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# The relationship of collective creativity with managerial work and workplace climate in hierarchical and less hierarchical organizations

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## Abstract

Collective creativity, managerial work, and workplace climate can influence innovation, organizational learning, and productivity at work. However, little empirical research has examined these factors in everyday work, especially in relation to organizational hierarchies. This study explores the relationships among collective creativity, managerial work, and workplace climate in hierarchical and less hierarchical organizations. A quantitative empirical analysis was conducted using data from a survey of 265 respondents from six Finnish organizations. The findings show that managerial work and workplace climate that focus on building and maintaining trust and highlight empathy, fairness and equality, and collegial support, are important factors in the realization of collective creativity. However, these relationships did not vary in hierarchical and less hierarchical organizations. Findings of the study underline the essential role of managerial work in supporting collective creativity at work.

**Key Words:** Collective creativity, managerial work, workplace climate, organizational hierarchy

## Introduction

Creativity and innovation are crucial to long-term economic growth, especially in the current global environment, which is characterized by rapid change (e.g., Oddane, 2015). So far, most research on creativity at work has focused on creative individuals, creative outcomes, or the development of new products (Zhou & Hoever, 2014). However, due to rapidly changing workplace environments, the importance of collective creativity and organizational factors supporting it at work has been recognized in organization and management studies (Bissola & Imperatori, 2011; Caniëls & Rietzschel, 2015; Cirella, 2021; Vogelgsang, 2020), while collective creativity is one of the developing areas also in creativity research (cf. Gilson et al., 2019).

Contemporary work is often project-based, denoting nonlinear work processes with messy problems that cannot be solved through individual efforts and individual creativity alone (Oddane, 2015; Hargadon & Bechky, 2006). The prevailing approach to creativity as an individual endeavor ignores the fact that real-life problems are so complex that it is unlikely for any single individual to possess all the knowledge required to deal with them (Hargadon & Bechky, 2006; Glaveanu, 2015). Solving complex problems requires combining knowledge and efforts of people and interplay of individuals and collectives (Bissola & Imperatori, 2011; Cirella, 2021). Thus, collective creativity here refers to “creative processes leading to creative products that are the results of interaction between two or more people” (Parjanen, 2012, p. 110).

Studies of collective creativity emphasize that creativity is more than sum of individuals’ creative ideas and process, and different organizational and contextual factors, such as team diversity and leadership, can both foster and inhibit creativity (Cirella, 2021; Gilson et al., 2019; Rosso, 2014). Even if studies on the topic exist, some aspects of creativity at collective level remain unclear, for example barriers of collective creativity (Gilson et al., 2019) and the role of organizational

factors in managing and supporting collective creativity. Research shows that creativity might not occur even if some favorable elements of creativity exist (Gilson et al., 2019). For example, the tensional nature between right amount of freedom and autonomy versus stability and structures in organization to support creativity has been recognized (e.g. Fortwengel et al., 2017).

Previous research on the relationships between organizational hierarchies for creativity has yielded conflicting results. For example, a low organizational hierarchy seem to promote autonomy that increases creativity, but a higher hierarchy brings clarity to responsibilities and roles, which is also important for creativity (e.g. Collin et al., 2018). In turn, rigid organizational structure can hinder creativity (e.g. Delmestri et al., 2005; McLean, 2005) but too much autonomy or freedom can inhibit creativity as well (Rosso, 2014). Moreover, research shows that the level of formality in hierarchy together with managerial practices influences creativity at team level (Oedzes et al., 2019). The importance of designing structures and processes for collective creativity has been noted in prior research (Cirella 2021; Cirella & Shani, 2012; Hargadon & Bechky, 2006), its antecedents have been explored and identified (Baer et al., 2010; Sung & Choi, 2012) and outcomes of collective creativity have been examined (Bissola & Imperatori, 2011), but the role of the organizational hierarchy for creativity remains still unclear.

In changing situations at work, the roles of managers and leaders are pivotal in many ways, including supporting employees’ creativity (e.g., Anderson et al., 2014; Zhang & Bartol, 2010). Previous research has shown that elements of transformational leadership (e.g., encouragement, fairness, and support) are essential to promoting creativity in organizations (Avolio et al., 1999; Bass & Steidlmeier, 1999). Interactional, dialogic atmospheres also help promote collective creativity in organizations (Forsman et al., 2014). Thus, managerial work and organizational climate can establish a

context that inspires teams and other collectives at work to collaborate productively and create ideas.

Understanding organizational and managerial aspects of collective creativity is important in order to systematically maintain and develop teamwork and creativity at collective level in organizations (cf. Gilson et al., 2019). However, we know relatively little about collective creativity in organizations and even less about the role of organizational factors in managing and supporting collective creativity. Especially, there is still lack of research on how the level of organization hierarchy is linked with collective creativity, and how are the other organizational key factors, namely managerial work and workplace climate, are associated with this relationship.

In this study, we explore the relationship of collective creativity with workplace climate and managerial work in hierarchical and less hierarchical organizations. This study aims to clarify the conflicting current knowledge on the topic and examines collective creativity in organizations that are organized in different ways. We seek to answer the research question: How do managerial work and workplace climate influence collective creativity in organizations with different types of hierarchies? To answer this question, we conducted a quantitative, survey-based study of six Finnish organizations with a total of 265 respondents.

The main contribution of the paper is twofold. First, the study contributes to the existing literature on collective creativity by introducing workplace climate as an antecedent to collective creativity. We also show how managerial work mediates this link. Second, we add to the literature on managerial work by exploring its relationship with collective creativity and workplace climate. In addition, we broaden the discussion of managerial work by examining it in the context of hierarchical and less hierarchical organizations. Creativity at workplace is formed through interaction. Supporting interactional atmospheres is essential to promote both the well-being of employees and the quality of the creative outcomes.

## Theoretical Framework

### Collective Creativity at Work

Most existing creativity research, starting from an understanding of creativity as an individual capacity or a disposition, has focused on measuring the creativity of individuals in certain situations or contexts. It is still the case that many studies focus on individual or organizational rather than collective creativity (Parjanen, 2012). Moreover, there are as yet no comprehensive, coherent models of collective creativity in organizational research (Bissola & Imperatori, 2011; Cirella, 2016).

Zhou and Hoever (2014) identify three sequential lines of research that have followed each other in research on organizational creativity. The first line of research focused on the relationships among context, job design, and creative performance. Following this, the second stream of research investigated the effects of managerial practices on individual creativity. The third and growing field of research focuses on collective creative processes at work. In this line of research, creativity at work is usually studied on the level of teams: team processes and the creativity of their outcomes (Boon, Vangrieken, & Dochy, 2015; Messmann & Mulder, 2017). The current understanding of collective creativity follows the idea of organizations as social systems (Jiang & Zhang, 2014): collective creativity can be viewed as a micro social system embedded within an organization that comprises organizational members, teams, or small groups (Quinn, 1992; Morgeson & Hofmann, 1999).

