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Knowledge-related tensions in remote work arrangements during the COVID-19 pandemic

Tanja Matikainen
School of Business and Management, LUT University, Lappeenranta, Finland, and
Aino Kianto and Heidi Olander
School of Business and Management, LUT University, Lahti, Finland

Abstract

Purpose – This study aims to identify knowledge-related tensions in remote work in higher education institutions during the COVID-19 pandemic and increase understanding of how such tensions can be managed.

Design/methodology/approach – The research was conducted as an inductive, qualitative study in the field of higher education in Finland. The data were collected using semi-structured interviews of 34 managers in two higher education institutions and analyzed using an inductive and interpretive analysis method.

Findings – The findings demonstrate that the knowledge-related challenges and opportunities during the remote work period of the COVID-19 pandemic in Finnish higher education institutions can be conceptualized as tensions involved in knowledge codification, knowledge silos and creating new knowledge. The study contributes to research by presenting a framework for managing knowledge-related tensions in remote work arrangements to benefit remote and hybrid work in knowledge-intensive organizations.

Practical implications – This paper increases the understanding of the tensions in remote work arrangements; the results can help managers understand the challenges and opportunities of remote knowledge work concerning their organization and thereby assist them in management and decision-making in complex operational environments.

Originality/value – This study adopted the little-used perspective of tensions to examine knowledge management issues. By examining the various affordances that remote work may allow for knowledge-intensive work and higher education institutions, the study contributes to a deepened understanding of knowledge work in remote contexts, the related tensions and their management.

Keywords Remote work, Knowledge silos, Knowledge codification, Knowledge creation, Knowledge-related tensions, Higher education institutions

Paper type Research paper

1. Introduction

During the COVID-19 pandemic, i.e. since 2020, work life has been forced to shift suddenly toward remote work all over the world. This is especially the case in knowledge-intensive organizations, such as higher education institutions (HEIs), which have mostly transitioned to a remote work mode during the lockdown. Currently, work life is in preparation for the

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post-pandemic period, when various hybrid work arrangements will be adapted, and remote work will possibly remain on a wider scale than before the pandemic (Staniec *et al.*, 2022).

Previous studies have examined the extent and methods of remote work, related employee experiences and attitudes and opinions in terms of knowledge work, and they have indicated both positive and negative outcomes on the part of remote work (van der Meulen *et al.*, 2019; Nakrošienė *et al.*, 2019; Bolisani *et al.*, 2020; Jackowska and Lauring, 2021; Ipsen *et al.*, 2021; Kirchner *et al.*, 2021). Because this type of work seems to generate controversy and paradoxical issues (van der Meulen *et al.*, 2019; Jackowska and Lauring, 2021; Ipsen *et al.*, 2021), it is not clear from the knowledge point of view whether the shift toward remote work represents a change for the better or the worse.

In the field of higher education, previous studies have investigated the effects of the COVID-19 pandemic, e.g. based on the viewpoints of communality among students and staff in a Finnish university (Uusiautti *et al.*, 2021); Australian universities' support for academic staff with caring responsibilities during COVID-19 (Nash and Churchill, 2020); the effects of job-related factors on mental health for academic staff (Docka-Filipek and Stone, 2021); knowledge sharing in HEIs via enterprise social networks (Kazemian and Grant, 2022); delivering student services via digital tools (Paolini *et al.*, 2022); organizational communication misalignments (Lovell *et al.*, 2022); the emotional experience of working from home (Staniec *et al.*, 2022); and relationships between employees' experiences of perceived competence, autonomy, relatedness, intrinsic motivation and productivity (Rietveld *et al.*, 2022). In the field of Finnish higher education management, Pekkola *et al.* (2021) have investigated the impact of COVID-19 on Finnish universities' leadership from the viewpoint of managers (rectors and deans) in Finnish higher education, specifically how they coped during the crisis and how they feel about it. Although knowledge management is critical in HEI management (Pekkola *et al.*, 2021), there is a lack of scientific research on the issue, especially concerning managers' viewpoints on knowledge handling amid changes in the operational environment, such as remote work arrangements.

The research gaps identified above and HEIs' central role in the knowledge society (Secundo *et al.*, 2017; Pulkkinen *et al.*, 2019) provide a fruitful research context for our study (Pekkola *et al.*, 2021; Rietveld, *et al.*, 2022). Our research aims to identify knowledge-related tensions in remote work in HEIs during the COVID-19 pandemic and increase understanding of how such tensions can be managed. It does so by examining challenges and opportunities concerning knowledge handling from a managerial viewpoint.

The study was conducted as a qualitative, inductive study in two Finnish HEIs. The data were collected using semi-structured interviews with 34 managers in two organizations. Our purpose was to develop new theory regarding a novel phenomenon that was scantly investigated in prior research (Edmondson and McManus, 2007). Given that we were interested in the managers' experiences and interpretations (Gioia, 2021) of such a phenomenon and wanted to increase understanding on it, we used a grounded theory approach and analyzed the research data with the inductive, interpretive Gioia methodology (Gioia *et al.*, 2013).

The findings of our inductive, interpretive analysis of research data demonstrate that knowledge-related challenges and opportunities in remote work contexts can be conceptualized as tensions (Lewis, 2000; Smith and Lewis, 2011; Schad and Bansal, 2018) involved in knowledge codification (Nonaka, 1994; Hislop, 2013, pp. 207–210), knowledge silos (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) and new knowledge creation (Nonaka, 1994; Nonaka and von Krogh, 2009). The findings contribute to previous research results showing contradictory and paradoxical outcomes on the part of remote knowledge work, with both positive and negative results. Furthermore, we contribute to the literature by

presenting a framework for managing knowledge-related tensions in remote work arrangements to benefit remote and hybrid work in knowledge-intensive organizations.

