2020). This specific profile was chosen based on the sector's significant contribution to the Brazilian economy and the identified research gap concerning KP in the context of hybrid and remote work arrangements within IT companies.

The selection of interview participants adhered to the following criteria: a) having engaged in hybrid or remote work for at least 6 months, and b) being IT professionals employed by companies operating in Brazil. Invitations were extended via WhatsApp and email, where the interviewer introduced themselves and outlined the research objective. Data collection occurred during individual interviews, facilitated by Microsoft Teams®. Participants were requested to authorize recording, and subsequently, the interviews were transcribed to streamline the data analysis process. Table 1 provides an overview of the interviewees' characteristics.

Table 1: Characteristics of the interviewees

Work Setting	Code	Position	Gender	Age	Time in the Company	Time in the Position
Remote	E1	Software Engineer	Male	39	17	3
	E6	Software Engineer	Male	28	3	2
	E7	Head of Development	Female	50	4	2
	E11	Developer	Male	28	6	0.5
	E12	Specialist	Male	26	1.5	1
	E14	Product Manager	Male	39	11	3
	E15	Project Manager	Female	45	6	3
	E17	Head of Security	Male	47	2	2
	E19	Project Manager	Female	45	1.5	1.5
	E20	Test Analyst	Female	28	0.1	0.1
Hybrid	E2	Partner	Male	59	13	13
	E3	Director	Male	53	4	1
	E4	Partner	Male	24	1	1
	E5	Partner	Male	34	9	9
	E8	Partner	Male	23	2	2
	E9	Scrum Master	Female	36	0.1	0.1
	E10	HR Manager	Female	33	5	1.5
	E13	HR Manager	Female	35	0.5	0.5
	E16	Support Manager	Male	36	4	4
	E18	Financial Manager	Male	20	1	0.4

The initial phase of data analysis involved the authors reading through the 90 pages of interview transcriptions, during which they identified and emphasized the main ideas extracted from the interviews (Creswell, 2017). Subsequently, MAXQDA® software , designed for qualitative data analysis in academic research, was employed to conduct open and axial coding, allowing for the organization and categorization of data according to emergent themes and patterns.

4. Results and Discussion

4.1 Hybrid and Remote Working

For the employees engaged in hybrid work arrangements, there is no set standard mandating specific days and times for on-site attendance, as expressed by E6: "*I don't have a fixed day, our employment contracts allow us to decide the days we'll be present, right? So it could be Monday and Friday, it could be Tuesday and Thursday, it could be Wednesday and Thursday.*"

None of the remote workers reported a requirement for physical attendance at the company, with some residing in different cities from their workplace. Additionally, certain companies, as mentioned by E13, do not maintain physical office spaces.

The interviewees identified several benefits associated with hybrid and remote work, primarily emphasizing gains in productivity and better time management. Another notable advantage highlighted by the participants is the enhanced security provided by having the online meetings recorded.

The insights from the interviews prompt several considerations: 1) The absence of standardized days and times in hybrid work setups poses challenges for effective KS due to limited face-to-face interactions among employees; 2) In companies where some employees work remotely while others adopt hybrid or on-site arrangements, the situation may be exacerbated. Discrepancies in attendance could result in uneven KS, potentially leaving some individuals poorly informed. Conversely, a unified presence, such as everyone attending the office on the same day, might facilitate smoother KS. When nobody is physically present in the office, KS can be compromised due to a lack of opportunities for interaction. Although physical co-location does not guarantee effective KS, it does foster informal interactions (Hu *et al*., 2023) and contributes to trust-building (Testoni *et al*., 2022), both of underpin effective communication (Ng, 2022).

4.2 Differences in KS Between Hybrid and Remote Working

It is evident that structured processes and incentives for KS, such as training and mentoring, are in place across companies of varying sizes. However, there remains scope for improvement, as expressed by E17: "*More explicit, more documented knowledge exists within the company, but it is still a little immature.*"

Regarding the existence of differences in KS between hybrid or remote environments, three types of responses emerged:

a. KS is better and more effective in a face-to-face environment - 12 interviewees (60%);
b. KS is better in a remote environment - 5 interviewees (25%);
c. There is no difference in KS - 3 interviewees (15%).

Table 2 presents the KS mechanisms cited by the interviewees.

