Research article

The dark side of enterprise social media and employee digital creativity: Communication visibility perspective

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A B S T R A C T

The primary objective of this study is to evaluate the significances of excessive usage of enterprise social media (ESM) on individuals' digital creativity through ESM exhaustion. In addition, we intend to investigate the significance of ESM visibility as a moderator in the connection between excessive usage of ESM, ESM exhaustion, and digital creativity. The results presented in this study are derived from primary data collected from 718 Chinese workers who utilize ESM. The data analysis were conducted using SPSS version 23.0. Findings revealed that excessive usage of ESM is negatively linked to employee digital creativity and has a significant impact on ESM exhaustion. ESM exhaustion is negatively related to employee digital creativity. ESM visibility is further found to play a significant moderating role in strengthening the connection between excessive use of ESM and ESM exhaustion. Additionally, ESM visibility reinforces the negative association between excessive use of ESM and employee digital creativity. This study encompasses ESM users' perceptions of the connection between excessive ESM usage and its exhaustion, providing evidence for organizations to develop and manage ESM usage policies to mitigate the negative impact of ESM usage for employees.

1. Introduction

In the current digitally advanced business world, an increasing number of organizations are utilizing enterprise social media (ESM) to facilitate employee interactions, establish social connections, enable smooth communication, and foster knowledge sharing [1,2]. ESM not only facilitates convenient interaction and communication among employees but also enhances employees' digital creativity. Digital creativity refers to the capacity of an employee to use information technology applications to develop novel ideas, methods, or solutions that hold significant value for an organization [3,4]. However, research has noted that the associated creative benefits of ESM depend on its rational use [5]. In addition, increasing functionalities of ESM technologies has attracted several companies to develop their ESM platforms [6] like Yammer, DingTalk, Slack, and IBM Connections for work and social related communication. Notably, research has identified excessive ESM usage as a situation where individuals exceed the optimal level of ESM use, resulting in a negative influence on user performance [7,8]. Despite this awareness, the precise mechanisms governing why and when excessive ESM

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use can influence employee digital creativity remain unclear.

Scholars have begun to explore the effects of ESM use on employee performance and digital creativity. For example, looking at the positive side of ESM use, Yan, Davison [9] proposed that the use of digital technologies and information seeking and sharing behavior may benefit employees' digital creativity. Ding, Liu [10] reported that challenging tasks have a substantial effect on employee creativity in an ESM environment. Other studies have concentrated on the negative effects of excessive ESM usage. For instance, research has noted that the widespread accessibility of ESM technology might lead to misuse, which could negatively impact worker efficiency and output [11,12]. Consequently, when external factors consume time and attention while analyzing the information obtained through ESM, given its vast exchange of information [13], individuals experience a loss of productivity and may suffer from anxiety and overload, which can contribute to exhaustion. Yu, Zhong [11] discussed the overuse of social media in the context of employee performance. Si, Khan [14] found that the overuse of ESM is significantly related to individual creativity through work-family conflict. While existing literature has made significant contributions to understanding how excessive ESM use can promote and impede employee performance, the specific ways in which excessive ESM use hinders employee digital creativity warrant further attention. Considering this research gap, the present study aims to analyze the dark side of ESM in connection with digital creativity when individuals misuse ESM technology in the workplace. Particularly, this research study analyzes the adverse impact of excessive usage of ESM on employee digital creativity through ESM exhaustion.

The impact of ESM exhaustion resulting from the overuse of ESM is not solely reliant on the particular background of excessive ESM usage. ESM technology, specifically, has several novel aspects that set it apart from other information and communication technologies [15,16]. As an illustration, information shared on the ESM platform frequently seems on the page of another individual, even if he/she is not openly concerned in that interaction process [17,18]. As a result, another party can analyze the contents of information shared by other employees at any time and location. In this vein, ESM visibility may have a moderating role in the link between excessive usage of ESM, ESM exhaustion, and individual digital creativity. The characteristics of ESM visibility may have a double-edged role in the work environment. On the one hand, higher visibility of unnecessary information on ESM may disrupt individual daily work routines and may cause exhaustion [19]. On the other hand, ESM visibility may increase the work efficiency of employees by constantly visualizing the communication of other parties [20]. Previous research has shown the impact of excessive usage of ESM on ESM exhaustion based on some contextual characteristics of ESM visibility. Additionally, individuals who use excessive ESM for communicating with others in their virtual lives are under stress, which might have a negative effect on individual digital creativity. To better understand the connection between excessive ESM usage, ESM exhaustion, and digital creativity, present study analyzes the impact of ESM visibility as a moderator.

The present investigation aims to study the negative impact of the overuse of ESM on employee digital creativity through ESM exhaustion. Applying the theory of communication visibility, this study investigates the adverse effects of excessive ESM usage on individual digital creativity, using survey data obtained from Chinese workers. The results of the present research have several implications. First, prior research has analyzed the relationship between the overuse of ESM and employee digital creativity through the concept of ESM exhaustion. Secondly, the current research responds to the call to understand the negative impact of ESM usage [21]. Thirdly, present research also investigates the moderating role of ESM visibility, an affordance of ESM. Specifically, it explores ESM users' perceptions of the link between excessive ESM usage and its exhaustion, providing evidence for organizations to develop and manage ESM usage policies aimed at controlling the negative impact of ESM usage. The conceptual model of the study is depicted in Fig. 1.

