LUT University

A psychological perspective on the sociotechnical enablers of knowledge worker digital creativity

Nisula Anna-Maija, Heinänen Sanna, Kianto Aino, Toth Ilona, Blomqvist Kirsimarja

A psychological perspective on the socio-technical enablers of knowledge worker digital creativity

[1]**Anna-Maija Nisula*** Associate professor

[2]**Sanna Heinänen**, Associate professor,

[1]**Aino Kianto**, Professor

[2]**Ilona Toth**, Post-doctoral researcher,

[2]**Kirsimarja Blomqvist**, Professor,

*corresponding author

[1] *School of Business and Management*
LUT University, Lahti, Finland
[2] *School of Business and Management,*
LUT University, Lappeenranta, Finland

Abstract

While the work realm is moving toward various digital platforms and environments, the antecedents of knowledge worker digital creativity remain poorly understood. This study investigated the digital work environment as a sociotechnical environment and contextual enhancer of knowledge worker digital creativity. We proposed a research model that links perceived organisational support, sense of virtual community and digital creativity. Furthermore, we proposed an indirect moderation model suggesting that the relationship between organisational support and digital creativity is moderated by the sense of virtual community that, in turn, is facilitated by technology ease of use. We tested the model with data collected from platform knowledge workers ($N = 159$) using partial least squares structural equation modelling (PLS-SEM). The results indicate that organisational support positively relates to digital creativity, and that the sense of virtual community moderates the effect of organisational support for digital creativity, whereas technology ease of use facilitates a sense of virtual community.

Keywords: Knowledge worker; Digital creativity; Creativity; Technology ease of use; Organisational support; Sense of virtual community

1. Introduction

Movement of work to digital platforms and workspaces, or 'platformisation of work' (Richardson, 2021, p. 347), applies to complex knowledge-intensive work and knowledge workers (KWs) performing such work (Davenport et al., 2002; Drucker, 1999; Dul et al., 2011). KWs are working remotely more than ever, partly thanks to the COVID-19 pandemic, with the number of freelancers working on digital work platforms increasing steadily (Kodama, 2020). Technologically mediated (Bosch-Sijtsema et al., 2009; Colbert et al., 2016), complex and continually changing (Davenport, 2005; Dery et al., 2017) digital workplace environments (DWEs) connect actors from various domains to perform specific work tasks and enable integration of knowledge across organisational boundaries despite the actors' physical locations. While providing undisputed opportunities for collaboration and joint creation, DWEs alter our

understanding of the determinants of KW creativity because in such an environment, communication, collaboration and work are conducted only through digital tools and technologies, either synchronously or asynchronously (Bordi et al., 2018; Bosch-Sijtsema et al., 2009).

Although creativity has been identified as one of the central digital skills for KWs in the 21st century (Van Laar et al., 2019, 2017), digital creativity – i.e., creativity that occurs through digital tools, technologies and work systems – is a surprisingly underexamined area (Lee & Chen, 2015). Research on creativity within organisations has demonstrated that in addition to individual factors, the work context is central to creativity (Amabile, 1983; Woodman et al., 1993), whether it be understood as an organisational-level construct (Amabile et al., 1996) or multi-dimensional construct comprising organisational, physical, technical and social dimensions (Dul et al., 2011; Peschl & Fundneider, 2014; Literat, 2017). DWEs can be viewed as comprising psychological, socio-organisational and technological factors (Literat, 2017; Sony & Naik, 2020; Bednar & Welch, 2020). Previous studies have not reached an integrative understanding of the most effective support mechanisms for creativity, even within traditional organisations (Baer & Oldham, 2006; DiLiello et al., 2011), and much less is known about DWE support mechanisms (Dittes & Smolnik, 2019) for KW creativity.

While extant creativity research in virtual environments has focussed on collaborative and team-level creativity (Alahuhta et al., 2014; Chamakiotis et al., 2013; Peppler & Solomou, 2011; Wilson, 1990) and tools, systems and approaches that can be implemented to support creativity (Wang & Nickerson, 2017; Dittes & Smolnik, 2019; Literat, 2017), a far less addressed area is, how those individuals, whose creativity is supposed to be enabled, perceive their DWEs. For example, Lee and Chen (2015) found that social, attitudinal and psychological perspectives on DWE and creativity are underexamined in the literature.

The psychological perspective emphasises individuals' subjective interpretations of work environment (Newman, 1977), suggesting that the perceived work context is the sphere where creativity happens – or does not (Amabile et al., 1996). The supportiveness of the DWE depends on the perceiver's interpretations of the work context in which that individual is engaged at a particular time. Given that an individual's creativity (ability to create novel and useful ideas) contributes to joint creative achievements, and that engagement in creative processes depends on a perceived enabling work environment (Amabile et al., 1996; Peschl & Fundneider, 2014; Zhou & Hoever), DWEs' role in KWs' creativity needs to be examined.[1]

This study draws from extant literature on creativity-enabling work environments (Amabile et al., 1996) and conceptualises DWEs as comprising socio-organisational factors of perceived organisational support (POS), a sense of virtual community (SOVC) and the technical factor of technology ease of use (TEU). We posit the following research question: What is the impact of sociotechnical factors of the digital work environment on knowledge worker's digital creativity? We propose a research model in which POS and SOVC affect KW creativity. In an indirect moderation effect model, we propose that SOVC moderates the relationship between POS and creativity, but simultaneously is facilitated by TEU. We test the hypothesis with data collected from platform KWs ($N = 159$) using partial least squares structural equation modelling (PLS-SEM).

---

[1]   In this paper, the term *creativity* means *digital creativity* when it is discussed in the context of DWE. Otherwise, the term *creativity* refers to creativity theories and creativity in general.