Table 2: KS mechanisms used by the Organisations

Interviewees	Work Setting	KS Mechanisms													Total
		A	B	C	D	E	F	G	H	I	J	K	L	M	
E2	Hybrid	X			X						X	X			4
E3					X				X		X	X	X		5
E4		X							X	X	X	X		X	6
E5		X			X	X		X			X	X	X	X	**8**
E8		X								X	X	X	X		5
E9		X		X	X	X	X			X	X	X		X	**9**
E10		X	X	X	X	X		X	X	X	X	X		X	**11**
E13		X	X	X	X	X		X	X	X	X	X	X	X	**12**
E16						X			X		X	X	X		5
E18						X				X		X		X	4
Total		**7**	2	3	6	6	1	3	5	6	**9**	**10**	5	6	69
E1	Remote	X	X	X	X	X			X			X		X	**8**
E6		X	X	X	X	X			X	X		X		X	**9**
E7		X	X	X	X	X		X		X		X		X	**9**
E11		X			X	X			X	X		X		X	7
E12		X	X		X				X	X		X		X	7
E14		X	X	X	X	X	X		X	X		X		X	**10**
E15		X			X			X	X			X		X	6
E17		X		X	X	X			X	X		X		X	**8**
E19		X	X		X	X	X		X	X		X		X	**9**
E20		X				X				X		X		X	5
Total		**10**	6	5	**9**	**8**	2	2	**8**	**8**	0	**10**	0	**10**	78

Legend: A = Technical Presentations; B = HR Presentations; C = Communities of Practice; D = Project Management; E = Intranet; F = Job Rotation; G = Mentoring; H = Platform; I = Social Networks; J = Face-to-face Meetings; K = Online Meetings; L = Face-to-face Training; M = Online Training.

KS mechanisms were identified, with an observation: in hybrid work settings, face-to-face interactions are predominantly adopted for KS, whereas in remote work settings, a wider array of mechanisms is employed, all of which are non-face-to-face.

Analysis of the interviewee reports reveals the presence of structured processes and incentives for KS across most companies, aligning with findings by Henttonen *et al*. (2016). Commonly mentioned KS mechanisms include online meetings, social networks, platforms, and online training, consistent with observations made by Delfino and Van Der Kolk (2021). While communities of practice, mentoring, and job rotation are recognized as effective mechanisms applicable to both hybrid and remote work, they were less frequently mentioned by the interviewees, possibly due to the additional time required for their adoption.

The number of KS mechanisms reported by the interviewees indicates that the quantity of different mechanisms is nearly identical, irrespective of the work setting.

4.3 Differences in KP Between Hybrid and Remote Working

The interviewees highlighted a variety of KP mechanisms employed in companies, encompassing both formal and informal approaches, as outlined in Table 3. As can be seen, certain mechanisms, such as passwords, are universally present across all cases, and others, like contracts, are employed in almost all instances.

Table 3: KP mechanisms used by the organisations

Interviewees	Work Setting	Formal Mechanisms													Informal Mechanisms		
		A	B	C	D	E	F	G	H	I	J	K	L	Total	M	N	Total
E2	Hybrid				X	X		X		X	X	X		6	X		1
E3				X	X			X	X	X				5	X		1
E4					X			X		X				3	X		1
E5					X			X		X	X			4	X		1
E8					X			X		X	X			4	X		1
E9			X	X	X		X	X		X	X	X	X	9			0
E10		X	X	X	X		X	X		X	X	X		9		X	1
E13		X	X	X	X		X	X	X	X	X			9		X	1
E16		X	X	X	X			X	X	X	X	X	X	10		X	1
E18			X	X	X		X	X		X			X	7	X		1
Total		**3**	**5**	**6**	**10**	**1**	**4**	**10**	**3**	**10**	**7**	**4**	**3**	**66**	**6**	**3**	**9**
E1	Remote		X	X	X	X	X	X	X	X		X	X	10		X	1
E6			X	X	X	X	X	X	X	X		X	X	10		X	1
E7				X	X		X	X	X	X		X	X	8	X		1
E11			X	X	X	X	X	X	X	X		X	X	10		X	1
E12			X	X	X		X	X		X		X		7		X	1
E14			X	X	X	X	X	X	X	X		X	X	10		X	1
E15			X	X	X	X	X	X	X	X		X	X	10		X	1
E17				X	X		X	X		X			X	6	X	X	2
E19				X	X	X	X	X	X	X		X	X	9			0
E20			X	X			X	X		X				5			0
Total		**0**	**7**	**10**	**9**	**6**	**10**	**10**	**7**	**10**	**0**	**8**	**8**	**85**	**2**	**7**	**9**

Legend: A = Restricted Physical Access; B = Restricted Digital Access; C = Contracts; D = Company devices; E = NDA; F = Policies; G = Passwords; H = Monitoring Software; I = Communication Software; J = Face-to-face Training; K = Online Training; L = VPN; M = Trust; N = Selection Process.