2. Theoretical background and literature review

2.1. Communication visibility theory

Communication visibility theory implies that when communication visibility is enhanced in the organizations, unseen workplace communication among employees becomes visible to all the parties and people have a better understanding of "*who knows what and who knows whom*" [2,22]. In relation to communication visibility theory, ESM visibility is described as the extent to which workers have knowledge of what others know and whom they know [23,24]. ESM visibility permits individuals to express their behaviors, expertise, and connections with peers [15,25]. Communication visibility theory is based on two mechanisms: message transparency, and network translucence. Message transparency is the extent to which an individual may observe and analyze the information of workmates on ESM [7,13], network translucence refers to the concept that ESM makes individuals' social networks visible [26].
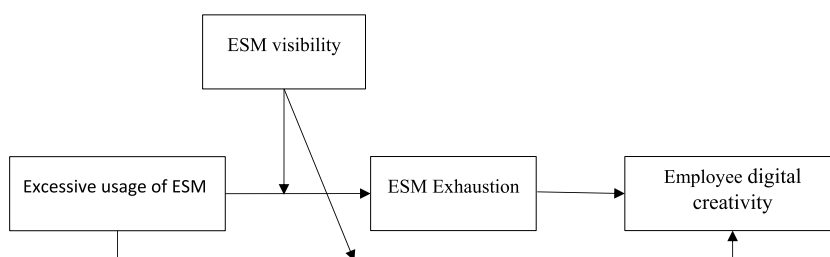

Fig. 1. Proposed model.

Leonardi [2] proposed that ESM visibility silently uncovers the third party contents and communication partners of their individuals without the consent of a third party. Accordingly, transmission of information between two colleagues using ESM technology is often obtainable on the individual's wall outside of the communication session [15,24], the individual disseminates the information using ESM, thereby further providing visibility. Further, scholars noted that visibility of information on the ESM platform allows individuals to obtain unmanaged and redundant material that amplifies their interpretive and cognitive capabilities and causes ESM exhaustion [19,26].

Presently in the context of ESM, several scholars have analyzed the theory of communication visibility. Accordingly, Chen and Wei [19] discovered that the visibility of the information on ESM significantly promotes the link between overload and strain. Engelbrecht, Gerlach [26], analyzed visibility theory and illustrated that ESM visibility develops employees' meta-knowledge. Yin, Wang [13] reported that ESM visibility significantly enhances the link between overload and job autonomy. Zhu, Sun [22] using visibility theory, and also discovered that ESM visibility strengthens the link between task structure and social network ties. Although there is inter-action, it is still unknown how ESM visibility affects employee outcomes. Consequently, the present research examines the moderating role of ESM visibility on the connection between excessive use of ESM and ESM exhaustion and it also investigates the connection between excessive use of ESM and digital creativity.

2.2. Employee digital creativity

Employee creativity at the workplace is the process of creating emerging ideas and designing effective products and services for potential clients [4,10,20]. Prior research reported that employee creativity is related to personality, cognitive style, types of job, work environment, social media usage, relationships with colleagues and higher management [23,27–29], knowledge sharing, and hiding [20,30]. Few studies also investigated the link between the use of information and communication technologies and employee digital creativity [10,31]. Nevertheless, the role of ESM usage, a work environment factor that may affect the creativity of workers, has attracted less scholarly attention with conflicting outcomes.

On the one hand, several scholars have conveyed that ESM usage is beneficial for employee creativity, as social media usage fa-cilitates knowledge exchange, trust, and social interaction [32,33]. On the other hand, merely a few studies have analyzed the negative impact of ESM on work outcomes, information sharing, and innovation [34,35]. These inconsistent findings imply that additional research is required to determine the underlying processes by which excessive use of ESM affects individual digital creativity. As a consequence, the present study analyzes the impact of overuse of ESM on employee digital creativity through ESM exhaustion.

2.3. Excessive usage of enterprise social media in the workplace

The attractiveness of ESM technology in the workplace has changed not only the nature of the workplace but also have changed the individual's daily lives. Several organizations have adopted the ESM at the workplace for employee communication, information sharing, and file sharing [13,36]. This popularity of ESM technology has also attracted scholarly attention [26,37,38]. Scholars from several domains have investigated the consequences and outcomes of ESM usage. For example, Sheer and Rice [37], found that instant messenger (IM) has been widely adopted by organizations for information and communication purposes. Yin, Wang [13] reported a significant relationship between ESM usage and job autonomy. Similarly, Lu and Pan [38], also reported that knowledge sharing and searching behavior of employees on the ESM platform has a positive impact on employee job outcomes. Previous studies have described the primarily positive use of ESM in the workplace. However, only a few research studies have investigated the negative consequences of excessive usage of ESM [19,39].

Generally, reasonable usage of ESM has a significant impact on individual social and work-related communication. Conversely, unnecessary usage of ESM may consume an important amount of assets such as the use of time and resources on ESM [36,40], when this usage exceeds a certain level; such needless utilization may have negative results on work outcomes. Accordingly, when in-dividuals communicate through the ESM platform with workmates, they may need to deal with several amounts of information [41], which may result in ESM exhaustion. The findings of these studies indicate that excessive usage of ESM leads to strain and has a negative impact on job performance. Therefore, this research analyzes the influence of excessive use of ESM on ESM exhaustion.

