

Transformational Leadership and Digital Creativity: The Mediating Roles of Creative Self-Efficacy and Ambidextrous Learning

Completed Research Paper

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Abstract

Drawing insights from social cognitive theory and organizational learning theory, this study aims to uncover the mediating mechanisms between direct manager's transformational leadership behaviors and employees' digital creativity in the context of digital technology. We conducted a field survey in China and collected data from 234 employees who utilized digital technologies to support daily work. Structural equation modelling analysis results showed that employees' creative self-efficacy and two learning activities (exploitation vs. exploration) effectively transmitted the influence of transformational leadership on digital creativity. Our study not only contributes to the understanding on effective use of digital technologies, but also provides practical insights for managers in the big data era.

Keywords: Transformational Leadership, Digital Creativity, Creative Self-Efficacy, Exploitation, Exploration

Introduction

Digital technology refers to the group of technological tools that help users identify, analyze, create, communicate, and utilize information in a digital context, e.g., social networking, cloud-computing, internet-of-things (IoT), and artificial intelligence (Lee, 2013; Quora, 2018). The worldwide spending on digital technologies is estimated to reach \$1.97 trillion by 2022, with a five-year compound annual growth rate of 16.7% from 2017 to 2022 (IDC, 2017a). As big data enjoys hay day in the past ten years, organizations are keen to implement digital technologies to gain competitive advantages in the global market, though still face many challenges in realizing new business innovations with digital technologies (Albanese & Manning, 2016). Unfortunately, most organizations stay at the initial phase of digital maturity, i.e., they have not fully assimilated digital technologies but trapped in the "digital impasse" (IDC, 2017b). One of the key reasons attributable to the "digital impasse" is that employees as end users of digital technologies within organizations failed to effectively utilize digital technologies and realize digital innovation (Chung et al., 2015; Oldham & Da Silva, 2015; Nambisan et al., 2017).

Digital creativity characterizes employees' ability to create new ideas in support of business processes using digital technologies (Lee, 2013; Nambisan et al., 2017). Digital creativity has attracted much research attention over the past few years and scholars approach employees' digital creativity through three alternative theoretical perspectives (Chung et al., 2015; Seo et al., 2015). One stream of studies focused on task characteristics, e.g., task complexity (Chae et al. 2015), the fit between task and

technology (Chung et al. 2015); the other stream of studies paid attention to organizational characteristics, e.g., organizational learning culture and social network structures (Hahn et al. 2013); the third one concentrated on individual characteristics, e.g., employee knowledge and absorptive capacity (Seo et al. 2015). The accumulated knowledge indeed provides us insights in understanding digital technologies and digital creativity, still, little is known through the theoretical lens of leadership. According to Fitzgerald et al. (2014), managers' lack of leadership skills is one of the biggest obstacles that impede organizations' successful implementation and utilization of digital technologies to generate business values. Notably, transformational leadership has been recognized as one of the most powerful sources that inspire employees' creativity by stimulating their internal psychological motivations in organizational contexts (Shin and Zhou, 2003; Piccolo et al., 2006; Gumusluoglu and Ilsev, 2009). However, little is known about how direct managers' transformational leadership influences employees' creativity in the context of digital technology. There is a significant research gap regarding the mediation mechanism between the two constructs.

Toward this end, our research motivations are two-fold. Firstly, we introduce transformational leadership into the digital technology context and examine its influence on employees' digital creativity. Second, we also attempt to uncover the mediating mechanisms between transformational leadership and digital creativity. Particularly, we draw insights from social cognitive theory (Bandura 1978, 1991) and organizational learning theory (March 1991), and identify three mechanisms of creative self-efficacy, exploitation, and exploration. Next, we review the extant literature on transformational leadership, creative self-efficacy, exploitation and exploration, and digital creativity. We then propose the research model and corresponding hypotheses, followed by method, data analysis, and results. We conclude the paper with a discussion on theoretical and practical implications of our findings.