2. Theoretical background

In parallel with the move toward remote work during the COVID-19 lockdown, i.e. since 2020, researchers have become increasingly interested in how the non-office context alters work activities. Because organizations rely on knowledge work to ensure productivity and competitiveness (Nonaka, 1994; Drucker, 1999), understanding how to support such work in remote conditions through knowledge management has become a vital area of research.

2.1 Knowledge work

Knowledge work is defined as the creation, distribution or application of knowledge by highly skilled and autonomous workers using tools and theoretical concepts to produce complex, intangible and/or tangible results (Drucker, 1999; Schultze, 2000; Davenport *et al.*, 2002; Bosch-Sijtsema *et al.*, 2011). Knowledge workers can be characterized by the nature of their work, which is often seen as unstructured, non-routine, complex and situation-specific (Davenport *et al.*, 1996; Bosch-Sijtsema *et al.*, 2011). Knowledge work is often performed using multiple places and between team members who can even be globally distributed, and knowledge workers can move between different locations (Lin, 2010; Bosch-Sijtsema *et al.*, 2011). Therefore, it is evident that remote work is relatively more feasible in knowledge work than it is in some other professions.

2.2 Remote work

Remote work can be broadly defined as participation in work away from an office by means of information and communication technology (Boell *et al.*, 2016), and it has been especially in use in expert organizations. However, researchers have asked whether this type of work is beneficial, and it seems to generate controversy and paradoxical issues (van der Meulen *et al.*, 2019; Jackowska and Lauring, 2021; Ipsen *et al.*, 2021). Many studies (van der Meulen *et al.*, 2019; Nakrošienė *et al.*, 2019; Bolisani *et al.*, 2020; Jackowska and Lauring, 2021; Ipsen *et al.*, 2021; Kirchner *et al.*, 2021) have examined the extent and methods of remote work, as well as related employee experiences, attitudes and opinions in terms of knowledge work, and these studies have shown both positive and negative outcomes on the part of remote work. Ipsen *et al.* (2021) investigated knowledge workers' experiences of remote work during the COVID-19 pandemic, specifically during the early stages of the lockdown, in 2020. Their results indicated that work–life balance, improved work efficiency and greater work control were the main perceived advantages of remote work. The main disadvantages were identified as home office constraints, work uncertainties and inadequate tools. According to the findings, most people had a positive, rather than negative, experience of remote work during the lockdown. In another study, Kirchner *et al.* (2021) found that managers experienced remote work as more challenging than employees did, with the main challenges being related to organizing work, distance leadership and communication with employees. Bolisani *et al.* (2020) examined Italian knowledge workers and found that those who were less able to maintain relationships with colleagues worked longer hours than normal to achieve the usual results. This led the authors (Bolisani *et al.*, 2020) to argue that knowledge-intensive work is relational in essence and distance work makes interactions and knowledge exchange more difficult, which can be a hindrance to knowledge work productivity. Similarly, Jackowska and Lauring (2021) examined how the virtual context affects perceived group efficacy and found that workplace mobility had a negative association with employee abilities for knowledge location (identification) and knowledge utilization.

Several studies have also noted the challenges that working remotely poses for knowledge-sharing and creation processes. Trust is an essential element of social capital and an important antecedent of knowledge sharing and creation (Nahapiet and Ghoshal, 1998). It has been suggested that the formation and maintenance of trust are more difficult in conditions of technologically mediated communication (Toth *et al.*, 2020). Waizenegger *et al.* (2020) applied the affordance theory to study team collaboration during forced working from home during the COVID-19 pandemic. They found that withdrawal from the environmental affordances of the office space reduced the frequency of *ad hoc* meetings because of a lack of spontaneity, which led to more planned and orchestrated collaboration. This situation also impeded knowledge sharing and spontaneous coordination and, thus, threatened team problem-solving and innovation capabilities (Waizenegger *et al.*, 2020). Van der Meulen *et al.* (2019) studied how the temporal and spatial separation from colleagues experienced in remote work can constrict homogeneous and heterogeneous knowledge flows, as well as whether it affects the development of metaknowledge. According to their findings, spatial separation directly reduces the frequency of knowledge sharing between colleagues, whereas temporal separation affects knowledge sharing via reduced knowledge awareness, resulting in lower job and proactive performance levels (van der Meulen *et al.*, 2019).

While many studies have demonstrated that remote work arrangements may pose challenges for knowledge development and utilization, there are also quite a few studies showing the brighter side of remote work. The typically mentioned benefits associated with remote work arrangements include improved work efficiency and productivity (Ipsen *et al.*, 2021). Remote work allows employees to establish a rhythm that suits individual preferences and work during their most personally productive times (Nakrošienė *et al.*, 2019). Restricted social interaction can also produce benefits because work efficiency may increase because of diminished interruptions and a more peaceful work environment (Boell *et al.*, 2016). Furthermore, the relative lack of constraints and surveillance related to remote arrangements leads to greater autonomy (Nakrošienė *et al.*, 2019) and an improved feeling of control (Ipsen *et al.*, 2021). In turn, autonomy is related to greater creativity at work because it fosters risk-taking and alternative thinking (Naotunna and Zhou, 2018). Creativity is an important antecedent of knowledge development and creation; it also enables organizational renewal and dynamic capability (Nonaka, 1994).