2.4. ESM exhaustion

The use of ESM in the workplace continues to be a topic of discussion [21,42–45]. On the one hand, Cao, Vogel [42] asserted that use of ESM increases work performance due to factors such as employees' trust and knowledge exchange. On the other hand, Cao and Yu [21] observed that the use of ESM has a negative effect on job performance when it is excessively employed. Chen and Wei [19] supported the notion that both social and work related ESM overload leads to the level of ESM exhaustion at workplace and hence reduces the organizational performance. Therefore, the streams of the theoretical work have begun to recognize the negative features of ESM usage, including exhaustion. Exhaustion refers to the loss of cognitive resources as a result of any long-term connection in challenging circumstances [7,46]. Such exhaustion has several managerial implications, particularly due to the large-scale adoptions of ESM technology by companies. ESM generates a deluge of communication and information as each of the users sends messages to other users in the existing network. These communication overload lead to fatigue among the people, arising feelings of nervousness, weakness, and stress. Ayyagari, Grover [47] explored several technological characteristics that can impact individual work perfor-mance and eventually result in strain. The literature suggests that ESM exhaustion negatively impacts individual work performance. Therefore, this study investigates the effect of excessive ESM use on employee digital creativity through the lens of exhaustion.

3. Hypotheses development

3.1. Excessive usage of ESM and employee digital creativity

Previous studies described the overuse of ESM as the usage of ESM in which employees may understand that time and energy spent on ESM at the workplace reduces their capacity [19,21], and that result has a negative impact on productivity. ESM platform includes several communication and information features, and employees may use these features to interact and exchange work-related information with other workmates [16,48]. Individuals may provide unneeded information in the ESM platform to solve a specific problem or make decisions, and this repetitive information requires individuals to expend significant time and energy [16,49]. Individuals who use excessive ESM technology in the workplace are surrounded by an excessive quantity of information that they are unable to handle promptly and efficiently.

Furthermore, ESM technology provides users with the ability to engage and exchange information without regard to time or geography [50,51]. Accordingly, several amounts of information from distinct locations can be shared by every individual at the workplace. Such constant flow of information and exchange of messages may cause individuals to lose focus from the task [14], leading to poor performance [20,32,52]. Previous research has also demonstrated that excessive and irrelevant information might impair an individual's ability to solve issues and cause them to make poor decisions [19,53], thereby reducing employee digital creativity. In addition, Yu, Cao [54] analyzed the link between excessive usage of social media and work outcomes and noted that overuse of social media may reduce worker performance. Burt [55], also found that interaction with the same type of individuals may likely generate inadequate information and leads to the creation of fewer emerging ideas for the companies. Based on previous studies, this research proposes the hypothesis.

H1. Excessive usage of ESM is negatively related to employee digital creativity.

3.2. Excessive usage of ESM and ESM exhaustion

In the modern work environment, ESM is commonly used by employees. In this context, scholars have investigated the information and communication features of ESM technology. Accordingly, Ding, Liu [10] examined the impact of work and non-task-related ESM usage on employee innovative ideas and concluded that ESM usage positively strengthens the link between work stress and innovative behavior. Ou and Davison [52], found a significant link between communication messenger and work performance. Similarly, Pitafi, Kanwal [56], analyzed the role of ESM in developing individual agility through the quality of information. Past studies show that ESM is mainly used for information exchange, social interaction, and communication purposes in the workplace. Nevertheless, the unnecessary usage of ESM has a negative impact on work outcomes [7,14,21,40]. Furthermore, the social features of ESM make it hard for individuals to effectively disconnect themselves from socializing.

We are proposing that excessive use of ESM may lead to psychological exhaustion. Specifically, overuse of ESM may divert employees' attention away from other crucial activities in the workplace. As a result, inappropriate communication and a high rate of information flow exaggerate the adverse effect. Consequently, Wurman [57] stated that excessive flow of information can lead to feelings of despair, irritation, and anxiousness. Conversely, Karr-Wisniewski and Lu [8], suggested that overuse of ESM might cause people to lose focus on their daily tasks, as well as provoke emotions of anger and anxiety. Ngien and Jiang [41] also conveyed that ESM usage has a significant effect on stress. In line with the above studies, present study suggests the following hypothesis.

H2. *Excessive usage of ESM is positively related to ESM* exhaustion.

3.3. ESM exhaustion and employee digital creativity

Previously, this study suggested that overuse of ESM is negatively associated with employee digital creativity and positively related to exhaustion. Accordingly, when employees are mistitled by the requirements of overuse of ESM, they feel irritation, social nervousness, exhaustion, and resulting in poor work outcomes [15,58]. Therefore, individuals do not have a sufficient amount of time and resources to deal with other tasks and responsibilities. Employees are less likely to develop new ideas as a result of reducing their daily investment of resources in job activities. Prior studies have found a detrimental association between job stress and individual ability to do a job [36]. For example, Ayyagari, Grover [47] stated that strain related to overuse of ESM usage harms individual work performance.

Furthermore, exhaustion diverts the consideration of an individual from task activities, leading to dissatisfaction [19,59] and, finally, lower outcomes and ineffectiveness. Employees are unable to perceive information effectively when they are exhausted, and as a result, decision mistakes occur [19,25] affecting creative performance. For example, exhaustion prevents individuals from critical thinking, and employees are unable to efficiently contribute to task-related information resulting to poor emerging ideas. In accordance with prior studies, this research proposes the following hypothesis.