1. Theoretical framework

2.1. Knowledge worker digital creativity

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 tangible results' (Bosch-Sijtsema et al., 2009, p. 533). A KW is an individual who handles knowledge—distributing knowledge to others, searching for existing knowledge from colleagues and in databases, creating new knowledge and applying knowledge in making decisions and taking actions (Davenport et al., 2002). While doing so, KWs conduct complex and situation-specific tasks (Bosch-Sijtsema et al., 2009), adjust their work and work environment (Kelloway & Barling, 2000), and engage in creative processes and task improvisations that result in knowledge-based intellectual outputs (Davenport et al., 2002). KW creativity can be defined as the generation of novel and useful ideas (Amabile, 1988; Tierney et al., 1999) in the context of knowledge work, whereas creativity is digital when mediated by technology or occur in a DWE (Lee & Chen, 2015).

Creativity is embedded in knowledge work (Södergren, 2002), which entails a high degree of autonomy, complexity and challenges, providing room for it to flourish, but also calling for a creativity-enabling context. Therefore, DWEs' infrastructure and mediating technology should not hinder or slow down creativity or the creative process, which both depend on social interaction among those involved (Pesch & Fundneider, 2014). Moreover, in DWEs, organisational practices and activities are managed and structured through digital tools, a characteristic in the socio-organisational work environment that requires further understanding of how and through which kinds of mechanisms KW creativity can be enhanced.

2.2. Digital work environment as a sociotechnical context for digital creativity

Adopting a psychological perspective and focussing on individuals' subjective perceptions of the work environment, Amabile et al. (1996) suggested that the creativity-enabling work environment (creative climate) comprises three central factors: organisational support; resources; and management practices. By maintaining these factors, organisations can construct favourable circumstances in which creativity can take place. Organisational support concerns the degree to which organisational members perceive that their organisation, supervisors and co-workers are supporting their creativity. Resources refer to sufficient infrastructure, facilities, technology and tools, time allocated, available training and tangible materials that support work creativity, i.e., all available support that an organisation devotes to creativity (Amabile et al., 1996). Sufficient autonomy, challenging and interesting work, and self-organisation represent management practices. On this basis, we also suggest that in DWEs, sociotechnical contextual factors enable creativity, with creativity-relevant factors in digital contexts (Bourgeois-Bougrine et al., 2020) including POS, SOVC and TEU.

2.2.1. Perceived organisational support

POS theory (Eisenberger et al., 1986) explains how employee performance can be enhanced through shared values and perceived support. It refers to employees' beliefs about the degree to which an organisation considers and values employees' contributions and well-being (Rhoades et al., 2001; Rhoades & Eisenberger, 2002) by providing the support needed to perform and master work tasks (Fee & Gray, 2020). Much of organisational support is crystallised in an individual's sense of psychological safety and care that stems from organisational and supervisor

activities (Kahn, 1990), enabling an individual to explore and try new things/experiment when needed (Saks, 2006).

KWs make organisational-support perceptions related to psychological safety (Kahn, 1990; West, 1990), caring and supportive supervision (Kahn, 1990; May et al., 2004), and sufficient autonomy (Kelloway & Barling, 2000; Liu et al., 2011; Ryan & Deci, 2002), which also are part of DWEs. Scholars associate POS with positive work attitudes and behaviours, like work performance (Chen et al., 2005), engagement (Rhoades et al., 2001; Saks, 2006, 2019) and job involvement (Riggle et al., 2009).

2.2.2. Sense of virtual community

SOVC, defined as 'members' feelings of membership, identity, belonging and attachment to a group that interacts primarily through electronic communication' (Blanchard, 2007, p. 827), complements POS, and its role may become increasingly important in digital work contexts in which employees and freelancers work remotely. In DWEs, SOVC refers to a social work environment that enables professional interaction, collaboration, knowledge exchange and creation (DeFillippi et al., 2007), akin to a sense of community in physical communities (Abfalter et al., 2012; McMillan & Chavis, 1986).

Like a psychological feeling of membership and belonging (Blanchard, 2007; McMillan & Chavis, 1986), SOVC reflects a KW's experience of a supportive climate and social environment of the work community. Previous studies have indicated that professionals who feel belonging, identity and attachment to their virtual communities are more willing to share knowledge and ideas (Fang & Chiu, 2010; Peñarroja et al., 2019). Similarly, SOVC has been found to exert a positive

effect on employee engagement, empowerment, job satisfaction (Boyd & Nowell, 2014; Garrett et al., 2017), participation and knowledge sharing among online users (Chiu et al., 2006).

2.2.3. Technology ease of use

Technology acceptance is key in helping organisations acquire maximum benefits from technology implementation (Davis et al., 1989; Wixom & Todd, 2005). Davis' (1986) technology acceptance model is grounded on two technology characteristics that influence individual attitudes and behavioural intentions towards the technology in question. The perceived usefulness of technology refers to the degree to which an individual believes that using a particular system will enhance job performance, whereas perceived TEU refers to the degree to which an individual believes that using a particular system will be free of physical and mental effort.

Considering that digital technology, with its various tools, always is present in DWEs, TEU is prominent. We view TEU as a supporting mechanism through which organisations can facilitate KW creativity. Thus, it represents perceived resources in the work environment framework (Amabile et al., 1996). Scholars have found that TEU influences attitudes toward technology, behavioural intentions, and actual use of technology (see, e.g., Yousafzai et al., 2007). Furthermore, technology has the potential to offer flexibility, matchmaking, extended reach, managed transactions, trust building and facilitation of collectivity (Sutherland & Jarrahi, 2018), which entail deploying technology as part of social work practices (Cole & Derry, 2005). According to Lin (2009) TEU contributes to the sense of belonging in a virtual community. Panahi et al. (2013) also noted that TEU and community-like features are central for collaboration and

tacit knowledge sharing in a social web environment. Extant research also indicates that intentions to use a virtual community increase when TEU is perceived as high (Lin, 2009).