2.3 Higher education institutions as knowledge-intensive organizations

Knowledge handling plays a central role in the management of HEIs for several reasons. Through their activities in education and research, HEIs play an important role in society (Secundo *et al.*, 2017; Pulkkinen *et al.*, 2019). In the Finnish higher education system, universities focus on scientific research and provide the highest level of education based on it, promote the societal impact of research results and artistic activities, interact with society and offer opportunities for lifelong learning (Universities Act. 558, 2009). The universities of applied sciences, for their part, provide education for professional expert tasks based on the requirements of working life and its development; promote lifelong learning and conduct applied research, development, innovation and artistic activities, which serve education, working life and regional development (Universities of Applied Sciences Act. 932, 2014).

As knowledge-intensive organizations, HEIs rely on professional knowledge and are primary sources of information and knowledge (Käpylä *et al.*, 2011; Pekkola *et al.*, 2021). Their tasks are associated with knowledge creation and dissemination, as well as learning, and their knowledge management objectives include creating knowledge repositories, improving knowledge access, enhancing knowledge environment and managing knowledge as an asset (Rowley, 2000).

The operational environment of Finnish HEIs was in constant change before the transition to remote work during the COVID-19 pandemic. During the past two decades (Pulkkinen *et al.*, 2019), HEIs in Finland have faced many reforms, such as the structural development of the higher education system, changes in the funding formula and changes in universities' academic professions (Siekkinen *et al.*, 2020). There is an increasing need for efficiency, as well as to respond the needs of various external stakeholder groups (Pulkkinen *et al.*, 2019). Such changes increase the need for efficient knowledge management practices.

3. Research methodology

3.1 Research setting

The study was conducted as an inductive, qualitative study in two Finnish HEIs. Our purpose was to consider the empirical findings to facilitate bringing out new findings and developing theory, so we chose the inductive and interpretive Gioia methodology (Gioia *et al.*, 2013) for use in analyzing the research data. The Gioia method is a rigorous approach to qualitative analysis, which, as an inductive grounded theory methodology, enabled us to investigate a new phenomenon in depth (Edmondson and McManus, 2007; Hiemer and Andresen, 2019; Nisula *et al.*, 2022) and create a theory grounded in the managers' experiences (Gioia *et al.*, 2013; Gioia, 2021) of the knowledge-related tensions in remote work in HEIs. The literature review took place after the inductive empirical research phase.

3.2 Data collection

The research data were collected using 34 semi-structured interviews of managers during autumn 2020. The interview themes concerned experiences of remote work during the COVID-19 lockdown – what the challenges and the opportunities concerning knowledge handling were and how they influenced knowledge work. The interviews were carried out from August 14 to September 10, 2020. The transcribed data amounted to 46 pages (Word, line spacing 1), a total of 24,152 words.

The informants represented both the senior and middle management of each task field (education, research and services) and operational unit of the organizations and thus provided a versatile view of the management of knowledge work in the remote work context. A total of 20 senior managers (rector, vice-rectors, deans, heads of units, directors of services and other members of the executive groups) were interviewed. The total of 13 of them were women, and seven were men. The 14 informants (eight women and six men) representing middle management were degree program managers, managers of research and development and heads of departments. The informants shared their views, both from their perspective as managers and knowledge workers and from the perspective of the people they lead.

3.3 Data analysis

The analysis was carried out in three phases according to the Gioia methodology (Gioia *et al.*, 2013) to determine what kind of knowledge-related opportunities and challenges there were in remote work during the COVID-19 pandemic and how they influenced knowledge-intensive work. The results of the analysis are represented in Figure 1.

Phase 1: coding for the first-order concepts and writing the interview memos

We began by coding anything in the interviews that was related to opportunities and challenges concerning remote knowledge work. We used *in vivo* coding because open coding enabled the coding of the terms and words used by the interviewees (Corbin and Strauss, 2008; Saldaña, 2016, pp. 105–110) and gave a voice to the informants (Gioia *et al.*, 2013). The preliminary *in vivo* codes (Saldaña, 2016, pp. 105–110) were then formulated into informant-centered first-order concepts (Gioia *et al.*, 2013; Gioia, 2021) depicting the informants' conceptions of what is going (van Maanen, 1979).

Phase 2: developing second-order themes and aggregate dimensions

We drew connections and sought similarities and differences between the first-order concepts and organized them into more abstract second-order themes (Gioia *et al.*, 2013). The second-order themes are the researcher's interpretations and concepts with which to describe and explain the observed phenomena (van Maanen, 1979; Gioia *et al.*, 2013) in theoretical terms (Gioia, 2021). To formulate an overall concept of knowledge-related tensions in remote work and develop our theory, we drew connections between the second-order themes and distilled them further into theoretical aggregate dimensions (Gioia *et al.*, 2013; Hannah and Robertson, 2015; Gioia, 2021).

Phase 3: developing a data structure

We demonstrated our findings regarding knowledge-related tensions and our theory building by developing a data structure (Gioia *et al.*, 2013). It visualizes our analysis process, from informant-centric data (first-order concepts) to more abstract theory-centric second-order themes and aggregate dimensions and their relationships (Gioia *et al.*, 2013; Gioia, 2021), as well as summarizes the factors promoting and challenging knowledge work in remote work contexts. The data structure also visualizes how we developed our theory and created a framework for the management of knowledge-related tensions in remote work arrangements. The theory development is explained in the theoretical contributions section.