Collective creativity, as we understand it in this study, is

more than individual creativity in teams (Kurtzberg & Amabile, 2001); it highlights creative behavior that occurs when people interact and cooperate with each other (Leopoldino et al., 2016; Sawyer & DeZutter, 2009). Collective creativity is needed in the everyday work of organizations. Challenges that require creativity in organizations are typically complicated and unclear. To solve these complicated problems, different kinds of competences and expertise – in other words, collective creativity – are needed (Parjanen, 2012).

In contemporary working life, new products and services are increasingly being seen as the outcomes of collective processes in teams that are specifically established for the purpose of creating (Hargadon & Bechky, 2006; Bissola & Imperatori, 2011). Most of the work in organizations requires the expertise and creativity of multiple employees (Hargadon & Bechky, 2006; Parjanen, 2012). Creativity plays an important role in different stages of innovation, which involves a messy, complex process wherein people explore and experiment with possibilities without knowing how their efforts will unfold (Oddane, 2015). Thus, creativity must be understood as both an individual and a social act (Oddane, 2015). Creative problem solving can also be seen as a learning process (Boon, Vangrieken, & Dochy, 2015; Härmäläinen & Vähäsantanen, 2011; Messmann & Mulder, 2017). Especially in technical design work, learning in creative work requires shared problem solving and the development of new, tailored solutions to meet customer needs (Lemmetty & Collin, 2020).

In this study, we lean on existing research on organizational creativity, as well as on approaches used in the social sciences and in organizational and leadership studies (see Runco, 2014). From these perspectives, our definition of creativity includes the aspects of novelty, value, and usefulness (Anderson et al., 2014). We view creativity as an ordinary phenomenon that takes place in the course of everyday activities at work.

Previous research on collective creativity has focused on the team-level circumstances for creativity and found that such elements as structured process, team diversity, openness, resources and technology are crucial for enhancing creativity at collective level (Cirella, 2021). Even if some studies on collective creativity and its antecedents exist (e.g. Baer et al., 2010), it has been recognized that managerial perspective in supporting collective creativity has been understudied (Linder & Sperber, 2017; Cirella, 2021).

### Managerial Work and Collective Creativity

Even if it is widely acknowledged that managerial work and leadership styles play a crucial role in promoting creativity and innovation in organizations, the research on this topic is still limited (Anderson et al., 2014; Zhang & Bartol, 2010). Managers cannot force collaboration or creativity, but they can support and enhance collective creativity by exploring and influencing organizational designs that increase the flow of ideas, the sharing of knowledge, and the process of collective creativity (Cirella, 2016; Shalley & Gilson, 2004).

In this study, we focus on the managerial work of line and middle managers in different types of hierarchies. The main task of middle managers is to go between top management and employees. Managerial work includes different roles in relation to human resource management and employees. In this study, we are particularly interested in the relationship between managers and employees, which has been found to influence employee satisfaction, commitment, and performance (Heiskanen & Jokinen, 2015). Managerial work is about acknowledging and linking different competences and sources of knowledge. It requires

communication skills, decision-making authority, empathy, and patience (Round & Styhre, 2017). Managerial work includes such elements and behaviors as building and maintaining trust, supporting and encouraging, promoting fairness and equality, inspiring, appreciating, sharing responsibility, and engaging in open communication (Heiskanen & Jokinen, 2015). These behaviors also play a role in supporting creativity (c.f. Zhang & Bartol, 2010). For example, organizing structured processes has been found to support collective creativity (Cirella, 2016; Ohly & Fritz, 2010). In addition, managers can support collective creativity by setting aims around creativity, linking organizational objectives to creativity, and encouraging employees to be creative (Parjanen, 2012). Therefore, based on prior research, we assume that managerial work is positively related to collective creativity; we used this as the initial point of our research. Thus, we hypothesize that:

**Hypothesis 1:** Managerial work is positively related to collective creativity.

### Workplace Climate and Collective Creativity

The discussion of workplace climate draws on two main concepts: organizational culture, which refers to shared assumptions and values, and organizational climate, which focuses on shared perceptions in an organization (Victor & Cullen, 1988). According to Schein (2010), both organizational culture and climate provide a valuable approach to examining human behavior in complex organizational settings. Research on workplace climate is interested in examining shared perceptions of everyday life in organizations (McLean, 2005). Workplace climate can be defined as a collection of shared ideas about organizational politics, practices, and policies (Patterson et al., 2004). It includes perceptions of organizational life as well as attitudes and behaviors that are shared by organizational members (Isaksen, Lauer, Ekvall, & Britz, 2001). Workplace climate includes socio-environmental factors, such as taking care of employees, work atmosphere, open communication, emotional and practical support from managers and supervisors, and employees' willingness to share their expertise, ideas, and responsibilities (Ghosh, 2015).

A workplace climate that is characterized by trust, empathy, helpfulness, and encouragement supports communication and idea sharing among employees, thereby supporting creative solutions (Von Krogh et al., 2000). A workplace climate that allows trials of new and alternative ways of doing work supports employee creativity and creativity at work (Ghosh, 2015; Collin et al., 2017). Trust and an open flow of information within teams are important for sharing new ideas and perspectives (Parjanen, 2012). Furthermore, a climate that allows risk-taking, experimentation, and failure is important for collective creativity, as is support from management (Martins & Terblanche, 2003).

Organizations can support collective creativity in teams and groups by supporting creative processes and developing creative atmospheres (Leopoldino et al., 2016). Research on workplace climate has explored creative workplace climates and how climate can enhance creativity (Lin & Liu, 2012). Prior research on the link between climate and creative behavior at work has shown that factors such as sufficient resources, challenging work, employee autonomy, and support from supervisors, colleagues, and the organization can significantly enhance creativity at work (Lin & Liu, 2012; McLean, 2005).

Prior research indicates that workplace climate seems to be positively related with creativity. Our research emphasizes the collective side of creativity, which brings out the less studied

sociocultural aspect of creativity. Thus, we formulate hypotheses 2 and 3 as follows:

**Hypothesis 2:** Workplace climate is positively related to collective creativity.

**Hypothesis 3:** Managerial work mediates the relationship between workplace climate and collective creativity.

### Organizational Hierarchy and Collective Creativity

Currently, one of the most important ongoing changes in organizations is the shift away from hierarchical, bureaucratic organizational structures towards less hierarchical or self-directed organizations (Lee & Edmondson, 2017; Holbecke, 2015). Organizational hierarchy refers to a hierarchy of authority, or the system through which employees report to managers who have the authority to make decisions and direct work in the organization (Lee & Edmondson, 2017). In traditional, hierarchical organizations, a high degree of hierarchy is seen as a crucial factor in efficiency, and managers are needed to control employees and ensure that work is accomplished (Adler, 2001; Burns & Stalker, 1961; Landes, 1986). Rapid changes in working life (e.g., increased flow of information and fast-paced technological advancements), the growth of knowledge-based work, and an increased desire for meaningfulness at work have increased the demand for reduced hierarchy (Lee & Edmondson, 2017). Less hierarchical, self-directed organizations, also called organic, decentralized organizations (Burns & Stalker, 1961), are complex social entities with very little or no hierarchy of authority (Lee & Edmondson, 2017). Self-directed organizations "radically decentralize authority in a formal and systematic way throughout the organization" (Lee & Edmondson, 2017, p. 39). In these organizations, power, management control, and decision-making are decentralized (Lee & Edmondson, 2017). In this type of organization, individuals and groups have more responsibility and decision-making power (Moe et al., 2008).