2.3. Conceptual model and hypotheses

We propose a research model (Figure 1) in which sociotechnical enablers of DWE are linked with KW creativity: POS (H1) and SOVC (H2) affect creativity; TEU affects SOVC (H3); and SOVC moderates between POS and creativity (H4).

Figure 1. Research model.
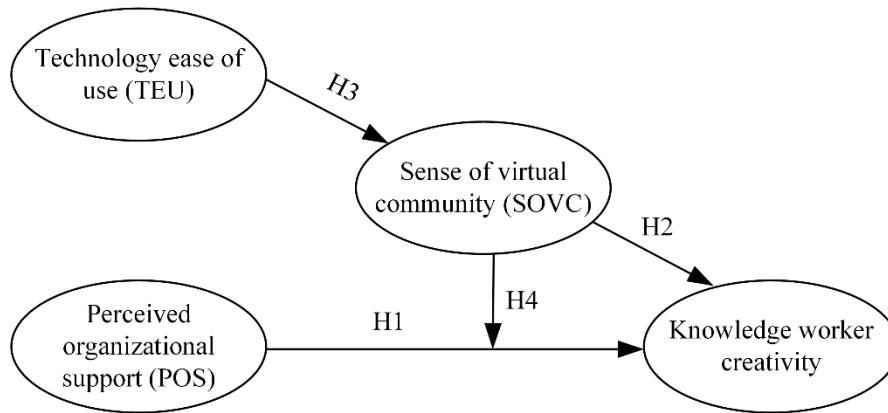
2.3.1. Main effect model

Scholars have suggested that a relation exists between POS and individual creativity (Amabile, 1988; DiLiello et al., 2011; Eisenberger et al., 2020). We suggest that POS also increases KWs' willingness to develop new ideas and engage in creative activities in DWEs. When KWs perceive that DWEs support their values, goals and well-being, they are more likely to be

engaged (Saks, 2019) and to demonstrate creativity. (Aldabbas et al., 2021). Tolerance of failures and a climate of trust embedded in POS also increase psychological safety and the likelihood of risk-taking behaviours, which are needed to generate new ideas (Eisenberger et al., 2020). Such a DWE also enables emergence and serendipity (Yoo et al., 2012), which are central for KW creativity. Thus, we propose the following hypothesis:

> **H1:** *Perceived organisational support positively affects knowledge workers' creativity.*

SOVC – i.e., KWs' feelings of membership, identity, belonging and attachment to their electronically connected work community (Blanchard et al., 2011) – likely influences their creativity in DWEs. Extant studies indicate that SOVC positively affects online user participation in knowledge sharing (Chiu et al., 2006). Moreover, professionals who feel belonging, identity and attachment to their virtual community are willing to share ideas, experiences and knowledge related to their professions and tasks (Fang & Chiu, 2010; Peñarroja et al., 2019). Such community-like behaviours provide insights and knowledge and thereby enhance KWs' creativity. When KWs view the DWE as a community that serves their needs and in which members openly share knowledge and provide help and support when needed, it positively affects their creativity. Therefore, we propose:

> **H2:** *A sense of virtual community positively affects knowledge worker creativity.*

In DWE, technology's role is highlighted in building relationships and community-like behaviours resulting in SOVC. TEU, the degree to which an individual perceives use of technology

and related tools as free of physical and mental effort (Davis, 1986), is likely to develop SOVC among KWs in DWEs. However, if technology is viewed as difficult to use, it may take the main role and hinder or slow down willingness to participate, as well as mutual communication and interaction (Vuori et al., 2019), thereby weakening SOVC development. For example, technology-mediated asynchronous communication is likely to hamper spontaneous and emergent interaction, which is central for building relationships, collaborations (Collins et al., 2016) and SOVC development. When KWs find technology difficult to use, time-consuming and not meeting their needs, they may limit its use to compulsory duties, thereby leaving community-building activities aside (Blanchard, 2008a). Difficulties using technology also may lead to nonparticipation (Blanchard, 2008a) and loss of information about the current state of the community (Faraj et al., 2011), as well as hinder community building. This handicaps any sense of belonging to and membership in a professional community, particularly as scholars suggest that the more time people spend in a virtual community, the more positively it affects collaboration (Faraj et al., 2011; Fleming & Waguespack, 2007) and builds SOVC. Conversely, high TEU enables KWs to participate even in spontaneously arising events and idea generation, which direct the focus on interacting and building SOVC instead of tackling technological issues. Therefore, we propose:

> **H3**: *Technology ease of use positively affects the sense of virtual community*

2.3.2. Moderating effect of sense of virtual community

As proposed earlier, both POS and SOVC promote KW creativity in DWEs. POS increases creativity mainly through engagement and confidence (Amabile et al., 1996), while SOVC evokes knowledge sharing and co-creation (Chiu et al., 2006). We further hypothesise that together, these

elements contribute to a greater level of creativity in DWEs. The more strongly an individual perceives membership in a community, the more important the perceived degree of organisational support will be to the person's creativity. Conversely, the less connected one feels to the virtual community, the smaller the impact of perceived organisational support for creativity. Therefore, we propose:

H4: *Sense of virtual community moderates the link between perceived organisational support and knowledge worker creativity.*

2. Methodology

3.1. Data collection

We collected data in September 2017 and March 2018 through an online questionnaire sent to experts contracting for two digital work platforms based in Finland using experts worldwide. These platforms are global online workspaces for experts who engage in temporary joint knowledge creation and complex problem solving (sustainability experts) or work independently on challenging tasks (language translators) to use and share their expertise. We received 366 responses, of which the effective sample size was 159 due to missing values in responses. The respondents' demographic characteristics are presented in Table 1.

