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Digital knowledge sharing and creative performance: Work from home during the COVID-19 pandemic

Øystein Tønnessen^{a,b,*}, Amandeep Dhir^{a,c,d}, Bjørn-Tore Flåten^a

^a Department of Management, School of Business and Law, University of Agder, Kristiansand, Norway

^b Egde Consulting AS, Kristiansand, Norway

^c Norwegian School of Hotel Management, University of Stavanger, Stavanger, Norway

^d Optentia Research Focus Area, North-West University, Vanderbijlpark, South Africa

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ABSTRACT

The outbreak of the COVID-19 pandemic and the resulting social distancing requirements have led to major disruptions in the world of work. The outcomes of the enforced and large-scale work from home (WFH) practices are currently largely unexplored. This study aims to address this gap in the research by investigating the external and internal digital knowledge sharing (DKS) and creative performance (CP) of employees under these extraordinary circumstances. The social capital theory was utilized as the theoretical lens for examining the associations of DKS and CP with demographic, individual, and organizational factors. An online cross-sectional survey was carried out among knowledge workers based in Norway during the pandemic lockdown. The study results indicate that internal and external DKS are significant predictors of CP in the WFH context during the COVID-19 pandemic. Females and older employees are more likely to engage in external DKS than their counterparts. Furthermore, individual motivation is found to be positively associated with internal DKS, external DKS, and CP. The findings suggest that increased use of digital platforms helps increase CP in the WFH setting resulting from the pandemic. Various theoretical and practical implications are discussed, and future research avenues are proposed.

1. Introduction

The year 1666—when the Great Plague of London had led King Charles II to impose a lockdown—was Sir Isaac Newton's *annus mirabilis*, or “year of wonders”, during which he made groundbreaking discoveries, including the law of gravitation (Whiteside, 1966). Enforced work from home sparked his creativity and problem-solving skills. Given the current situation with the COVID-19 pandemic and widespread lockdowns, the objective of this study is to investigate whether higher creative performance could be a potential outcome for individuals who work from home during this period.

The COVID-19 pandemic is one of the most devastating crises of modern times, with profound consequences for economies, organizations, and workers all over the globe (Choudhury et al., 2020; Margherita et al., 2021). By March 2021, approximately 123 million have been infected with COVID-19 globally and more than 2.7 million have perished because of the disease (WHO, 2021). Experts have proclaimed that the COVID-19 pandemic has caused a deep economic crisis—i.e.,

declining economic growth and deteriorating employment prospects (Baert et al., 2020; OECD, 2020). Preliminary studies have suggested that the negative implications of the pandemic and associated control measures (e.g., lockdowns, social distancing, working from home, etc.) have resulted in increased anxiety (Usher et al., 2020), stress (Mimoun et al., 2020), and productivity loss (Goodell, 2020). However, scholars have also highlighted that the crisis has a silver lining. Recent studies have indicated that the pandemic has led to an exponential boost in the growth and use of digital communication and supporting technologies because organizations are being forced to innovate and change (Chandra et al., 2020; Savić, 2020). In addition, the pandemic has resulted in a paradigm shift in terms of flexible work arrangements (Lee and Lee, 2021).

At the beginning of March 2020, numerous countries began implementing various regulations in an attempt to contain the spread of COVID-19, including lockdown (partial or total), self-isolation, and social distancing measures (Davison, 2020; Yoo and Managi, 2020). Organizations were also instructed to implement measures related to social

* Corresponding author.

E-mail address: oystein.tonnessen@egde.no (Ø. Tønnessen).

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distancing at their workplaces. As a result, they were forced to impose work from home (WFH) on their employees (Jaiswal and Arun, 2020). Immediately, an overwhelming majority of knowledge workers had no other choice but to switch to the WFH practice overnight (Yang et al., 2020).

In the present study, WFH is understood as a work practice in which an employee carries out work-related activities from their home instead of being physically present at an employer's office or other location, predominantly using digital technology (Allen et al., 2015; Garrett and Danziger, 2007). WFH practice during the COVID-19 pandemic implies that knowledge workers must accomplish their work tasks from their homes with almost no face-to-face communication (Brem et al., 2021). Due to the absence of face-to-face interaction for purposes of knowledge sharing, they must rely on digital platforms to replace their previous co-located interactivity. Digital platforms refer to shared, common sets of communication and collaboration tools that connect knowledge workers digitally to one another in real-time (Elia et al., 2020). Numerous platforms have been adopted and are widely being used by employees who WFH during the pandemic (Brem et al., 2021), including video conferencing solutions (e.g., Zoom, Skype, Google Meet), enterprise social media (e.g., Slack, Workplace), and file-sharing tools (e.g., SharePoint, Dropbox, Google Drive). Scholars have suggested that digital platforms are extensively used to build professional relationships (Golden, 2006) and that they influence the creative performance (CP) and knowledge sharing (KS) of employees (Chandra et al., 2020; Van der Meulen et al., 2019). CP refers to the individual production of novel and appropriate ideas (Zhou and Oldham, 2001). In the current study, CP is utilized to evaluate creativity because it relates to how employee work performance is influenced by social interactions, contextual factors, and access to heterogeneous knowledge (Amabile, 1996; Perry-Smith and Shalley, 2003).

Studies on WFH prior to the COVID-19 pandemic have indicated that teleworking (including WFH) results in higher CP of employees in comparison to work from office settings (Naotunna and Zhou, 2018; Vega et al., 2015). The major reasons for this include flexibility, autonomy, and lack of distractions in WFH setting (Alge et al., 2006; Amabile et al., 2002). Furthermore, scholars have already observed that KS practices positively influence the CP of employees in telework environments (including WFH ones) prior to the COVID-19 pandemic (Bélanger and Allport, 2008; Van der Meulen et al., 2019). In other words, KS is one of the most important antecedents of CP (Kremer et al., 2019; Lee, 2018). However, these associations might not hold true during the large-scale enforcement of the WFH situation in the ongoing COVID-19 pandemic. WFH during the pandemic primarily differs from the WFH practice in the pre-COVID-19 era because the former is unprecedented (Choudhury et al., 2020), rapidly introduced (Dwivedi et al., 2020), and enforced (Waizenegger et al., 2020).

There is barely any research on how WFH during the pandemic affects the digital knowledge sharing (DKS) and CP of employees. Jaiswal and Arun (2020, p. 18) have examined the impacts of WFH during the lockdown in India and have discovered “sparks of creativity” among employees. Similarly, other scholars have pointed out that DKS is crucial for CP (Chen et al., 2020), especially in a WFH context (Van der Meulen et al., 2019). In contrast, a recent French study has found that employees who WFH do not display an increase in CP (Mercier et al., 2021). Furthermore, Waizenegger et al. (2020) have found that the reduction of spontaneous meetings while WFH during the pandemic inhibits KS. The WFH literature before the COVID-19 crisis suggested that influential roles were played by demographics (Soda et al., 2019), individual factors (Kim et al., 2018), and organizational factors (Moolenaar et al., 2014) in relation to the KS and CP of knowledge workers. However, it is unclear whether these and similar results are still valid during pandemic-related WFH. Additionally, we do not yet know what kinds of work practices will exist in the post-COVID-19 era in terms of DKS and CP. The COVID-19 crisis involves disruptions that are worthy of examination, especially considering the fact that DKS and CP are widely

regarded as main determinants of organizational survival and competitiveness (Anderson et al., 2004). This becomes particularly important during uncertain times—like the current COVID-19 crisis—because the generating and sharing of knowledge and ideas are essential activities for adapting to changing demands (Roskes, 2015).