H3. *ESM exhaustion has a negative impact on employee digital creativity.*

3.4. ESM visibility as a moderator

ESM visibility may attenuate the impact of overuse of ESM on exhaustion since the accessibility of information allows users to

reveal routine information, which contains conversion of work-related problems, responsibilities, and other social communication [17, 60]. According to Leonardi [2], ESM visibility afforded by ESM usage allows users to become acquainted with other people's conversations. For example, communications and the continual stream of content, whether work- or non-work-related, force individuals to pay attention and process an extensive amount of information with coworkers. This unorganized overflow of information may cause them to lose concentration from work and become exhausted [61,62]. More specifically, with higher visibility, individuals may need to deal with unorganized and meaningless information, which overwhelms employees' informational and cognitive powers, causing exhaustion [13]. Conversely, low visibility strengthens the employee's confidence to control the communication and interaction with workmates. ESM visibility forces individuals to use ESM and access redundant information from a huge social network [19,21], this uncontrolled information can lead to frustration, anxiety, and strain.

Individuals get worry about their inefficiency and inadequacies being exposed as a result of ESM visibility [59,63], an employee may understand that unnecessary usage of ESM requires more time and resources, thereby enhancing employees' level of pressure. Accordingly, when visibility of information is greater the impact of overuse of ESM is higher, as visibility of information encourages individuals to exchange, interact, and process contents more frequently with colleagues [26]. Specifically, visibility of information may inevitably generate stress from workmates as employees have to react to their workmate's opinions and demands [22]. When communicating with others on ESM platform, they are required to maintain a personal positive image, respond to messages quickly, and sustain online relationships. Such online connection needed more energy and time, leading to exhaustion. In accordance to previous studies argument, this study proposes the following hypothesis.

H4. ESM visibility significantly moderates the link between excessive usage of ESM and ESM exhaustion.

Earlier studies indicate that higher visibility means high message transparency on ESM [31,32]. A higher degree of ESM visibility allows employees to interact with a greater public network, which may also enhance the probability of ESM use, and employees may access a higher amount of unnecessary information. Additionally, individuals may obtain an extensive amount of information from internal and external parties, resulting in a high frequency of distraction. Accordingly, when employees obtain an extensive amount of information than necessary [13], their creative performance may be reduced. Consequently, it is difficult for employees to efficiently obtain related information for creative ideas. ESM visibility also includes the characteristics of network translucence which encourages individuals to collaborate with workmates more closely [2]. Such close interaction motivates individuals to use ESM and respond to workmates communication. This suggests that individuals have more interaction with others, likely to more dealing with others on ESM [4]. Considering the flexible and open nature of ESM platform, ESM visibility forces individuals to interact and exchange a high amount of information with other employees [15], and the individuals may not be capable of absorbing the information appropriately and make decision errors [12]. This reveals that ESM visibility may lead to information overload. As a consequence, an employee may not be capable of integrating, and using information properly, which may also hinder their ability to produce creative ideas. In accordance with the relevant literature debate, we present the following hypothesis.

H5. ESM visibility significantly moderates the negative link between excessive usage of ESM and employee digital creativity.

4. Research Methodology

4.1. Sample and procedure

In order to statistically analyze the research model of the present study, we applied a questionnaire approach which has been consistently used in previous empirical information systems research [64–66]. The survey was performed in companies located in China. Given the prevalent utilization of ESM technology by Chinese employees for social and work-related activities, we preferred to acquire data in China. Prior scholars have also noticed that Chinese companies widely adopted ESM technology as a low-cost tool for their employee's communication. We reached out to the Human Resource (HR) managers of six companies, providing them with a brief introduction and outlining the purpose of our research. We also confirmed whether their companies are using ESM for communication, interaction, and social exchange among employees. HR managers of four companies agreed to participate and confirmed that their employees use ESM for work-related and social-related purposes at the workplace. Targeted companies mainly belong to the banking sector, manufacturing sector, and financial services, and are located in East China. The banking sector included 1, manufacturing sector included 2, and 1 from financial sector. In addition, we also performed a pilot study on a sample of 45 respondents to check the validity of the survey measures. The pilot study was conducted almost four months prior to the original survey. In the pilot study, all the 45 participants belong to 1 organization. The participants of this organization were contacted through its HR manager who was an alumni student of one of the authors' universities. After the pilot study, the wording of several questions was modified, however, we did not feel any need to delete or add a question in the original survey as a result of our pilot study. The participants of the pilot study did not participate in the original survey. The outcome of the preliminary analysis was found acceptable, suggesting to conduct a full-scale survey.

4.2. Data collection procedure

We used a time-lagged survey design and collected data in two phases following the recommendations of previous research [67–69]. The time-lagged approach of data collection is considered appropriate to avoid the potential threat of common method bias [70]. A convenience sampling method is used to collect the data for this study, as this approach is more easy as compared to other sampling procedures. Convenience sampling relies on selecting participants who are nearby or easily accessible, making it more

cost-effective compared to other sampling methods. This approach is particularly well-suited for smaller studies or those with limited resources. By using readily available participants, it allows for quicker data collection, saving time compared to more structured sampling techniques. In the first phase of the survey, participants rated their ESM usage behavior, ESM exhaustion, ESM visibility, and demographic variables. After one month of the first phase survey, in the second phase, data was collected for digital creativity of the employees. All the participants were informed that the feedback provided by them would be used for research only, this helped us mitigate common method variance [62,71,72].