Overall, there appears to be little variation in the types of formal and informal mechanisms employed across companies, although some exceptions exist, particularly regarding strategies implemented when there is a critical need to safeguard specific knowledge assets. For instance, as reported by E13, "*There is contractual clause whereby, depending on the individual's knowledge level, the company pays for them to be retained on the payroll for about 3 months, akin to a quarantine period, even if they are no longer actively engaged in the company's operations, after which they are released.*"

According to the interviewees, the organizations largely rely on formal mechanisms, particularly technical ones such as passwords, digital access restrictions, and monitoring software, to protect their knowledge assets. In terms of informal mechanisms, companies rely on trust in their employees' discretion regarding the non-disclosure of the company's strategic knowledge. Additionally, meticulous attention is given to the selection processes, ensuring that recruited individuals possess the integrity and reliability necessary to safeguard the organization's proprietary information.

The interviewees indicated that their companies have implemented KP initiatives. As expressed by E16: "*So there are a series of mechanisms and processes to ensure KP for different actors involved in the processes*." Moreover, the majority of interviewees noted that there is no distinction between the KP measures implemented for hybrid and remote work setups.

It is evident that not all companies attribute KP the same level of priority. Some organizations permit employees to utilize their personal devices for work purposes, a practice that can pose significant risks to the company and potentially facilitate knowledge leakage, as noted by Abbas and Alghail (2023). Additionally, certain organizations treat KP as a mere procedural formality, limited to the implementation of basic measures such as passwords and access restrictions to specific sections of their platforms. However, they do not prioritize investments in employee training and awareness-raising initiatives regarding the importance of KP.

Although the interviewees may not perceive a difference between hybrid and remote work in terms of KP, disparities in the mechanisms employed do exist. Specifically, the number of KP mechanisms mentioned is 28% greater for remote work environments compared to hybrid setups.

5. Conclusions, Limitations and Future Research

In answering the stated research question, this study provides insights into the mechanisms utilized for KP and KS in IT companies based in Brazil operating remote or hybrid work arrangements. Most of the interviewees claimed that KS mechanisms were part of their daily routine, with online meetings, training sessions, and technical presentations featuring prominently. While few differences in KS mechanisms were reported between hybrid and remote work, most of the interviewees suggested KS was more effective in a face-to-face setting, suggesting that hybrid work, with a planned balance of in-office and remote work, may offer advantages over remote work alone. In terms of KP, a greater emphasis was placed on formal mechanisms such as passwords and communication software. Informal mechanisms, however, were less frequently mentioned, with trust in employees and careful selection processes being the primary focuses for some interviewees.

This study contributes theoretically by identifying the mechanisms employed by companies, as reported by the interviewees, for both KS and KP. It sheds light on the distinctions between remote and hybrid work environments, particularly noting a greater diversity of KP mechanisms in remote work settings. Furthermore, this research provides practical contributions by furnishing a comprehensive list of both KS and KP mechanisms. The recognition by a majority of interviewees that KS is more effective in hybrid work implies that organizations embracing remote work models must proactively motivate employees to engage in effective KS practices.

Several limitations should be acknowledged in this study. Firstly, the surveyed companies are all within the IT sector, and therefore, to a greater or lesser extent, incorporate some type of KP. Additionally, the fact that many the interviewees were still adapting to hybrid or remote working arrangements may introduce variability in perceptions over time and influence their experiences with these work environments.

Indeed, this topic presents several avenues for future research. Firstly, expanding this study to encompass other sectors of the economy. The comparative analysis could shed light on sector-specific nuances in communication, collaboration, and KP practices. Furthermore, future research could focus on the development of a comprehensive framework that integrates KS and KP mechanisms within organizations adopting hybrid or remote work models.

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