

# Employee creativity in a digital era: the mediating role of social media<sup>1</sup>

Pawel Korzynski

*Department of Management, Kozminski University, Warszawa, Poland and  
Department of Business Economics, Harvard University, Massachusetts, USA*

Jordi Paniagua

*Department of Applied Economics II, University of Valencia, Valencia, Spain, and*

Eduardo Rodriguez-Montemayor

*Department Economics, INSEAD, Fontainebleau, France*

**Purpose** - The purpose of this paper is to investigate how the use of social media can facilitate employee creativity. Departing from theories on social capital and knowledge management, this study examines the relationship among individual characteristics, the use of social technologies, and employee creativity. The main hypothesis of the study is that online social networking mediates the relationship between personal innovativeness and creativity.

**Design/methodology/approach** - Data were obtained through an online survey of 80 engineers and 12 managers working in a large IT company listed by the Fortune 500 ( $n_1=80$ ,  $n_2=12$ ). Our empirical strategy relies on fixed-effects structural equation modeling and confirmatory factor analysis with a quasi-experimental design to study the structural relationship among creativity, online social connectivity, and personal innovativeness.

**Findings** - The study provides three major findings. First, the results show that personal innovativeness regarding new technologies is positively associated with creativity. Second, 18% of the association between personal innovativeness and creativity is explained by the latent mediator online social connectivity (a construct of online networking and knowledge management). More specifically, the partial mediation is driven by online networking, specifically establishing new connections. Finally, contrary to our expectations, there is no significant evidence that the relationship between creativity and personal innovativeness is mediated by online social knowledge management.

**Practical implications** - Understanding the ways in which personal innovativeness enables employee creativity through online social connectivity guides organizations in building innovative teams. This study may facilitate recruitment and selection strategies and encourage organizations to implement platforms with networking-friendly functionalities of connecting with other employees and searching data.

**Originality/value** - The main question of this study is whether all features related to social technologies make people more creative. Evidence is still scarce, but there are hints that creativity is not only an innate personal feature but also a social phenomenon than can be amplified with adequate tools. This study explores the benefits of online social connectivity for enhancing employee creativity.

**Keywords** - Creativity, Social media, Online networking

---

<sup>1</sup> This is an Author's Original Manuscript (pre-print without revisions) of an article published in Management Decision, [copyright Emerald], available online at: <https://doi.org/10.1108/MD-05-2018-0586>

## Introduction

In a world of rapid technological change and increasing business complexity, understanding how employee creativity develops in increasingly digital settings is very important for organizations (Arthur, 2014). Employees' creativity in the workplace is one of the key drivers of organizational innovation (Amabile et al., 1996, Gong et al., 2013, Ramalingam et al., 2015, Liu et al., 2017). The drivers of creativity (at both the individual and organizational levels) are well-identified and documented. But we still do not know much about how technology helps creativity in the digital era.

Individual creativity is relevant for business, as its effect on organizational innovation has been found in many studies (Peng et al., 2014). Creativity is associated with several factors, including knowledge sharing activity (Giustiniano et al., 2016) and social networking (Andersen and Kragh, 2015). However, former studies have overlooked the role of online social technologies in creativity. This paper fills this gap. Now that online social networks have infiltrated people's lives, the question is whether (and how) they can improve creativity.

There is a gap between using online social networking tools and becoming more creative that depends on how people use certain technology features and people's individual characteristics. That is why we propose that online social connectivity (OSC) has an indirect effect on creativity by enhancing personal innovativeness (defined as a willingness to use new technologies).

Two aspects of online social connectivity (OSC) are : online social knowledge management (OSKM), which is related to a persistent profile of visibility for obtaining, sharing, and organizing information, content, and ideas and then converting information into organizational knowledge (Alavi and Leidner, 2001, Černe et al., 2014); and online social networking, which is linked to the capacity to connect to other people more easily, and thus strengthen the "social" side of creativity (Fischer et al., 2007).

Unlike previous literature on creativity, we do not ask questions about the strength of the tie (Perry-Smith and Shalley, 2003, Sosa, 2011), number of connections (Zhou et al., 2009), topic of

communication (Gilson and Shalley, 2004), and network structure (Burt, 1992). Our study instead shifts the attention to communication pattern, i.e., how to network through social technologies to get better creative outcomes.

We identify two theoretical approaches to hypothesize the relationship between social technologies and creativity through personal innovativeness. One is related to social capital. Social capital is a resource that facilitates organizational and individual activities (Tsai and Ghoshal, 1998), which we split in two arguments. The *structural* argument is that the expansion (and changing nature) of the social network, which could occur with social technologies, would foster the exchange of information, create peer effects (such as inspiration from the actions of new contacts), and even promote pro-social behavior (e.g., help people in need of information). The *relational* argument is that social technologies would strengthen trust, team familiarity, and organizational values (Huy and Shipilov, 2012), which can facilitate knowledge sharing and enhance the sense of organizational direction.

The second approach emphasizes the usefulness of social technologies for knowledge management in the organization. There are two necessary conditions for the technology–creativity link to happen. First, in order for social technologies to make an impact, people have to use them. The first question is the extent to which people like using technology. Second, we have to make sense of all the additional information coming from the use of technology, and thus converting the information into organizational knowledge (Alavi and Leidner, 2001, Černecký et al., 2014).

## **Theoretical background**

Creativity should be described as having multiple contextual levels (Fischer et al., 2005, Schilling and Phelps, 2007), including different levels of aggregation (personal level, team level, organizational level) and also different processes that drive it. In this paper, we placed emphasis on personal

innovativeness as the main driver of creativity, more specifically, the role of online social connectivity in fostering the link between personal innovativeness and creativity.

### ***Drivers of creativity: personal innovativeness***

The obvious point to start analyzing creativity is at the level of people's personality. Early studies have applied different types of creative personality scales to examine the influence of individual characteristics on creative outcomes (Gough, 1979). Such studies have continue to show, in more recent papers, an interdependence between creativity and emotional states (Baas et al., 2008, Davis, 2009), proactive personality (Gong et al., 2012), and openness to experience (Scratchley and Hakstian, 2001).

Personal Innovativeness on Information Technology (PIIT) serves as a domain-specific derivate of an individual's broad personality trait "openness to experience" (Powell, 2013) that increases the willingness to change and to take risks (Hurt et al., 1977). Former studies have indicated that innovative individuals are often considered to be the "early adopters" of new technologies, to demonstrate a positive approach to novel technologies, and to undertake an innovative behavior (Agarwal, 2000, Agarwal and Prasad, 1998, Agarwal and Prasad, 1999). Users high with PIIT develop positive perceptions of a technology's usefulness (Agarwal and Prasad, 1998, Jackson et al., 2013, Yi et al., 2006). Moreover, PIIT promotes novel and innovative usage of technology (Wang et al., 2013) where people apply a higher number of new features (Davis and Mun, 2012, Magni et al., 2010, Sun, 2012). Furthermore, Li et al. (2013) showed how PIIT moderates employees' intrinsic motivations and their innovative use of information systems.