4. Findings

Our empirical findings demonstrate that the opportunities and challenges related to remote knowledge work can be conceptualized as tensions in knowledge codification, knowledge silos and creating new knowledge.

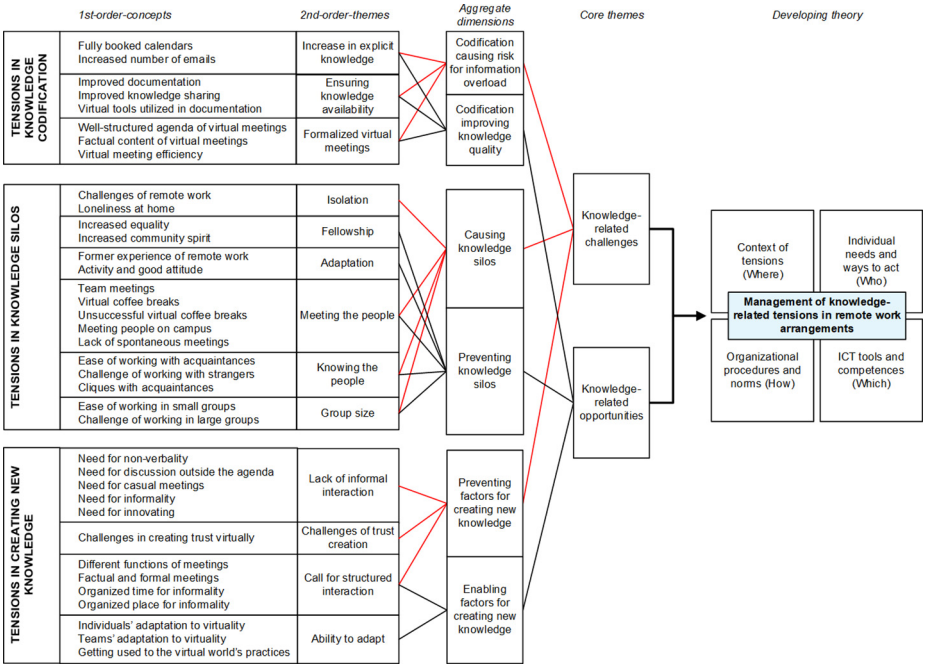

Figure 1.
Data structure of knowledge-related tensions and their management

4.1 Tensions in knowledge codification

The tensions involved in knowledge codification (Nonaka, 1994; Hislop, 2013, pp. 207–210) occur because it both causes a risk of information overload (Dalkir, 2011, p. 23) and improves knowledge quality (Figure 1).

4.1.1 Increase in explicit knowledge

> Email is a bad tool nowadays. When you try to follow the feed – the amount of it has probably multiplied.

The transition to remote work increased the amount of explicit knowledge in terms of an increased number of emails and calendar bookings. The work matters previously taken care of at the workplace now required new channels, such as virtual meetings. The number of calendar bookings was increased when each contact was booked on the calendars. The other channel for interaction was email. Sending emails became preferred as a way to communicate and share knowledge. Also, the increased internal crisis communications concerning the COVID-19 pandemic increased the number of emails. The problem with emails was their huge number, as well as difficulties involved in using them to carry out day-to-day business.

4.1.2 Ensuring knowledge availability

> When we don't see each other, you must think how to better share knowledge. It might be that information has moved even faster than normally.

Knowledge availability was attended to more often in remote work time than it had been before. Knowledge documentation was improved so as to ensure that relevant knowledge was available equally for everyone when working online, and that crisis communications concerning the COVID-19 pandemic were shared with everyone. Knowledge could no longer be shared in face-to-face discussions, and the need for knowledge codification became more obvious. Virtual tools were used in documentation by sharing knowledge in an explicit form, e.g. by sharing screens and documents in online meetings and using chats or instant messaging tools when communicating with others.

4.1.3 Formalized virtual meetings

> The virtual meetings are surely focused more on business and the agenda.

The virtual meetings of teams and units took a formal form in the online world. The meetings were well prepared and well structured, factual and focused on the agenda, with people talking only business. This resulted in effective meetings with certain schedules and specified times.

4.1.4 Conclusions regarding tensions in knowledge codification. Our findings showed that knowledge codification may both be a challenge and an opportunity in a remote work context. We suggest that the increased amount of explicit knowledge shared in the forms of emails and calendar bookings, virtual meetings, chats, instant messaging tools and improved documentation may create a risk of information overload. However, the same factors may improve knowledge quality when knowledge is available for everyone in a codified form.

4.2 Tensions in knowledge silos

The tensions concerning knowledge silos (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) result from factors that caused knowledge silos, prevented them or influenced both dimensions simultaneously (Figure 1).

4.2.1 Isolation

> Now, when sitting alone at home, not seeing each other, the relationships with other people suffer. You distance yourself, and the feeling of belonging to the community weakens.

The restrictions of the COVID-19 pandemic and the transition to working remotely increased the risk of isolation and social exclusion for personnel working alone at home. Remote work may have been challenging for individuals; not everyone was accustomed to working remotely, nor did they necessarily prefer to do so.

4.2.2 Fellowship

> It has created such "We" spirit.

Remote work with virtual meetings increased equality and community spirit in some spatially separated units and teams that had faced a recent organizational change. Now, everyone was working remotely and participating in the virtual meetings from home instead of meetings on various campuses.

4.2.3 Adaptation

> I think the attitude is the most important.