In first phase, we collected data through a paper-pencil survey based on the number of employees in the organizations and distributed 810 survey questionnaires among employees from September 2022 to November 2022 through human resource (HR) managers of companies. We approached these HR managers through our personal communication (emails, calls, and physical visits). We also included a verification question at the beginning of the questionnaire, asking individuals if they utilize ESM technology at work. If they utilize ESM, they may continue with the survey; otherwise, they will discontinue answering the questions. In addition, to increase the response rate, we made several reminder emails, messages, and telephone calls to managers. The collaboration attitude of managers increased our response rate. As a result, we received 750 responses in the first phase with a response rate (92.59 %). One month after the first phase, we asked supervisor (153) in the surveyed organizations to rate the digital creativity of their subordinates. We used supervisors' email IDs and subordinates' email IDs to match the two phases of data. Supervisory positioned employees were informed to not participate in the first phase of the survey. After the completion of two phases of data collection, we performed an initial data check. We removed 32 responses from the data set either it was filled improperly or incomplete. Finally, 718 valid responses were used in final analysis [73].

4.3. Sample characteristics

The demographic characteristics of the participants are presented in Table 1. Within the samples, 62.7 % are male and 37.3 % are female; a majority of samples over 50.4 % aged between 21 and 30 years. In addition, most of the participants obtained graduate degrees (49.0 %); 35.1 % of participants had work experience between 5 and 10 years, and 32.3 % between 11 and 15 years. In addition, we also analyzed the non-response bias test using the approach of Armstrong and Overton [74]. Accordingly, we compared the mean of all the variables including control variable between the initial 25 % and last 25 % of responses. The findings revealed that two groups were not significantly different, indicating that non-response bias is not a serious issue in this data set.

4.4. Measures

We used five 5-Likert scale from (1 = strongly agree, 5 = strongly disagree) to measure all constructs in our model. We performed an extensive literature review and developed questionnaire based on previous studies. Initially, scales were developed in English, therefore we followed the procedure of prior studies [75], and translated all the measurement items into the Chinese language. Next, we invited three local Chinese professionals who were also experts in English language to translate Chinese version of questionnaire into English language. Finally, by comparing both versions of the questionnaire, no semantic difference was found. As a result, a Chinese version of questionnaire was used a data collection purposes. Next, we also invited four faculty members from the information systems department to critically review the survey instruments. According to their suggestions, we made minor modifications to the survey items. We measured excessive ESM usage using four items adapted from the literature. The measures were adapted from Cao, Guo [36]. A sample item of this measure is "*I spend more time using social media at work to communicate with people*". The scale of ESM exhaustion of employees using ESM at the workplace using four items adapted from Ayyagari, Grover [47], and Chen and Wei [19]. A sample item of this measure is, "*I feel drained from activities that require me to use ESM*". To measure ESM visibility, we adopted four items from Chen and Wei [19], and Rice, Evans [76]. A sample item of this measure is "*ESM enables me to see other coworkers' answers to other coworkers' questions*". To capture the digital creativity of employees using six items scale adapted from Tierney, Farmer [77]. A sample item of this measure is "*This employee finds new uses for existing methods or equipment using enterprise social media*". Prior studies of information systems and creative performance suggest that demographic characteristics may affect the findings of the study [64,72]. Therefore, to generate robust results, we controlled the effects of gender, education, age, and experience.

Table 1
Demographics.

Variables	N	Percentage	Variables	N	Percentage
Gender			**Qualification**		
Male	450	62.7	Under-graduate	80	11.1
Female	268	37.3	Graduate	352	49.0
Age			Masters	286	39.8
Between 21 and 30	362	50.4	**Experience**		
Between 31 and 40	312	43.5	Less than- 1 year	68	9.50
Between 41 and 50	44	6.1	5–10 years	252	35.1
			11–15 years	232	32.3
			More than 16 years	166	23.1

4.5. Data analyses

In order to accomplish the research objective, two stages were taken to analyze the collected data. The proposed theoretical model of the study was evaluated using initial assessments such as outlier, normality, convergent validity, reliability, discriminant validity, and common method bias. Second, Process Macro tool of SPSS version 23.0 was used to assess the impacts of the independent variables (excessive use of ESM) on the dependent variables (ESM exhaustion, and digital creativity). Specifically, we tested our direct and indirect hypotheses, and the moderating effect in our model using SPSS.

5. Results

5.1. Measurement model

Before testing the hypothesized model, we performed a set of statistical tests to check and validity and reliability of the data using loading of items, Cronbach alpha (CA), composite reliability (CR), and variance extracted (AVE)). Results in Table 2 indicate that loadings of all constructs are above the threshold of 0.60. Results of Table 2 also show that values of CA, CR, and AVE are reasonably greater than the acceptable values of 0.70, 0.70, and 0.50 respectively [78–80]. Table 2 findings confirmed that measurement model has appropriate level of convergent validity and reliability.

We measured the discriminant validity of the measurement model by calculating the square roots of AVEs as suggested by Fornell and Larcker [79]. The square roots of AVEs values are provided in Table 3. Accordingly, results of Table 3 reveal that square roots of AVEs values are higher than the correlations of corresponding constructs. These findings provide the evidence of discriminant validity of the measurement model. Therefore, the above results of Tables 2 and 3 suggest that the measurement model possesses a reasonable level of convergent and decrement validity.

Due to nature of research data, common method bias (CMB) may have been present in the data [81]. Accordingly, previous scholars argued that CMB may occur when a similar procedure may be used by the author to gather data for research [81,82]. As a consequence, we applied a variety of methodologies to analyze the possibility of CMB in the data set. Firstly, the questionnaire was designed with the intention of minimizing CMB at the respondent level. For this purpose, author has used one backward questionnaire to capture participants' attention while they attempt the questionnaire.