### ***Online social connectivity and creativity: networking***

Online social connectivity has two distinct areas: networking (establishing new connections or reconnecting with peers) and knowledge management (organizing, sharing, and accessing information). We focus on the first aspect and lean on social network theory to explain the link

between networking and creativity. Theories explaining creativity as a social process started to appear a few decades ago (Amabile, 1983), and the most important insights to date have been generated by social networks theory.

Scholars have, over the years, focused on different aspects of social networks. Some of them have put an emphasis on the tie's strength. Perry-Smith and Shalley (2003) stated that weak ties (defined as relationships between people who do not know each other well) may have more a positive influence on creative outcomes than strong ties (closely tied relationships, such as friends). They explained this influence of weak ties arguing that it is more likely that nonredundant components of information come from distant relationships. Baer (2010) added to this concept that weaker ties are not enough to enable exposure to diverse viewpoints. However, there are also social creativity studies that underline the role of stronger ties. Sosa (2011) argued that strong ties help generate creative outcomes when they are related to individuals willing to cooperate with each other. Some studies have indicated that strong ties may cause the opposite effect, i.e., they can constrain creativity when individuals receive distinct information (facts or data) compared to distinct frames (interpretations) (Perry-Smith, 2014, Perry-Smith and Mannucci, 2017).

Another network and creativity-related issue studied by researchers is the number of connections. Zhou et al. (2009) discovered an interdependence between personal creativity and the number of weak ties. The authors observed that individuals whose number of weak connections was higher distinguished themselves with a greater creativity than individuals with a number of connections at lower levels. Scholars have also studied the topic of communication. For example, Gilson and Shalley (2004) stated that level of creativity in a team depends how much team members socialize with each other..

Finally, many scholars have studied network structure. Burt (2004) argued that creative ideas are brought by people whose networks span gaps between actors, as these people operate in highly diversified environments with access to novel information. Kidane and Gloor (2007) discovered a positive interdependence between creativity and adjustments related to betweenness centrality. Hirst

et al. (2015) focused on non-redundancy in terms of interconnections, which turned out to be positively associated with individual creativity.

*Online social networking as a mediator of personal innovativeness and creativity*

Networking through online social technologies can enable access to diverse sources of information. Moreover, because social interactions in online communities ensure a dynamic flow of resources and ideas that may be developed independently from their authors, knowledge is also being generated (Faraj et al. (2011). Social technologies can also facilitate passive transfer of information between linked actors as well as information flow among actors who do not stay in any relationship (Kane et al., 2014). These technologies contain many useful tools that were developed to search for individuals with a certain expertise (Piskorski, 2011), and in this way they may support a change in network structure that brings positive outcomes in terms of information diversity (Wu, 2013). In contrast with online technologies, offline settings are related to some traits and past experiences that limit possibilities in change of social networks (Powell et al., 2005).

Beyond information diversity, social technologies increase social communication (Wu, 2013). Thanks to abilities such as instant messaging or following (Panahi et al., 2012), new information can now make more sense. This is particularly important for capturing tacit knowledge that resides in individuals' minds.

Finally, pro-social behavior can be a vehicle by which individuals react to the needs and business problems of other teams, and social technologies facilitate allocating attention. Researchers have indicated that allocation attention might be driven by attention allocation, which is driven by the knowledge provider–seeker relationships (Constant et al., 1996) and knowledge provider–problem matches (Haas et al., 2014).

*H1 Online social connectivity positively mediates the relationship between personal innovativeness and creativity.*

*H1.A Online social networking (acquiring new connections and reconnecting) through online social technologies positively mediates the relationship between personal innovativeness and creativity.*

***Online social connectivity and creativity: knowledge management***

Research has shown that the transfer of knowledge between employees may bring many positive outcomes, such as innovation (Hargadon and Sutton, 1997, Obstfeld, 2005) and organizational creativity (Giustiniano et al., 2016). We hypothesize that social technologies have “knowledge management” affordances that make individuals more likely to make sense of information and thus become more creative. As proposed by Nonaka’s framework, knowledge creation always involves a process of “socialization,” which allows transforming tacit knowledge into codified one and then recombining it with other sources of knowledge to generate new ideas (Nonaka and Von Krogh, 2009).

*Online social knowledge management as a mediator of personal innovativeness and creativity*

Knowledge is good for creativity and firm innovation. Yet, information and knowledge are usually costly to transfer and remain “sticky” within organizations (Von Hippel, 1994, Szulanski, 1996). Even if information does flow freely, when it comes from different organizational units (or outside of it) it remains underused to the extent to which people do not understand it or are unable to see their relevance to their own work (Dougherty, 1992, Nonaka and Von Krogh, 2009). The interaction between processes associated with knowledge management and social processes matter. The knowledge creation process involves making sense of information, a process which is always discursive and therefore in some respect social (Berente et al., 2011). As previously mentioned, the social and knowledge management processes are connected. Knowledge is created when individuals exchange information among each other (Tsoukas, 2009) and when they undertake social interaction (Inkpen and Tsang, 2005, Obstfeld, 2005). It is only then that these individuals are able to produce creative outcomes. Tacit knowledge, in particular, is exchanged informally thanks to socialization

(Swap et al., 2001) because dynamic and unstructured processes are difficult to be defined and codified.

It is known that the process of making sense of information is important for becoming creative in projects with high complexity and long-term horizons (Drazin et al., 1999). The process of sense-making is determined by how information is interpreted (storytelling and narrative) and on organizational memory to facilitate a course of action.

We hypothesize that social technologies have the potential to create narratives around knowledge through contextual details. Narratives positively influence shared understanding among people (i.e., common goals, organizational culture, and organizational identity) and help achieve a sense of direction. This inspires individuals to create new ideas (Fenton and Langley, 2011) and allows to use knowledge to solve problems and innovate.

We also hypothesize that social technologies can facilitate organizational memory by tracking ideas (Tippins and Sohi, 2003). Organizational memory was already discussed by Alavi and Leidner (2001) in their discussion related to knowledge management systems but social technologies can improve the cognitive aspect by leveraging single events of personal innovativeness, that are rather difficult buy the traditional work settings which do not store memory of such moments.

*H1.B Online social knowledge management positively mediates the relationship between personal innovativeness and creativity.*

#### *Other factors of creativity (controls)*

Creativity is also driven by the intrinsic motivation of the person, such as the willingness to engage in analytical thinking (Zhang and Bartol, 2010). Intrinsic motivation refers to behaviors that are driven by internal factors (Ryan and Deci, 2000). Such motivation facilitates individuals' tendency to be risk-taking, curious and, as a result, more creative (Utman, 1997).

Some other personal characteristics are related to how people work. Individual differences in creative outcomes are often driven by the employee's cognitive style, including things like how they approach



complex problems and the type of information they consulted (Amabile, 1983, Amabile et al., 1996, Masten and Caldwell-Colbert, 1987). On the one hand, “adaptors” operate within specific frameworks without questioning their effectiveness; innovators, on the other hand, take more risky and new ideas. Innovators break the typical way of thinking (Kirton and De Ciantis, 1986) and approach problems from a different perspective than others (Singer, 1990).