To uncover how DKS and CP are linked and affected by the current distinct WFH practice, we conducted a cross-sectional survey among 282 knowledge workers in Norway during the lockdown period. Norway is an open and small economy (Aastveit and Trovik, 2012), frequently considered to be an early adopter of digital technologies (European Commission, 2020). Knowledge workers are professionals who have high education or experience and whose work relates to the creation, transformation, or utilization of knowledge (Davenport, 2005). The three main research questions (RQs) investigated by the current study are:

- **RQ1.** What is the association between the DKS and CP of knowledge workers while WFH during the pandemic?
- **RQ2.** What is the association between the demographic, individual, and organizational factors and the DKS and CP of knowledge workers while WFH during the pandemic?
- **RQ3.** How do knowledge workers evaluate their work practices, DKS, and CP in the post-COVID-19 pandemic era?

The study utilized the social capital theory (SCT) as its theoretical framework to examine the empirical associations between the study variables. **RQ1** and **RQ2** were answered using the cross-sectional survey data, while **RQ3** was answered using the qualitative data provided by the study participants in response to an open-ended essay question that was also part of the survey.

The novelty and contribution of this study are threefold. First, it explored contemporary phenomena—i.e., DKS and CP—during the WFH practice in midst of an ongoing pandemic. Second, the study considered associations that have not been investigated in the current pandemic context. Third, the research context of the study is Norway, a technologically advanced country (Breene, 2016) with high social capital in terms of trust in the society (Newton, 2001) that is recognized by a strong social safety net (Bakko, 2002).

The rest of the paper is structured in the following manner. **Section 2** presents the background literature. **Section 3** is dedicated to the theoretical foundation and hypotheses development. Methods and results are presented in **Sections 4** and **5**, respectively, while **Section 6** focuses on discussion. Finally, the conclusions, implications, limitations, and future research recommendations are addressed in **Section 7**.

2. Background literature

2.1. Creative performance (CP)

In turbulent times of crisis, when organizations face unpredictable challenges, creativity is of crucial importance (Anderson et al., 2014). Scholars recognize creativity to be a way of coping with uncertainty by challenging old assumptions and trying new things (Ford, 1996). CP refers to individual creativity and includes risk-taking, adopting new ways of thinking and doing, and initiating change (Ford et al., 2008; Goh et al., 2020). Similarly, CP at the workplace is defined as an individual employee's generation of novel ideas, products, services or procedures, that are potentially useful for the organization (Amabile, 1996; Zhou and Oldham, 2001). Woodman et al. (1993) have provided an interactional perspective on CP, which posits that CP is a consequence of complex interactions between individual (e.g., motivation) and contextual factors (e.g., organizational climate).

Research across disciplines has demonstrated that integrating digital technologies can effectively stimulate CP (Aral and Weill, 2007; Cai et al., 2020). A growing body of research has suggested that social relations that are mediated by digital platforms could be just as important

as co-presence for fostering creativity (d'Ovidio and Gandini, 2019). Cai et al. (2020) have noted that employees with digital skills, who are motivated and provided with necessary digital tools, become more engaged in creative problem solving.

Scholars have argued that creativity and innovation are crucial for firms—not just to survive but in order to thrive in the post-COVID-19 world (Chesbrough, 2020; Cohen and Cromwell, 2020). Hence, it is more now important than ever to study how CP can be fostered in these challenging times. However, since COVID-19 is a recent phenomenon, we do not presently know how firms can facilitate creativity while their workforce is WFH during this ongoing crisis—and is likely to continue WFH even in the post-pandemic era.

2.2. Digital knowledge sharing (DKS)

KS is a critical success factor of knowledge management (Blankenship and Ruona, 2009). It can be defined as activities that involve the transfer of knowledge between individuals and organizations (Lee, 2001). In the present study, DKS refers to those activities through which employees share knowledge digitally with actors within or outside their organization (Lin, 2007; Luo et al., 2021). Scholars have argued that the use of digital platforms is a critical KS enabler in contemporary organizations (Lee, 2018). Rather than co-located KS, DKS is the phenomenon under examination in this study because of the completely digitally mediated exchange of information and ideas in the pandemic-related WFH setting. DKS goes beyond the standard knowledge transfer process and should, in light of the “practice-based orientation” of knowledge, be regarded as a social phenomenon (Brown and Duguid, 2001).

DKS can proceed at both the internal level (e.g., colleagues and supervisors) as well as the external level (e.g., customers and external experts), and scholars have recommended including both of these dimensions when investigating DKS (Charband and Navimipour, 2016; Lee et al., 2020). However, limited prior literature has examined the associations between internal and external DKS and CP (Rese et al., 2020). Carmeli et al. (2013) have highlighted the complex associations between the internal and external DKS and the creative problem-solving capacity of employees, thereby improving the overall CP. Similarly, Van der Maulen (2019) has suggested that the integration of diverse expertise from multiple digital sources, both within and outside an organization (i.e., internal and external DKS), can foster a higher level of CP in a WFH context.

Scholars have further argued that fostering DKS during the pandemic is invaluable for firms (Duarte Alonso et al., 2020). However, at present, we have only a limited understanding of how DKS unfolds in large-scale WFH settings (Waizenegger et al., 2020). This is an important area to understand because, in the post-COVID-19 era, the assumption is that hybrid work models that include a mixture of office work and WFH are becoming the new normal (Jaiswal and Arun, 2020).

2.2.1. Internal DKS

Internal knowledge refers to knowledge that is present within organizational borders (Jensen and Szulanski, 2004). It is based on the insight and expertise that an organization's employees already possess (Carmeli et al., 2013). According to the knowledge-based view (Grant, 1996), the knowledge that is embedded within a firm is a crucial resource for generation of ideas. Internal DKS involves the virtual dissemination of this internal knowledge throughout a department or an entire organization (Yang, 2004).

The pivotal role of DKS in CP has widely been acknowledged among scholars (Charband and Navimipour, 2016). According to Cummings (2004), one main objectives of DKS is collaboration with colleagues to solve problems and generate new ideas. A high degree of internal DKS supports the learning process of employees and may consequently enhance the creative skills of individuals, which constitutes a fundamental building block of CP (Sosa, 2011). However, there currently a lack of research on how the pandemic impacts the association between

internal DKS and CP.

2.2.2. External DKS

Individuals and organizations might also need outside sources of expertise to complement their own and assist them in generating new knowledge (Nonaka and Takeuchi, 1995). Firms are increasingly following an open innovation approach, combining internal ideas with external knowledge (Chesbrough, 2020; Ferraris et al., 2020). Scholars have shown that employees with relations that go beyond organizational boundaries perform better (Cross and Cummings, 2004; Ferraris et al., 2020). In an online environment, DKS between actors with different expertise and know-how makes it possible to approach a problem or task from alternative angles (Tortoriello et al., 2012). External DKS provides diversified knowledge through employees' boundary spanning knowledge networks (Carmeli et al., 2013). However, it is not known at present how the pandemic-related disruptions in organizations—including the acceleration of digital transformation—affect DKS with sources outside a firm (Savić, 2020).