A traditional hierarchical organizational structure functions well in routine work situations, but it is ineffective for companies with new types of problems or companies that are experiencing changes (Lam & Lundvall, 2007). As routine work continues to shift towards knowledge-intensive, problem-based work, organizations are increasingly shifting toward less hierarchical, self-directed forms. These types of structural changes have also been called "lean production," which aims to organize production in a customer-oriented manner, offer shorter delivery times, reduce waste, implement continuous improvements, and increase flexibility. At the heart of achieving these goals is the dismantling of hierarchies, increased teamwork and autonomy, and increased opportunities to learn on the job (Wang et al., 2014). In growth companies, continuous growth also drives changes to organizational structures. Although the idea of organizational structures seeking self-direction and low levels of hierarchy is not new, little research has been done on such organizations or the unique challenges they face (Lee & Edmondson, 2017).

De Jong and Den Hartog (2007) discuss the conflict between controlling tasks and encouraging innovative action: excessive control may negatively impact creativity, but, on the other hand, organizational effectiveness should also be controlled. Some researchers have found that creativity is realized in small networks, which often form spontaneously and are essentially non-hierarchical. Therefore, it has been suggested that innovative firms should be free of formal hierarchy (Kastelle & Steen, 2010). The idea that freedom and autonomy are prerequisites for creativity has been shown to be better realized in agile, self-directed organizations (Collin et al., 2017), which is why some may as-



sume that inflexible, hierarchical firms do not allow creativity. However, research on the impact of hierarchies and constraints on creativity has yielded conflicting results. On the one hand, limitations have often been seen as promoting creativity (Stokes, 2014), while, on the other hand, they have also been described as barriers to creativity (Rosso, 2014). All this conflicting research needs some clarification. Therefore, we have analyzed the relationships among collective creativity, managerial work, and workplace atmosphere in three different organizational hierarchies in order to elucidate the foundations of creativity.

Minimal hierarchy, shared decision-making, and flexible human resource solutions have been identified as crucial factors in successful organizations (Owens & Crohn, 1983). Organizations with low levels of hierarchy have been found to be more innovative than hierarchical organizations (Shane, 1992). Furthermore, more recent studies distinguish when hierarchy is beneficial in the creative process. High levels of hierarchy and strong authority negatively influence creativity during the idea generation phase, but increasing degrees of hierarchy are beneficial in the later phases, such as idea selection and implementation (Keum & See, 2017). However, the current understanding of the links between organizational hierarchy and creativity is based on theoretical inquiry; there is still a lack of empirical evidence (Lee & Edmondson, 2017). Moreover, prior empirical results on the organizational structure's role in creativity are mixed. Research views stiff organizational structure, formalization and hierarchy as barriers for creativity and suggests that organic structures are more likely to support creativity (Blomberg et al., 2017). However, some studies have shown contradicting results and suggest that rules and structures can promote creativity (Bissola & Imperatori, 2011; Brown et al., 2012). As the prior research results are somewhat contradictory, further studies are needed. Therefore, we hypothesize as follows:

**Hypothesis 4:** The relationships among workplace climate, managerial work, and collective creativity vary in different organizational hierarchies.

We present the hypotheses in Figure 1 (p. 23) to illustrate the research model.

## Data and Analysis

### Data and Measures

The empirical data used in this study are derived from two Finnish research and development projects (CREANCY and HeRMO). These projects aimed to investigate the meaning of management within work organizations and its relationship to creativity in everyday work. A total of six organizations partici-

pated in the projects. The data utilized in this sub-study consist of questionnaire data ( $n = 265$ , response rate 30.2%). An electronic questionnaire addressing creativity, management, and workplace atmosphere was sent to employees of participating organizations. Even though the overall response rate turned out to be rather low, the respondents from each organization were representative of the organizations' overall employee profiles.

The questionnaires elicited participants' self-reports on collective creativity (applied from Bissola & Imperatori, 2011) in their work communities. The participants were asked to respond to seven items addressing collective creativity at work, such as "We create novelty with the help of our shared previous experiences" and "We help each other in challenging problem-solving situations." They responded using a five-point Likert scale (scale 1-5; 1 = totally disagree, 5 = totally agree). The results were compiled into one indicator of collective creativity with an overall internal consistency of Cronbach's alpha of 0.89.

Managerial work was measured using the supervisory work scale drawn from Heiskanen and Jokinen (2015). Fifteen items addressed managerial work, and respondents answered using a five-point Likert scale (scale 1-5; 1 = totally disagree, 5 = totally agree). Sample items include "My supervisor knows my tasks well" and "My supervisor is inspiring." The Cronbach's alpha for this scale was 0.94.

Ten items addressed workplace climate (drawn from Heiskanen & Jokinen, 2015, social climate at the workplace), again using a Likert scale (scale 1-5; 1 = totally disagree, 5 = totally agree). Examples of these items are "Information is transmitted openly at our workplace" and "People can really be trusted at our workplace." The Cronbach's alpha for this scale was 0.87. In addition, an interaction variable was calculated for managerial work and workplace climate.

The control variables in the questionnaire included level of education (vocational school or less, university of applied sciences, university) and work experience at the participant's current organization (years). The organizations were also rated according to their levels of hierarchy as they identified their organizational structure (1 = high hierarchy, 2 = self-organized, 3 = low hierarchy). Fifty-five of the respondents work in highly hierarchal organizations; 161 work in self-organized companies, and 49 work in low hierarchy organizations.