## **Methodology and measurements**

The theoretical discussion above leads to the model in Figure 1. We propose using a latent variable to capture online social connectivity (OSC) composed of the ability to use online social technologies to improve social networks in organizations and the ability to use online social technologies to improve searching and organizing information (i.e., to improve knowledge management by finding information more quickly by capturing tacit knowledge, etc.). The circles in the figure represent latent variables and the rectangles represent measurement variables.

Figure 1 here

### ***Sampling and data collection***

In this study a questionnaire was sent to 475 engineers to measure the use of digital technologies and work practices. These are highly qualified and trained staff working for a multinational company in Europe. Engineers particularly fit into the empirical design of this study as they are the source of creativity (Tan and Chang, 2015), and the importance of research on the influence of new technologies on engineers' creativity was stated a few decades ago (Azani and Khorramshahgol, 1991).

To measure creativity in the workplace, 30 managers were asked to evaluate engineers who on their teams in terms of creativity performance. Each individual in the sample received an online survey.

The research team obtained separate questionnaires from 140 engineers and 12 managers. The response rate is 30% for engineers and 67% for managers. After matching the responses from engineers and managers, we had to drop 40 engineers who had not been evaluated by a manager. We dropped 20 additional cases due to excessive missing data. Therefore, the final sample consists of 80 engineers evaluated by 12 managers. Sample demographics are shown in Table 1, descriptive statistics and sources are presented in Table 2, and a correlation matrix is in Table 3.

Table 1, 2 and 3 here

### ***Measurement design***

A multiple-item, 7-point Likert-type scale (1=strongly disagree; 7=strongly agree) was applied for all constructs except for the creativity score. Each manager referred to four statements on the creative performance of each individual on his or her team from 1 to 10 (1 - not at all creative performance; 10 - very creative performance). The managers replied to the creativity questionnaire and the engineers to all other questionnaires. The creativity scale was adapted from Perry-Smith (2006). Cronbach's alpha for creativity was 0.97. To rule out any bias stemming from heterogeneity in different managers' assessments, we used the creativity score relative to the mean of each team:

$$relative_{creativity_j} = \frac{creativity_j}{\frac{\sum_{i=1}^{i=N} creativity_i}{N}}$$

where the relative creativity for engineer  $j$  is calculated dividing his/her creativity score ( $creativity_j$ ) by the average score of the team graded by the same manager. Our dependent variable measures the creativity of engineers with respect to their peers within the same team.

We used a scale developed by Agarwal and Prasad (1998) to obtain personal innovativeness. The

Cronbach's alpha for personal innovativeness was 0.83.

Online social connectivity was validated with a confirmatory factor analysis. The measurement variables used are getting new connections (Cronbach's alpha: 0.82), which consists of six items; re-connecting with other users (Cronbach's alpha: 0.83), with six items as well; and online social knowledge management, which consists of seven items measuring how engineers manage the knowledge through social media in relation to issues such as time, usefulness, diversity, tacitness, motivation and connections (both new and re-connections) which appeared in previous knowledge management studies (Offsey, 1997, Lewis et al., 2003, Hult et al., 2006, Acar et al., 2017) (Cronbach's alpha: 0.94).

Control variables, including intrinsic motivation, were measured with four items capturing the enjoyment in the tasks related to the work description. Cronbach's alpha for intrinsic motivation was 0.76. We measured creative process engagement with 11-item scale concerning problem identification, information searching, and idea generation (Zhang and Bartol, 2010); (Cronbach's alpha: 0.88).

Leadership, supervisory style, individual empowerment, and experience were included as control variables, as they may affect the engineers' creativity assessments (Khalili, 2016). We measured leadership with nine items that give a measure of leadership role of the engineer within their team (Ahearne et al. (2005); (Cronbach's alpha: 0.90). Supervisory style was measured with four items, which measures supervisors' micro-management style (Oldham and Cummings (1996); Cronbach's alpha: 0.69). Individual empowerment was measured with five items related to the control of an engineer's job-related tasks and responsibilities (Zhang and Bartol (2010); Cronbach's alpha: 0.61). We measured experience with the log of years because each employee is enrolled in the firm. We controlled for experience because more experienced employees may have acquired abilities that rank them higher in their creativity assessment. All these control variables were measured using a 7-point

Likert scale. The details of the construct are shown in the Appendix.

### ***Empirical strategy***

Our empirical strategy relies on fixed-effects structural equation modeling with a quasi-experimental design. An appropriate empirical strategy is required to obtain appropriate internal validity inferences in our cross-section non-special purpose setting. Stone-Romero and Rosopa (2008) documented how an inappropriate research design biases estimates of mediation models. Our approach is to use one quasi-experiment to test our assumed causal model. Our empirical design goes beyond the standard two non-random group design. In particular, we grouped the engineers according to their manager, with 12 groups in total. We then introduced a fixed-effects regression (one dummy per manager). Thus, we controlled statistically for any unobservable cofounds that might affect measurement at the manager-group level (Allison, 2009). However, this method presents a drawback that stems from the fact that our variable of interest is sampled at the engineer level, but measured at a higher level (i.e., manager) (Moulton, 1990). To minimize the effect of serial correlation among groups, we used clustered robust standard errors (Cameron and Miller, 2010).

To calculate direct, indirect, and total effects of mediation, we followed Baron and Kenny (1986), who divided the total effect of a mediated variable as the sum of the direct effect  $\beta_1$  and the indirect effect ( $\beta_2 \times \beta_3$ ). To test for the significance of the indirect effect, we used a Sobel (1986) test. When the indirect effect is significant, we can compute the relative importance of the mediator by:

$$\% \text{ Indirect effect} = \frac{(\beta_2 \times \beta_3)}{(\beta_2 \times \beta_3) + \beta_1}$$

### **Empirical results**

We began by estimating the full model, which includes a set of control variables (intrinsic motivation, leadership, creative process engagement, supervisory style, experience, and individual empowerment) along with a set of manager dummy variables. Additionally, we used robust standard errors clustered by manager.

The model fit indices lie within acceptable boundaries. The root mean squared error of approximation

(RSMEA) is 0.04, which is sufficiently close to 0, assuring that the population covariances are consistent. The Bentler Comparative Fit Index (CFI) is close to 1, meaning that there is a good fit of our target model vs. the independent model (where covariances are zero). The standardized root mean squared residual (SRMR) is 0.057, and thus we do not have to worry excessively about correlated residuals. Overall, these values suggest a good fit between the model and the observed data.

The reliability of the measurement variables in relation to the latent OSC construct is reported in the third column of Table 4. These squared multiple correlations (SMC) suggest that the construct OSC accounts for around 15% of the variance in each measurement variable.

Most of the control variables reported in Table 4 have expected signs. Leadership ( $\beta_5$ ), supervisory style ( $\beta_7$ ), and experience ( $\beta_8$ ) are significantly and positively associated with creativity. The results suggest that more experienced individuals with leadership attributes with a non-micro manager tend to be more creative on their job. We found no significant evidence that intrinsic motivation ( $\beta_4$ ), creative process engagement ( $\beta_6$ ), or individual empowerment ( $\beta_9$ ) had an effect on creativity.