According to the informants, previous experiences of working remotely varied among the personnel. The former experiences with remote work, as well as resilience during the COVID-19 pandemic, helped people to adapt to the situation.

4.2.4 Meeting the people

> There have been more participants than in meetings on campus.

> Just the tacit knowledge [. . .] when you hear somebody talking to somebody, you get interested and join the discussion.

The online meetings organized for teams and units had both formal and informal contents. People participated actively, at least in formal team and unit meetings, but the success of informal meetings, such as virtual coffee breaks, varied between teams. Informal virtual coffee breaks were mostly considered a good way to keep in touch with team members and share knowledge, but they were sometimes found to be artificial.

When the COVID-19 pandemic closed campuses in March 2020, the virtual meetings became a way to interact in formal and informal contexts. However, the spontaneous, casual meetings on campuses seemed to be significant because participants could meet people informally, hear what was going on, share knowledge and ideas and innovate with one another. These elements were missing from the virtual working environment. Later in 2020, COVID-19 restrictions allowed face-to-face meetings in small groups and working on campuses when precise safety rules were followed, which the informants found to be positive.

4.2.5 Knowing the people

> If you have cooperated earlier, it works, but between strangers, it is more difficult virtually [. . .] then, we go back to the old cliques again.

Knowing one another seemed to contribute to virtual cooperation. Working with previous acquaintances was easy regarding both formal and informal issues, and it was challenging to work virtually with people one had not known know beforehand. This especially concerned new, fresh teams or units and new employees who were not well networked yet.

4.2.6 Group size

> If you think about a whole unit, it is challenging when you don't see expressions and gestures. You don't know if it is clear or you should clarify something.

According to the informants, working virtually in small groups was easier than working in larger groups. When challenges arose, they often related to communication and technology.

It was technically easier to keep cameras on when meeting with a few people, and the interaction was more personal as a whole in small groups than in large ones.

4.2.7 Conclusions regarding tensions in knowledge silos. It seems that, at the level of the individual employee, isolation when working alone at home may cause knowledge silos, and adaptation to remote work, as well as participating in virtual meetings, prevent them. From an individual's point of view, virtual meetings with formal or informal agendas can decrease isolation and increase interaction with one's team or unit. By contrast, the meetings were only meant for a particular group of people, and the lack of meetings with other units or teams was causing knowledge silos between different groups. Informal meetings and virtual coffee breaks may cause knowledge silos between individuals if not everyone is keen on participating in them.

When working and meeting virtually with acquaintances was regarded as easier than doing so with less familiar colleagues or strangers, the knowledge silos of individuals and teams could be prevented. However, decreased cooperation between less familiar colleagues and other teams or units may create cliques and silo effects between people and groups. Based on the results, it seems that, when working in small groups, knowledge silos, at an individual level, may decrease when one has an opportunity to participate and increase if the group is too large to allow fluent interaction.

This increased equality may have prevented knowledge silos from appearing when people were not spatially separated in various campuses, as they had been previously. Everyone was working remotely and participating in the virtual meetings from home instead. Based on the results, is seems that a lack of casual meetings may cause knowledge silos between individuals and teams, as well as between units or teams. By contrast, we suggest that a lack of random meetings can prevent knowledge silos when these random meetings on campuses are typically meetings with a restricted population within a particular campus or facility, rather than between campuses.

4.3 Tensions in creating new knowledge

The tensions concerning the preventing and enabling factors for creating new knowledge (Nonaka, 1994; Nonaka and von Krogh, 2009) relate to interaction in virtual remote work and its influence on the creation of new knowledge. These tensions result from factors that either enabled new knowledge creation, prevented it or influenced both dimensions simultaneously (Figure 1).

4.3.1 Lack of informal interaction

> Concerning the creation of something new, if the situation lasts for a long time, it is challenging. The innovations require people being together. It is difficult virtually.

The interaction between people changed remarkably when working online and remotely from home. There was a great demand for both non-verbal and verbal communications, but especially, non-verbal communication was missing. Interaction was complicated when the interpretation of others' opinions and reactions was only based on hearing colleagues' voices.

The lack of casual and informal discussions, *ad hoc* meetings and random discussions was a great disadvantage on the part of the virtual working environment. The informants were concerned about what would happen to the innovations and ideas in the virtual environment in the long run when it was not possible to engage in impromptu innovation with colleagues, meet face to face by chance or have everyone in the team participate in virtual interaction.

4.3.2 Challenges of trust creation

> Virtuality is a challenge in new openings.

Creating trust was regarded as a challenge in the virtual world when it was not possible to meet face to face. This was especially the case in new openings, such as between previously unknown contacts, in new teams and between fresh supervisors and their teams.

4.3.3 Call for structured interaction

> The virtual meetings are enormously efficient. There is no space for – chatting randomly about something, although this is valuable too. As a result, we have different kinds of meetings with a different focus.

The formal virtual meetings were efficient, well-structured meetings with agendas and timetables. This was considered a norm despite the observed point that these formal meetings did not allow time and space for informal discussion. The informants described how time for informal discussion needed to be organized consciously, either within the formal meeting or within virtual informal meetings for that purpose, or how meetings had various functions depending on the formality or informality of the discussion. Although this caused challenges in carrying out meetings either formally or informally, it was also a benefit and helped to develop meetings in a more efficient direction.

4.3.4 Ability to adapt

> It is not so natural [. . .] but surely, we get used to it when we learn and get acquainted.