Literature Review

Transformational Leadership

Transformational leadership is recognized as one of the most powerful organizational leadership styles. Burns (1978) was the first to propose the framework of transformational leadership. When writing biographies of political leaders, Burns found that some leaders motivate followers by changing their personal needs and values. In the light of Burns' works, Bass (1985) extended the transformational-leadership theory into the organizational context. According to Bass (1985), transformational leaders motivate followers by internalizing the organizational visions and values, aligning their individual interests with organizational benefits, and encouraging followers to achieve higher order personal needs (Bass, 2006). According to Multifactor Leadership Questionnaire (MLQ) (Bass & Avolio, 2000), the most widely used measurement set, transformational leadership is comprised of four sub-dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass 1985, 1998). The description of each sub-dimension is shown in Table 1.

Table 1. Descriptions of Transformational Leadership

Sub-Dimension	Descriptions
Idealized Influence (ID)	Instills pride, gains respect, and provides a strong sense of vision and purpose
Inspirational Motivation(IM)	Communicates high expectations, uses symbols to focus efforts, express important purposes in simple ways.
Intellectual Stimulation(IS)	Promotes intelligence, rationality, and careful problem solving.
Individualized Consideration(IC)	Gives personal attention, treats each employee individually, coaches, advises.

The theory of transformational leadership has been extensively applied in organizational and business settings (Bass and Riggio 2006, Yukl, 2006), and it was identified as a significant antecedent that drives employees' creativity in organization contexts (Jaiswal et al., 2015; Li et al., 2015; Mittal & Dhar, 2015). In the past few years, transformational leadership has also attracted much attention from IS scholars (Shao et al., 2016; Shao et al., 2017; Shao, 2018), however, little empirical validation has been obtained

in the digital technology context. The next section will provide an introduction of digital creativity.

Digital Creativity

Creativity is defined as an individual's ability to create new ideas and constructive outcomes for problem solving, and it is regarded as one of the most important factors to enhance innovativeness and competitiveness of the organizations (Amabile, 1988; Lapierre & Giroux, 2003). Digital creativity gradually permeates in both life and work and provides a better environment for organizational development (Lee, 2013). Founded on the conceptualization of creativity, digital creativity emphasizes the creativity embodied by the use of digital technologies, and it is defined as the creation of market offerings, business processes, or models that result from the use of digital technologies, such as big data, cloud computing and internet of things (Lee, 2013; Nambisan et al., 2017). The definition is consistent with effective and innovative usage of information technologies, as suggested in the previous literature (Burton-Jones & Grange, 2012; Li et al., 2013). In order to achieve the goals for using digital technologies in support of business operations and innovations, employees must make an innovative and creative usage of emerging technologies.

In the past few years, digital creativity has become an emerging research field due to its rapid growth and relative novelty (Lee, 2015). The appearance of digitization has attracted scholars' attention to question the usefulness of extant organizational innovation theory (Nambisan et al., 2017). In organizations, employees' daily works are supported by various digital technologies (Lee, & Chen, 2015). There is a great call for novel theorizing on digital innovation and creativity management that draws on the rapidly emerging research on digital technologies (Hahn et al., 2013; Oldham et al., 2015; Nambisan et al., 2017). Accordingly, this study considers digital creativity as an outcome variable and examines its impact mechanism from a transformational leadership lens. The next sections will provide an overview on the three potential mediation mechanisms between transformational leadership and digital creativity.

Creative Self-Efficacy

The concept of self-efficacy originated from social cognitive theory, and it refers to a confidence level of an individual's ability to complete the job (Bandura, 1978). Self-efficacy was identified as a significant intrinsic motivation that determines individuals' persistence in adversity and the efforts they make to accomplish specific tasks (Bandura, 1991; Lin, 2007; Shao et al., 2015). Based on Bandura's conceptualization of self-efficacy, Tierney and Farmer (2002) proposed the construct of creative self-efficacy, and defined it as an individual's judgment of his/her ability to generate creative ideas and produce innovative behaviors. Creative self-efficacy was recognized as an individual's self-evaluation of his/her own behavior in an innovative activity. The higher an individual's creative self-efficacy, the more willing he/she is to learn and study new things and knowledge spontaneously (Tierney & Farmer, 2011).