3. Theoretical framework and hypotheses

In this study, SCT served as the theoretical lens through which we examined the associations between the DKS and CP and the demographic, individual, and organizational variables. Social capital (SC) can be understood as the resources that employees obtain through their social relationships and networks (Lin, 2002). Nahapiet and Ghoshal (1998) have posited that these relationships and resources influence the extent to which KS occurs among colleagues (internal DKS) and within interorganizational networks (external DKS). The structural dimension of SC involves relationship patterns and can be analyzed from the perspective of social interaction and network ties among the actors (Inkpen and Tsang, 2005; Nahapiet and Ghoshal, 1998). Strong ties involve frequent interactions and a high level of emotional closeness, while weak ties represent the opposite (Granovetter, 1973). Scholars have also considered the intensity of social interactions and the strength of network ties in relation to facilitating and constraining creative work (Perry-Smith and Shalley, 2003).

SCT is a framework that is frequently used to better understand KS and CP as well as the associations between them (Chen et al., 2008). Previous literature has suggested that social interactions and network ties can explain how KS positively influences CP in offline (Carmeli et al., 2013) as well as online settings (Korzynski et al., 2019). Similarly, scholars have highlighted the importance of interactions and ties in explaining internal and external DKS in telework settings (Golden and Raghuram, 2010; Van der Meulen et al., 2019). Furthermore, researchers have applied SCT to explore associations between KS and CP using demographic variables such as age and gender (Soda et al., 2019), individual factors such as intrinsic motivation (Kim et al., 2018), and organizational factors such as innovative climate (Moolenaar et al., 2014).

Hence, in line with the seminal literature, we drew on SCT to evaluate DKS and CP among employees who WFH during the COVID-19 pandemic. Our proposed research model consisted of five main components. DKS (internal and external) and CP were the dependent variables, while the independent variables were demographic, individual, and organizational factors. The proposed relationships between the study variables are presented in Fig. 1. A detailed description of the variables is presented in the Table 1.

3.1. Demographic variables, DKS, and CP

Prior literature has suggested that demographic variables—such as employee age, gender, and position, organization size (number of employees), and organization type (private vs. public)—are influential variables for predicting DKS (Wang and Noe, 2010) and CP (Sousa and Coelho, 2011). A major reason for this is the fact that demographic

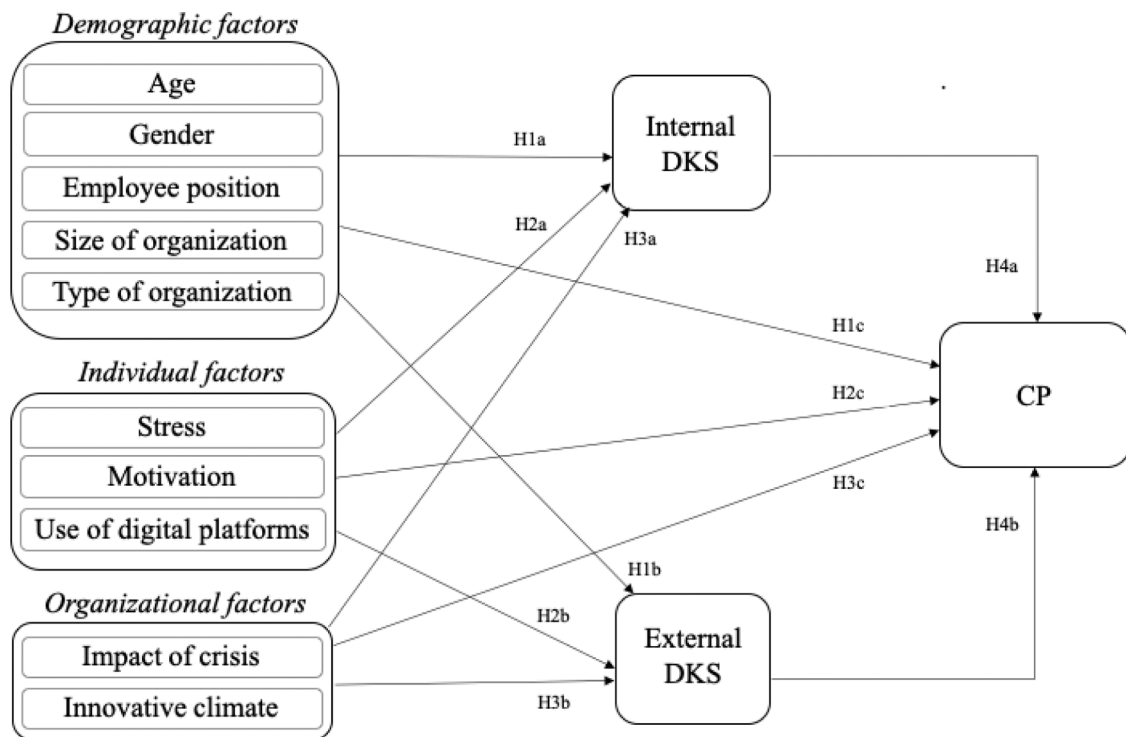


Fig. 1. Our Research Model.

Table 1
Study Measures and Their Operationalization.

Study Measures	Operationalization (References)
Internal DKS	Digital sharing of knowledge throughout a department or an entire organization (Cummings, 2004; Yang, 2004).
External DKS	Digital sharing of knowledge through knowledge networks outside an organization (Carmeli et al., 2013; Pacheco et al., 2020).
CP	Individual employee's generation of novel ideas, products, procedures, or problem solutions that are potentially useful for an organization (Amabile, 1996; Zhou and Oldham, 2001).
Demographics	Demographics are operationalized as age (Romero et al., 2012), gender (Ma and Yuen, 2011), position of an employee as either a manager or non-manager (Hu and Randel, 2014), organization size in terms of the number of employees (Serenko et al., 2007), and organization type as either private or public (Hartley and Benington, 2006).
Individual factors	Individual factors are operationalized as stress (work-related) (Hon et al., 2013), motivation (intrinsic and pro-social) (Golden and Gajendran, 2019; Grant and Berry, 2011), and use of digital platforms (tools for video meetings, enterprise social media, file-sharing, etc.) (Golden and Raghuram, 2010; Wasko and Faraj, 2005).
Organizational factors	Organizational factors taken into consideration are the impact of the pandemic crisis and innovative climate. Impact of crisis refers to the implications of a crisis for an organization in terms of KS and creativity (Cohen and Cromwell, 2020; Ford et al., 2008). Innovative climate refers to the shared perception among the employees regarding openness to new ideas (Goh et al., 2020; Van der Vegt et al., 2005).

factors can impact social interactions, which in turn facilitates the formation of network ties—a crucial element for KS and CP (Soda et al., 2019).

With respect to age, Romero et al. (2012) have suggested that middle-aged employees are better equipped to solve complex problems in which they are more experienced than their young counterparts.

However, other studies have suggested that in networks that require the use of digital tools, older employees experience more difficulties with DKS in comparison to their younger colleagues (Marquíe et al., 2002; Nielsen, 2002).