Focusing on our variables of interest, we found positive and significant evidence that personal innovativeness ( $\beta_1$ ) ( $p < 0.05$ ) and connectivity ( $\beta_2$ ) ( $p < 0.1$ ) had a significant positive direct effect on creativity. In line with our theoretical arguments, these results confirm that more innovative people show higher levels of creativity.

Table 4 here

However, it is not the direct effect of OSC that we interested in, but rather the indirect effect that accounts for OSC's enhancing effect of personal innovativeness on creativity. To correctly test our hypothesis, we computed the indirect and total effects in the first row of Table 4. The indirect effects of OSC is positive (0.017) and significant ( $p < 0.10$ ). The total effect is the statistical sum of both direct and indirect effects, which are positive (0.093) and significant ( $p < 0.01$ ). Therefore, 18% of the association between personal innovativeness and creativity is explained by online social connectivity. To detangle the individual effects of networking and knowledge management, we have estimated a

model on the manifest level, examining the mediating role of new connections, re-connections, and knowledge management independently. The results of the direct effect, indirect effect, and total effect are reported in rows 2, 3, and 4 for new connections, re-connections, and knowledge management, respectively. It is readily seen that the only significant, indirect effect is that of new connections. In this model, 21% of the total effect of personal innovativeness on creativity is explained by new connections. For coherence, we have calculated the percentage of the indirect effect of re-connections (14%) and knowledge management (13%). However, these values should be interpreted with caution, as the indirect effect of these variables was not statistically significant.

Table 5 here

## **Conclusions**

As individuals increasingly use external online social technologies such as Twitter or LinkedIn and internal ones such as Yammer or Chatter for work-related purposes, it is crucial for organizations to understand to whom they should assign these technologies and how to use them in order to generate new ideas, which are the basis for innovation and competitive advantage (Sadowski, 1995). Our study reveals several insights that might be useful for current organizations in terms of increasing employee on-the-job creativity.

First, our results show that being innovative with new technologies is positively associated with engineers' creativity. This finding relates to the most recent study performed by Parise et al. (2015). They stated that just participating in diverse networks does not suffice for enhancing creative outcomes because additional capabilities, such as ability to identify and exploit new ideas, are needed. Moreover, similarly to research examining the link between creativity and individual features, such as (i) employee engagement in cognitive processes (Zhang and Bartol, 2010), (ii) personality (Mumford and Gustafson, 1988, Zhou, 2003), or intrinsic motivation (Grant and Berry, 2011), our

study demonstrates that these engineers who distinguished themselves in a willingness to play with new technology were evaluated as being more creative.

Kobe and Goller (2009), who studied the creativity of engineers, examined the prerequisites of creative outcomes, such as expertise, cognitive abilities and, motivation, and. In the category of personality traits, Malakate et al. (2007) related features such as risk-taking and self-confidence to personal innovativeness.

Second, our study suggests that online social connectivity mediates the effect of personal innovativeness on creativity. That is, being innovative with new technologies enhances the positive association of personal innovativeness and engineers' creativity.

This result relates to studies supporting positive perceptions of the technology's usefulness by users high in PIIT (Agarwal and Prasad, 1998, Jackson et al., 2013, Yi et al., 2006) as well as studies indicating benefits, such as diversity and social communication, of online social networks that influence positively creative outcomes (Wu, 2013). In our study, online social connectivity consists of making new connections, re-connecting through social media, and online social knowledge management. We found that innovative engineers tend to be more creative if they use social media to find and contact engineers who do not belong to their connections, but not if they renew their relationships with previously acquainted engineers.

Third, we found no evidence that the interdependence between creativity and personal innovativeness is significantly mediated by online social knowledge management, which is explained as the ability to use online social technologies to improve searching and organizing information. In the study undertaken by Giustiniano et al. (2016), heavy use of online communication technologies negatively moderated the interdependence between knowledge collection and organizational creativity. To explain this finding, the authors indicated that creativity is related to tacit knowledge, which is not easily transferred through communication technologies. Similarly, in our study, engineers achieved better creative outcomes from social interactions with people than interactions with data.

### ***Theoretical implications***

Precious research has examined the role of the strength of the tie (Perry-Smith and Shalley, 2003, Sosa, 2011), number of connections (Zhou et al., 2009), topic of communication (Gilson and Shalley, 2004), and network structure (Burt, 1992). Our study shifts the focus to a communication pattern, i.e., whether getting new connections or reconnecting brings better creative outcomes. Research related to communication patterns has already captured the attention of some scholars. For example, Madjar et al. (2002) indicated that work-related (coworkers and supervisors) and nonwork (friends and family members) support positively influenced creative performance. Andersen and Kragh (2015) argued that supervisors need to define the creative space and act in the creative space. Our study suggests that communication patterns, especially with that use of networking platforms, need further analysis. Our results also show that in a digital age some individual characteristics such as personal innovativeness matter more than others in terms of creative outcomes. Moreover, another theoretical implication is that personal innovativeness is mediated by connectivity, consisting of making new connections, re-connecting through social media, and online social knowledge management. Therefore, our contribution is to see how the use of social technologies disrupts current wisdom. Social technologies would affect creativity by exacerbating (or possibly reducing) the effects of the conventional creativity drivers, such as the creative process engagement or the intrinsic motivation of each person. For instance, for people who tend to approach problems with a data-driven analytical mindset (which in itself would be good for creativity), the additional information coming from their use of social networks would facilitate their creative output as they produce innovative ideas or new solutions to business problems.

### ***Practical implications***

Organizations may use the findings of our study in their employee selection procedures. This suggestion has already appeared in other studies (Asson et al., 2017). However, relationships between



personal innovativeness and creative outcomes have not been discussed. According to our study, an assessment of personal innovativeness in the case of engineers may bring advantages in attaining higher levels of creativity.

Another important implication concerns how employees should use social media to facilitate their creativity. It is not enough simply to register on internal or external social media to enhance creative performance. Additional networking activities such as connecting to new employees through social media, connecting to new people working for partner companies, or connecting to new external professionals are needed to ensure better connectivity throughout an organization.

Drawing on the concept of organizational memory developed by Alavi and Leidner (2001), our study reveals that online social technologies can improve the cognitive aspect by leveraging spontaneous moments of personal innovativeness. Companies willing to improve their employee creativity should implement platforms with user-friendly functionalities of storing and searching data (Olszak et al.). This way, organizations may encourage employees to use these platforms to find information more quickly and capture tacit knowledge.

### ***Limitations***

As a closing remark, this study presents certain limitations. We surveyed a particular type of employees, i.e. engineers. We decided to examine individuals in engineering positions because they often serve as entrepreneurs in organizations (Menzel et al., 2007). However, another studies are needed to examine online social technologies and creativity for other positions.

Moreover, our study was conducted in the United States, where online social networking technologies were born. The influence of online social connectivity and online social knowledge management on creativity might be different in European countries.

Additionally, our research design has certain caveats. Our fixed-effects clustered SEM analysis allows us to have moderate internal validity inferences. Therefore, we cannot completely rule out alternative confounding factors that were not included in our model to explain our statistically

significant results.

Finally, data were obtained from engineers working for a large IT company on the Fortune 500 list.