Table 1. Respondents' demographic characteristics (N = 159).

Gender	N	Percentage
Female	65	40.9
Male	94	59.1
Age	**N**	**Percent**
Under 25	2	1.3
25–34	48	30.2
35–44	46	28.9
45–54	28	17.6
55–64	30	18.9
Over 64	5	3.1
Nationality	**N**	**Percent**
Finnish	53	33.3
Other	106	66.7
Education	**N**	**Percent**
Bachelor of Science	44	27.7
Master of Science	22	13.8
Doctorate or Licentiate of Science	3	1.9
Other	85	53.5
System missing	5	3.1

3.2. Measurements

We used multi-item measures with a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree) for each construct.

To measure KW creativity, we used an employee creativity scale (Tierney et al., 1999). As independent KWs do not necessarily have a supervisor in DWEs, we used self-reported assessment (see, e.g., Shalley et al. 2009; Conway & Lance, 2010). POS was measured using a five-item scale adapted from Saks (2006). Items were designed to measure POS in digital platforms in which individuals work independently (i.e., without supervisors). TEU was measured using a three-item scale adapted from Venkatesh and Davis (2000). SOVC was measured using a seven-item scale

from Blanchard (2008b). We also contextualised the measure by referring to digital work platform names.

We controlled for general self-efficacy (Chen et al., 2001) and the demographic variables gender, age, education and nationality. Gender, nationality and education were used as dummy variables. Age was assessed using ordinal categories (Table 1).

3.3. Analysis methods

PLS-SEM was applied to test the proposed research model and hypotheses, as well as to verify the measurement model of the underlying latent concepts. PLS is an appropriate method for analysing small data sets because the focus is on the path coefficients' significance instead of overall model fit. IBM SPSS Statistics (Version 26) was applied for descriptive analysis and data preparation. For PLS modelling, Smart PLS (Version 3.2.7) was employed.

3. Results

4.1. Measurement model validation

PLS-SEM was applied in confirmatory factor analysis to assess the measurement model, and the results indicate that the model demonstrated good validity and reliability for the operationalisation of the latent concepts of interest.

First, the construct reliabilities (CRs) for all constructs (Table 2) were well above the threshold of 0.7 (Bagozzi et al., 1991). Second, each item's factor loading was high and statistically significant, indicating that they all were related to their specific underlying constructs, verifying the relationship posited among the indicators and constructs (see Appendix I). Third, the values of the average variance extracted (AVE) exceeded the cut-off point of 0.5 (Fornell & Larcker, 1981)

for all constructs (Table 3). Furthermore, each construct's squared AVE (diagonal in Table 3) was greater than the correlation between other constructs, indicating a high level of discriminant validity (see, e.g., Chin, 1998). To sum up, considering the aspects of measurement reliability and validity discussed above, the measurements met the necessary requirements for further analyses.

Table 2. Measurement model statistics.

Concept	Item	Loading	CR	AVE
Creativity	I demonstrate originality in my work.	.923	.978	.866
	I take risks in terms of producing new ideas in doing my job.	.903		
	I solve problems that have caused others difficulty.	.935		
	I try out new ideas and approaches to problems.	.955		
	I identify opportunities for new products/processes.	.941		
	I generate novel and operable ideas.	.946		
	I generate ideas that are new to my field.	.908		
Perceived organisational support	XYZ representatives really care about my well-being.	.868	.947	.782
	XYZ representatives strongly consider my goals and values.	.869		
	XYZ representatives care about my opinions.	.885		
	Help is available from XYZ representatives when I have a problem.	.912		
	XYZ representatives would forgive an honest mistake on my part.	.888		
Sense of virtual community	I think the XYZ community is a good place for me to be a member.	.877	.967	.809
	If there is a problem in the XYZ community, there are members here who can solve it.	.915		
	It is very important to me to be a member of the XYZ community.	.928		
	I expect to stay in the XYZ community for a long time.	.927		
	I believe I can get support from the XYZ community.	.880		
	Members of the XYZ community can be counted on to help others.	.914		
	The XYZ community is important to me.	.851		
Technology ease of use	My interaction with the platform is clear and understandable.	.918	.947	.857
	Interacting with the platform does not require a lot of mental effort.	.920		
	I find the platform to be easy to use.	.939		

CR = construct reliability
AVE = average variance extracted
XYZ = respondent's platform identifier

Table 3. Descriptive statistics, latent variable correlations and discriminant validity.

	Mean	SD	1.	2.	3.	4.
1. Creativity	4.34	1.86	**0.930**			
2. POS	4.17	1.67	0.234	**0.884**		
3. SOVC	5.02	1.47	0.123	-0.059	**0.899**	
4. TEU	5.33	1.35	0.140	0.054	0.500	**0.926**

*4.2. Structural model results*

The PLS analysis was conducted to test the hypothesised paths in the research model. Table 4 provides the standardised path coefficients and their significance, assessed with t-values obtained from a bootstrapping method (Chin, 1998). The model explained 16.9% of creativity variation. TEU explained 25.0% of SOVC variation. Regarding the first hypothesis, POS was related positively to creativity expressed with a positive and significant path coefficient ($\beta = .151$, $p = .018$). The results did not support the second hypothesis concerning the SOVC's main effect on creativity. From the main effects, TEU was expected to facilitate SOVC (H3). The results supported this hypothesis ($\beta = .500$, $p = .000$), indicating that SOVC is highly dependent on TEU.

The fourth hypothesis concerned the moderating effect that SOVC was expected to exert on the relationship between POS and creativity. The path coefficient was positive and significant ($\beta = .147$, $p = .000$). The interpretation of the moderating effect is illustrated in Figure 2. SOVC's influence on the relationship between POS and creativity made the positive relationships even stronger when the perceived support level was high. However, the opposite effect was found when the POS was perceived as low, i.e., with low support levels, stronger SOVC exerts less influence on creativity when compared with situations with higher perceived support levels.