Regarding gender, some scholars have implied that there might be slight differences between DKS and CP. Ma and Yuen (2011) have demonstrated that male participants rate digital social networks for KS more highly than their female counterparts. In addition, researchers have suggested that females might have a lower CP capability in some cases as a result of gender stereotyping (Foss et al., 2013). Prior literature has also highlighted that the position of an employee in an organization (manager vs. non-manager) could affect DKS, especially when it comes to heterogenous knowledge sharing, which is essential for CP (Hu and Randel, 2014). Managers might have better access to knowledge and ideas because they are often involved in multiple networks with both strong and weak ties (Soda et al., 2019). In relation to organization size, Serenko et al. (2007) have found that the more employees that an organization has, the less effective its internal KS is. Recent literature has suggested that small and medium-sized enterprises (SMEs) are at the forefront of DKS and CP partly due to their limited size (Tassabehji et al., 2019).

Internal and external DKS are contemporary characteristics of both private and public organizations (Sandhu et al., 2011). Hartley and Benington (2006) have noted that in the private sector, external KS unfolds in relatively closed networks. Nevertheless, public service settings are characterized by more open and widespread KS. These scholars have concluded that the strength and quality of network ties means more than the scope of the network when it comes to creativity and innovation. Based on this, the following hypothesis was proposed:

H1. Demographic variables (age, gender, employee position, organization size, and organization type) are significantly associated with (a) Internal DKS, (b) External DKS, and (c) CP.

3.2. Individual variables, DKS, and CP

At the individual level, stress and motivation are believed to affect both DKS and CP. Scholars have demonstrated that a decreased level of stress and an increased level of employee well-being support both KS and CP (Hoff and Öberg, 2015; Wagner and Growe, 2019). However, this appears to be more complex. Hon et al. (2013) have indicated that challenge stressors are associated with high CP, while stress related to job insecurity and role ambiguity can have the opposite effect.

Golden and Gajendran (2019) have suggested that CP significantly relies on intrinsic motivation and less on employee work location, which is also supported by seminal research (Amabile, 1988; Ford, 1996). Other scholars have highlighted that prosocial motivation, with a focus on outcome that is useful for others, is strongly associated with CP (Grant and Berry, 2011). Utilizing SCT, Wasko and Faraj (2005) have concluded that individual motivations foster DKS in online social networks.

In their study of employees who are spatially separated from each other, Golden and Raghuram (2010) have found that limited use of digital platforms might create uncertainty and undermine KS in general. In contrast, extensive use of digital platforms tends to provide more information crucial for CP. However, researchers who build on SCT have also noted that the availability of digital technologies does not guarantee that either internal or external DKS will actually occur (Wasko and Faraj, 2005). Based on this, the following hypothesis was proposed:

H2. Individual factors (stress, motivation, and digital platform use) are significantly associated with (a) Internal DKS, (b) External DKS, and (c) CP.

3.3. Organizational variables, DKS, and CP

The impacts of the COVID-19 crisis on organizations might include slowdown of activity, client and customer defection, lower revenue, layoffs and dismissals, supply disruptions, and cybersecurity threats (Alstadsaeter et al., 2020). Jaiswal and Arun (2020) have emphasized that massive COVID-19 disruptions involve involuntary organizational responses. A pandemic lockdown could have inarguably negative consequences for many companies in terms of both internal/external KS and creativity (Cohen and Cromwell, 2020). On the other hand, scholars have proposed that uncertainty in times of crisis actually motivates exploration and is at the root of creative endeavors (Ford et al., 2008). Hence, the extent to which the pandemic crisis impacts organizations negatively is an aspect worth investigating.

Innovative climate is generally understood as a shared perception among employees regarding the procedures and practices that promote the production and implementation of novel ideas (Van der Vegt et al., 2005). It includes openness to challenging traditional ways of doing things, encouraging idea exploration, and learning from internal and external actors (Van der Vegt et al., 2005). Previous research has shown that an organization’s innovative climate plays a vital role in shaping its employees’ CP (Jaiswal and Dhar, 2015) and improving KS behavior (Liu et al., 2012). Thus, the following hypothesis was formulated:

H3. Organizational factors (impact of COVID-19 crisis and innovative climate) are significantly associated with (a) Internal DKS, (b) External DKS, and (c) CP.

3.4. DKS and CP

Theoretical contributions from studies on SC have suggested that a significant relationship exists between KS and CP in non-digital settings (Chen et al., 2008). Similarly, scholars have found a positive association between both internal and external DKS and CP (Korzynski et al., 2019). Based on an SCT perspective, the following hypothesis was proposed:

H4 (a) Internal DKS and (b) external DKS have a positive association with CP.

4. Methodology

4.1. Sample and procedure

The participants in this study were knowledge workers based in Norway. They were recruited from both private and public firms located in southern and eastern parts of Norway. The developed research model was evaluated using an online cross-sectional survey design. The distribution of the survey was made nationally via emails as well as social media platforms (e.g., LinkedIn and Facebook). The participants were assured of confidentiality and anonymity with regard to their participation.

The Norwegian government imposed a nationwide lockdown beginning on March 12, 2020. We wanted to study various associations after the disruption shock and sudden change in the work setting had somewhat stabilized and employees had some time to consider and adjust to unforeseen WFH arrangements before we conducted the study. Hence, data collection was performed from April 2 to May 4, 2020. A total of 282 individuals participated in the study but 45 responses were removed—either because of incomplete data or because respondents did not engage in WFH. Thus, the final dataset comprised 237 respondents and was used for subsequent data analysis. The mean age of the respondents was 42 years, 50% were females, and 61% worked in the private sector.

4.2. Measures

All study measures were examined using closed-ended questions. However, respondents’ expectations of work practices post-COVID-19 was evaluated using an open-ended question. Qualitative data were necessary to obtain an in-depth understanding of opinions and attitudes to the future of work.

4.2.1. Demographics

The study considered the demographic profiles of the respondents and the organizations at which they were employed. Respondent profiles were assessed using five survey items. Three of these items were related to the respondent profiles, while the remaining two items evaluated the profile of their organizations (see Table 2). The demographic profile consisted of age, gender (male vs. female), and position of the employee within the organizational hierarchy (manager vs. non-

Table 2
Descriptive Statistics on the Study Variables.

Study Measures	Study variable	Category	Percentage (Frequency)
Demographics	Age	Below 30 years	16 (36)
		40–49 years	50 (111)
		Above 50 years	33 (44)
	Gender	Female	50 (111)
		Male	49 (109)
	Position	Manager	37 (85)
Non-manager		62 (142)	
Type of organization	Private	Private	61 (145)
		Public	39 (92)
	Size of organization	≤ 100 employees	58 (138) with less than a hundred employees
	> 100 employees	42 (99) with more than a hundred employees	
Future of work practices	Permanent change	Yes	89 (174)
		No	11 (22)
	Type of changes	Open-ended question	(see table 8)

manager), organization type (private or public), and organization size (less than 100 employees vs. more than 100 employees). The average age of the respondents was 42 years (SD = 6.6) and 50% of respondents were female.

4.2.2. Organizational factors

Organizational factors were assessed using two variables—namely, (a) How does the COVID-19 crisis affect your organization and (b) Innovative climate in the organization during COVID-19—where respondents were asked to evaluate their company’s attitude toward testing new ideas and solutions. Both items were evaluated using a 5-point Likert scale, where 1 = Very negative and 5 = Very positive.

4.2.3. Individual factors

Individual factors were assessed using three variables, which asked the respondents how the COVID-19 crisis affects them—namely, their (a) Motivation, (b) Stress, and (c) Use of digital platforms. Both items were evaluated using a 5-point Likert scale where 1 = Much less and 5 = Much more.