Future research could examine whether results for small and medium enterprises reflect the findings from this study.

Figure 1. The Model

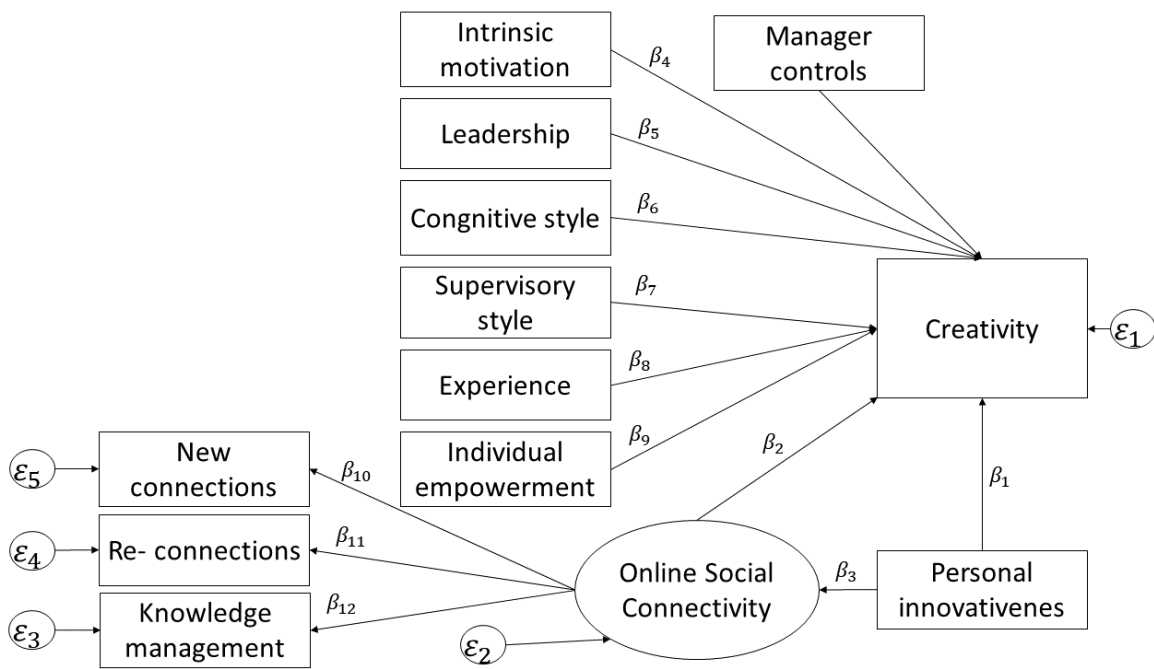


Table 1: Demographics

	mean	sd	max	min
Age	37.67089	9.483753	65	23
Working years	3.240625	3.476286	17	1
Gender	1.075	.2650531	2	1
(1=male)*				
<i>N</i>	80			

\*(6 females in total)

Table 2: descriptive statistics and sources

		Type & source	Cronbach alpha	mean	sd	max	min
Creativity	<i>Dependent variable</i>	7-point Likert (Perry-Smith (2006))	0.97	1	.284	2.042	.134
Personal Innovativeness	<i>predictor</i>	7-point Likert (Agarwal and Prasad (1998))		5.34	.995	6.833	2.167
New connections	<i>mediator</i>	7-point Likert <i>ad hoc</i>	0.82	3.654	1.693	7	1
Re-connections	<i>mediator</i>	7-point Likert <i>ad hoc</i>	0.83	3.661	1.690	7	1
Online social knowledge management (OSKM)	<i>mediator</i>	7-point Likert <i>ad hoc</i>	0.94	4.575	2.048	7	1
Intrinsic motivation	<i>control</i>	7-point Likert <i>ad hoc</i>	0.76	6.006	.841	7	4
Creative process engagement	<i>control</i>	7-point Likert (Zhang and Bartol, 2010)	0.88	5.640	.817	7	3

log(experience)	<i>control</i>	Log of years		1.228	.604	2.890372	.693
Leadership	<i>control</i>	7-point Likert (Ahearne et al. (2005))	0.90				
Individual empowerment	<i>control</i>	7-point Likert (Zhang and Bartol (2010))	0.61	4.76	.990	6.8	1.8
Supervisory Style	<i>control</i>	7-point Likert (Oldham and Cummings (1996))	0.69	3.118	.923	7	1

Table 3: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1- Creativity	1									
2- P. Innovativeness	0.220	1								
3. New connections	0.230*	0.318**	1							
4. Re-connections	0.181	0.257*	0.869***	1						
5. OSKM	0.193	0.222*	0.823***	0.828***	1					
6. Intrinsic motivation	-0.114	0.245*	0.101	0.149	0.138	1				
7- Leadership	0.0779	0.209	0.135	0.0988	0.197	0.326**	1			
8- Creative proc. eng.	-0.045	0.363***	0.163	0.168	0.268*	0.574***	0.467***	1		
9- Ind. empowerment	0.0853	0.169	0.0762	0.0789	0.113	0.0747	0.0611	0.275*	1	
10. Supervisory Style	0.0641	0.0381	0.188	0.138	0.256*	0.117	0.155	0.249*	0.0904	1
11. Log Experience	0.136	-0.165	-0.191	-0.165	-0.160	0.0328	-0.223*	-0.153	0.0973	-0.210

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

Table 4: SEM mediating effect of latent online social connectivity.

	Direct Effect on creativity	Effect on OSC	Direct effect on OSC measurement (latent)
Personal Innovativeness ( $\beta_1$ )	0.075** (0.03)		
Online Social Connectivity ( $\beta_2$ )	0.005* (0.00)		
P. Innovativeness->OSC ( $\beta_3$ )		3.269*** (1.25)	
Intrinsic motivation ( $\beta_4$ )	-0.076 (0.05)		
Leadership ( $\beta_5$ )	0.076* (0.04)		
Creative proc. eng. ( $\beta_6$ )	-0.055 (0.05)		
Supervisory Style ( $\beta_7$ )	0.022*		

	(0.01)	
log(experience) ( $\beta_8$ )	0.159***	
	(0.06)	
Individual empowerment ( $\beta_9$ )	0.017	
	(0.03)	
New connections ( $\beta_9$ )		0.140***
		(0.01)
RE- connections ( $\beta_{10}$ )		0.150***
		(0.01)
Knowledge Management ( $\beta_{11}$ )		0.150***
		(0.01)

---

Notes:

Observations: 80; Root mean squared error of approximation (RSMEA): 0.04; Comparative fit index (CFI): 0.977; Standardized root mean squared residual (SRMR): 0.057

Robust standard errors in parentheses, clustered by manager.

Manager dummies included but not reported.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Table 5: SEM mediating effect of the individual factors online social connectivity.