With the advent of the digital economy, the emerging digital technologies usually pose a high-knowledge cognitive burden that challenges employees. Creative self-efficacy can help encourage individuals to generate innovative ideas and make efforts to achieve it (Yang & Cheng, 2009; Shao et al., 2015), and it may play an essential role in employees' application and creativity of digital technologies (Seo et al., 2015). In a recent study, Mittal et al. (2015) reported that transformational leadership is beneficial to increase employees' creativity in the context of Indian organizations. Thus, this study adopts creative self-efficacy as a significant intrinsic motivation to examine its mediating mechanism between transformational leadership and digital creativity.

Ambidextrous Learning: Exploitation and Exploration

The exploitation and exploration framework was firstly proposed in organizational learning theory (March, 1991). According to March (1991, p. 85), exploration describes organizations' "experimentation with new alternatives", whereas exploitation refers to "the refinement and extension of existing competencies, technologies, and paradigms". Scholars usually juxtapose the two types of learning activities in organizational learning context, and regard them as important mechanisms for the

survival and development of an organization (March, 1991; Gilson et al., 2005; Raisch et al., 2009; Jones, 2012). Drawing upon an ambidextrous learning perspective, organizations pursue both radical and incremental learning activities for sustained performance, thus, an appropriate and balanced allocation of resources between exploitation and exploration is required (Raisch et al., 2009; Bocanet & Ponsiglione, 2012).

Applying March (1991)'s organizational learning framework at the individual level, Nemanich and Vera (2009) argued that employees can devote time and resources in exploitation and exploration activities and flourish under leaders who encourage them to act for the strategic development of an organization. Meanwhile, Hahn (2013) focused on balancing exploitation and exploration to improve individual creativity from the perspective of psychological motivation. Seo et al. (2015) found that exploitation and exploration have positive influences on employees' creativity in IT companies.

Accordingly, our study adopted March (1991)'s exploitation vs. exploration learning framework at the individual level, in order to examine their effects on employees' digital creativity in the context of digital technology utilization from an ambidextrous learning perspective.

Research Model and Hypotheses

Figure 1 shows the research model that examines the impact mechanisms of transformational leadership behaviors on individuals' digital creativity in the context of digital technology, mediated by creative self-efficacy and two types of learning activities, i.e. exploitation vs. exploration. In particular, individuals' digital knowledge, gender, age and education are included in the research model as control variables, as suggested in the previous literature (Liang et al., 2015). The research model is described in Figure 1, and the theoretical logic of each hypothesis is illustrated in the next section.

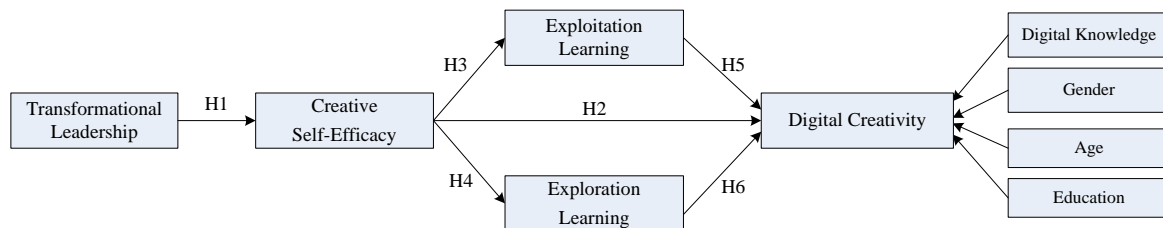


Figure 1. Research Model

Transformational Leadership, Creative Self-Efficacy and Digital Creativity

Transformational leadership is considered as an important prerequisite for encouraging individuals' creativity and innovation in the organizations (Jaiswal & Dhar, 2015; Li et al., 2015). Specifically, transformational leaders are good at conveying a charismatic image, articulating compelling visions and missions, and providing inspirational motivations to followers in the work environment (Shao et al., 2017a; Shao et al., 2017b). In addition, transformational leaders usually challenge traditional ways of thinking and provide personalized consideration to their followers. This is beneficial to enhance individuals' self-confidence that they are capable of accomplishing jobs in an innovative way and resolving problems creatively (Li & Hsieh, 2007; Shao et al., 2017a).