Table 4. Results

	β	t	p
H1: POS → Creativity	**.151**	**2.38**	**.018**
H2: SOVC → Creativity	.008	.129	.897
H3: TEU → SOVC	**.500**	**7.50**	**.000**
H4: SOVC * POS → Creativity	**.147**	**3.60**	**.000**
Control variables			
Self-efficacy → Creativity	**.197**	**3.28**	**.001**
Age → Creativity	**-.133**	**2.40**	**.017**
Education:			
Bachelor's → Creativity	.078	1.11	.268
Master's → Creativity	.007	.091	.928
Doctorate → Creativity	.011	.166	.868
Nationality:			
Finnish → Creativity	.064	1.30	.194
Gender:			
Male → Creativity	.007	.159	.873

Regarding control variables' effect, we found a positive and statistically significant relationship between general self-efficacy and creativity ($\beta = .197$, $p = .001$). The relationship between age and creativity was also significant ($\beta = -.133$, $p = .017$), but negative.
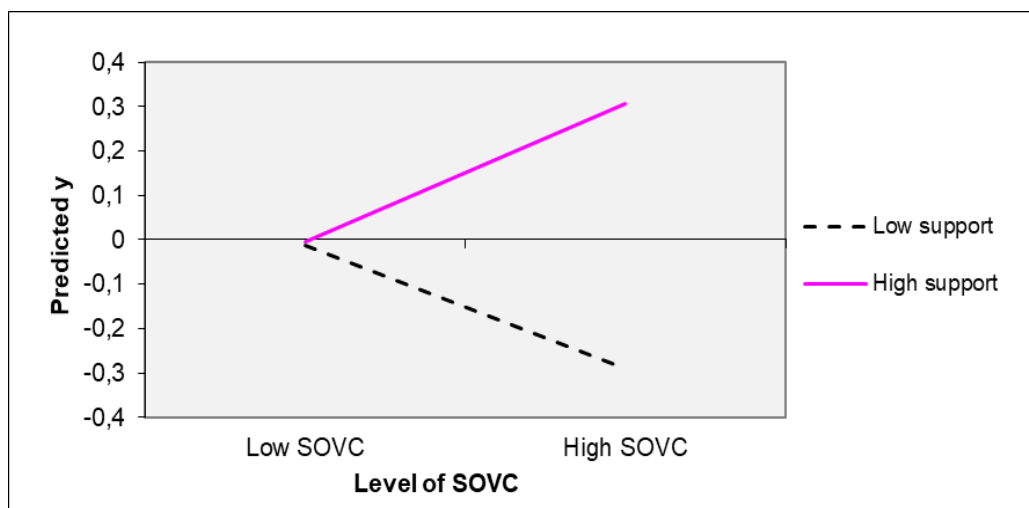
Figure 2. SOVC's moderating effect.

5. Discussion

This study aimed to extend understanding of KWs' digital creativity by adopting a psychological perspective and focussing on their perceptions of their work environment. Building on extant research on creativity within organisations (Amabile et al., 1996), we theorised that the DWE – comprising POS, SOVC and TEU – plays a significant role in creativity. The empirical results based on data from KWs in two digital platforms partly supported the hypotheses and demonstrated that only POS exerted a positive effect on creativity. While we found no support for a main effect between SOVC and creativity, we found that SOVC functions as a moderating mechanism that strengthens POS' effect on creativity, indicating that SOVC strengthens POS' effect when it is high. We also found that TEU facilitates SOVC, confirming TEU's importance in building a sense of membership and belonging in a virtual community. We believe that this study is among the first to investigate perceived DWE factors in relation to KW creativity, thereby providing important theoretical and managerial contributions to this body of research.

5.1. Theoretical implications

This study extends understanding of DWEs' role in KWs' creativity, while earlier research focussed on fostering team creativity (Alahuhta et al., 2014; Chamakiotis et al., 2013), tools and systems for fostering creative processes (Wang & Nickerson, 2017; Dittes & Smolink, 2019) and facilitation of participation on platforms (JafariNaimi, 2015; Literat, 2017). This study highlighted DWEs' role as it is perceived for creativity (Amabile et al., 1996; Woodman et al., 1993; Zhou & Hoever, 2014), a perspective that has received less attention in the digital creativity literature. Thus, this study extends understanding of digital creativity (Lee & Chen, 2015) by exposing the role of DWEs' sociotechnical factors and mechanisms in KW creativity. While Van Laar et al.

(2019) found that TEU was related positively to KW creativity, our findings indicate that TEU and KW creativity are related and mediated indirectly by SOVC.

This study contributes to creativity research (Amabile et al., 1996; Liu et al., 2011; Zhou & Hoever, 2014) in which digital creativity was not yet relevant by suggesting that perceptions of DWEs comprise different aspects compared with traditional organisations. We investigated DWEs' sociotechnical factors and demonstrated that POS and creativity are related positively – a relationship that SOVC strengthens. Furthermore, TEU facilitated SOVC. Indeed, this study extends understanding of contextual factors in KW creativity and contributes to research that highlights creativity's contingent nature. While Zhou and Hoever (2014) noted that the same antecedents' effects on creativity function differently across contexts, our study adds to this area by suggesting that the contextual antecedents are made up differently across contexts. While scholars increasingly have investigated individual and contextual factors' joint effects (Liu et al., 2016; Zhou & Hoever, 2014), the present study extended this area by investigating the joint effects of creativity's sociotechnical enhancers. By addressing creativity's sociotechnical aspects in DWEs, this study adds to research on antecedents of KW creativity, which has focussed on socio-organisational and physical work environments (Dul et al., 2011).