Secondly, Harman's single-factor assessment was applied to assess the potential problem of CMB in the study. This approach demonstrated that there are no CMB concerns in the data set if the first factor has a variation below 50 %. Findings indicate that the factor represents exactly 23.8 % of the overall variation, which is significantly below the threshold value of 50 % [81]. In addition, author examined the variance inflation factor (VIF), and the results of Table 3 indicate that VIF values were below the minimum value of 3.3 [59], indicating that CMB is not a serious issue in the present study. In sum, all the findings indicate that this study is free from CMB.

5.2. Hypotheses testing

We followed previous empirical research of information systems and creativity and analyzed the suggested hypothesis using PROCESS MACRO tool. Previous scholars suggested that PROCESS macro is an appropriate tool to analyze the models that include moderation variables [83]. We also analyzed the effect of control variables in our data. Results presented in Table 4 reveal that none of the control variables has a significant effect on employee digital creativity.

Table 2
Results of measurement analyses.

Constructs	Items	Factor Loadings	Cronbach α	Composite Reliability	AVE
Excessive use of ESM	5	0.830	0.91	0.92	0.71
		0.891			
		0.802			
		0.822			
		0.861			
ESM Exhaustion	4	0.892	0.89	0.91	0.72
		0.758			
		0.886			
		0.859			
ESM Visibility	4	0.924	0.89	0.92	0.74
		0.860			
		0.923			
		0.729			
Employee digital creativity	4	0.722	0.91	0.84	0.57
		0.779			
		0.719			
		0.805			

Note: AVE = Average Variance Extracted.

Table 3
Correlation matrix, Mean, and Standard Division.

	Mean	SD	VIF	1	2	3	4	5	6	7	8
1- Excessive use of ESM	3.13	0.64	1.545	**0.83**							
2- ESM Exhaustion	3.67	0.73	1.569	−0.323[b]	**0.84**						
3- ESM Visibility	3.70	0.98	1.300	0.574[b]	0.310[b]	**0.86**					
4- Employee digital creativity	2.03	0.61	1.602	0.414[b]	0.354[b]	0.435[b]	**0.75**				
5- Experience	NA	NA	NA	−0.121[b]	0.005	−0.147[b]	−0.032	**NA**			
6- Education	NA	NA	NA	0.110[b]	0.064	0.083[a]	0.160[b]	−0.166[b]	**NA**		.
7- Age	NA	NA	NA	−0.083[a]	−0.059	−0.163[b]	−0.184[b]	0.147[b]	−0.311[b]	**NA**	
8- Gender	NA	NA	NA	−0.041	−0.074[a]	0.024	0.041	−0.171[b]	−0.145[b]	0.070	**NA**

Note.
[a] $p < 0.05$.
[b] $p < 0.01$, VIF = Variance Inflation Factor.

In addition, results of Table 4 show that excessive ESM usage is negatively associated with employee digital creativity (B = −0.280, t = −3.81, p < 0.01), and significantly related to ESM exhaustion (B = 0.433, t = 5.317, p < 0.01), thus, providing support for H1, and H2. Results presented in Table 4 also reveal that ESM exhaustion is negatively related to employee digital creativity (B = −0.205, t = −3.81, p < 0.01), thereby, H3 is also supported in this study. In addition, H4 suggests that ESM visibility significantly strengthens the connection between excessive ESM usage and ESM exhaustion. Table 4 findings reveal that ESM visibility is significantly moderating the effects of excessive ESM usage on ESM exhaustion (B = 0.263, t = 4.382, p < 0.01), H4 is authenticated by present study. We also hypothesized that the connection between excessive ESM usage and employee digital creativity is moderated by ESM visibility. Findings illustrated that ESM visibility moderated the connection between excessive ESM usage and employee digital creativity (B = −0.280, t = −3.257, p < 0.01), H5 is also supported.

We further applied the graphical procedure to explain the moderation role of ESM visibility. Fig. 2 displays that when ESM visibility is higher, the link between excessive use of ESM and ESM exhaustion is stronger. In the same way, Fig. 3 shows that ESM visibility also moderates the negative link between excessive ESM usage and employee digital creativity.

6. Discussion, implications, limitations

Recent research interrelated to ESM usage has emphasized the adverse impact of ESM usage and suggested further investigation in this domain. While effective usage of social media can improve individual performance [84–86], higher levels of usage may have a detrimental impact on employee productivity. To overcome this shortcoming, current research analyzed the negative impact of overuse use of ESM at workplace. We have addressed this investigation space by analyzing the adverse impact of overuse of ESM on individual digital creativity through ESM exhaustion. The results indicated that overuse of ESM has an adverse impact on employee digital creativity and has a significant impact on ESM exhaustion, as we suggested in the hypothesis. These results are also related to previous related research studies. For example, findings of prior studies confirmed that overuse of ESM has a negative impact on work

Table 4
Hypothesis testing.