### Studied Organizations

Table 1 (p. 24) presents the studied organizations, which have different products, managerial practices, and degrees of organizational hierarchy. The organizations studied here have different organizational hierarchies, distinguished by different levels of control and authority (Lee & Edmondson, 2017). Before this study and questionnaire was carried out, key people in the

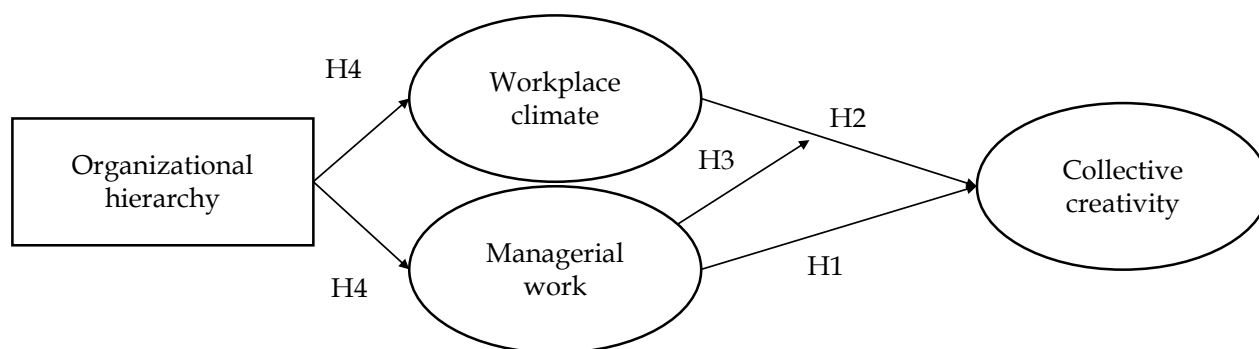


Figure 1. Study framework for hypotheses 1, 2, 3, and 4.

studied organizations were interviewed about the organization structures, hierarchy, and practices. Based on these interviews, we categorized the organizations into three different types: self-organized, low hierarchy, and high hierarchy (Table 1, p. 24). Those organizations that had a self-organized, flat organizational hierarchy without conventional supervisory roles, and the autonomy of teams and individuals had been deliberately increased, were categorized as self-organized companies (Collin et al., 2021). Software and Device are self-organized companies.

In low hierarchy organizations, control and authority were distributed. Low hierarchy organizations had some supervisory structures to support operating teams in the organization. The supervisory role was described to be based on coaching and enabling work instead of being bureaucratic or commanding. Technology and Resolution have low hierarchy. Finally, in high hierarchy organizations, managers have control and authority; Machine and Building are traditional hierarchical organizations. They had multiple levels of management. In these organizations, structures were more 'traditional' (see Lee & Edmondson, 2017), with more limited decision-making power for teams or individuals.

Building (350 employees) and Technology (250 employees) are large firms; the other included companies are small or medium-sized (25 to 108 employees) organizations. Technology plays a crucial role in every organization, which increases the need for problem-solving skills and drives creativity.

### Analyses

Means, standard deviations, correlations, and reliability estimates were calculated. To minimize the risk of multicollinearity between variables, workplace climate and managerial work were z-standardized prior to the analyses. The results of the regression assumptions of normality, homoscedasticity, linearity, and multicollinearity (VIF from 1 to 1.995 and tolerance values from 0.501 to 1) were satisfactory.

To test hypotheses 1, 2, 3, and 4, multiple linear regressions were conducted, and the independent associations among variables were calculated. To test hypotheses 1, 2, and 3, five analytical steps were conducted using multiple linear regression. Two

background factors, workplace climate and managerial work, were added in steps one to four. In the fifth step, an interaction variable was added to test whether managerial work moderates the relationship between workplace climate and collective creativity. In addition, a multiple linear regression was calculated for all three types of organizational hierarchies. To compare the included organizations and test Hypothesis 4, a multiple linear regression analysis was conducted for the three different types of organizations, categorized according to the level of hierarchy. The statistical significance of differences among groups were established using the z-value.

## Findings

### Descriptive Analyses

The descriptive statistics (means and standard deviations), reliability estimates, and correlations for the study variables are presented in Table 2 (p. 25). As the table shows, the means are relatively high, and the correlations are significant. Managerial work correlates positively with collective creativity ( $r = 0.57$ ), which is consistent with previous research. Higher scores for managerial work and workplace climate correlate with higher scores for collective creativity.

The relationship between work experience and creativity is statistically significant, but the correlation is low ( $r = -0.17$ ). Employees with less work experience in the organization rated collective creativity higher than more experienced employees did. The correlation between education and creativity is also low but statistically significant ( $r = 0.14$ ): higher education correlates with higher creativity scores.

### Regression Analyses

The multiple linear regressions for the variables of collective creativity, education, work experience, workplace climate, and managerial work and for the interaction variable are presented in Table 3 (p. 25). First, education ( $F[1,221] = 4.06$ ;  $p < 0.05$ ) and work experience ( $F[2,220] = 4.48$ ;  $p < 0.05$ ) were positively related to collective creativity. However, adding steps 3, 4, and

Organization	Software	Device	Technology	Resolution	Machine	Building
<b>Number of employees</b>	188	25	250	30	108	350
<b>Organizational structure</b>	Self-organized; Structure based on self-directed teams; Employees do not have assigned supervisors	Self-organized; Structure based on self-directed teams; Employees do not have assigned supervisors	Low hierarchy; Job (task)-specific department; Employees have assigned supervisors and HR managers	Low hierarchy; Structure based on project teams; Employees have assigned supervisors and HR managers	High hierarchy, internationally networked; Job (task)-specific departments; Employees have assigned supervisors and managers	High hierarchy; Job (task)-specific departments; Structure based on project teams; Employees have assigned supervisors and managers
<b>Business area</b>	Information technology	Information technology	Information technology, electrical engineering, automation technology	Information technology, technological consulting	Automation technology, information technology	Construction

Table 1. Descriptions of organizations.

	Mean	SD	1	2	3	4	5
<b>Variables</b>							
1. Collective creativity <sup>a</sup>	3.94	0.67	(0.89)				
2. Education <sup>b</sup>	2.15	0.71	0.14*				
3. Work experience <sup>b</sup>	5.36	5.30	-0.17*	-0.05**			
4. Workplace climate <sup>a</sup>	3.84	0.66	0.69**	0.21**	-0.26***	(0.87)	
5. Managerial work <sup>a</sup>	4.01	0.72	0.57**	0.16*	-0.18**	0.68***	(0.94)
6. Hierarchy <sup>b</sup>	1.98	0.63	0.42***	0.17**	-0.39***	0.51***	0.24***

Reliability estimates are in parentheses.

Scale for variables 1, 4, and 5: 1 = totally disagree; 5 = totally agree.

Scale for hierarchy: 1 = high hierarchy; 2 = self-organized; 3 = low hierarchy.

Scale for education: 1 = vocational school or less; 2 = university of applied sciences; 3 = university

a = Pearson correlation; b = Spearman's Rho

\*\*\* p < 0.001, \*\* p < 0.01, \* p < 0.05

Table 2. Descriptive statistics, reliability estimates (Cronbach's alpha) and intercorrelations of study variables.