		Direct Effect	Indirect effect	Total effect	% Indirect effect
		$\beta_1$	$(\beta_2 \times \beta_3)$	$(\beta_2 \times \beta_3) + \beta_1$	$\frac{(\beta_2 \times \beta_3)}{(\beta_2 \times \beta_3) + \beta_1}$
Personal Innovativeness	$(\beta_1)$	0.075**	0.017*	0.093***	18%
mediated by OSC (latent)					
Personal Innovativeness	$(\beta_1)$	0.071**	0.019*	0.090***	21%
mediated by New connections					
Personal Innovativeness	$(\beta_1)$	0.081**	0.013	0.093***	14%
mediated by Re connections					
Personal Innovativeness	$(\beta_1)$	0.083**	0.012	0.095***	13%
mediated by Knowledge management					

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Appendix

### **Online Social Connectivity**

#### **New Connections**

Level of agreement...Social media has helped me connect to ABC employees I did not know before.

Level of agreement...Social media has helped me connect to people working for our partner companies I did not know before.

Level of agreement...Social media has helped me connect to external professionals (i.e. experts not working neither at ABC nor in partner companies) I did not know before.

#### **Re-connections**

Level of agreement...Using social media has helped me communicate with more colleagues from other ABC divisions with which I would have not communicated otherwise.

Level of agreement...Using social media has helped me communicate with employees of our partner companies (e.g. Cisco, Microsoft etc.) with which I would have not communicated otherwise.

Level of agreement.. Using social media has helped me communicate with more experts and peers outside ABC and ABC's partners (e.g. other engineers, etc.) with which I would have not communicated otherwise.

#### **Online social knowledge management**

Level of agreement...Social media has allowed me find information more quickly.

Level of agreement...Social media has allowed me obtain useful information for my work I was not actively searching.

Level of agreement...Social media has allowed me access more diverse perspectives about current work issues.

Level of agreement...Social media has allowed me access capturing tacit knowledge (aspects of tasks, routines, and know-how in ABC) more easily.

Level of agreement...Social media has given me the motivation to share information I would not share otherwise.

Level of agreement...Social media has helped me find people with professional interests close to those of mine.

Level of agreement...Social media encourages me to explore new connections.

## References

- Acar, M. F., Tarim, M., Zaim, H., Zaim, S. and Delen, D. (2017), "Knowledge management and ERP: Complementary or contradictory?", *International Journal of Information Management*, Vol. 37 No. 6, pp. 703-712.
- Agarwal, R. (2000), "Individual Acceptance of New Information Technologies", in Zmud, R. W. (Ed.) *Framing the Domains of IT Management Research: Glimpsing the Future through the Past*, Pinnaflex, pp. 85-104., Cincinnati, OH.
- Agarwal, R. and Prasad, J. (1998), "A conceptual and operational definition of personal innovativeness in the domain of information technology", *Information systems research*, Vol. 9 No. 2, pp. 204-215.
- Agarwal, R. and Prasad, J. (1999), "Are individual differences germane to the acceptance of new information technologies?", *Decision sciences*, Vol. 30 No. 2, pp. 361-391.
- Ahearne, M., Mathieu, J. and Rapp, A. (2005), "To empower or not to empower your sales force? An empirical examination of the influence of leadership empowerment behavior on customer satisfaction and performance", *Journal of Applied psychology*, Vol. 90 No. 5, p. 945.
- Alavi, M. and Leidner, D. E. (2001), "Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues", *MIS quarterly*, pp. 107-136.
- Allison, P. D. (2009), *Fixed effects regression models*, SAGE, Los Angeles.
- Amabile, T. M. (1983), "The social psychology of creativity: A componential conceptualization", *Journal of personality and social psychology*, Vol. 45 No. 2, p. 357.
- Amabile, T. M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996), "Assessing the Work Environment for Creativity", *Academy of Management Journal*, Vol. 39 No. 5, pp. 1154-1184.
- Andersen, P. H. and Kragh, H. (2015), "Exploring boundary-spanning practices among creativity managers", *Management Decision*, Vol. 53 No. 4, pp. 786-808.
- Arthur, R. (2014), "How Hermès Is Winning With Creative Online Content", <http://www.forbes.com/sites/rachelarthur/2014/10/24/how-hermes-is-winning-with-creative-online-content/>.
- Asson, T., White, D., Huntington, J., Humphries, A., Walley, K. and Goodall, S. (2017), "Key dimensions of personal innovativeness", *International Journal of Business Innovation and Research*, Vol. 12 No. 2.
- Azani, H. and Khorramshahgol, R. (1991), "The impact of automation on engineers' creativity and innovation and its implications for reducing resistance to change", *Computers in industry*, Vol. 16 No. 4, pp. 377-383.
- Baas, M., De Dreu, C. K. and Nijstad, B. A. (2008), "A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus?", *Psychological bulletin*, Vol. 134 No. 6, p. 779.
- Baer, M. (2010), "The strength-of-weak-ties perspective on creativity: a comprehensive examination and extension", *Journal of applied psychology*, Vol. 95 No. 3, p. 592.
- Berente, N., Gal, U. and Hansen, S. (2011), "Ethical implications of social stratification in information systems research", *Information Systems Journal*, Vol. 21 No. 4, pp. 357-382.
- Burt, R. S. (1992), *Structural holes: The social structure of competition*, Harvard University Press, Cambridge, MA.
- Burt, R. S. (2004), "Structural holes and good ideas1", *American journal of sociology*, Vol. 110 No. 2, pp. 349-399.
- Cameron, A. C. and Miller, D. L. (2010), "Robust inference with clustered data", *Handbook of empirical economics and finance*, pp. 1-28.
- Černe, M., Nerstad, C. G., Dysvik, A. and Škerlavaj, M. (2014), "What goes around comes around: Knowledge hiding, perceived motivational climate, and creativity", *Academy of Management Journal*, Vol. 57 No. 1, pp. 172-192.