4.2.4. Creative performance

CP was measured using a single item, where the respondents were asked to compare and evaluate how their capability of coming up with new ideas and solutions has changed during the pandemic. It was evaluated using a 5-point Likert scale where 1 = Much lower and 5 = Much better.

4.2.5. Digital knowledge sharing

The study differentiates between two types of DKS—namely, internal DKS (sharing within an organization) and external DKS (sharing outside an organization). The response options were evaluated using a 5-point Likert scale, where 1 = Much lower and 5 = Much better.

- (a) *Internal DKS*: Internal DKS was reported based on the question: “How have internal interactions and knowledge sharing been during the lockdown?”
- (b) *External DKS*: Survey participants reported on external DKS by responding to the question: “How have interactions and

knowledge sharing been with people outside the company during the lockdown?”

4.2.6. Work practices post-COVID-19

The respondents were asked for their opinion about the future of work practices in post-COVID-19 times. These opinions were assessed using an open-ended question, where participants were asked to share their opinions concerning how work practices will permanently change after the COVID-19 pandemic.

4.3. Data analysis

The study utilized IBM SPSS 26.0, which is a widely used software for statistical analysis in the social science field. Cross-sectional data were analyzed using a variety of techniques—namely, an independent sample *t*-test, a one-way ANOVA test, and linear regression analysis. The responses to the open-ended question related to the post-COVID-19 work practices were analyzed using thematic analysis of the qualitative comments or opinions of the participants.

5. Results

The survey data suggest that 41% of the participating knowledge workers believed that their CP has increased and 22% believed that their CP has decreased while WFH during the COVID-19 pandemic. About 42% of knowledge workers indicated an increase in internal DKS, while 29% indicated a decrease in internal DKS. Similarly, 26% of knowledge workers believed that their external DKS has increased, while 31% suggested otherwise.

5.1. Relationships between demographic factors, DKS, and CP

The results of the Pearson correlation analysis revealed that external DKS has a weak positive correlation with age ($r = 0.18, p < 0.01$), a weak negative correlation with gender ($r = -0.15, p < 0.05$), and a weak negative correlation with organization size ($r = 0.17, p < 0.01$) (see Table 3). However, no significant relationship was found with employee position and organization type.

Table 3
Correlations Between the Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. CP	1												
2. Internal DKS	0.24***	1											
3. External DKS	0.40***	0.31***	1										
4. Age	0.05	0.05	0.18**	1									
5. Gender	-0.13	-0.06	-0.15*	0.12	1								
6. Position	-0.14*	-0.01	-0.07	-0.18**	-0.14*	1							
7. Size of organization	-0.07	-0.07	-0.17*	0.10	-0.05	0.14*	1						
8. Type of organization	0.09	-0.08	0.03	0.01	-0.28***	0.17**	0.24***	1					
9. Stress	0.06	0.16*	0.14*	-0.08	-0.06	-0.01	-0.03	-0.15	1				
10. Motivation	0.34***	0.18**	0.20**	0.15*	0.01	-0.14*	-0.02	-0.02	-0.06	1			
11. Use of digital Platforms	0.27**	0.14*	0.05	-0.01	-0.11	0.03	-0.03	0.17**	4.11	-0.07	1		
12. Impact of crisis	.19**	.07	.18*	-0.11	0.01	0.06	0.05	0.11	-0.02	0.12	0.03	1	
13. Innovative climate	.13	.38***	.01	.03	-0.06	-0.04	0.17*	0.10	-0.02	0.20**	0.07	0.16*	1

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$.

Table 4
Demographic Differences in CP, Internal and External DKS.

		CP				
Demographic variables	Categories	Mean (SD)	F	t-value	df	p
Gender	Female	4.40 (0.91)	0.93	1.96	216	0.05
	Male	4.16 (0.92)				
Position	Manager	4.43 (0.93)	0.19	2.00	213	0.05
	Non-manager	4.17 (0.97)				
Size of organization	<100 employee	4.32 (0.93)	0.06	1.00	222	0.32
	>100 employee	4.19 (0.97)				
Type of organization	Private	4.20 (0.94)	0.65	-1.36	222	0.18
	Public	4.37 (0.96)				
		Internal DKS				
Gender	Female	3.32 (1.14)	7.22	0.84	209.02	0.40
	Male	3.19 (1.00)				
Position	Manager	3.23 (1.08)	0.02	0.05	211	0.96
	Non-manager	3.23 (1.07)				
Size of organization	<100 employee	3.32 (1.11)	2.07	1.24	216	0.22
	>100 employee	3.13 (1.00)				
Type of organization	Private	3.31 (1.07)	0.27	1.13	216	0.26
	Public	3.14 (1.06)				
		External DKS				
Gender	Female	3.13 (1.09)	0.65	2.09	202	0.04
	Male	2.83 (0.98)				
Position	Manager	3.06 (1.08)	1.62	0.94	193	0.35
	Non-manager	2.92 (0.99)				
Size of organization	<100 employee	3.11 (1.06)	0.08	2.38	202	0.06
	>100 employee	2.76 (0.98)				
Type of organization	Private	2.95 (0.99)	1.56	-0.41	202	0.68
	Public	3.01 (1.12)				

Independent sample *t*-test results suggest that females tend to engage more in external DKS than their male counterparts (see Table 4). Independent ANOVA-test results indicate insignificant age differences in relation to CP and internal DKS (see Table 5). However, the ANOVA-test results suggest significant differences between employees 30–40 years of age and those 50–60 years of age in terms of external DKS. Furthermore, the Post Hoc test results reveal that those 30–40 years of age possess higher external DKS in comparison to employees 50–60 years of age (see Table 6).

Table 5
Results of the ANOVA-test Using Age, CP and DKS.

	Sum of Squares	df	Mean Square	F	p
CP	1.51	2	0.75	0.84	0.43
Internal DKS	0.85	2	0.43	3.58	0.69
External DKS	7.60	2	3.80	3.58	< 0.05

Note. Degrees of freedom = *df*.

Table 6
Results of the Post Hoc Test.

Posthoc test	Variable	Groups	Mean difference	Standard error	p	
Tukey’s test	External DKS	30–40 years	40–50 years	−0.36	0.22	0.23
		40–50 years	50–60 years	−0.60	0.23	< 0.05

Note. **p* < 0.05.

5.2. Relationships between individual factors, DKS, and CP

The Pearson correlation analysis results show that internal DKS scores have a weak positive correlation with stress ($r = 0.16, p < 0.05$). On the other hand, external DKS scores have no significant relationships with individual variables. However, CP scores have positive correlations with two of the individual variables—namely, motivation ($r = 0.34, p < 0.001$) and use of digital platforms ($r = 0.27, p < 0.01$).

5.3. Relationships between organizational factors, DKS, and CP

The correlation analysis results suggest that internal DKS scores have a medium positive correlation with innovative climate ($r = 0.38, p < 0.001$), while external DKS scores have a medium positive correlation with impact of crisis ($r = 0.38, p < 0.001$). The latter indicates that the more that organizations are negatively affected by the crisis, the less their employees engage in external DKS. No relationships between CP and organizational variables are revealed.

5.4. Relationship between DKS and CP

The analysis results reveal that CP has a moderate positive correlation with external DKS ($r = 0.40, p < 0.001$) and a weak positive correlation with internal DKS ($r = 0.24, p < 0.001$).

