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# The Effect of Employee Participation in Enterprise Social Media on Their Job Performance

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**ABSTRACT** This study focuses on employee involvement in enterprise social media (ESM) and the impact of ESM on job performance. Few studies found empirical support for this perspective due to limited sample size either the difficulty of accessing the data on user behavior in ESM and their job performance. We addressed this research gap through a data-sharing agreement with a large, high-tech manufacturing enterprise with internal social media and conducted a cooperative study on the impact of employee behaviors involved in ESM on their job performance. We divided online activities on ESM into information-sharing behaviors, information-seeking behaviors and general usage behaviors and then employed hierarchical regression analysis to investigate how the various usage behaviors of employees on ESM affect their job performance significantly. We find that information-seeking behaviors on ESM have positive effects on job performance, but information-sharing behaviors on ESM have negative effects on job performance. Overall, the usage of social media within enterprise social media use could help improve employee job performance. Moreover, to test whether the timing of ESM usage (during working hours or off-work hours) may affect employee job performance, we add a variety of moderator variables into the model. The results show that information-sharing behaviors, information-seeking behaviors and general usage behaviors during working hours negatively moderate the relationship between ESM usage and job performance. The findings have valuable managerial implications for the use of ESM.

**INDEX TERMS** Enterprise social media, information sharing, information seeking, job performance.

## I. INTRODUCTION

With the rapid development of Web 2.0 technologies, a growing number of organizations have adopted Web 2.0 applications in the workplace. Some popular social networking sites, such as Facebook and Twitter, have been routinely employed by many organizations for organizational external communication with partners, including their customers and suppliers, and for internal employee communication and information sharing. However, these publicly available social networking sites pose apparent risks that may result in serious negative consequences, including loss of confidential data, mismanaged and misplaced business records, exposure of company secrets, and security breaches [1].

Consequently, some organizations implement an integrated social media platform within the enterprise for internal knowledge sharing and collaboration among employees [2],

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which was called enterprise social media (ESM). ESM was put forward by Leonardi and defined as “Web-based platforms that allow workers to (1) communicate messages with specific coworkers in the organization; (2) explicitly indicate or implicitly reveal coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited, and sorted by anyone else in the organization at any time of their choosing.” ESM includes corporate blogging, microblogging, and enterprise social network sites to provide employees the ability to post and share information [3]. ESM platforms run on the host organization’s servers, are protected by firewalls and are restricted to use by employees due to security concerns [4].

Some well-known companies have launched internal deployments of integrated enterprise social software services to encourage their employees to exchange information with each other on the corporate intranet [5]. Examples include

Microsoft Yammer, Salesforce Chatter, and IBM's Connections, etc. Some companies even developed their own ESM platforms, such as the Beehive system developed at IBM [6], [7] and the Watercooler system developed at HP [8]. In addition to those multinational enterprises in developed countries, many small and medium-sized enterprises have attempted to use ESM to foster internal collaboration, communication and knowledge interaction among employees, especially in some emerging market countries such as China. For example, in recent years, many Chinese companies tend to use ESM for knowledge management and work cooperation. A well-known ESM application, DingTalk, a free and all-in-one enterprise communication and collaboration platform developed by Alibaba Group in 2015, has already been employed at over 7 million business and organization clients [9]. Another leading enterprise social software platform, Mingdao, was officially launched in January 2014 and has become a very popular SaaS product for enterprise internal collaboration and knowledge management applications in China [10]. The software has been installed by millions of users, more than 4,000 of whom are paying customers.

However, to date, ESM has not been widely used in most organizations, even though Web 2.0 technologies are readily available and require little additional investment. One key factor that prevents widespread adoption of ESM is the lack of a clear understanding of ESM. Many organizations simply believe that ESM will bring potential advantages, but they had no idea how to effectively utilize ESM to achieve business benefits. A global survey found that one-third of organizations reported that they had not seen concrete benefits from employees actively using these ESM tools to perform their job, despite the companies' widespread deployment of ESM in their organizations [11], [12].