5 the individual background factors are not significant anymore. As predicted by Hypothesis 1, managerial work was positively related to collective creativity ( $F[4.218] = 53.73$ ;  $p < 0.001$ ). Higher scores for managerial work correlated with higher scores for collective creativity. These results support Hypothesis 1 ( $\beta = .20$ ,  $P < .01$ ). Hypothesis 2 was also supported ( $\beta = .61$ ,  $P < .001$ ): workplace climate had a positive and statistically significant relationship with collective creativity ( $F[3.219] = 67.25$ ;  $p < 0.001$ ). Better evaluations of workplace climate correlated with higher scores for creativity. In addition, as predicted by our third hypothesis, the mediating effect of managerial work on the

relationship between climate and creativity was statistically significant ( $F[5.217] = 46.00$ ;  $p < 0.001$ ). Therefore, managerial work influences collective creativity through climate; this finding supports Hypothesis 3 ( $\beta = .14$ ,  $P < .01$ ).

The coefficient of determination ( $R^2$ ) changes in step 3, when the variable of workplace climate is added to the model. The addition of managerial work in step 4 does not change the  $R^2$ . In step 5, the interaction between workplace climate and managerial work is added, creating a statistically significant difference. After all variables were added, three variables remained statistically significant: workplace climate, managerial work, and the

Variables	$\beta$	$\beta^2$	$R^2$	$\Delta R^2$
<b>Dependent variable: collective creativity</b>				
Step 1 Education	0.13*	0.02	0.02*	0.02*
Step 2 Education Work experience	0.12 0.15*	0.02	0.04*	0.02*
Step 3 Education Work experience Workplace climate	0.00 0.01 0.70***	0.48	0.48***	0.44***
Step 4 Education Work experience Workplace climate Managerial work	0.00 0.01 0.58*** 0.18**	0.03	0.50**	0.02**
Step 5 Education Work experience Workplace climate Managerial work Interaction of workplace climate with managerial work	0.01 0.02 0.61*** 0.20** 0.14**	0.02	0.52**	0.02**

\*\*\* p < 0.001, \*\* p < 0.01, \* p < 0.05

Table 3. Regression results.

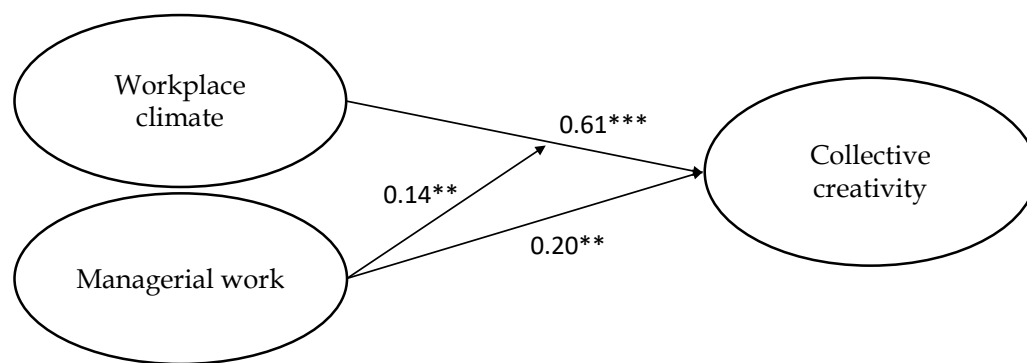


Figure 2. Results for regression analysis.

interaction between these two variables, which emphasize their important role in explaining collective creativity.

Semi-partial correlations were converted into percentages. The independent association of education was 1.8%, that of work experience was 2.2%, that of workplace climate was 48%, and that of managerial work was 3.1%. The association of the interaction of workplace climate with managerial work was 2.1%.

Our fourth hypothesis proposes that the relationships among workplace climate, managerial work, and collective creativity vary in different organizational hierarchies. To test Hypothesis 4, a multiple linear regression analysis (Table 4, p. 27) was conducted for select cases using groups divided according to organizational hierarchy (1 = high hierarchy, 2 = self-organized, 3 = low hierarchy). The regression coefficient differences between hierarchically different organizations were tested. The results showed that the relationships among workplace climate, managerial work, and collective creativity did not vary in organiza-

tions with different levels of hierarchy (high and low: workplace climate  $z = 0.18$ , managerial work  $z = 1.30$ ; high and self-organized: workplace climate  $z = 1.25$ , managerial work  $z = 0.96$ ; low and self-organized: workplace climate  $z = 1.49$ , managerial work  $z = 0.58$ ). Figure 3 (p. 26) illustrates this finding. Therefore, in our analysis, the relationships among managerial work, workplace climate, and collective creativity were the same in every type of organizational hierarchy, and the level of collective creativity is the same in different organizations. Thus, Hypothesis 4 is not supported.

## Conclusions

This study highlights that managerial work plays an important role in collective creativity and that collective creativity can occur in different organizational hierarchies. Moreover, our findings show that managerial work that builds and maintains trust,