Overall, we expect that these findings will be highly relevant for understanding the nature of KW creativity in DWEs.

5.2. Managerial implications

DWEs, platforms and collaborative workspaces are increasingly common for KWs' as well. We found that perceived supportiveness of a DWE is more complex compared with traditional organisation contexts. Therefore, platform providers and managers should think about

designing DWEs by considering users' perceptions regarding DWEs' sociotechnical aspects, as well as their needs. For this purpose, platform providers could assess KWs' perceptions of DWE (comprising of TEU, POS and SOVC) with regular surveys. These assessments reveal strength and weaknesses of DWE and enable to develop platforms further. Specifically, data allow for directing focussed development activities (e.g. introduction, training, guidance) whatever they are needed.

Our study demonstrated that TEU affects SOVC, suggesting that technology plays an important role in building social relationships, community-like behaviours and a sense of belonging in the virtual community. Considering that experiencing DWE quality is both subjective and situational, platform providers and designers should provide sufficient training and real-time help to facilitate effortless use of technology, which refers to supporting resources in creativity literature (Amabile et al, 1996). This will become more important as digital technology's ubiquity in the workplace increases.

While maintaining and developing DWEs, management should pay attention not only to technological aspects, but also increasingly to development of novel work practices (Dittes et al., 2019), as well as DWEs' social and psychological aspects. The POS increases the likelihood of idea generation in DWEs, so managers need to think about how to build enabling POS and practices to enhance it in DWEs when work circumstances entail little to no face-to-face interaction between KWs. In particular, considering that creativity is constructed socially regardless of context, DWEs that provide opportunities and facilitate social interaction are likely to foster KW creativity. Just like the traditional work context, DWEs also can employ various creativity support systems to facilitate idea generation and creative processes (Wang & Nickerson, 2017).

As the pandemic accelerated digitalisation, work environments increasingly have become digital (i.e., DWEs); therefore, this study's implications are valuable for managers in any industry while aiming to build creativity in supporting DWEs.

5.3. Limitations and future research directions

While focussing on KW perceptions concerning the contextual sociotechnical aspects of DWEs, we ignored individuals' intrinsic factors, e.g., motivation, creative skills and expertise, which are central for creativity regardless of context (Amabile, 1983). In future studies, scholars could consider intrinsic aspects and also investigate attitudinal aspects of digital creativity, as Lee and Chen (2015) noted. There is also room for research on joint effects between intrinsic and contextual factors, which would shed light on DWEs' complexity and creativity's contextual nature. Furthermore, considering that our study focussed on perceived aspects of DWEs, we ignored material and other aspects of them, thereby opening avenues for future studies to consider both perceived and material aspects, as well as their joint effects on KW creativity.

The present study focussed on a limited set of factors in two different DWEs. Future research would benefit from widening sociotechnical aspects' approach to concern socioemotional and cognitive aspects, and how they are linked with KW creativity. Considering that digital platforms and DWE types vary, e.g., in terms of the technology's media richness and allowance of real-time synchronous communication vs. asynchronous communication, various DWE types need to be examined as enablers of creativity.

This study's cross-sectional design included self-rated measures of the constructs, which are relevant when individuals' subjective perceptions are under investigation (Convey & Lance, 2010; Shalley et al., 2009). However, qualitative data and case studies would support quantitative

data, and demand has surfaced for mixed-method studies, which are particularly important in building theories about creativity-enabling DWEs.

References

Abfalter, D., Zaglia, M. E., & Mueller, J. (2012). Sense of virtual community: A follow-up on its measurement. *Computers in Human Behaviour*, *28*(2), 400–404.

Alahuhta, P., Nordbäck, E., Sivunen, A., & Surakka, T. (2014). Fostering team creativity in virtual worlds. *Journal of Virtual Worlds Research*, *7*(3), 1–22.

Aldabbas, H., Pinnington, A., & Lahrech, A. (2021). The influence of perceived organisational support on employee creativity: The mediating role of work engagement. *Current Psychol*ogy, 1–15.

Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualisation. *Journal of Personality and Social Psychology*, *45*(2), 357–376.

Amabile, T. M. (1988). A model of creativity and innovation in organisations. *Research in Organisational Behaviour*, *10*(1), 123–167.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of Management Journal*, *39*(5), 1154–1184.

Baer, M., & Oldham, G. R. (2006). The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. *Journal of Applied Psychology*, *91*(4), 963.

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organisational research. *Administrative Science Quarterly*, *36*(3), 421–458.

Bednar, P. M., & Welch, C. (2020). Sociotechnical perspectives on smart working: Creating meaningful and sustainable systems. *Information Systems Frontiers*, *22*(2), 281–298.

Blanchard, A. L. (2007). Developing a sense of virtual community measure. *CyberPsychology & Behaviour*, *10*(6), 827–830.

Blanchard, A. L. (2008a). Definition, antecedents and outcomes of successful virtual communities. In: Eds. Cartelli, A. & Palma, M. *Encyclopaedia of e-collaboration* (pp. 126–132). IGI Global.

Blanchard, A. L. (2008b). Testing a model of sense of virtual community. *Computers in Human Behaviour*, *24*(5), 2107–2123.

Blanchard, A., Askay, D. A., & Frear, K. A. (2011). Sense of community in professional virtual communities. In: *Virtual communities: Concepts, methodologies, tools and applications* (pp. 1805–1820). New York, IGI Global. DOI: 10.4018/978-1-60960-100-3

Bordi, L., Okkonen, J., Mäkiniemi, J. P., & Heikkilä-Tammi, K. (2018). Communication in the digital work environment: Implications for well-being at work. *Nordic Journal of Working Life Studies*, *8*(8), 29–48

Bosch-Sijtsema, P. M., Ruohomäki, V., & Vartiainen, M. (2009). Knowledge work productivity in distributed teams. *Journal of Knowledge Management*, *13*(6), 533–546.