- Constant, D., Sproull, L. and Kiesler, S. (1996), "The kindness of strangers: The usefulness of electronic weak ties for technical advice", *Organization science*, Vol. 7 No. 2, pp. 119-135.
- Davis, J. M. and Mun, Y. Y. (2012), "User disposition and extent of Web utilization: A trait hierarchy approach", *International Journal of Human-Computer Studies*, Vol. 70 No. 5, pp. 346-363.
- Davis, M. A. (2009), "Understanding the relationship between mood and creativity: A meta-analysis", *Organizational behavior and human decision processes*, Vol. 108 No. 1, pp. 25-38.
- Dougherty, D. (1992), "Interpretive barriers to successful product innovation in large firms", *Organization Science*, Vol. 3 No. 2, pp. 179-202.
- Drazin, R., Glynn, M. A. and Kazanjian, R. K. (1999), "Multilevel theorizing about creativity in organizations: A sensemaking perspective", *Academy of Management Review*, Vol. 24 No. 2, pp. 286-307.
- Faraj, S., Jarvenpaa, S. L. and Majchrzak, A. (2011), "Knowledge collaboration in online communities", *Organization science*, Vol. 22 No. 5, pp. 1224-1239.
- Fenton, C. and Langley, A. (2011), "Strategy as practice and the narrative turn", *Organization studies*, Vol. 32 No. 9, pp. 1171-1196.
- Fischer, G., Giaccardi, E., Eden, H., Sugimoto, M. and Ye, Y. (2005), "Beyond binary choices: Integrating individual and social creativity", *International Journal of Human-Computer Studies*, Vol. 63 No. 4-5, pp. 482-512.
- Fischer, G., Rohde, M. and Wulf, V. (2007), "Community-based learning: The core competency of residential, research-based universities", *Computer-Supported Collaborative Learning*, Vol. 2 No. 1, pp. 9-40.
- Gilson, L. L. and Shalley, C. E. (2004), "A little creativity goes a long way: An examination of teams' engagement in creative processes", *Journal of management*, Vol. 30 No. 4, pp. 453-470.
- Giustiniano, L., Lombardi, S. and Cavaliere, V. (2016), "How knowledge collecting fosters organizational creativity", *Management Decision*, Vol. 54 No. 6, pp. 1464-1496.
- Gong, Y., Cheung, S.-Y., Wang, M. and Huang, J.-C. (2012), "Unfolding the proactive process for creativity integration of the employee proactivity, information exchange, and psychological safety perspectives", *Journal of Management*, Vol. 38 No. 5, pp. 1611-1633.
- Gong, Y., Zhou, J. and Chang, S. (2013), "Core knowledge employee creativity and firm performance: The moderating role of riskiness orientation, firm size, and realized absorptive capacity", *Personnel Psychology*, Vol. 66 No. 2, pp. 443-482.
- Gough, H. G. (1979), "A creative personality scale for the Adjective Check List", *Journal of personality and social psychology*, Vol. 37 No. 8, p. 1398.
- Grant, A. M. and Berry, J. W. (2011), "The necessity of others is the mother of invention: Intrinsic and prosocial motivations, perspective taking, and creativity", *Academy of management journal*, Vol. 54 No. 1, pp. 73-96.
- Haas, M. R., Criscuolo, P. and George, G. (2014), "Which problems to solve? Online knowledge sharing and attention allocation in organizations", *Academy of Management Journal*, p. amj. 2013.0263.
- Hargadon, A. and Sutton, R. I. (1997), "Technology brokering and innovation in a product development firm", *Administrative science quarterly*, pp. 716-749.
- Hirst, G., Van Knippenberg, D., Zhou, J., Quintane, E. and Zhu, C. (2015), "Heard it through the grapevine: Indirect networks and employee creativity", *Journal of Applied Psychology*, Vol. 100 No. 2, p. 567.
- Hult, G. T. M., Ketchen Jr, D. J., Cavusgil, S. T. and Calantone, R. J. (2006), "Knowledge as a strategic resource in supply chains", *Journal of operations management*, Vol. 24 No. 5, pp. 458-475.
- Hurt, H. T., Joseph, K. and Cook, C. D. (1977), "Scales for the measurement of innovativeness", *Human Communication Research*, Vol. 4 No. 1, pp. 58-65.
- Huy, Q. and Shipilov, A. (2012), "The key to social media success within organizations", *MIT Sloan Management Review*, Vol. 54 No. 1, pp. 73-81.
- Inkpen, A. C. and Tsang, E. W. K. (2005), "Social capital, networks, and knowledge transfer", *Academy of management review*, Vol. 30 No. 1, pp. 146-165.

- Jackson, J. D., Mun, Y. Y. and Park, J. S. (2013), "An empirical test of three mediation models for the relationship between personal innovativeness and user acceptance of technology", *Information & Management*, Vol. 50 No. 4, pp. 154-161.
- Kane, G. C., Alavi, M., Labianca, G. and Borgatti, S. P. (2014), "WHAT'S DIFFERENT ABOUT SOCIAL MEDIA NETWORKS? A FRAMEWORK AND RESEARCH AGENDA", *MIS Quarterly*, Vol. 38 No. 1, pp. 275-304.
- Khalili, A. (2016), "Linking transformational leadership, creativity, innovation, and innovation-supportive climate", *Management Decision*, Vol. 54 No. 9, pp. 2277-2293.
- Kidane, Y. H. and Gloor, P. A. (2007), "Correlating temporal communication patterns of the Eclipse open source community with performance and creativity", *Computational and mathematical organization theory*, Vol. 13 No. 1, pp. 17-27.
- Kirton, M. J. and De Ciantis, S. M. (1986), "Cognitive style and personality: The Kirton adaption-innovation and Cattell's sixteen personality factor inventories", *Personality and Individual Differences*, Vol. 7 No. 2, pp. 141-146.
- Kobe, C. and Goller, I. (2009), "Assessment of product engineering creativity", *Creativity and Innovation Management*, Vol. 18 No. 2, pp. 132-140.
- Lewis, W., Agarwal, R. and Sambamurthy, V. (2003), "Sources of influence on beliefs about information technology use: an empirical study of knowledge workers", *MIS quarterly*, pp. 657-678.
- Li, X., Hsieh, J. P.-A. and Rai, A. (2013), "Motivational differences across post-acceptance information system usage behaviors: An investigation in the business intelligence systems context", *Information systems research*, Vol. 24 No. 3, pp. 659-682.
- Liu, D., Gong, Y., Zhou, J. and Huang, J.-C. (2017), "Human resource systems, employee creativity, and firm innovation: The moderating role of firm ownership", *Academy of Management Journal*, Vol. 60 No. 3, pp. 1164-1188.
- Madjar, N., Oldham, G. R. and Pratt, M. G. (2002), "There's no place like home? The contributions of work and nonwork creativity support to employees' creative performance", *Academy of Management Journal*, Vol. 45 No. 4, pp. 757-767.
- Magni, M., Taylor, M. S. and Venkatesh, V. (2010), "'To play or not to play': A cross-temporal investigation using hedonic and instrumental perspectives to explain user intentions to explore a technology", *International journal of human-computer studies*, Vol. 68 No. 9, pp. 572-588.
- Malakate, A., Andriopoulos, C. and Gotsi, M. (2007), "Assessing job candidates' creativity: Propositions and future research directions", *Creativity and Innovation Management*, Vol. 16 No. 3, pp. 307-316.
- Masten, W. G. and Caldwell-Colbert, A. T. (1987), "Relationship of originality to Kirton's scale for innovators and adaptors", *Psychological Reports*, Vol. 61 No. 2, pp. 411-416.
- Menzel, H. C., Aaltio, I. and Ulijn, J. M. (2007), "On the way to creativity: Engineers as intrapreneurs in organizations", *Technovation*, Vol. 27 No. 12, pp. 732-743.
- Moulton, B. R. (1990), "An illustration of a pitfall in estimating the effects of aggregate variables on micro units", *The review of Economics and Statistics*, pp. 334-338.
- Mumford, M. D. and Gustafson, S. B. (1988), "Creativity syndrome: Integration, application, and innovation", *Psychological bulletin*, Vol. 103 No. 1, p. 27.
- Nonaka, I. and Von Krogh, G. (2009), "Perspective-tacit knowledge and knowledge conversion: Controversy and advancement in organizational knowledge creation theory", *Organization science*, Vol. 20 No. 3, pp. 635-652.
- Obstfeld, D. (2005), "Social networks, the tertius iungens orientation, and involvement in innovation", *Administrative science quarterly*, Vol. 50 No. 1, pp. 100-130.
- Offsey, S. (1997), "Knowledge management: linking people to knowledge for bottom line results", *Journal of knowledge management*, Vol. 1 No. 2, pp. 113-122.
- Oldham, G. R. and Cummings, A. (1996), "Employee Creativity: Personal and Contextual Factors at Work", *Academy of Management Journal*, Vol. 39 No. 3, pp. 607-634.