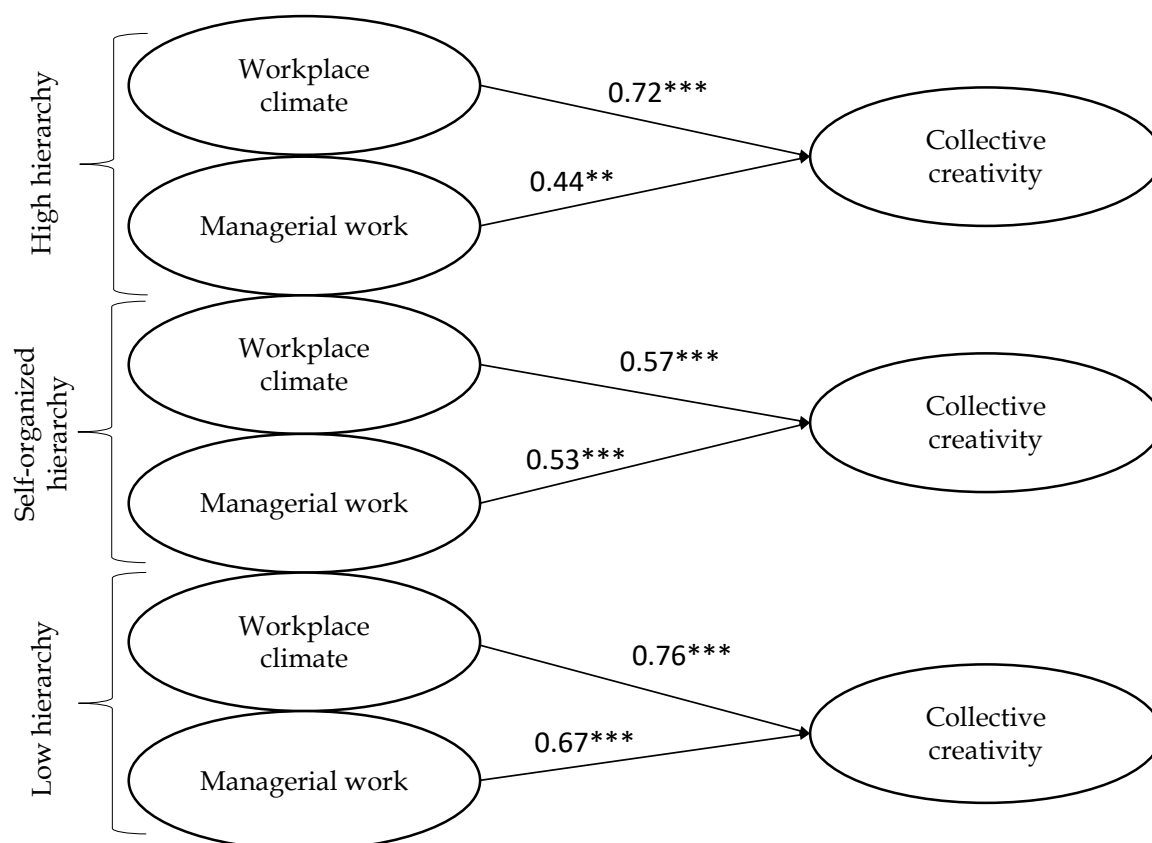


Figure 3. Results for regression analysis for three different organizational hierarchies.



Dependent variable: collective creativity							
Organization	Workplace climate			Managerial work			
	H	S	L	H	S	L	
<b>High hierarchy</b>				0.44**			
$\beta$	0.72***			0.19			
$\beta^2$	0.27			0.19**			
$R^2$	0.52***						
z		1.25	0.18		0.96	1.30	
<b>Self-organized</b>							
$\beta$	0.57***			0.53***			
$\beta^2$	0.33			0.28			
$R^2$	0.33***			0.28***			
z			1.49			0.58	
<b>Low hierarchy</b>							
$\beta$	0.76***			0.67***			
$\beta^2$	0.58			0.45			
$R^2$	0.58***			0.44***			

\*\*\* p < 0.001, \*\* p < 0.01, \* p < 0.05

H = High hierarchy, S = Self-organized, L = Low hierarchy

Table 4. Regression analysis with different organizational hierarchies (low hierarchy, self-organized or high hierarchy).

supports and encourages employees, and treats employees fairly and equally (Heiskanen & Jokinen, 2015) has a crucial role in supporting collective creativity. This finding is in line with previous research noting that positive transformational leadership behavior supports creativity in organizations (Zhang & Bartol, 2010). Structured managerial processes have also been found to support collective creativity (Cirella, 2016; Ohly & Fritz, 2010). Collective creativity can be enhanced by managerial practices that are based on trust, fairness and equality, inspiring and appreciating others, sharing responsibility and supporting open communication. As our study examined collective creativity in different organizational hierarchies, our findings suggest that such practices occur in different type of organizations varying from high formal hierarchies to self-directed forms of organizing and coordination. Thus, the elements of mutual trust, sharing and inspiration seem to have a special role in collective creativity. Our study complements the current understanding of managerial perspective on collective creativity by highlighting the role of managerial work that can be shared in teams and at the workplace. Collective creativity can be enhanced in teams that nurture trust, fairness, inspiring others and sharing responsibility independent of the level of formal hierarchy in the organization.

Second, our findings show that a workplace climate that highlights trust, empathy, and collegial support is positively related to collective creativity in organizations. The link between work-

place climate and collective creativity did not vary in different organizational hierarchies. However, previous research has presented different, and in some cases contradictory, perspectives on the relationship between organizational hierarchy and creativity (Shane, 1992; Bunderson & Boumgarden, 2010; Collin et al., 2021). Non-hierarchy has been seen to increase autonomy and freedom, which appears to be a prerequisite for creativity (Mintzberg, 1980). On the other hand, the existence and clarity of structures, roles and support in the workplace have been suggested as enablers of creativity (Bunderson & Boumgarden, 2010; Lemmetty & Collin, 2020). According to current study, instead of hierarchies, the organizational climate and the quality of management seem to be more important in enabling creativity at collective level. This result is also in line with previous research highlighting the role of a supportive organizational climate in enhancing creativity in organizations (Von Krogh et al., 2000). However, our study has examined this link with collective creativity as a shared phenomenon.

This paper concludes that the climate of the workplace and managerial work are more important for collective creativity than the level or amount of organizational hierarchy. Thus, collective creativity can emerge both in traditional, hierarchical organizations and in low-hierarchy companies. Instead of hierarchy, it is essential to focus on organizational climate and managerial work, which can be viewed, more broadly, as part of an organization's culture. The amount or structure of hierarchy is

not relevant but how employees are valued, trusted and treated, becomes an essential issue in fostering collective creativity. According to Hamel (2012), most firms control too much or wrong way. To avoid this, the solution is not necessarily to remove hierarchies, but to develop management style and climate of freedom, openness, communality and trust, that can occur in a wide variety of organizations.

### Limitations of the Study and Recommendations for Future Research

This study utilized datasets from employees working in six Finnish growth organizations. Quantitative empirical survey data were used to explore the links among collective creativity, managerial work, and workplace climate. However, the study and the data used are not without limitations. All data used in this sub-study consist of participants' self-reports – that is, individuals' accounts and evaluations of the survey items. Following Glaveanu (2014), creativity should also be studied as action using (for example) observational data in everyday contexts.

Collective creativity in everyday work is mostly understood as an interplay between individual and collective practices (e.g., problem solving, the creation of novel ideas, and the transformation of work practices). Consequently, avenues for future research lie in using more complex analysis methods that can account for the multiple relationships between sociocultural context and individual characteristics. For example, it has been noted that research on individual differences for creativity (e.g., education or work experience in this study) is somewhat limited and many of the studies have mixed results (Anderson et al., 2014). In addition, the conceptualization of collective creativity could be further developed as currently the definition of the concept is somewhat vague. Future research might also employ datasets that focus on actions and behavior in everyday work contexts. Moreover, different qualitative approaches (e.g., interviews, observations) can offer fruitful points for discussion when examining collective creativity and workplace practices

in the future.

### Practical Implications

Our study underlines the key role of managerial work in supporting collective creativity at work. Our study implies that managerial and organizational practices that support trust at the workplace, enhance communication, provide support and inspiration are central in providing collective creativity. These elements and practices can be considered in managerial, team and organizational development. However, managerial practices and actions vary in different organizations, even within one workplace. One can assume that the impact of managerial work on collective creativity is larger when (supportive) leadership practices are lacking. Context, resources, social networks, the external environment, organizational culture, and high dependence on customers all play a role in developing leadership practices and in supporting collective creativity in IT work (Collin et al., 2018).

The creation of novelty, shared problem solving, and the co-construction of knowledge, products, and practices are more likely in contexts that incorporate freedom, experimentation, sufficient resources, and mutual trust. In this way, managerial practices play an important role in either supporting or restricting the creativity of groups and individuals. In a changing work world, as accountability tightens and short-term financial goals are in focus, the flexibility of managerial work practices is one critical criterion for sustainability. This means that the products and services created, whether novel or not, should be developed as shared endeavors in ways that leverage the diverse expertise of professionals and customers. Such products and services may be used in various situations – some of which may be impossible to anticipate in advance. This also applies to leadership practices and ways of supporting collective creativity at work. This means that the most productive managerial work practices vary across different contexts, situations, and groups.