Previous studies have examined the influence of transformational leadership on individuals' intrinsic motivations and creativity in various research contexts. Specifically, Shin and Zhou (2003) found that transformational leaders can help followers internalize organizational goals, and attribute themselves more immersed in creative tasks. Likely, Li & Hsieh (2007) reported that leaders' personal support and attention can make subordinates less sensitive to extraneous worries and focus more on innovative tasks. Gumusluoglu and Ilsev (2009) indicated that transformational leadership is helpful to motivate employees' creativity and independent thinking by improving their creative self-efficacy.

In the context of digital technology, the direct supervisor plays a significant role in affecting followers' intrinsic motivations and behavioral intentions regarding technology usage (Liu et al., 2011; Rezvani et al., 2017; Shao & Huang, 2018). A supervisor who exhibits idealized influence and personalized consideration behaviors can motivate employees to make an innovative and creative usage of the emerging technologies (Li & Hsieh, 2007). This is beneficial to build up their confidence in overcoming challenges and accomplishing specific tasks in innovative ways, which in turn enhances their capabilities to create constructive outcomes for problem solving utilizing the digital technologies (Mittal & Rajib, 2015). Thus we propose the following hypotheses:

Hypothesis 1: Transformational leadership is positively related to creative self-efficacy.

Hypothesis 2: Creative self-efficacy is positively related to digital creativity.

Creative Self-Efficacy and Exploitation vs. Exploration

Creative self-efficacy refers to an individual's assessment of his/her ability to generate creative ideas, and it is regarded as a significant antecedent of innovative behaviors in the work environment (Tierney & Farmer, 2002). The higher creative self-efficacy perceived by employees, the more confident they will feel in achieving creative performance (Shin et al 2012;Shao et al., 2015). In the process of innovation, creative self-efficacy can affect performance through a host of activities like goal setting, seeking new knowledge and ideas (Gkorezis et al, 2017). In particular, employees with a higher creative self-efficacy are more willing to explore new technologies in order to improve their performance (Newman et al., 2018).

Previous studies have discussed the effect of creative self-efficacy on creative work performance. Specifically, Lah et al. (2011) found that employees with a higher level of creative self-efficacy are more likely to exhibit innovative behaviors at work in a service setting. Seo et al. (2015) explained that creative self-efficacy positively influences individual creativity through absorptive capacity, exploitation and exploration. Notably, exploitation and exploration activities interrelated with each other, and there should be a balance between the two learning activities (Bocanet & Ponsiglione, 2012; Lavie et al, 2010)

In the context of digital technology, creative self-efficacy plays an indispensable role in promoting employees to exploit and explore new technologies in order to improve their work efficiency (Zhou and Wu, 2010). Drawing upon adaptive structuration theory, Schmitz et al. (2016) found that individuals with a higher computer self-efficacy show a better exploitive technology adaptation and are more willing to engage in exploratory adaptation behaviors. Moreover, Seo et al. (2015) also reported a positive influence of creative self-efficacy on exploration vs. exploitation in the IT environment .Thus we propose the following hypotheses:

Hypothesis 3: Creative self-efficacy is positively related to exploitation.

Hypothesis 4: Creative self-efficacy is positively related to exploration.

Exploitation vs. Exploration and Digital Creativity

Creativity refers to producing new and useful ideas to make innovations (Amabile et al., 1996), and it plays an important role in organizational and individual development. In the past few years, a new shape of creativity, namely digital creativity, has emerged to replace the traditional form as digital technologies have become ubiquitous in our daily lives (Lee, 2013). Grounded on the concept of creativity, digital creativity is defined as "an individual's ability to resolve problems as well as create new and useful products when dealing with tasks in the digital environment." (Seo et al, 2013). With the advent of digital economy, digital technology enables employees to generate creative ideas, and can help enhance their innovation capability (Oldham, & Da Silva, 2015).