|	B	SE	t	LLCI	ULCI	R^2
Outcome: ESM Exhaustion						**0.29**
Constant:	−0.026	0.030	−0.65	−0.104	−0.052	
Excessive use of ESM	0.433	0.080	5.317[b]	0.273	0.593	
ESM Visibility	0.263	0.060	4.382[b]	0.145	0.382	
Excessive use of ESM[a] ESM Visibility	0.200	0.058	3.42[b]	0.085	0.313	
Experience	−0.048	0.068	−0.709	−0.184	0.0865	
Education Level	−0.017	0.056	0.314	−0.093	0.128	
Age	−0.067	0.066	−1.01	−0.199	0.063	
Gender	−0.088	0.037	1.91	0.014	0.1620	
Outcome: Employee digital creativity						**0.21**
Constant:	0.059	0.042	1.42	−0.022	0.142	
ESM Exhaustion	−0.205	0.053	−3.81[b]	−0.310	−0.099	
Excessive use of ESM	−0.280	0.086	−3.257[b]	−0.450	−0.111	
ESM Visibility	−0.153	0.059	−2.846[b]	−0.270	−0.036	
Excessive use of ESM[a] ESM Visibility	−0.159	0.055	2.768[b]	−0.268	−0.049	
Experience	−0.070	0.050	−1.269	−0.180	0.038	
Education Level	−0.025	0.055	0.457	−0.083	0.134	
Age	0.0622	0.056	1.102	−0.048	0.173	
Gender	−0.070	0.055	−1.269	0.021	0.154	

Note.
[a] $p < 0.05$.
[b] $p < 0.01$.
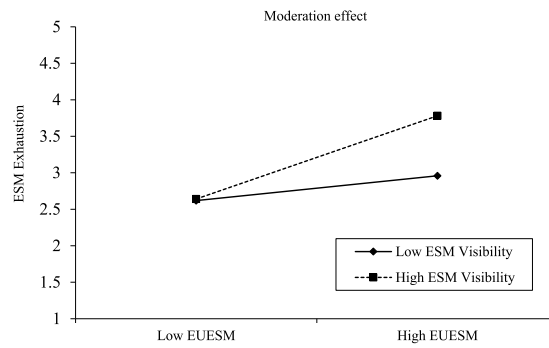
Note: EMS Visibility = Enterprise social media Visibility, EUESM = Excessive use of ESM

Fig. 2. An interactive effect of excessive use of ESM and ESM visibility on exhaustion
Note: EMS Visibility = Enterprise social media Visibility, EUESM = Excessive use of ESM.
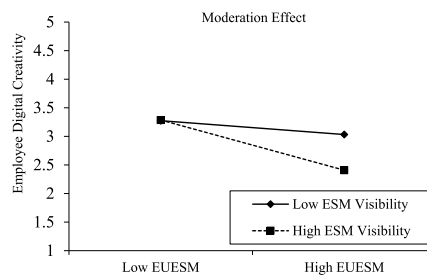
Note: EMS Visibility = Enterprise social media Visibility, EUESM = Excessive use of ESM

Fig. 3. An interactive effect of excessive use of ESM and ESM visibility on employee digital creativity
Note: EMS Visibility = Enterprise social media Visibility, EUESM = Excessive use of ESM.

outcomes [5], anxiety, and communication overload [87]. Accordingly, Yu, Cao [5] noted that unnecessary usage of ESM reduces employee outcomes through information overload. Yang and Pitafi [87] reported that visibility feature of ESM has a significant effect on work stress through overload. Chen and Wei [19] found that overuse of ESM has a significant impact on strain through information overload. Similarly, Yin, Wang [13] also suggested that ESM usage has a negative impact on job autonomy through information overload.

Furthermore, the findings of our study illustrated that ESM visibility reinforces the connection between excessive usage of ESM and ESM exhaustion. Considering ESM technology provides an open environment, where all individuals can see, interact, and share content with other employees at any time and any place. A higher degree of information visibility may generate high information overload, and an individual might not be capable of emphasis on given assignments, and they may use most of their time and energy in understanding the information. Findings also illustrated that the ESM visibility also reinforces the adverse link between excessive usage of ESM and individual digital creativity. A possible explanation is that visible characteristics of ESM technology make all communication visible to other parties [13]. Accordingly, the flow of information between two individuals often appears on the wall of other employees, and other employees may see, check, and may also be able to participate in that communication session, which also has a negative effect on worker digital creativity.

6.1. Theoretical implications

This investigation contributes to the existing ESM literature in a variety of ways. Firstly, prior research studies reported the significant impact of ESM usage on individual work outcomes [15,88,89]. However, this study advances the extant information systems research by analyzing the possible negative concerns of ESM usage on individual digital creativity. Although with ESM usage employees may acquire important information from different locations [2], which may be beneficial for individual creative performance it is unnecessary usage may reduce employees' digital creativity. The findings also indicated that ESM exhaustion, which is caused by excessive usage of ESM has a negative effect on employee creativity. The present findings contribute to ESM literature by highlighting the essential role of exhaustion.

Secondly, this research employs the visibility theory of communication to emphasize the detrimental effect of overuse of ESM on employee digital creativity, which has been ignored in previous studies [2]. Previous studies focused on the significant impact on ESM

visibility [2], and reported positive results. For example, Leonardi [2], argued that ESM visibility enables individuals to gather a variety of crucial information by only viewing others' communication on the ESM platform. According to the findings of this research, visibility of information allows individuals to acquire complex and diversified information, exposing them to more stress. As a result, the current study's findings suggest a comprehensive understanding of communication visibility theory.

Thirdly, this research analyzed ESM visibility as a moderator construct in the link between overuse of ESM and ESM exhaustion. Prior research has analyzed the positive role of communication visibility as a mediator construct in the context of information exchange [59]. Prior scholars of information systems noted the double-edged role of communication visibility. For example, Zhu, Sun [22] observed that ESM visibility significantly moderates the connection between task structure and social network ties. In contrast, Yin, Wang [13] found that communication visibility positively moderates the link between information overload and task autonomy. In the same way, the results of this study stated that ESM visibility strengthens the link between excessive usage of ESM and ESM exhaustion. Further, present research also analyzed the moderation role of ESM visibility in the link between excessive usage of ESM and individual digital creativity. The findings of the current study offer a new path for more studies for future scholars and suggest a direction to explore more in this context.