### References

- Adler, P. S. (2001). Market, hierarchy, and trust: The knowledge economy and the future of capitalism. *Organization Science*, 12(2), 215-234.
- Anderson, N., Potočník, K., & Zhou, J. (2014). Innovation and creativity in organizations: A state-of-the-science review, prospective commentary, and guiding framework. *Journal of Management*, 40(5), 1297-1333.
- Avolio, B. J., Bass, B. M. and Jung, D. I. (1999). Re-examining the components of transformational and transactional leadership using the multifactor leadership. *Journal of Occupational and Organizational Psychology*, 72(4), 441-462.
- Baer, M., Leenders, R. T. A., Oldham, G. R., & Vadera, A. K. (2010). Win or lose the battle for creativity: The power and perils of intergroup competition. *Academy of Management Journal*, 53(4), 827-845.
- Bass, B. M. & Steidlmeier, P. (1999). Ethics, character, and authentic transformational leadership behavior. *The Leadership Quarterly*, 10(2), 181-217.
- Bissola, R. & Imperatori, B. (2011). Organizing individual and collective creativity: Flying in the face of creativity clichés. *Creativity and Innovation Management*, 20, 77-89. <https://doi.org/10.1111/j.1467-8691.2011.00597.x>
- Blomberg, A., Kallio, T., & Pohjanpää, H. (2017). Antecedents of organizational creativity: drivers, barriers or both? *Journal of Innovation Management*, 5(1), 78-104.
- Boon, A., Vangrieken, K. & Dochy, F. (2015). Team creativity versus team learning: Transcending conceptual boundaries to inspire future framework building. *Human Resource Development International*. <https://doi.org/10.1080/13678868.2015.1096635>.
- Brown, A. D., Kornberger, M., Clegg, S. R. & Carter, C. (2010). 'Invisible Walls' and 'Silent Hierarchies': A case study of power relations in an architecture firm. *Human Relations*, 63(4), 525-549.
- Bundersom, J.S. & Boumgarden, P. (2010). Structure and learning in self-managed teams: why "bureaucratic" teams can be better learners. *Organization Science* 21(3), 609 – 624.
- Burns T., & Stalker G. M. (1961). *The management of innovation*. London: Tavistock.
- Caniëls, M. C. J., & Rietzschel, E. F. (2015). Organizing creativity: Creativity and innovation under constraints. *Creativity and Innovation Management*, 24, 184-196.
- Cirella, S. (2016) Organizational variables for developing collective creativity in business: A case from an Italian fashion design company. *Creativity and Innovation Management*, 25, 331-343. <https://doi.org/10.1111/caim.12189>.
- Cirella, S., & Shani, A. B. (2012). Collective Creativity by Design: Learning from an Italian Fashion Design Company. *Irish Journal of Management*, 32(1).
- Collin, K., Herranen, S., Paloniemi, S., Auvinen, T., Riivari, E.,

- Sintonen, T., & Lemmetty, S. (2018). Leadership as an enabler of professional agency and creativity: Case studies from the Finnish information technology sector. *International Journal of Training and Development*, 22(3), 222-232.
- Collin, K., Keronen, S., Lemmetty, S., Riivari, E. & Auvinen, T. (2021). Self-organized structures in the field of ICT – Challenges for employee workplace learning. *Journal of Workplace Learning* 33(2), 95-108. <https://doi.org/10.1108/JWL-10-2019-0124>.
- Collin, K., Lemmetty, S., Herranen, S., Paloniemi, S., Auvinen, T. and Riivari, E. (2017), 'Professional agency and creativity in information technology work', in M. Goller and S. Paloniemi (eds.), *Agency at work: Agentic perspective on professional learning and development*, Springer, Dordrecht.
- Delmestri, G., Montanari, F., & Usai, A. (2005). Reputation and strength of ties in predicting commercial success and artistic merit of independents in the Italian feature film industry. *Journal of Management Studies*, 42(5), 975-1002.
- Forsman, P., Collin, K. and Eteläpelto, A. (2014), 'The practice of professional agency and the emergence of collaborative creativity in developmental staff meetings', in C. Harteis, A. Rausch and J. Seifried (eds.), *Discourses on professional learning: on the boundary between learning and working*, Springer, Dordrecht, pp. 45–74.
- Fortwengel, J., Schüßler, E., and Sydow, J. (2017). Studying Organizational Creativity as Process: Fluidity or Duality? *Creativity and Innovation Management*, 26: 5– 16. doi: 10.1111/caim.12187.
- Ghosh, K. (2015). Developing organizational creativity and innovation: Toward a model of self-leadership, employee creativity, creativity climate and workplace innovative orientation. *Management Research Review*, 38(11), 1126-1148. <https://doi.org/10.1108/MRR-01-2014-0017>
- Gilson, L. L., Lee, Y. S., & Litchfield, R. C. (2019). Advances in Team Creativity Research. *Oxford Research Encyclopedia of Business and Management*. <https://doi.org/10.1093/acrefore/9780190224851.013.171>
- Glăveanu, V. P. (2014). *Distributed creativity. Thinking outside the box of the creative individual*. London: Springer.
- Glăveanu, V. P. (2015). From individual agency to co-agency. In C.W. Gruber et al. (Eds.), *Constraints of agency* (pp. 245-265). Switzerland: Springer.
- Hamel, G. (2012) *What matters now: how to win in a world of relentless change, ferocious competition, and unstoppable innovation*. San Francisco: Jossey-Bass.
- Hargadon, A. B., & Bechky, B. A. (2006). When collections of creatives become creative collectives: A field study of problem solving at work. *Organization Science*, 17(4), 484-500.
- Hämäläinen, R., & Vähäsantanen, K. (2011). Theoretical and pedagogical perspectives on orchestrating creativity and collaborative learning. *Educational Research Review*, 6, 169-184.
- Heiskanen, T., & Jokinen, E. (2015). Resources and constraints of line manager agency in municipal reforms. *Nordic Journal of Working Life Studies*, 5, 79-99. <https://doi.org/10.19154/njwls.v5i3.4808>
- Isaksen, S. G., Lauer, K. J., Ekvall, G., & Britz, A. (2001). Perceptions of the best and worst climates for creativity: Preliminary validation evidence for the situational outlook questionnaire. *Creativity Research Journal*, 13(2), 171-184.
- Jiang, H., & Zhang, Q. P. (2014). Development and validation of team creativity measures: A complex systems perspective. *Creativity and Innovation Management*, 23(3), 264-275.
- Kastelle, T. & Steen J. (2010). Are small world networks always best for innovation? *Innovation: Management, Policy & Practice*, 12, 75-87.
- Keum, D. D., & See, K. E. (2017). The influence of hierarchy on idea generation and selection in the innovation process. *Organization Science*, 28(4), 653-669.
- Kurtzberg, T. R., & Amabile, T. M. (2001). From Guilford to creative synergy: Opening the black box of team-level creativity. *Creativity Research Journal*, 13, 285-294.
- Lam, A. & Lundvall, B.-A. (2007). The learning organization and national systems of competence building and innovation. In N. Lorenz & B.-A. Lundvall (Eds.), *How Europe's economies learn: Coordinating competing models* (pp. 110-139). Oxford University Press.
- Landes, D. S. (1986). What do bosses really do? *The Journal of Economic History*, 46(3), 585-623.
- Lee, M. Y., & Edmondson, A. C. (2017). Self-managing organizations: Exploring the limits of less hierarchical organizing. *Research in Organizational Behavior*, 1-24. <https://doi.org/10.1016/j.riob.2017.10.002>
- Lemmetty, S., & Collin, K. (2020). Self-directed learning as a practice of workplace learning: Interpretative repertoires of self-directed learning in ICT work. *Vocations and Learning*, 13(1), 47-70.
- Leopoldino, K. D. M., González, M. O. A., de Oliveira Ferreira, P., Pereira, J. R., & Souto, M. E. C. (2016). Creativity techniques: A systematic literature review. *Product: Management and Development*, 14(2), 95-100.
- Lin, C. Y. Y., & Liu, F. C. (2012). A cross-level analysis of organizational creativity climate and perceived innovation. *European Journal of Innovation Management* 15(1), 55-76. <https://doi.org/10.1108/14601061211192834>
- Martins, E. C., & Terblanche, F. (2003). Building organizational culture that stimulates creativity and innovation. *European Journal of Innovation Management*, 6(1), 64-74. <https://doi.org/10.1108/14601060310456337>
- McLean, L. D. (2005). Organizational culture's influence on creativity and innovation: A review of the literature and implications for human resource development. *Advances in Developing Human Resources*, 7(2), 226-246.
- Messmann, G., & Mulder, R. (2017). Proactive employees: The relationship between reflection and innovative work behavior. In M. Goller & S. Paloniemi (Eds.), *Agency at work: Agentic perspective on professional learning and development* (pp.141-159). Dordrecht: Springer.
- Mintzberg, H. (1980). Structure in 5's: A synthesis of the research on organization design. *Management Science* 26(3), 322 – 341.
- Moe, N. B., Dingsøyr, T., & Dybå, T. (2008). Understanding self-organizing teams in agile software development. 19th Australian Conference on Software Engineering (aswec 2008), 76-85. <https://doi.org/10.1109/ASWEC.2008.4483195>.
- Morgeson, F. P., & Hofmann, D. A. (1999). The structure and function of collective constructs: Implications for multilevel research and theory development. *Academy of Management Review*, 24(2), 249-265.
- Oddane, T. A. W. (2015). The collective creativity of academics and practitioners in innovation projects. *International Journal of Managing Projects in Business*, 8(1), 33-57. <https://doi.org/10.1108/IJMPB-10-2013-0060>
- Oedzes, J. J., Rink, F. A., Walter, F., & Van Der Vegt, G. S. (2019). Informal hierarchy and team creativity: The moderating role of empowering leadership. *Applied Psychology*, 68(1), 3-25.