The change to a total remote work environment demanded adaptation to virtuality, and the adaptation differed between individuals and teams. The informants reported that the supervisors, personnel and teams had their own ways of interacting, communicating and working virtually. What was suitable or natural for one may not have been suitable for others. People were adapting and reacting to the various norms, practices and tools of the virtual working environment in different ways, and there was no common understanding of these practices, e.g. what kind of behavior rules virtual meetings have or what the best practices in virtual interaction are.

4.3.5 Conclusions regarding tensions in creating new knowledge. The lack of open interaction may prevent the creation of new knowledge if there are no opportunities for informal, innovative and casual discussions with other people in the virtual world. On the other hand, the supply of structured interaction may prevent the creation of new knowledge, because of its structured nature preventing creativity and free discussion. Nevertheless, the increase in factuality and structuredness may provide a frame for increasing the amount of new, explicit knowledge. The individuals' and organization's ability to adapt to the virtual working environment and interaction in meetings may enable and boost the creation of new knowledge. If the adaptation is not progressing well, this may prevent knowledge creation.

5. Discussion and implications

The empirical findings of our study demonstrate the complex, controversial and interrelated characteristics and consequences that remote arrangements pose for knowledge work. They both cause challenges and create opportunities for knowledge work, often at the same time, as illustrated by the tensions related to knowledge codification (Nonaka, 1994; Hislop, 2013, pp. 207–210), knowledge silos (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) and creating new knowledge (Nonaka, 1994; Nonaka and von Krogh, 2009).

5.1 Tensions in knowledge codification

The empirical findings of our study indicate that tensions in knowledge codification (Nonaka, 1994; Hislop, 2013, pp. 207–210) result from factors that both cause a risk of information overload (Dalkir, 2011, p. 23) and improve knowledge quality. Managing such tensions in a remote work context involves creating circumstances in which knowledge is

available for everyone equally in codified form (Nonaka, 1994; Hislop, 2013, pp. 207–210), but shared without intentionally causing information overload (Dalkir, 2011, p. 23), as well dealing with any overload of codified knowledge.

5.2 Tensions in knowledge silos

As our empirical results demonstrate, silos in knowledge flows can exist and be examined at the individual, team and organizational levels. Tensions in knowledge silos result from factors causing or preventing knowledge silos. For management, it is necessary to consider the consequences of knowledge silos in various contexts and at various organizational levels (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) because some factors preventing knowledge silos at the individual employee level can, in fact, cause them between teams or units. For instance, the ease of working with acquaintances may help to avoid the social isolation of individual employees and simultaneously decrease cooperation between less familiar colleagues or teams. Managing knowledge silos (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) in a remote work context is about supporting individuals' adaptation to remote work (Waizenegger *et al.*, 2020; Ipsen *et al.*, 2021; Kirchner *et al.*, 2021) and creating circumstances for within-team collaboration and collaboration between teams and units (Olson and Olson, 2000; Ahn *et al.*, 2005; Waizenegger *et al.*, 2020; Wang *et al.*, 2021).

5.3 Tensions in creating new knowledge

The empirical findings of our study show that, in remote work, new knowledge creation (Nonaka, 1994; Nonaka and von Krogh, 2009) is influenced by enabling or preventing factors. Managing these tensions requires answering the call for both structured and informal interaction in virtual meetings (Hislop, 2007; Waizenegger *et al.*, 2020; Kirchner *et al.*, 2021), even when working totally or partly remotely.

5.4 Tensions in knowledge-related challenges and opportunities

The three themes – *knowledge codification* (Nonaka, 1994; Hislop, 2013, pp. 207–210), *knowledge silos* (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) and *creating new knowledge* (Nonaka, 1994; Nonaka and von Krogh, 2009) – together with their aggregate dimensions, form a wider concept of knowledge-related challenges and opportunities (Figure 1). The risk of information overload (Dalkir, 2011, p. 23), causing knowledge silos (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) and factors preventing the creation of new knowledge (Nonaka, 1994; Nonaka and von Krogh, 2009) can also be defined as knowledge-related challenges when improved knowledge quality, preventing knowledge silos (Nonaka, 1994; Hislop, 2013, p. 109; Riege, 2005) and enabling factors for new knowledge creation (Nonaka, 1994; Nonaka and von Krogh, 2009) serve as knowledge-related opportunities. Managing knowledge-related tensions is about balancing between these tensions, which often simultaneously cause challenges and create opportunities for knowledge management practices.

5.5 Theoretical contributions

We report four main findings concerning the management of knowledge-related tensions in remote work contexts and illustrate them in Figure 1.

5.5.1 Context of tensions (where). Both the knowledge-related challenges and opportunities caused by complex, controversial and interrelated tensions related to knowledge work in remote-work contexts must be accounted for in management. Paradoxical tensions are contradictory but interrelated and persistent demands in organizations (Smith and Lewis, 2011), and their management is a potential method of

gaining a competitive advantage (Harvey *et al.*, 2021). They can be considered as opposing poles of a phenomenon, simultaneous elements (Smith and Lewis, 2011) appearing inherently and ubiquitously in organizations and their complex, dynamic and ambiguous systems (Lewis and Smith, 2014). Tensions may be salient or latent (Smith and Lewis, 2011) or underlying elements rooted in the complex dynamic systems of organizations, which makes their interdependence even more complex (Schad and Bansal, 2018).