Employee involvement in ESM and the impact of ESM on job performance have recently become hot academic issues. ESM usage was generally considered a double-edged sword [13], [14]. Some previous studies [15] consider ESM as a time-waster that will lead to increased interruption and decreased productivity. They noted that ESM has become an important platform for leisure and entertainment for many employees, where employees discuss interesting topics they are concerned about. They worried that employees might spend much time engaging in ESM doing non-work-related activities such as browsing hot topics, posting to express their opinions and chatting with other users during working hours, resulting in a decrease in their productivity. However, most studies [16], [17] express the opposite opinion that ESM could provide more efficient communication channels and convenient information-sharing services where employees can obtain work-related information and share their work experiences. Evidence has suggested that ESM have potential for knowledge sharing and problem solving by strengthening communication and collaboration among employees [18], [19].

In addition, ESM can be used to maintain relationships with colleagues. Some scholars proposed that

ESM could promote employees' interactivity with colleagues to strengthen mutual trust [20] and work cooperation [21], which helps improve work performance. However, other research [22] has reported that ESM can also aggravate the adverse effects of workplace conflict because conflicts publicized by ESM can deepen misunderstandings between relevant parties. These contradictory conclusions maybe result in difficulties in making organizational policies regarding the use of ESM.

While many studies have been done about the impact of ESM, few studies have found empirical evidence on how employee participation in ESM affects their job performance. In our studies, we address this research gap through a data-sharing agreement with a large, high-tech manufacturing enterprise with internal social media and conducted a cooperative study on the impact of employee behaviors involved in ESM on their job performance. We want to know whether employee online behaviors significantly affect their job performance and how enterprise managers should manage their ESM. Thus, in our study, we try to investigate the following research questions:

RQ1: Will employee participation in ESM affect their job performance? Which kinds of employee online behaviors positively influence job performance? Which kinds of employee online behaviors negatively influence job performance?

RQ2: How could enterprise managers implement practical policies toward the use of ESM to help employees improve their job performance?

## II. LITERATURE REVIEW

### A. EMPLOYEE BEHAVIORS AND MOTIVATIONS IN ESM

Previous studies argued that ESM is a well-liked channel for employees to obtain information, express views and interact with others within the organization. They focused on the analysis of employee behavior patterns of ESM usage and their motivations for participating in ESM. For example, DiMicco *et al.* [6] conducted qualitative interviews with employees involved in a social network site deployed within an IBM intranet and found what motivates employees to use the site included connecting on a personal level with coworkers, assisting them in their personal career advancement and convincing others to support their ideas and projects.

Information-seeking behavior and information-sharing behavior are widely considered two distinct types of behaviors in a social network environment [23], and different behaviors were driven by several different incentives [24]. Employees could draw on the knowledge of others by searching the work-related information posted by other users, which helped them become more professionally productive. Browsing some valuable posts when they encounter obstacles at work often brings employees new ideas [25]. Moreover, many employees prefer to seek some leisure-related information on ESM, such as vacation pictures, entertainment gossip, and hot social issues. Although this non-work-related information might not help the employees improve their productivity,

it could satisfy employees' interests and help them relieve stress. Some studies supported the proposition that ESM is a good platform to relax for employees with a heavier workload and greater pressure [26], [27].

Knowledge contribution behaviors in ESM primarily occur when users are motivated to review the questions posted, choose those they are able and willing to answer, and take the time and effort to formulate and post a response [28]. The determinants of information-sharing behaviors are different from those of information-seeking behaviors. Information contributors voluntarily help strangers through ESM. They have no assurances that those they are helping will ever return the favor, since lurkers may draw upon the knowledge of others without contributing anything in return. Therefore, it seems irrational that they contributed much time and effort without immediate benefits [29], [30]. To understand this paradox, some studies focused on the motivations for information-sharing behaviors in ESM. According to Pi *et al.* [31], there are several different factors affecting the intention and attitude toward knowledge sharing in ESM, including reputation, expected relationship, sense of self-worth and subjective norm. Many users would like to contribute their knowledge when they perceive that doing so enhances their professional reputations and they have the experience to share [32]. Additionally, they acquire an increased sense of self-worth, which is thought to motivate them to continuously share their knowledge [33]. In addition, some users hope to create and strengthen ties with colleagues through knowledge sharing [33], [34]. Some studies also showed that the subjective norm is a significant influencing factor encouraging knowledge-sharing behaviors [31].