- <https://doi.org/10.1111/apps.12155>
- Ohly, S., & Fritz, C. (2010). Work characteristics, challenge appraisal, creativity, and proactive behavior: A multi-level study. *Journal of Organizational Behavior*, 31(4), 543-565.
- Owens, T. R., & Crohn, L. (1983). Designing excellence in secondary vocational education: Applications of principles from effective schooling and successful business practices. Research Summary Report. Northwest Regional Educational Lab. <https://eric.ed.gov/?id=ED241711>
- Parjanen, S. (2012). Creating possibilities for collective creativity. Brokerage functions in practice-based innovation [Doctoral dissertation, Acta Universitatis Lappeenrantaensis 474, Lappeenranta University of Technology].
- Patterson, M., Warr, P., & West, M. (2004). Organizational climate and company productivity: The role of employee affect and employee level. *Journal of Occupational and Organizational Psychology*, 77(2), 193-216.
- Quinn, J. B. (1992). *Intelligent enterprise: A knowledge and service-based paradigm for industry*. Simon and Schuster.
- Round, H., & Styhre, A. (2017). Reality bites: Managing identity ambiguity in an advertising agency. *Creativity and Innovation Management*, 26(2), 202-213.
- Rosso, B. D. (2014). Creativity and constraints: Exploring the role of constraints in the creative processes of research and development teams. *Organization Studies*, 35(4), 551-585.
- Runco, M. A. (2014). *Creativity: Theories and themes: Research, development, and practice*. Elsevier.
- Sawyer, R. K., & DeZutter, S. (2009). Distributed creativity: How collective creations emerge from collaboration. *Psychology of Aesthetics, Creativity, and the Arts*, 3(2), 81-92.
- Schein, E. H. (2010). *Organizational culture and leadership* (vol. 2). John Wiley & Sons.
- Shalley, C. E., & Gilson, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *The Leadership Quarterly*, 15(1), 33-53.
- Shane, S. A. (1992). Why do some societies invent more than others? *Journal of Business Venturing*, 7(1), 29-46.
- Stokes, P. D. (2014). Thinking inside the tool box: Creativity, constraints, and the colossal portraits of Chuck Close. *The Journal of Creative Behavior*, 48(4), 276-289.
- Sung, S. Y., & Choi, J. N. (2012). Effects of team knowledge management on the creativity and financial performance of organizational teams. *Organizational Behavior and Human Decision Processes*, 118(1), 4-13.
- Wang, X., Lunesu, I., Rikkila, J., Matta, M., & Abrahamsson, P. (2014). Self-organized learning in software factory: Experiences and lessons learned. In *International Conference on Agile Software Development* (pp. 126-142). Cham: Springer.
- Victor, B., & Cullen, J. B. (1988). The organizational bases of ethical work climates. *Administrative Science Quarterly*, 101-125.
- Vogelgsang, L. (2020). Transition rather than balance: Organizing constraints for collective creativity in pharmaceutical development. *Creativity and Innovation Management*, 29(3), 413-423.
- Von Krogh, G., Ichijo, K., & Nonaka, I. (2000). *Enabling knowledge creation: How to unlock the mystery of tacit knowledge and release the power of innovation*. Oxford University Press on Demand.
- Zhang, X., & Bartol, K. M. (2010). Linking empowering leadership and employee creativity: The influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Academy of Management Journal*, 53(1), 107-128.
- Zhou, J., & Hoever, I. J. (2014). Research on workplace creativity: A review and redirection. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 333-359.

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