Previous studies have discussed the effects of exploitation and exploration activities on innovation and creativity at different levels (Seo et al., 2013; Lee, & Chang, 2013; Seo, Chae & Lee,2015;Tierney &

Farmer, 2011). Specifically, He and Wong (2004) found that explorative and exploitative innovation strategies are helpful to improve firm innovation at the organizational level. Lee and Choi (2010) examined the positive relationship between exploitation vs. exploration and knowledge creation at the team level. In another study, Lee & Hahn (2011) indicated that the balance between exploitation and exploration can lead to creativity at the individual level.

In the context of digital technology, exploitation and exploration learning activities are essential for employees to assimilate new technologies (Shao et al., 2017). The process of exploiting existing competence and exploring new knowledge can contribute to individual creativity (Seo et al., 2015), which in turn enhances employees' performance (He & Wong, 2004). Based on adaptive structuration theory, Schmitz et al. (2016) also revealed that exploitative and exploratory task adaptation are positively associated with individual performance. Thus we propose the following hypotheses:

Hypothesis 5: Exploitation is positively related to digital creativity.

Hypothesis 6: Exploration is positively related to digital creativity.

Research Methodology

Instrument Design

The measure scale is designed based on the extant literature, and each construct is measured using five points Likert scale, ranging from “strongly disagree” to “strongly agree”. In particular, transformational leadership is considered as a formative second-order construct (Shao et al., 2018), and its four dimensions are measured based on Bass and Avolio (1995)’s Multifactor Leadership Questionnaire. Creative self-efficacy is operationalized following Tierney & Farmer (2002)’s study, and exploitation vs. exploration are designed drawing upon Seo et al. (2015)’s study. The instrument of digital creativity is adapted from Zhou & George (2001)’ study. We revised the items to better adapt to the research context of digital technology usage, and a sample item is like “*I can find new solutions at work by using digital technology*”.

A pilot study was conducted before the final data collection to examine the content validity and reliability of the instrument. A total of 60 questionnaires were distributed to alumnus of a business school in China, and 43 valid questionnaire were returned back. We revised several items based on the feedback from the respondents and a primary statistical analysis of the datasets. The items for each construct and corresponding references are illustrated in Table 2.

Table 2. Constructs and Items

Constructs		Items	References
Transformational Leadership	Idealized Influences	ID1-ID6	Bass & Avolio (1995)
	Inspirational Motivation	IM1-IM3	
	Intellectual Stimulation	IS1-IS3	
	Interpersonal Consideration	IC1-IC3	
Creative Self-Efficacy		CSE1-CSE3	Tierney & Farmer (2002)
Exploitation		EI1-EI3	Seo et al. (2015)
Exploration		ER1-ER3	
Digital Creativity		DC1-DC3	Zhou & George (2001); Lee (2013)

Data Collection

The final data collection was conducted during September to November in the year of 2018 in China. The target technology focuses on internet-of-things (IoT), which is recognized as a representative digital technology that realizes the auto-identification and information sharing through the Internet (Fitzgerald

et al., 2014). In the past few years, IoT has achieved rapid development and application in China with the support of government. We contacted 8 organizations whose utilization of IoT had progressed into a mature stage across 5 provincial or municipal locations, including Beijing, Shanghai, Guangdong, Zhejiang and Heilongjiang, and 6 industries, ranging from manufacture, finance, logistics, real estate, retailing, and IT service, which guarantee a diversity of datasets (Liang et al., 2015). In each organization, employees who use IoT on a daily basis to support their work come from different functional areas and are with different work experiences background, thereby ensure the variety of sample demographics (Liang et al., 2015; Peng et al., 2018).

An online survey was distributed to the respondents. The questionnaire is comprised of three sections. In the first section, the respondents were asked to evaluate the transformational leadership behaviors of their direct supervisors. Then they were required to self-evaluate their creative self-efficacy, exploitation vs. exploration, digital knowledge and digital creativity. In the final section, they were asked to complete personal demographics information, such as gender, age, educational background and work experience. We provided each respondent with a red envelope for rewards after they completed the questionnaires. A total of 350 questionnaires were distributed to the selected respondents, and 285 questionnaires were returned back. After deleting the questionnaires with missing and dirty data, we finally got 234 valid datasets for analysis. Table 3 illustrates the demographics of the respondents.