## B. ESM AND EMPLOYEE PERFORMANCE

With its increasing popularity in a few corporate settings, there is considerable research related to the use of social media in the workplace and its effects on job performance. Some previous studies consider ESM as a time-waster [35]. According to a survey report from an IT research company allowing access to social networking sites in the workplace, 77% of employees using social media at work resulted in a 1.5% decrease in total employee productivity [36]. There is evidence that most employees use ESM as a tool to socialize with their friends and families rather than discuss work-related issues with colleagues [37], [38]. Therefore, the usage of ESM inside companies is blamed for reducing the productivity of employees due to the addictive and excessive use of ESM in non-work-related activities. Accordingly, some studies also reported that many employers consider banning the use of social media during working hours [39] because they worry that staff is wasting time on websites during working hours and weakening productivity [40].

While some studies take a more negative view on the impact of ESM on job performance, several recent studies have shown just the opposite. They argued that social media use at work has a positive impact on job performance. Many employees found that ESM makes obtaining advice from

friends or colleagues who are in their social media network more convenient and easier [41]. ESM could serve as a communication channel where explicit and implicit knowledge can be effectively transferred among employees. There is evidence suggesting that employees who use social networking sites are 9% more productive than those who do not [36]. Another independent survey of 2,500 employees conducted in five European countries has shown that 65% of employees think ESM make them more efficient workers, 65% of employees think ESM give them more creativity and ideas, and 38% of employees think ESM help them gain knowledge and create solutions to problems. Employees also reported that social networking has become part of the culture of their workplace.

In addition, some studies considered that social media use in non-work-related activities could help improve job performance because personal surfing and online chatting on social media can serve as one solution to help employees relax and take breaks from their stressful work surroundings. There is evidence that the employees who are involved with highly demanding jobs are more likely to access social media compared to those in less stressful positions because employees who experience a high degree of job stress need some type of support to help them deal effectively with external stressors [41]. Another similar study reported that 70% of 300 employees think personal surfing on social media enables their brain to be refreshed and renewed, leading to a higher total concentration on their work and, as a result, increasing job productivity [36].

Moreover, different from the views that ESM is a time-waster because it is an online communication platform for personal business driven by private demands, further analysis found that social media, as a means by which they can maintain personal connections with family, friends, and colleagues, could enhance employee satisfaction, which is positively associated with job performance [42]. Good relationships among colleagues make employees feel connected to one another, which in turn motivates them to communicate and interact more often. In addition, the ability to maintain personal connections outside the enterprise can be a crucial factor that allows employees to balance their work and life activities more effectively. Employees who are fully satisfied in their personal lives are more able to concentrate on their work, which will subsequently help them achieve higher levels of performance. Therefore, ESM as a source of social support will help improve employee performance through the mediating effect of job satisfaction.

## C. SUMMARY

Although an increasing number of studies have begun to explore ESM, the focus has mainly been on how to evaluate its value for the organization in terms of internal communication and knowledge management at the macro level [43]. These studies have provided few insights into the effects of ESM on individuals at the micro level. There seems to be a very limited understanding of personal use of ESM and

its impact on job performance [44]. Empirical studies are still somewhat scarce because of limited sample size either the difficulty of accessing the data on user behavior in ESM and their job performance. Therefore, empirical analysis is needed to provide further evidence for the important value of ESM within enterprises, since this proposition remains an issue under investigation.

### III. RESEARCH HYPOTHESES

Earlier studies suggested that the usage of social media within enterprises could be blamed for employees spending too much time on online activities unrelated to the workplace, resulting in a decrease in their job performance. The preconceived notion that ESM is considered time-wasters had a sizeable impact on employers' willingness and desire to take advantage of social media in the workplace. Some recent studies, however, have provided different opinions regarding ESM. For example, a survey was done on the opinion that using ESM lowered employee job performance, and the results indicated that the same percentages of respondents agreed and disagreed with the notion [37].

Employees involved in ESM engage in different types of online activities due to different motivations, which may engender a complicated influence on their job performance. Information sharing and information seeking are thought to be two types of distinct user online activities. Information-sharing behaviors on ESM constitute online activities for the purpose of contributing information, such as posting some messages or viewing other messages. Previous studies found that there are multiple factors affecting the attitude of employees towards information sharing on ESM. Employees could receive much attention by sharing much work information. Some of them are even identified as experts in a certain domain by continually sharing their work experience or offering useful advice to others. Accumulated reputation from information-sharing behaviors could bring them certain indirect benefits, such as becoming known to senior employees and upper management, thereby potentially increasing their job performance. In addition to professional reputation, some intrinsic benefits are considered to motivate employees to contribute their knowledge, such as self-esteem and feelings of commitment to their organization. Some employees perceive that helping others with challenging problems is interesting work and makes them gain higher self-satisfaction. Some also consider they have an obligation to help their colleagues solve difficulties; however, they also acquired much knowledge and improve their problem-solving skills, which may positively affect their job performance. Thus, we propose the following hypothesis:

*Hypothesis 1: The employees who engage in information-sharing activities on ESM would achieve higher performance than other employees.*

Information-seeking behaviors on ESM refers to online activities for the purpose of obtaining information, such as searching for valuable knowledge or browsing specific online communities to find topics of interest. Employees could gain

much valuable work-related information and practical experience of others through ESM platforms. They also could try to seek advice and assistance information to create solutions to problems they encountered in their work. In addition, some employees pointed out that ESM could help them think of innovative ideas for their work. This valuable information and knowledge obtained from ESM make employees become more productive and professional, which leads to better job performance.

Moreover, some employees prefer to browse entertainment information or read gossip through ESM that has nothing to do with their job. It seems that information seeking with hedonic motivation is a distraction and interruption to work and apparently has a negative impact on job performance. Several studies, however, argued that these information-seeking behaviors unrelated to their job will help employees achieve higher job performance. The possible explanation is that accessing ESM could allow employees to relax and take breaks from their stressful work surroundings and therefore help increase their job satisfaction. Employees with a very high workload in particular can achieve a work-life balance by seeking non-work-related recreation or leisure topics. When employees are happy with their jobs, they are more likely to enjoy working, thereby indirectly potentially increasing their job performance. Thus, we propose the following hypothesis:

*Hypothesis 2: The employees who engage in information-seeking activities on ESM would achieve higher performance than other employees.*

In addition to the above two types of usage behaviors, employees could benefit from involvement in ESM in many other ways, such as building individual social network relationships. Employee long-term involvement in ESM could make them feel more connected within an organization and more willing to interact with others, discuss novel ideas and work together in problem solving. In addition, as a communication channel, ESM provides a platform for employees to communicate non-work-related information and helps build informal personal relationships. Employee involvement in ESM makes it more convenient and easier for them to interact with others and perceive more emotional support. According to social capital theory, these positive outcomes through involvement in ESM could have a positive impact on their job performance. Thus, we propose the following hypothesis:

*Hypothesis 3: The employees who participate more in ESM would achieve higher performance than other employees.*

Regardless of their motivations for involvement in ESM, employees will inevitably devote much time and effort to online activities. A survey of 237 employees in an IT research company found that 77% of respondents who were allowed to access social media during working hours lose an average of 1.5% employee productivity, indicating that working fewer hours would have an obvious negative effect on job performance. Nevertheless, we tried to find the best approaches being used to effectively utilize ESM to help employees improve their job performance while avoiding unfavorable



consequences. An alternative solution to the problem of ESM usage is to only allow employees to participate in ESM in their spare time or off-work hours instead of during working hours, since employee online activities on ESM during working hours significantly affect their job performance. The choice to limit access to ESM is based on the condition that employees who were more likely to engage in various types of online activities during working hours would achieve lower performance than others would without usage preference. Thus, we propose the following three hypotheses:

*Hypothesis 4-a: The employees who are more willing to share information on ESM during working hours would achieve lower performance than those without preference for the timing of information-sharing activities.*

*Hypothesis 4-b: The employees who are more willing to seek information on ESM during working hours would achieve lower performance than those without preference for the timing of information-seeking activities.*

*Hypothesis 4-c: The employees who are more willing to use ESM during working hours would achieve lower performance than those without preference for the timing of usage.*

## IV. METHODS

### A. RESEARCH CONTEXT AND DATA COLLECTION

The empirical study was conducted in a large state-owned high-tech spacecraft equipment manufacturing company with over 10,000 employees in China. The company has become one of the leading international spacecraft designers and manufacturers over the last four decades, providing fully integrated solutions of all kinds of spacecraft equipment and systems for global customers. A social media platform, that is, an online discussion forum, was deployed within the company in 2005. The online forum is restricted to the employees of the company and supports interpersonal communication, coordination and collaboration inside the company. Any employee could have access to the online forum on the company intranet to browse and search the messages posted by other users. Only the registered users are allowed to initiate a new topic or reply to other posts in a discussion thread after logging in. All the messages posted by users are accessible to all the employees of the company and are stored in a database on the internal server.