5.5. Predicting DKS and CP

Multiple regression analysis was performed to examine the relative influences of demographic, individual, and organizational variables in predicting internal and external DKS and CP among employees who WFH during the COVID-19 pandemic (see Table 7). The study results suggest that stress (individual) ($\beta = 0.16, p < 0.05$) and innovative climate (organizational) ($\beta = 0.40, p < 0.01$) positively predict internal DKS. Similarly, demographic variables—namely, age ($\beta = 0.15, p <$

Table 7
Predicting DKS and CP.

Measures	Internal DKS			External DKS			CP		
	β	t	p	β	t	p	β	t	p
Demographic									
Age	0.10	1.41	0.16	0.15	2.09	< 0.05	0.04	0.55	0.58
Gender	-0.10	-1.45	0.15	-0.16	-2.27	< 0.05	-0.05	-0.73	0.47
Position	0.06	0.95	0.34	-0.01	-0.06	0.95	-0.09	-1.44	0.15
Type of organization	-0.12	-1.60	0.11	0.03	0.33	0.74	0.04	0.56	0.57
Size of organization	-0.11	-1.56	0.12	-0.18	-2.47	< 0.05	-0.01	-0.08	0.94
Individual									
Stress	0.16	2.46	< 0.05	0.11	1.58	0.12	0.06	0.84	0.40
Motivation	0.11	1.51	0.13	0.01	0.06	0.95	0.28	4.17	< 0.001
Use of digital platforms	0.04	0.59	0.56	-0.07	-0.96	0.34	0.29	4.31	< 0.001
Organizational									
Impact of crisis	-0.02	-0.25	0.81	0.15	2.10	< 0.05	0.08	1.22	0.23
Innovative climate	0.40	5.91	< 0.001	-0.05	-0.77	0.45	0.05	0.63	0.53
DV: KS									
Internal DKS							0.03	0.45	0.66
External DKS							0.28	3.96	< 0.001
R²	26.9%			26.5%			37.4%		

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, β = Beta, t = t -value.

0.05), gender ($\beta = -0.16, p < 0.05$), and organization size ($\beta = -0.18, p < 0.05$)—as well as one organizational variable—namely, impact of crisis ($\beta = 0.15, p < 0.05$)—significantly predict external DKS. Finally, the results of the multiple regression analysis suggest that individual factors—namely, motivation ($\beta = 0.28, p < 0.001$) and use of digital platform ($\beta = 0.29, p < 0.001$)—as well as external DKS ($\beta = 0.28, p < 0.001$) positively predict CP. The multiple regression analysis explains 26.9%, 26.5%, and 37.4% of the variance found in internal DKS, external DKS, and CP, respectively.

5.6. Work practices post-COVID-19 pandemic

The thematic analysis of the open-ended item related to work practices after the COVID-19 pandemic suggest five broad themes—namely, digital platforms, WFH, flexibility, mobility, and supervision. The categorization and coding of the open-ended textual responses are presented in Table 8.

6. Discussion

The present study examined the relationship between DKS and CP while employees WFH during the COVID-19 pandemic. The associations between demographic, individual, and organizational factors, as well as DKS and CP, were examined. The study examined cross-sectional data obtained from 282 knowledge workers from Norway.

H1-H4 addresses the RQ1 and RQ2. To begin with, H1a-c examined the associations between various demographic variables, DKS, and CP. The study results suggest insignificant relationships between demographic variables and internal DKS. A possible reason for such results could be the sudden transition to large-scale WFH practices, which allowed for internal DKS procedures and tools to be available to all employees, regardless of their age, gender, and position, as well as across all organization types (big vs. small, public vs. private), in order to maintain “business as usual” during the pandemic (Kirchner et al., 2021; Waizenegger et al., 2020). Following SCT, social relationships between colleagues existed prior to the pandemic (Zhang et al., 2021); hence, the enforced WFH practice did not affect the association between demographics and internal DKS.

In contrast, the results indicate that age does have a positive association with external DKS. This finding can be explained by the fact that older employees might have a broader social network outside the organization, as confirmed by prior research (Ng and Feldman, 2013). Consequently, older employees might have a higher external DKS capability that also applies in a WFH context.

With respect to gender, the results suggest that females engage in external DKS more than their male counterparts. This is consistent with

the findings of Anderson and Haddad (2005), who have also suggested that females tend to build stronger social connections than males in DKS settings. The study results indicate a strong negative relationship between external DKS and organization size. A possible reason for this could be that larger organizations have larger in-house knowledge resources and are consequently less dependent on outside actors (external DKS), which is in line with previous research (Cumings, 2004).

The results indicate insignificant associations between external DKS, employee position, and organization type. The possible reasons for this finding could be: (a) Managers, as well as non-managers, have to rely on digital platforms for external DKS due to the WFH setting during the pandemic, so it is reasonable to assume that the preconditions for this are the same for both types of employees; (b) External DKS has no relationship with organization type. The enforced WFH practice hit both private and public sectors simultaneously with the same strength and scope (Bailey et al., 2020), which can help us make sense of this particular result. Furthermore, the results indicate insignificant associations between demographic variables and CP. These findings are inconsistent with prior literature, where significant associations were found (Foss et al., 2013). The possible reason for this finding could be the relatively flat structure of Norwegian organizations, which could facilitate broad inclusion in creative processes. Another possible reason could be that the joint confrontation of the COVID-19 crisis might have abolished the demographic dividing lines in relation to CP.

H2a-c examined the associations between various individual variables, DKS, and CP. A significant relationship between stress and internal DKS is found. Recent literature has suggested that the collective trauma of the pandemic might have increased the employees’ levels of stress (Garfin, 2020), as a result of which employees tend to seek knowledge and social support from their colleagues and managers within the company (Wang et al., 2021). Similarly, it is reasonable to assume that an increase in stress is related to an increase in internal DKS. In comparison, the study does not find any significant association between stress and external DKS. This result can be explained using the aforementioned analogy that professional stressors caused by the pandemic and the related unforeseen lockdown have resulted in an increase in internal DKS, while they have had no impact on nor association with external DKS.

The study results suggest that motivation is positively associated with both internal and external DKS. This finding is consistent with Lin (2007) who has found motivational factors to be significantly associated with KS attitudes and intentions. Furthermore, (Nguyen, 2019) has also suggested that motivation is the primary trigger for DKS.

With respect to digital platforms, the results suggest—rather surprisingly—an insignificant association with both internal and external DKS. This finding, however, is consistent with Wasko and Faraj (2005),

Table 8
Open and Axial Codes for the Qualitative Data.