Table 3. Sample Demographics

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	144	61.50
	Female	90	38.50
Age	18-29	143	61.10
	30-39	75	32.10
	40 and above	16	6.80
Education	College degree and below	53	22.60
	Undergraduate	115	49.10
	Master degree and above	66	28.20
Working Experience	<3	97	41.50
	4-8	80	34.20
	9 and above	57	24.30

Structural Equation Model Analysis

The partial least square (PLS) method is used to analyze the structural equation model since it is more suited for theory exploration compared with covariance-based SEM methods (Gefen et al., 2000), and can accommodate smaller data samples without requiring normal distribution of the data (Chin et al., 2003). The sample size of 234 can satisfy the requirement of PLS-either 10 times the larger measurement number within the same construct or 10 times the larger construct number affecting the same construct (Chin et al., 2003). The bootstrapping procedure with resampling method is used to estimate the statistical significance of the parameter estimates to derive valid standard errors or t-values (Temme et al., 2006).

Measurement Model Analysis

Following a two-step procedure, we first examined the measurement model to evaluate the reliability and convergent validity of the constructs. As noted in Table 4, the Cronbach's alpha of each construct has exceeded 0.8. Moreover, the item loadings of each construct have exceeded 0.75, and the average variance extracted (AVE) for each construct is higher than 0.5. The results indicate a good reliability and convergent validity of the constructs (Chen et al., 2003; Yi & Davis, 2003).

Table 4. Construct Reliability and Validity Analysis

Construct	Items	Factor	Cronbach's	AVE
Idealized Influences (ID)	ID1	0.79	0.88	0.62
	ID2	0.79		
	ID3	0.81		
	ID4	0.77		
	ID5	0.76		
	ID6	0.81		
Inspirational Motivation (IM)	IM1	0.88	0.84	0.76
	IM2	0.87		
	IM3	0.86		
Intellectual Stimulation (IS)	IS1	0.88	0.88	0.81
	IS2	0.90		
	IS3	0.92		
Interpersonal Consideration (IC)	IC1	0.89	0.86	0.78
	IC2	0.87		
	IC3	0.89		
Creative Self-Efficacy (CSE)	CSE1	0.90	0.88	0.81
	CSE2	0.87		
	CSE3	0.92		
Exploitation (EI)	EI1	0.90	0.88	0.80
	EI2	0.87		
	EI3	0.91		
Exploration (ER)	ER1	0.87	0.87	0.80
	ER2	0.90		
	ER3	0.91		
Digital Creativity (DC)	DC1	0.86	0.83	0.75
	DC2	0.83		
	DC3	0.90		

Discriminant validity is assessed based on the following criterion: the square root of the AVE for each construct exceeds that construct's correlation with other constructs (Chin et al., 2003). As described in Table 5, the square root of the AVE for each construct is highly above that construct's correlation with other constructs. The above analysis results demonstrate a good discriminant validity of the constructs.