The online forum was classified into 66 discussion boards according to their topics, where users could have access to all kinds of information that they were interested in, including work-related knowledge, problem-solving experiences, personal life trivia, entertainment, leisure and so on. Because little restriction was imposed on the use of the online forum by the company, employees could engage in all kinds of online activities, including information seeking, information sharing and communicating with others at any time. After over ten years of development, the site has 5,640 registered users who generated a total of 682,036 posts. Currently, more than half of the employees in the company have been involved in the online forum, indicating that it has become an important channel of communication for the company.

For many years, the company has made great efforts to promote information communication and knowledge sharing within the enterprise. The managers thus attempted to make full use of social media for communication and coordination among the employees. However, with the popularity of the online forum among the employees, management has serious doubts concerning whether the social media platform could improve employee performance and, if so, to what extent. Therefore, we conducted a cooperative study to explore the effect of employees participating in ESM on their job performance in the context of this company.

In our study, one of the challenges is to establish a data collection approach that is appropriate to measure employee engagement in ESM. The most common data collection methods currently used in social media research include surveys, interviews, experiments, online data collection and so on. In recent studies about social media, some studies use employees' online behavior data instead of their self-report survey data to measure the employee engagement in enterprise internal social media [45]–[48]. Considering that we aim to assess three types of online behaviors, including information-sharing behaviors, information-seeking behaviors and general usage behaviors, we decided to use online behavioral data on users' online traces of activities and interactions in the ESM platform. There are three reasons for this. First, methodologically, we wish to capture actual behaviors of employee engagement in ESM, not the employees' attitudes toward and perceptions of their engagement in ESM. Thus, online behavioral data are more appropriate for our study compared to data from self-report methods such as surveys or interviews. Second, studies [49] have found a large disparity between self-report online behaviors and actual usage. Often, users significantly underestimate their online engagement because they may have trouble accurately accounting for the full amount of time spent online. Our data collection approach can solve the problem and make the results more accurate. Finally, sampling techniques used in the surveys or interviews limit generalizability of findings due to their small sample size. In contrast, the large amount of behavioral data created by online users makes the experiment results more credible and convincing.

In our study, the available data for empirical analysis were collected from two sources: online employee behavior information stored in the internal ESM database and offline employee information from the human resource management system.

On one hand, the ESM database contains detailed information about employee posts, where each post is uniquely identified. The additional necessary attributes were also stored, including author, post title, post body content, thread to which the post belongs, and timestamp, indicating the date and time it was posted. However, it is difficult to collect data on employee information-seeking activities, as the system just contains an entry for every access to the sites of registered users in the server log file and was not used to keep track of user online behaviors. To solve this problem, we were

**TABLE 1. A summary description of all variables.**

Variables	Description
<i>Dependent variable</i>	
Performance	An annual performance evaluation provided by employee's peers and supervisors, which was measured by a performance rating using a 5-point numeric scale with values of 1 for those among the lowest contributors, 2 for average contributors, 3 for above average contributors and 4 for the top contributors
<i>Independent variables</i>	
Share	Information-sharing behavior that was measured by the number of posts written by one user
Seek	Information-seeking behavior that was measured by the number of clicks on post subjects
Use	Usage behavior of ESM that was measured by the number of total clicks
<i>Control Variables</i>	
Gender	Dummy variable with 1 for male and 0 for female
Age	Age of the employee
Education	Four-level (1 through 4) ordinal scale (1 = High School degree or less; 2 = Bachelor's degree; 3 = Master's degree; 4 = Doctoral degree or above)
Tenure	Number of years that the employee had worked for the company
<i>Moderating Variables</i>	
Share_working	Proportion of working time to the total time spent in information-sharing activities, which was measured using the percentage of the number of posts written by the employee during working hours
Seek_working	Proportion of working time to the total time spent in information-seeking activities, which was measured using the percentage of the number of post subjects clicked by the employee during working hours
Use_working	Proportion of working time to the total time spent in using ESM, which was measured using the percentage of the number of total clicks by the employee during working hours

authorized to make the secondary development on the sites to obtain the necessary information of all the user online activities by tracking and recording every user click on the sites. Specifically, we did not use registered user ID as the user identifier because many users were more likely to anonymously login in the sites as guests when they had no intention of posting. Instead, we used the IP address to identify the users, as the office computer of each employee was typically associated with a unique IP address.