- Olszak, C. M., Bartuś, T. and Lorek, P. "A comprehensive framework of information system design to provide organizational creativity support", *Information & Management*.
- Panahi, S., Watson, J. and Partridge, H. (2012), "Social media and tacit knowledge sharing: developing a conceptual model", *World academy of science, engineering and technology*, No. 64, pp. 1095-1102.
- Parise, S., Whelan, E. and Todd, S. (2015), "How Twitter Users Can Generate Better Ideas", *MIT Sloan Management Review*, Vol. 56 No. 4, p. 21.
- Peng, J., Zhang, G., Fu, Z. and Tan, Y. (2014), "An empirical investigation on organizational innovation and individual creativity", *Information Systems and e-Business Management*, Vol. 12 No. 3, pp. 465-489.
- Perry-Smith, J. E. (2006), "Social yet creative: The role of social relationships in facilitating individual creativity", *Academy of Management journal*, Vol. 49 No. 1, pp. 85-101.
- Perry-Smith, J. E. (2014), "Social network ties beyond nonredundancy: An experimental investigation of the effect of knowledge content and tie strength on creativity", *Journal of Applied Psychology*, Vol. 99 No. 5, p. 831.
- Perry-Smith, J. E. and Mannucci, P. V. (2017), "From creativity to innovation: The social network drivers of the four phases of the idea journey", *Academy of Management Review*, Vol. 42 No. 1, pp. 53-79.
- Perry-Smith, J. E. and Shalley, C. E. (2003), "The social side of creativity: A static and dynamic social network perspective", *Academy of management review*, Vol. 28 No. 1, pp. 89-106.
- Piskorski, M. J. (2011), "Social strategies that work", *Harvard Business Review*, Vol. 89 No. 11, pp. 116-122.
- Powell, A. L. (2013), "Computer anxiety: Comparison of research from the 1990s and 2000s", *Computers in Human Behavior*, Vol. 29 No. 6, pp. 2337-2381.
- Powell, W. W., White, D. R., Koput, K. W. and Owen-Smith, J. (2005), "Network dynamics and field evolution: The growth of interorganizational collaboration in the life sciences<sup>1</sup>", *American journal of sociology*, Vol. 110 No. 4, pp. 1132-1205.
- Ramalingam, T., Karim, J. A., Piaralal, S. and Singh, B. (2015), "Creativity and Innovation (Organizational Factor) Influence on Firm Performance: An Empirical Study on Malaysian Telecommunication Mobile Network Operators", *American Journal of Economics*, Vol. 5 No. 2, pp. 194-199.
- Ryan, R. M. and Deci, E. L. (2000), "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being", *American psychologist*, Vol. 55 No. 1, p. 68.
- Sadowski, S. T. (1995), "The knowledge-creating company: How Japanese companies foster creativity and innovation for competitive advantage", *The Academy of Management Executive*, Vol. 9 No. 3, pp. 83-85.
- Schilling, M. A. and Phelps, C. C. (2007), "Interfirm collaboration networks: The impact of large-scale network structure on firm innovation", *Management Science*, Vol. 53 No. 7, pp. 1113-1126.
- Scratchley, L. S. and Hakstian, A. R. (2001), "The measurement and prediction of managerial creativity", *Creativity Research Journal*, Vol. 13 No. 3-4, pp. 367-384.
- Singer, M. (1990), "Individual differences in adaption-innovation and the escalation of commitment paradigm", *The Journal of Social Psychology*, Vol. 130 No. 4, pp. 561-563.
- Sosa, M. E. (2011), "Where do creative interactions come from? The role of tie content and social networks", *Organization Science*, Vol. 22 No. 1, pp. 1-21.
- Stone-Romero, E. F. and Rosopa, P. J. (2008), "The relative validity of inferences about mediation as a function of research design characteristics", *Organizational Research Methods*, Vol. 11 No. 2, pp. 326-352.
- Sun, H. (2012), "UNDERSTANDING USER REVISIONS WHEN USING INFORMATION SYSTEM FEATURES: ADAPTIVE SYSTEM USE AND TRIGGERS", *Mis Quarterly*, Vol. 36 No. 2.

- Swap, W., Leonard, D. and Mimi Shields, L. A. (2001), "Using mentoring and storytelling to transfer knowledge in the workplace", *Journal of management information systems*, Vol. 18 No. 1, pp. 95-114.
- Szulanski, G. (1996), "Exploring internal stickiness: Impediments to the transfer of best practice within the firm", *Strategic management journal*, Vol. 17 No. S2, pp. 27-43.
- Tan, C. L. and Chang, Y. P. (2015), "Does Organizational Learning Affect R&D Engineers' Creativity?", *Asian Social Science*, Vol. 11 No. 16, p. 137.
- Tippins, M. J. and Sohi, R. S. (2003), "IT competency and firm performance: is organizational learning a missing link?", *Strategic management journal*, Vol. 24 No. 8, pp. 745-761.
- Tsai, W. and Ghoshal, S. (1998), "Social capital and value creation: The role of intrafirm networks", *Academy of management Journal*, Vol. 41 No. 4, pp. 464-476.
- Tsoukas, H. (2009), "A dialogical approach to the creation of new knowledge in organizations", *Organization Science*, Vol. 20 No. 6, pp. 941-957.
- Utman, C. H. (1997), "Performance effects of motivational state: A meta-analysis", *Personality and Social Psychology Review*, Vol. 1 No. 2, pp. 170-182.
- Von Hippel, E. (1994), "'Sticky information" and the locus of problem solving: implications for innovation", *Management science*, Vol. 40 No. 4, pp. 429-439.
- Wang, W., Li, X. and Hsieh, J. P.-A. (2013), "The contingent effect of personal IT innovativeness and IT self-efficacy on innovative use of complex IT", *Behaviour & information technology*, Vol. 32 No. 11, pp. 1105-1124.
- Wu, L. (2013), "Social Network Effects on Productivity and Job Security: Evidence from the Adoption of a Social Networking Tool", *Information Systems Research*, Vol. 24 No. 1, pp. 30-51.
- Yi, M. Y., Fiedler, K. D. and Park, J. S. (2006), "Understanding the role of individual innovativeness in the acceptance of IT-based innovations: Comparative analyses of models and measures", *Decision Sciences*, Vol. 37 No. 3, pp. 393-426.
- Zhang, X. and 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*, Vol. 53 No. 1, pp. 107-128.
- Zhou, J. (2003), "When the presence of creative coworkers is related to creativity: role of supervisor close monitoring, developmental feedback, and creative personality", *Journal of applied psychology*, Vol. 88 No. 3, p. 413.
- Zhou, J., Shin, S. J., Brass, D. J., Choi, J. and Zhang, Z.-X. (2009), "Social networks, personal values, and creativity: evidence for curvilinear and interaction effects", *Journal of Applied Psychology*, Vol. 94 No. 6, p. 1544.