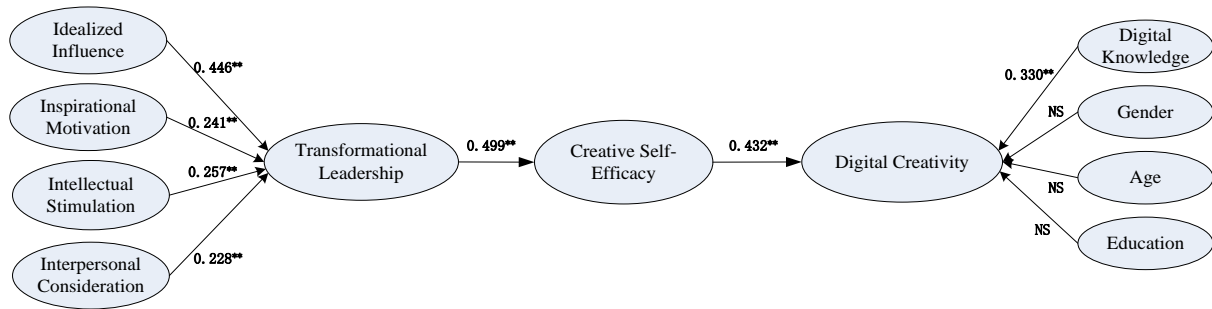
Table 5. Correlation Analysis

	Mean	S.D.	ID	IM	IS	IC	CSE	EI	ER	DC
ID	3.90	1.07	0.79							
IM	3.90	1.09	0.69	0.87						
IS	3.78	1.09	0.69	0.59	0.90					
IC	3.67	1.09	0.57	0.56	0.58	0.88				
CSE	3.86	0.98	0.51	0.39	0.38	0.35	0.90			
EI	3.83	0.98	0.42	0.35	0.40	0.39	0.49	0.90		
ER	3.81	1.04	0.42	0.35	0.43	0.35	0.50	0.69	0.89	
DC	3.88	0.95	0.63	0.52	0.57	0.53	0.62	0.56	0.59	0.87

(Note: Values on the diagonal are square root of AVEs)

Structural Model Analysis

We then analyzed the structural model to examine the path relationship between the constructs and the explanatory power of the proposed research model. We first added transformational leadership, creative self-efficacy and digital creativity in the structural model. Digital knowledge, gender, age and education are also included in the model as control variables. The analysis results are described in Figure 2. As noted in Figure 2, transformational leadership is positively associated with creative self-efficacy ($\beta=0.499$, $p<0.01$), which in turn has a positive influence on digital creativity ($\beta=0.432$, $p<0.01$). The empirical results can support hypotheses H1 and H2.



(Notes: ** represents $p < .01$; * represents $p < .05$; NS represents not significant)

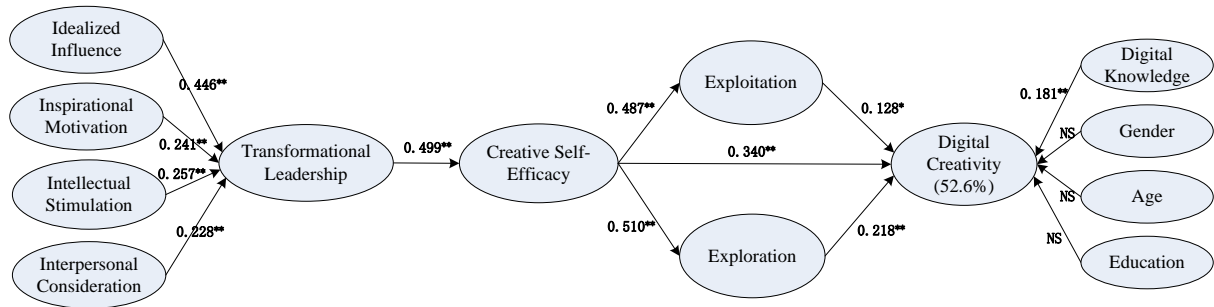
Figure 2. Structural Model Analysis Results I

In order to examine the mediating mechanism of creative self-efficacy, we removed the construct from the structural model and added a direct link between transformational and digital creativity. The analysis results suggest that transformational leadership is directly associated with digital creativity ($\beta=0.506$, $p<0.01$). Following Liang et al. (2007)'s procedure, we then added creative self-efficacy as a mediator and re-conducted the structural model. The relationship between transformational leadership and digital creativity decreases from ($\beta=0.506$, $p<0.01$) to ($\beta=0.419$, $p<0.01$) after incorporating creative-self-efficacy. The results demonstrate that creative self-efficacy partially mediates the relationship between transformational leadership and digital creativity (Liang et al., 2007; Shao et al., 2017).

We then added exploitation vs. exploration in the structural model to examine their mediating mechanism between creative self-efficacy and digital creativity. The analysis results are described in Figure 3. We note from Figure 3 that creative self-efficacy is positively associated with exploitation and exploration ($\beta_1=0.487$, $p<0.01$; $\beta_2=0.510$, $p<0.01$), thus supporting hypotheses H3 and H4. Moreover, exploitation and exploration have positive influences on digital creativity, ($\beta_1=0.128$, $p<0.05$; $\beta_2=0.218$, $p<0.01$), thus hypotheses H5 and H6 are supported.