Bourgeois-Bougrine, S., Richard, P., Burkhardt, J.-M., Frantz, B., & Lubart, T. (2020). The expression of users' creative potential in virtual and real environments: An exploratory study. *Creativity Research Journal*, *32*(1), 1–11.

Boyd, N. M., & Nowell, B. (2014). Psychological sense of community: A new construct for the field of management. *Journal of Management Inquiry*, *23*(2), 107–122.

Chamakiotis, P., Dekoninck, E. A., & Panteli, N. (2013). Factors influencing creativity in virtual design teams: An interplay between technology, teams and individuals. *Creativity and Innovation Management*, *22*(3), 265–279.

Chen, G., Gully, S. M., & Eden, D. (2001). Validation of a new general self-efficacy scale. *Organisational Research Methods*, *4*(1), 62–83.

Chen, Z. X., Aryee, S., & Lee, C. (2005). Test of a mediation model of perceived organisational support. *Journal of Vocational Behaviour*, *66*(3), 457–470.

Chin, W. W. (1998). The partial least squares approach to structural equation modelling. In G. A. Marcoulides (Ed.), *Methodology for business and management: Modern methods for business research* (pp. 295–336). New York, Lawrence Erlbaum Associates.

Chiu, C.-M., Hsu, M.-H., & Wang, E. T. G. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories. *Decision Support Systems*, *42*(3),1872–1888.

Colbert, A., Yee, N., & George, G. (2016). The digital workforce and the workplace of the future. *Academy of Management Journal*, *59*(3), 731–739.

Collins, A., Hislop, D., & Cartwright, S. 2016. Social support in the workplace between teleworkers, office-based colleagues and supervisors. *New Technology Work and Employment, 31*(2), 161–175.

Conway, J. M., & Lance, C. E. (2010). What reviewers should expect from authors regarding common method bias in organisational research. *Journal of Business and Psychology*, *25*(3), 325–334.

Davenport, T. H. (2005). *Thinking for a living: How to get better performance and results from KWs*. Harvard Business School Press.

Davenport, T. H., Thomas, R. J., & Cantrell, S. (2002). The mysterious art and science of knowledge-worker performance. *MIT Sloan Management Review*, *44*(1), 23.

Davis, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* [Unpublished doctoral dissertation]. Massachusetts Institute of Technology.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003.

DeFillippi, R., Grabher, G., & Jones, C. (2007). Introduction to paradoxes of creativity: Managerial and organisational challenges in the cultural economy. *Journal of Organisational Behaviour*, *28,* 511–521.

Dery, K., Sebastian, I. M., & van der Meulen, N. (2017). The Digital Workplace Is Key to Digital Innovation. *MIS Quarterly Executive*, *16*(2), 135–152.

DiLiello, T. C., Houghton, J. D., & Dawley, D. (2011). Narrowing the creativity gap: The moderating effects of perceived support for creativity. *Journal of Psychology*, *145*(3), 151–172.

Dittes, S., & Smolnik, S. (2019). Towards a digital work environment: The influence of collaboration and networking on employee performance within an enterprise social media platform. *Journal of Business Economics*, *89*(8), 1215–1243.

Dittes, S., Richter, S., Richter, A., & Smolnik, S. (2019). Towards the workplace of the future: How organisations can facilitate digital work. *Business Horizons*, *62*(5), 649–661.

Drucker, P. F. (1999). Knowledge-worker productivity: The biggest challenge. *California Management Review*, *41*(2), 79–94.

Dul, J., Ceylan, C., & Jaspers, F. (2011). KWs' creativity and the role of the physical work environment. *Human Resource Management*, *50*(6), 715–734.

Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organisational support. *Journal of Applied Psychology*, *71*(3), 500–507.

Eisenberger, R., Rhoades Shanock, L., & Wen, X. (2020). Perceived organisational support: Why caring about employees counts. *Annual Review of Organisational Psychology and Organisational Behaviour*, *7*, 101–124.

Fang, Y.-H., & Chiu, C.-M. (2010). In justice we trust: Exploring knowledge-sharing continuance intentions in virtual communities of practice. *Computers in Human Behaviour*, *26*(2), 235–246.

Faraj, S., Jarvenpaa, S. L., & Majchrzak, A. (2011). Knowledge collaboration in online communities. *Organization science*, *22*(5), 1224-1239.

Fee, A., & Gray, S. J. (2020). Perceived organisational support and performance: The case of expatriate development volunteers in complex multi-stakeholder employment relationships. *International Journal of Human Resource Management*, *33*(5).

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a sense of community at work: The emergence of community in coworking spaces. *Organisation Studies*, *38*(6), 821–842.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50.

JafariNaimi, N. (2015). MRx as a participatory platform. *Digital Creativity*, *26*(3–4), 207–220.

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, *33*(4), 692–724.

Kelloway, E. K., & Barling, J. (2000). Knowledge work as organisational behaviour. *International Journal of Management Reviews*, *2*(3), 287–304.

Kodama, M. (2020). Digitally transforming work styles in an era of infectious disease. *International Journal of Information Management*, *55*, 102172.

Van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2019). Determinants of 21st century digital skills: A large-scale survey among working professionals. *Computers in Human Behaviour*, *100*, 93–104.

Van Laar, E., Van Deursen, A. J., Van Dijk, J. A., & De Haan, J. (2017). The relation between 21st century skills and digital skills: A systematic literature review. *Computers in Human Behaviour*, *72*, 577–588.

Lee, M. R., & Chen, T. T. (2015). Digital creativity: Research themes and framework. *Computers in Human Behaviour*, *42*, 12–19.