Axial code	Open code	Some quotes
Digital platforms	Digital collaboration tools	"Forced use of digital collaboration tools (Hangouts, Teams) will open up for this to become a more widespread collaboration form" [Male, Non-manager, Private sector]
	Video meetings	"I think we will have more meetings with less physical participants. More meetings with external actors via Teams, Skype or similar" [Female, Non-manager, Public sector]
	File-sharing platforms	"We'll share much more documents on sharing platforms, and we'll work together on documents in the future" [Male, Manager, Private sector]
	Webinars	"More use of webinars to facilitate events with more participants" [Male, Manager, Public sector]
	Online teaching	"The coronavirus crisis has accelerated the use of digital tools for teaching and meetings in higher education" [Male, Non-manager, Public sector]
	Adoption	"I think we will adopt new technology and solutions faster. Now it has been proven that it went well when we were forced to do it" [Male, Manager, Private sector]
	Facilitation	"My employer has now provided all with the necessary tools for home-office" [Male, Manager, Public sector]
Work from home (WFH)	Effectivity	"I'm more effective when working from home, but of course without the kids running around my legs" [Female, Non-manager, Private sector]
	Productivity	"It is clear to me that my productivity doesn't decrease when I work from home" [Female, Non-manager, Public sector]
	Work satisfaction	"Home-office is great! I want more of this in the future" [Male, Non-manager, Private sector]
Frequency		"I think partly home-office will be more accepted, with emphasis on partly" [Male, Non-manager, Private sector]
Flexibility	Working hours	"Flexitime contributes to increased creativity and loyalty" [Female, Non-manager, Public sector]
	Work-family balance	"More flexibility makes it easier for me to take care of the kids" [Female, Non-manager, Public sector]
	Hybrid work	"This will open up a more balanced way of working between my regular office and home" [Female, Non-manager, Private sector]
	Performance	"Work without deadlines is more difficult, especially if you work alone" [Female, Non-manager, Private sector]
Mobility	Commuting	"Especially for those who need to commute, it will be opened up for more home-office" [Female, Non-manager, Private sector]
	Business travels	"I'll spend less time on traveling for meetings" [Male, Non-manager, Public sector]
	Cost reductions	"There will probably be tighter travel budgets in the future" [Male, Non-manager, Public sector]
	Greenhouse gas emissions	"Our new ways of working will reduce greenhouse gas emissions" [Female, Non-manager, Public sector]
Supervision	Support	"We need better support from managers and more internal training" [Male, Non-manager, Private sector]
	Evaluation	"There's a lack of routines for evaluation" [Female, Non-manager, Public sector]
	Project management	"I hope our managers will introduce more distributed teams" [Male, Non-manager, Private sector]

who have suggested that employees highly engaging in DKS are equally committed to the use of digital platforms in comparison to their counterparts. In addition, we also believe that the unprecedented shift from widespread face-to-face interaction to exclusively DKS during the enforced WFH situation could be another major reason why the association is found to be insignificant.

The results suggest that individual motivation and use of digital platforms are positively associated with CP. Prior literature has shown similar findings—e.g., Cai et al. (2020) have demonstrated that employees with digital skills and motivation to utilize digital tools become more engaged in creative problem solving. Hence, our results confirm that integrating digital platforms can effectively stimulate CP. Moreover, the significant relationship between motivation and CP is supported by a wide consensus in the previous literature (e.g. Ford, 1999; Shalley and Perry-Smith, 2001). In comparison, no significant relationship is found between stress and CP. Despite the fact that scholars have suggested such an association (Hon et al., 2013), the complexity of stressors during lockdowns (i.e., job insecurity, loneliness, anxiety, workload, work-life boundaries, etc.) might provide one possible reason for our finding that the relationship between stress and CP is insignificant.

H3a–c examined the associations between organizational variables, DKS, and CP. The study results suggest that innovative climate has a positive association with internal DKS. This finding is consistent with prior research, which has indicated that an organization's innovative climate plays a vital role in encouraging KS behavior (Goh et al., 2020; Liu et al., 2012). However, innovative climate is found to have an insignificant relation with external DKS. One potential explanation for this result could be that spatial isolation during WFH causes a perceived social distance from the organization, thus erasing the relationship between innovative climate and external DKS.

Surprisingly, our study results indicate no association between the organizational impact caused by the pandemic crisis and internal DKS. A possible reason for this could be that organizations have been affected differently, depending on the business sector and market segment they

are in (Nicola et al., 2020). Consequently, during the early pandemic phase (i.e., March–April 2020), no significant relationship between crisis impact and internal DKS had yet been able to manifest. However, the study results suggest that the impact of the crisis has a negative relationship with external DKS because more firms are negatively affected by the COVID-19 crisis, the less likely their employees are to engage in external DKS. The unprecedented pandemic lockdowns have caused major disruptions and have had dramatic consequences for many companies, as suggested by the recent literature (Cohen and Cromwell, 2020).

We did not find any significant associations between organizational factors and CP. This result is inconsistent with a recent study (Mercier et al., 2021) that has suggested that a negative organizational impact caused by the pandemic may motivate creative exploration (Mercier et al., 2021). In contrast, another study has suggested that the negative impact of the crisis may decrease CP (Cohen and Cromwell, 2020). One of the possible reasons for an insignificant association in the present study could be the fact that the participating Norwegian companies have broadly been affected by COVID-19, which is why organizational factors have no relationship with CP.

Similarly, the current study results reveal no association between innovative climate and CP, which is inconsistent with the prior literature (Goh et al., 2020; Jaiswal and Dhar, 2015). Scholars have indicated that strong ties and active participation in organizational actions support the employees' perception of innovative climate (Moolenaar et al., 2010). The full-time WFH practice resulting from the pandemic lockdowns might have decreased the employees' organizational activities and, consequently, neutralized the impact of innovative climate on CP.

H4a–b examined the associations between DKS and CP. The study results indicate that both (a) internal DKS and (b) external DKS have a positive significant relationship with CP. Scholars agree that information from multiple social networks with both strong and weak ties trigger idea generation in digital WFH settings (Carmeli et al., 2013; Oldham and Da Silva, 2015; Van der Meulen et al., 2019). Hence, the significant relation between internal DKS and CP is supported by prior

literature (Goh et al., 2020; Lee, 2018). Similarly, the strong association between external DKS and CP could be explained by the fact that digital connections outside organizational boundaries give employees access to new and heterogeneous knowledge, which is crucial for CP (Chen et al., 2015; Ferraris et al., 2020).

Finally, **RQ3** explored how knowledge workers perceive their work practices, DKS, and CP in the post-COVID-19 pandemic phase. As much as 89% of the respondents stated that they expect their everyday work practices to change permanently because of the individual experiences and organizational insights acquired during the COVID-19 pandemic. The open and axial coding performed indicates that the predicted changes that were most frequently highlighted by the respondents are: increased use of digital platforms, more frequent WFH than pre-COVID-19, reduced business-related travel, and increased work flexibility.

The results suggest an overall positive attitude toward digitalization, travel reduction, and flexibility. Our findings regarding flexible work satisfaction support those of recent studies (Baert et al., 2020; Lee and Lee, 2021). Although it has been reported that these changes could increase the daily working hours (Kumar et al., 2021), this issue is not addressed by the respondents in our study. One possible reason for this may be that the data were collected shortly after the pandemic began and the negative effects of WFH practices were overshadowed by joint efforts in facing this extraordinary crisis.

Employees pointed out major managerial challenges regarding new ways of organizing and managing distanced knowledge work. Lack of evaluation routines and unsatisfactory support from managers were the commonly expressed concerns. The latter is consistent with recent literature, which has noted that WFH during the COVID-19 pandemic could decrease managerial support in relation to employees' personal and professional development (Venkatesh, 2020).

Despite the contrasting preferences and experiences of employees, recent studies suggest that WFH and digital collaboration will become much more common in the future (Brem et al., 2021; Wang et al., 2021). However, we do not have sufficient knowledge about the perceptions, expectations, and capabilities of employees in terms of work practices, DKS, and CP in the post-COVID-19 era.