In order to examine the mediating mechanism of exploitation vs. exploration between creative self-efficacy and digital creativity, we compare the analysis results in structural model II (Figure 3) with structural model I (Figure 2). Interestingly, we find that the relationship between creative self-efficacy and digital creativity decreases from 0.432 to 0.340 after incorporating exploitation vs. exploration in the structural model, suggesting that exploitation vs. exploration partially mediate the association between creative self-efficacy and digital creativity.

Regarding the effects of control variables, we note from Figure 3 that digital knowledge is positively associated with digital creativity, while gender, age and education have no significant influences on digital creativity. In terms of the R^2 of the endogenous variable, Figure 3 indicates that the exogenous constructs can explain 52.6% variance of digital creativity, suggesting a good explanatory power of the structural model.



(Notes: ** represents $p < .01$; * represents $p < .05$; NS represents not significant)

Figure 3. Structural Model Analysis Results II

Theoretical and Practical Implications

Our study contributes to theory in two aspects. Firstly, our study introduces transformational leadership in the digital technology context, and empirically examines its influence on employees' digital creativity. IS literature has examined employees' digital creativity through the perspectives of task characteristics (Chung et al. 2015), organizational structure (Hahn et al. 2013), or individual capabilities (Seo et al. 2015). While leadership literature has long highlighted the effectiveness of transformational leadership in cultivating employee creativity, seldom has any studies contextualized such influence in the digital technology context. Our study not only empirically validates the influence of transformational leadership on employees' digital creativity, but also identifies its influential mechanisms. This lies in our second theoretical contribution. Specifically, our study reveals the mediating mechanisms between transformational leadership behaviors and employees' digital creativity by integrating social cognitive theory (Bandura 1978, 1991) and organizational learning theory (March 1991). Creative self-efficacy serves as a significant intrinsic motivation mechanism that partially mediates the relationship between transformational leadership and digital creativity. Moreover, we adapt the organizational learning framework at the individual level, and uncover the dual mediating mechanisms of exploitation and exploration between creative self-efficacy and digital creativity. These empirical findings effectively enrich our understandings on the particular impacts of transformational leadership on digital creativity from the ambidextrous learning lens, i.e., how creative self-efficacy enacts the ambidextrous learning of exploitation and exploration, thereby transmitting the influence of transformational leadership on digital creativity.

As for practical implications, firstly, this study provides guidance to direct supervisors regarding how to promote employees' creativity through effective leadership. With the emergence of digital technology, individuals' digital creativity is a significant antecedent for organizational innovation and development. Specifically, managers should pay more attention to the characteristics of their employees and enhance their digital creativity by articulating a strong sense of vision, communicating high expectations, promoting intelligence and giving personal attention to employees. Secondly, managers should understand that employees' creative self-efficacy can be greatly enhanced by transformational leadership behaviors, which further facilitates their digital creativity. Moreover, creative self-efficacy can affect creative performance through the exploitation and exploration of digital technologies. This requires the direct managers to facilitate a better environment for learning and innovation, in which employees are more willing to exploit and explore new knowledge.

Conclusions and Future Research Directions

This study develops a research model to examine the mediating effects of creative self-efficacy, exploitation, and exploration between transformational leadership behaviors and employees' digital creativity. Our empirical findings suggest that direct managers' transformational leadership behaviors benefit followers' creative self-efficacy, which in turn facilitates their ability to create new ideas with digital technologies. Moreover, exploitation and exploration partially mediate the relationship between creative self-efficacy and digital creativity. Our study has several limitations that provide opportunities for future research. Firstly, this study considers transformational leadership as a second-order construct

in the research model. Future studies can examine the specific influences of four first-order leadership attributes (idealized influences, inspirational motivation, intellectual stimulation, and interpersonal consideration) on digital creativity. Secondly, future studies can include top managers' transformational leadership behaviors in the theoretical model to explore the cascading effect of leadership on digital creativity from a multi-level perspective. Thirdly, this study majorly focuses on employees' digital creativity from the perspective of leadership. Future studies can integrate technological attributes, task characteristics and individual characteristics in the research model, in order to examine their joint influences on employees' digital creativity. Last but not least, this study chose IoT as a representative of digital technology. Future studies can be extended to other emerging technologies.

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