6.2. Managerial implications

The findings of our study suggest that excessive usage of ESM in the workplace has negative effect on digital creativity. Based on findings, existing research offers several recommendations for managers and supervisors. Firstly, results indicate that overuse of usage of ESM reduces employees' digital creativity. Management should consider the negative impact of excessive usage of ESM and provide alternate ways of information sharing such as arranging group discussion sessions [90]. As ESM is a digital platform and commonly used by individuals for socialization and less used for task-related communication at the workplace [19,91], employees consume most of their time on the ESM platform, therefore management should motivate their workers and engage them in some innovative task-related activities. The Findings also demonstrate that ESM exhaustion has a detrimental impact on employee digital creativity. Considering that "content is king" on ESM, managers should also be attentive to the direct negative effect of ESM exhaustion on digital creativity, considering that "content is king" in social media. Managers should facilitate some information management characteristics using ESM, such as provide a summarizing of posts or suggesting content based on the interest of several workers. This approach may enable individuals to process information on ESM more efficiently.

Secondly, results also indicate that overuse of ESM has a positive impact on ESM exhaustion. In this context, management should apply some procedures to standardize the usage of ESM in the workplace for their employee's work-related communication, as overuse of ESM generates unnecessary information [5], and is directly related to exhaustion. Accordingly, managers should develop some rules which suggest to the individuals how, and when ESM should be used. Further, management also specifies some time for employees to use ESM for personal communications.

Thirdly, increased ESM visibility reinforces the link between ESM overuse and ESM exhaustion. ESM is an open platform that allows everyone to observe the communications of others [20]. ESM visibility also strengthens the adverse link between excessive usage of ESM and employee digital creativity. As a result, managers should guide their employees and suggest they communicate personally as this way will reduce the level of information and personal information exchanged in the ESM environment.

6.3. Limitations and future research directions

Although the current research has various theoretical and practical implications, it also has some boundaries. Firstly, existing research based on the general usage of ESM technology, future scholars may apply the same concept and analyze the impact of overuse of some specific ESM platforms on employee digital creativity. In addition, the present research has concentrated on Chinese employees, even though China is a technologically advanced country [92]. A similar concept may be utilized for other countries as Chinese companies have a distinct culture of utilizing ESM platforms as compared to other states. Further, almost other public social media tools are not working in China.

Secondly, existing research adopted the ESM visibility as a moderator, future studies may use other moderators such as ESM strain or other ESM affordances [90,93]. Further, in this research author analyzed the educated individuals and companies where ESM is utilized by an employee for work purposes. Researchers may also analyze some specific workplaces that only focused on innovative ideas such as HP, and software houses, and explore the impact of overuse of ESM and employee digital creativity.

Thirdly, in existing research author only explored the impact of ESM exhaustion on employee digital creativity. Future researchers may analyze individual digital creativity using some other strain constructs such as ESM fatigue, ESM anxiety, and information overload. Furthermore, every employee has distinct competencies to analyze the information and deal with exhaustion. Future studies may use personality-related variables that may generate more interesting findings.

Finally, we have applied method of Fornell and Larcker [79] and evaluated the discriminant validity of the research model, recently scholars suggesting to evaluate the discriminant validity using HTMT analysis. Further, future scholars may also use SEM (structural equation modeling) and analyze the research model.

7. Conclusion

The present research intended to fill gaps in existing research on the consequences of using ESM in workplaces. Focusing on technological disruptions and exhaustion in the digital era, particularly within technological firms, the study employed the

communication visibility theory as a foundational framework. The study attempted to investigate the complicated relationships between excessive ESM usage, tiredness, and digital creativity. The study established the notion of communication visibility as a boundary condition, to assess its influence on the relationship between excessive ESM usage and tiredness as well as digital creativity. The findings of existing study suggested that overuse of ESM is significantly related to ESM exhaustion at the workplace. The moderating role of ESM visibility has been explored using communication visibility theory. Most of the proposed hypotheses validated by the current data set indicate that overuse of ESM is significantly related to ESM exhaustion and negatively related to digital creativity. ESM visibility strengthens the connection between overuse of ESM and ESM exhaustion. Furthermore, findings also revealed that ESM visibility significantly moderates the connection between excessive use of ESM and digital creativity. The present result extends the existing studies of information systems by exploring the significant role of ESM visibility and suggesting that managers take necessary steps to control the excessive use of ESM in organizations.

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Ethics approval and consent to participate

This study was conducted in accordance with the ethical principles and guidance from the ethical committee. All study protocols were approved by the university ethics committee of Sir Syed University of Engineering and Technology Karachi. The following is the ethical number of study. SSUET-1075.

CRediT authorship contribution statement

Qian Wang: Supervision, Quality checking. **Song Hong:** Writing – review & editing, Funding acquistion, Resources and Corresponding. **Abdul Hameed Pitafi:** Validation, Project administration, Methodology, Formal analysis, Data curation. **Nazik Hangeldiyeva:** Writing – original draft, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:Abdul Hameed Pitafi reports a relationship with Sir Syed University of Engineering & Technology that includes: employment. Abdul Hameed Pitafi has patent pending to Assignee. No potential conflict of interest was reported by the authors If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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