Managing tensions from a paradox viewpoint promotes meeting multiple and divergent demands in complex and uncertain systems (Schad and Bansal, 2018), such as in globalized, highly competitive, intricate, dynamic, diversified and changing organizational life (Lewis, 2000; Smith and Lewis, 2011). One approach to the management of tensions is to apply "both/and" thinking to accept conflicting tensions and create synergies between them instead of intending to choose one or another option regarding the phenomenon (Lewis, 2000; Smith and Lewis, 2011; Harvey *et al.*, 2021). For example, according to our findings on knowledge codification (Nonaka, 1994; Hislop, 2013, pp. 207–210), the improvement of knowledge quality in the form of knowledge availability or the effectiveness of virtual meetings would not have occurred without an increase in explicit knowledge and a risk for information overload.

It is important to be aware of the complex interrelations between tensions (Schad and Bansal, 2018) to adopt the best approaches for managing them. For instance, factors preventing knowledge silos (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) at the individual employee level can, in fact, cause them between teams or units. At the same time, the factors with these twofold consequences, e.g. knowing the people (the ease of working with acquaintances versus the challenge of working with strangers) and group size (the ease of working in small groups versus the challenge of working in large groups) may be crucial in avoiding personal isolation and maintaining the job satisfaction and well-being of individual employees (Kirchner *et al.*, 2021). By contrast, although cross-disciplinary collaboration between teams and units may decrease, gathering the knowledge domains of employees with narrow knowledge together can create synergies because of their specialization in those domains of knowledge (Hwang and Krackhardt, 2020). In turn, Nakrošienė *et al.*'s (2019) findings can be held as a counterargument to the social isolation of individual employees; these researchers showed that reduced time for communication with colleagues increases employee productivity. Managing such complex interrelated tensions may require using trade-offs to maximize the advantages and limit the disadvantages of competing options by understanding that opting for one choice impacts the benefits of the other option (Smith and Lewis, 2011; Harvey *et al.*, 2021). Alternatively, it may necessitate finding a compromise whereby contradictory elements are resolved by integrating them so as to find common ground (Smith and Lewis, 2011; Harvey *et al.*, 2021).

5.5.2 Individual needs and ways to act (who). It is necessary to create circumstances in which individuals' personal ways and needs to capture and share informal and formal knowledge, interact and create knowledge together in remote work arrangements are made the most of. The individuals' role is undoubtedly central when a knowledge-intensive public organization's ability to effectively use its knowledge depends on individuals who share, create and use knowledge and act as owners and controllers of this knowledge (Henttonen *et al.*, 2016) – the key resource of HEIs. Knowledge-sharing behavior is positively associated with an individual's performance, and such a positive twist should be supported by managerial practices, e.g. providing various kinds of knowledge-sharing support for different employee groups and individuals (Henttonen *et al.*, 2016).

Individual needs and ways of acting are interrelated with remote work, which is experienced both positively and negatively, with benefits and challenges (Boell *et al.*, 2016;

Nakrošienė *et al.*, 2019; Ipsen *et al.*, 2021; Kirchner *et al.*, 2021). Experiences with remote work are contextual and embedded in the complexity of work, e.g. individual differences in work activities, the diversity of work practices and interactive face-to-face interactions with colleagues (Boell *et al.*, 2016). However, the benefits of remote work may not be applicable, because of individual experiences, e.g. when the remote worker's workplace at home is unsuitable for remote work (Nakrošienė *et al.*, 2019; Waizenegger *et al.*, 2020). In addition, the kind of job and associated competences of employees affect remote work, and productivity may suffer if employees cannot work with autonomy, are unfamiliar with communication technologies or cannot maintain fruitful relationships with colleagues (Bolisani *et al.*, 2020).

5.5.3 Organizational procedures and norms (how). Paying attention to organizational procedures and norms concerning informal and formal knowledge handling and interaction between people in remote work contexts is essential in ensuring an organizational framework for knowledge work in remote work contexts. Olson and Olson (2000) concluded that, to succeed in remote work conditions, a culture of sharing common knowledge, as well as beliefs and attitudes that enable communication, is required.

According to media or information richness theory (Daft *et al.*, 1987), the use of a medium is effective when the characteristics of the chosen medium match the information requirements, e.g. analyzability or equivocality, of the task at hand. The culture of sharing common knowledge together with information or knowledge requirements explains the choice between asynchronous and synchronous communication channels. For example, a recent study of Yang *et al.* (2022) on knowledge work during the COVID-19 pandemic reported a decrease in synchronous and an increase in asynchronous communication. However, our findings show an increase both in synchronous and asynchronous communication. In our study, the increase in synchronous communication, as in virtual meetings, may have resulted from organizational procedures, especially when informal virtual meetings were organized to maintain community spirit and cooperation during the lockdown. The other reason for this may have been a need to handle complex information and create knowledge together with colleagues when synchronous communication channels, such as rich media, enable converging on the meaning of complex information (Daft *et al.*, 1987; Yang *et al.*, 2022).

The informants in our study talked about the socially constructed manners behind tensions (Lewis and Smith, 2014), e.g. certain tacit behavioral norms concerning remote work. For managers, it is important to notice such socially constructed norms when they can be considered underlying tensions (Schad and Bansal, 2018) affecting knowledge work. For example, time-effective meetings are praised as well structured and formal, but on the other hand, there is a need for informal discussions as well. As another example, misunderstandings may emerge when others view instant message channels as acceptable for communications whereas others regard them as unsuitable and prefer using email instead.