7. Conclusions

The economic and health-related crisis caused by the COVID-19 pandemic has shown us that stimulating creativity and innovation is more crucial than ever for the survival and growth of organizations. As we strive to cope with the challenges the pandemic has posed, opportunities arise for both scholars and practitioners to explore new horizons, share newly acquired knowledge, and engage in creative work. The current study offers some of the first insights into the pivotal yet understudied impact of enforced WFH practice on DKS and CP during the pandemic. Furthermore, the study utilizes SCT and considers an exhaustive set of demographic, individual, and organizational variables to better understand their association with DKS and CP.

7.1. Theoretical implications

First, the present study examines novel and ongoing phenomena. The literature on WFH practices during the COVID-19 pandemic is currently very limited. By examining various impacts of the mandatory and large-scale WFH practice through an SCT lens, the study extends and complements the growing body of research on telework and WFH. The findings contribute to SCT by showing that enforced WFH practices did not affect the association between demographics and intra-organizational KS. Furthermore, the findings also extend the theory by suggesting that both internal and external DKS have a positive and significant relationship with CP.

Second, our study contributes to the knowledge management literature by including demographic, individual, and organizational variables and by examining internal and external KS that is entirely

dependent on digital platforms. By integrating the concept of DKS, we add to the research stream of digitally mediated KS. We emphasize the social aspect and complexity of KS among strong and weak network ties, adding to the literature in terms of KS via online social networks and digital collaboration.

Third, the findings extend creativity research by highlighting that increased DKS within and outside of organizational boundaries could foster CP in a full-scale WFH context. Moreover, the study supports and augments the literature by emphasizing the importance of individual motivation for CP in the extraordinary lockdown situation caused by the COVID-19 pandemic.

7.2. Practical implications

A primary practical implication of the study is that both internal and external DKS affects CP in the WFH context. Managers can use this insight when responding to the demanding need of rethinking work practices and facilitating KS in view of the pandemic disruption. Our findings show that promoting DKS among colleagues, as well as actors outside the organization, is of crucial importance for CP in a WFH setting.

Second, the study has implications for managers regarding revisiting WFH policies and crafting short-term and long-term work practices. The findings encourage leaders to consider alternative work practice options before making decisions that will deeply affect the future workforce. Based on SCT, our findings provide practical suggestions to help managers facilitate social relationships prior to introducing WFH solutions. This is presumed to ease the transition to DKS and to encourage CP in new work arrangements.

Third, by including demographic, individual, and organizational variables, companies are offered a broader understanding of factors that affect CP among employees in the pandemic context. In addition, the results underline the pivotal role that DKS play in enhancing CP, highlighting the vital role of new digital technology in this endeavor. Hence, our study may serve to enlighten policymakers regarding the crucial importance of digital transformation in the new world of work and to encourage public government to provide the infrastructure needed for accelerating technological evolution. Furthermore, the study provides insights into the changes and challenges in the conditions of working life as a consequence of the pandemic, which may be useful for policymakers and trade unions.

7.3. Limitations and future research

The cross-sectional design of the present study has predictive limitations. Since exposures and outcomes are simultaneously measured, there is generally no evidence of a temporal relationship between the two. A second limitation is the convenience sampling, taken from a group of knowledge workers who were easy to contact digitally, primarily through the social media channels of the main author, employer, and collaborating network organizations. A major disadvantage of convenience sampling is that the sample is not generalizable—thus, the results are not representative of the entire population. Third, the study is country-specific. Consequently, the potential generalizability of the results is limited by the exclusively Norwegian context. While pandemic measures and policies might be similar across nations, their application and effectiveness remain dependent on the demographic, social, economic, and cultural characteristics of each country.

One direction for future research is to enlarge the geographical scope and conduct multi-country studies of both COVID-19 related measures and WFH arrangements affecting CP. This could broaden our understanding of cultural influences on work practices and governmental differences in managing COVID-19, which may influence both KS and CP in organizations. Methodologically, we encourage scholars to develop designs that assess variables over time in order to determine cause and effect. True experiments, quasi-experiments, and longitudinal

observational studies are advantageous for addressing future causal research questions regarding DKS and CP in a WFH setting. Preferably, the sampling procedure should be advantageously randomized sampling—e.g., probabilistic sampling.

Future studies may also include validated multi-item constructs, such as types of knowledge (i.e., explicit and tacit), types of motivation (i.e., intrinsic, extrinsic, and prosocial), and various stages of creative processes (i.e., idea generation, idea promotion, and idea implementation). Also, different organizational factors (e.g., location, culture, strategy, and technology infrastructure) and individual attributes (e.g., personality, cognitive style, expertise, and self-efficacy) can be utilized. SCT and other theories could be used to explore how internal and external DKS and CP are affected by hybrid work models in the post-COVID-19 era.

Furthermore, supervisor-rated measures of CP should be utilized in addition to self-rated measures. In-depth interviews with managers could provide a deeper understanding of the relations between work practices, DKS, and CP. How will managers evaluate employee creativity and review individual performance in a newly emerged mixture of on-site-work, WFH, and various hybrid models? How will leaders motivate and support knowledge workers in this conglomerate of work practices in order to foster creativity and innovation? We believe that all these avenues are worth exploring in the future.

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Øystein Tønnessen (MA, Cand.mag.) is an adviser at Egde Consulting AS and an Industrial Ph.D. Research Fellow at the School of Business and Law, University of Agder (UiA). His research focuses on remote work, knowledge sharing and creativity. He holds a bachelor's degree in business administration and a master's degree in public administration from UiA. In his master's thesis, he examined organizational culture and change management in the Norwegian and Danish broadcasting corporations. Furthermore, he studied piano and organ at the Norwegian Academy of Music. As an entrepreneur and project manager, he has been working with coworking spaces and conferences.

Amandeep Dhir (D.Sc., Ph.D.) is a Professor of Research Methods at the School of Business and Law, University of Agder. He is also a visiting professor at the Norwegian School of Hotel Management, University of Stavanger in Norway. His research appears in the *Journal of Retailing and Consumer Services*, *Journal of Destination Marketing & Management*, *International Journal of Contemporary Hospitality Management*, *International Journal of Hospitality Management*, *Technological Forecasting and Social Change*, *International Journal of Information Management*, *Computers in Human Behavior*, *Computers in Industry*, *Journal of Cleaner Production*, *Food quality and preferences*, *Appetite*, *Information Technology & People*, *Australasian Marketing Journal*, *Enterprise Information Systems*, among others.

Bjørn-Tore Flåtten (Ph.D.) is an Associate Professor at the School of Business and Law, University of Agder. He holds a Ph.D. in International Management from UiA and a MSc from the Norwegian School of Economics. His research interests revolve around strategic management of knowledge work and entrepreneurship, with focus on knowledge sharing and internet-enabled collaboration within and beyond the boundaries of the firm. He has contributed with book chapters in research-focused edited books, as well as published in journals such as *Information and Organization*, *Journal of e-Business*, and the *Norwegian Journal of Geography*. Currently, he is serving as the Head of Department of Management and as the Vice Dean for the School of Business and Law. Flåtten is also heading the University's center for Entrepreneurship and Social Innovation. Through the center, he has also launched UiA Innovation and UiA CoLAB for commercialization of research and co-creation.