Lin, H. F. (2009). Examination of cognitive absorption influencing the intention to use a virtual community. *Behaviour and Information Technology*, *28*(5), 421–431. https://doi.org/10.1080/01449290701662169

Literat, I. (2017). Facilitating creative participation and collaboration in online spaces: The impact of social and technological factors in enabling sustainable engagement. *Digital Creativity*, *28*(2), 73–88.

Liu, D., Chen, X.-P., & Yao, X. (2011). From autonomy to creativity: A multilevel investigation of the mediating role of harmonious passion. *Journal of Applied Psychology*, *96*(2), 294–309.

Liu, D., Jiang, K., Shalley, C. E., Keem, S., & Zhou, J. (2016). Motivational mechanisms of employee creativity: A meta-analytic examination and theoretical extension of the creativity literature. *Organisational Behaviour and Human Decision Processes*, *137*, 236–263.

May, D. R., Gilson, R. L., & Harter, L. M. (2004). The psychological conditions of meaningfulness, safety and availability and the engagement of the human spirit at work. *Journal of Occupational and Organisational Psychology*, *77*(1), 11–37.

McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology*, *14*(1), 6–23.

Newman, J. E. (1977). Development of a measure of perceived work environment (PWE). *Academy of Management Journal*, *20*(4), 520–534.

Panahi, S., Watson, J., & Partridge, H. (2013). Towards tacit knowledge sharing over social web tools. *Journal of Knowledge Management*, *17,* 379–397

Peñarroja, V., Sánchez, J., Gamero, N., Orengo, V., & Zornoza, A. M. (2019). The influence of organisational facilitating conditions and technology acceptance factors on the effectiveness of virtual communities of practice. *Behaviour & Information Technology*, *38*(8), 845–857.

Peppler, K. A., & Solomou, M. (2011). Building creativity: Collaborative learning and creativity in social media environments. *On the Horizon*, *19*(1), 13–23.

Peschl, M. F., & Fundneider, T. (2014). Designing and enabling spaces for collaborative knowledge creation and innovation: From managing to enabling innovation as socio-epistemological technology. *Computers in Human Behaviour*, *37*, 346–359.

Richardson, L. (2021). Coordinating office space: Digital technologies and the platformisation of work. *Environment and Planning D: Society and Space*, *39*(2), 347–365.

Riggle, R. J., Edmondson, D. R., & Hansen, J. D. (2009). A meta-analysis of the relationship between perceived organizational support and job outcomes: 20 years of research. *Journal of business research*, *62*(10), 1027-1030.

Rhoades, L., & Eisenberger, R. (2002). Perceived organisational support: A review of the literature. *Journal of Applied Psychology*, *87*(4), 698.

Rhoades, L., Eisenberger, R., & Armeli, S. (2001). Affective commitment to the organisation: The contribution of perceived organisational support. *Journal of Applied Psychology*, *86*(5), 825–836.

Ryan, R. M., & Deci, E. L. (2002). Overview of self-determination theory: An organismic-dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3–33). Rochester, NY; University of Rochester Press.

Saks, A. M. (2006). Antecedents and consequences of employee engagement. *Journal of Managerial Psychology*, *21*(7), 600–619.

Saks, A. M. (2019). Antecedents and consequences of employee engagement revisited. *Journal of Organisational Effectiveness: People and Performance*, *6*(1), 19–38.

Shalley, C. E., Gilson, L. L., & Blum, T. C. (2009). Interactive effects of growth need strength, work context and job complexity on self-reported creative performance. *Academy of Management Journal*, *52*(3), 489–505.

Sony, M., & Naik, S. (2020). Industry 4.0 integration with sociotechnical systems theory: A systematic review and proposed theoretical model. *Technology in Society*, *61*, 101248.

Södergren, B. (2002). Paths to creativity for knowledge-intensive workers. In M. Peiperl, M. Arthur, N. Annand (Eds.), *Career creativity: Exploration in the remaking of work* (pp. 35–57). Oxford, Oxford University Press.

Sutherland, W., & Jarrahi, M. H. (2018). The sharing economy and digital platforms: A review and research agenda. *International Journal of Information Management*, *43*, 328–341.

Tierney, P., Farmer, S. M., & Graen, G. B. (1999). An examination of leadership and employee creativity: The relevance of traits and relationships. *Personnel Psychology*, *52*(3), 591–620.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186–204.

Vuori, V., Helander, N., & Okkonen, J. 2019. Digitalisation in knowledge work: The dream of enhanced performance. *Cognition, Technology & Work, 21,* 237–252

Wang, K., & Nickerson, J. V. (2017). A literature review on individual creativity support systems. *Computers in Human Behaviour*, *74*, 139–151.

West, M. A. (1990). The social psychology of innovation in groups. In: ; M. A. West & J. L. Farr (Eds.) *Innovation and creativity at work: Psychological and organisational strategies* (pp. 309–333). John Wiley & Sons.

Wilson, P. (1990). Computer supported cooperative work: An overview. *Digital Creativity (Intelligent Tutoring Media)*, *1*(3), 103–116.

Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research*, *16*(1), 85–102.

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Towards a theory of organisational creativity. *Academy of Management Review*, *18*(2), 293–321.

Yoo, Y., Boland Jr., R. J., Lyytinen, K., & Majchrzak, A. (2012). Organising for innovation in the digitised world. *Organisation Science*, *23*(5), 1398–1408.

Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2007). Technology acceptance: A meta-analysis of the TAM: Part 1. *Journal of Modelling in Management*, *2*(3), 251–280.

Zhou, J., & Hoever, I. J. (2014). Research on workplace creativity: A review and redirection. *Annual Review of Organisational Psychology and Organisational Behaviour, 1*(1), 333–359.