5.5.4 Information and communication technology tools and competences (which). In remote work contexts, the information and communication technologies (ICTs) and the ways they are used are of high importance (Ahn *et al.*, 2005; Lee *et al.*, 2007; Hislop, 2013, p. 201; Bolisani *et al.*, 2020; Waizenegger *et al.*, 2020). Technological affordances enable equal communication opportunities regardless of physical proximity or hierarchical structures (Waizenegger *et al.*, 2020). With the right type of contextual enablers, e.g. Web-based virtual collaboration systems (Ahn *et al.*, 2005), it is possible to facilitate the creation, management and use of formal and informal knowledge in virtual collaborative work. Online platforms also boost social support and help avoid loneliness (Wang *et al.*, 2021).

According to our findings and the previous literature (Nakrošienė *et al.*, 2019; Waizenegger *et al.*, 2020), knowledge workers missed physical *ad hoc* meetings and face-to-face contacts. However, if one relies too heavily on physically present face-to-face contacts, opportunities for knowledge capture, codification and explicitation may be impeded (Lee *et al.*, 2007), which will cause knowledge silos (Nonaka, 1994; Riege, 2005; Hislop, 2013, p. 109) between spatially separated employees. Indeed, it may be that the findings underlining the negative consequences of remote work for tasks that require a great deal of synchronous communication, such as collaborative problem-solving and negotiation, may be diminished as electronic media options allowing for rich synchronous communications become more common and are developed further into more advanced virtual presence applications.

5.6 Managerial implications

In terms of implications for managing knowledge-related tensions in remote work contexts, we have several suggestions. First, the framework for managing knowledge-related tensions developed in this study can help to conceptualize which factors should be taken advantage of in the management of knowledge-related tensions in remote – or hybrid – work arrangements in knowledge-intensive organizations. Second, the complex, controversial and interrelated characteristics of tensions typical of an organization must be understood, and knowledge-related tensions should be regarded as both opportunities and challenges for knowledge work to find the best practices for knowledge. Third, just as employees were supported in the enormous change to remote work in the beginning of lockdown, it is now as important to support them in their adaptation to the post-pandemic hybrid arrangements of work, which may create various new tensions concerning knowledge work. It is necessary to enable various ways of working and handling knowledge to support individual employees' and teams' natural ways of interacting in formal and informal contexts and consider how organizational norms and procedures support this. Fourth, whether there is a need for input on ICT tools or virtual collaboration systems or for educating people to use those tools in the best possible ways must be considered. Attention should be paid to chances to share tacit knowledge by having informal discussions or meeting colleagues casually in the virtual world, e.g. in virtual hubs.

5.7 Research limitations and future research

Like any other, this study has certain limitations. First, we examined knowledge work in the context of Finnish HEIs, which had implemented a sudden transfer to remote work because of the lockdown related with the COVID-19 pandemic. Had there been more time to plan the transfer beforehand, some of the challenges would likely have been faced in a different manner.

We did not investigate the specific work activities conducted; however, it may be that the nature of the task affects the optimal communication medium (Straub and Karahanna, 1998). Hislop (2007) found that the specific nature of the work context strongly shaped the type of work activities performed and related types of knowing. Further acknowledging the requirements of the knowledge work task may offer a fruitful avenue for future research and help in better understanding the associated benefits and hindrances of remote work arrangements in various organizational contexts.

The context of tensions could be examined from the point of view of decision-making: what values steer decision-making processes in the case of complex interrelated tensions, and how do these values vary depending on the context, organization and decision-maker? The adaptation to post-pandemic hybrid arrangements for work may create various new

tensions concerning knowledge work. It would be fruitful to investigate what kind of tensions are there, and what kind of knowledge management practices, digital technologies and organizational procedures and norms support knowledge work when some team members work remotely and others work in office. The framework for managing knowledge-related tensions in remote work contexts was developed in a study in the field of HEIs, and whether the framework is suitable for other organizations in the public sector and the corporate world could be examined. We adopted the point of view of knowledge management, and the informants of our study were managers. In future research, it would be fruitful to examine the point of view of other knowledge workers to deepen the understanding of how individual knowledge workers experience knowledge-related tensions in remote work.

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About the authors

Tanja Matikainen (Master of Business Administration) is a PhD Student at the LUT School of Business and Management, LUT University, Finland. Her research focuses on knowledge management and intellectual capital management in higher education institutions during crisis and change. Tanja Matikainen is the corresponding author and can be contacted at: tanja.matikainen@student.lut.fi

Aino Kianto, DSc (Economics and Business Administration), is a Professor in Knowledge Management at the LUT School of Business and Management, LUT University, Finland. Her research focuses on knowledge management, intellectual capital, creativity, innovation and

organizational renewal. Her research on these topics has been published widely, e.g. in *Human Resource Management Journal*, *Journal of Knowledge Management*, *R&D Management*, *Journal of Business Research* and *Accounting, Auditing and Accountability Journal*. She holds an editorial board position in five academic journals.

Heidi Olander, DSc (Economics and Business Administration), is an Associate Professor at the LUT School of Business and Management, LUT University, Finland. Her research interest focuses on innovation management and knowledge management, especially on issues related to balancing knowledge sharing and protection in collaborative innovation. Recently, she has been involved in research projects with interest in entrepreneurs and individual-level collaboration dynamics, especially individual-level knowledge sharing and protection behavior in collaborative innovation. She has published over 60 academic papers, e.g. in *Technovation*, *European Management Journal*, *Journal of Intellectual Capital*, *Journal of Small Business Management* and *Journal of Knowledge Management*.