On the other hand, additional offline employee information could be obtained from the human resources management system, including employee demographics (gender, age, and education background, etc.), position within the company, job performance and so on. Note that the human resources department only provided basic information from three years earlier due to the sensitivity of employee performance data, but the available data are significant enough for our empirical analysis. In addition, the human resources department removed sensitive personal information and provided anonymized employee profile data for reasons of privacy.

In addition, we think the requirements for informed consent must be considered in our study to reduce potential ethical risks. However, it is much more difficult to obtain written informed consent online than in traditional settings. A possible solution for this difficulty was that we could waive the signed document of informed consent and take alternative approaches, such as allowing a procedure in which human subjects click a button on an online form to indicate they have read and understood the consent form. In our research,

we used two approaches to ensure the participating employees were fully informed about what the research involved and its risks and benefits. On one hand, an official notification elaborating on the purpose of the research and how the data will be used was sent by email to each participating employee, and asked the recipient to reply via email to confirm that it had been read. On the other hand, an informed consent page with a "click to accept" button was sent to ESM users through the messaging system in the ESM platform, allowing participants to click the button to express their understanding and agreement on our research.

We obtained personal information on 5,540 employees from the list provided by the human resources department, among whom 3,689 employees were involved in ESM, accounting for 66.58% of all employees. After deleting the employee samples with incomplete observations or missing values, we used additional processing to make connections between online behavior information and offline information on employees by their unique identities and allocated IP addresses, yielding a dataset consisting of 2,606 observations from 1,432 employees for the empirical analysis.

## B. VARIABLES DESCRIPTION

Table 1 provides a summary description of all variables. Job performance, as the dependent variable in our empirical analysis, should be measured in terms of the results produced by employees. Previous research has relied on merit pay as a measure of worker outcome. However, the sample in our study consisted of different kinds of employees based on their

job positions, including production workers, process workers, R&D engineers, and administrative workers and managers. Compared to the manual workers, whose performance relies on their total output or output per hour based on the quantity of goods and services produced per hour of labor input, it is impractical to measure the output of knowledge workers and managers, as knowledge work is not easily observable or measurable and therefore is more difficult to evaluate. Thus, many studies adopt survey questionnaire methods to measure job performance by constructing a self-report questionnaire. However, measurement of job performance remains a major challenge due to the poor reliability and validity of measures used on self-assessment questionnaires.

Considering the measurement should be feasible, reliable, valid and easy-to-obtain, an annual performance evaluation of each employee conducted by the company was used in our study to measure job performance. The outcomes were rated as excellent, good, average, fair and poor. The performance rating was determined through a deliberative process involving employee's peers (colleagues), and supervisors based on the accomplishment of duties and tasks that were specified in their job descriptions. The annual evaluation provided an objective and comprehensive evaluation of job performance by soliciting feedback from a variety of points of view and was therefore used as the measure of job performance.

The independent variables in our empirical model are all measures of different usage patterns of ESM from the online discussion forum in the company. As mentioned above, information seeking and information sharing on ESM are thought to be two distinct online behaviors that could be measured using different independent variables. Considering that the information-sharing behaviors on ESM mainly include posting new messages and replying to previous messages, we used the variable *Share* to represent the number of posts written by one user to measure information-sharing behaviors.

In contrast, it remains a major challenge in measuring the information-seeking behavior because it is difficult to observe and track actual seeking activities on online forum sites. A valid proxy measure of information-seeking behavior is deemed necessary. Considering that users have to click a post's subject with an URL that links to one discussion thread to see the information that interests them, it may be inferred that the clicking behavior on the post means user seeking the information on the post. Hence, the number of clicks on posts' subjects, represented as variable *Seek*, might be taken as a proxy measure of information-seeking behavior.

Similarly, for the measure of user involvement in ESM, we could not directly observe when the employees were using ESM. However, it seems inevitable for users to click on a button or a link on the sites no matter what online activities the users are engaged in. We thus capture and record all users' clicking behaviors used to request new pages from the server. The number of total click activities, represented as variable *Use*, might be taken as a valid proxy measure of the level of involvement in the online forum sites.

In addition to the aforementioned independent variables, there are other important factors that may affect employee job performance. Traditionally, employees' position and tenure in the company are thought to have significantly influenced their job performance in many studies. Moreover, some previous studies have considered that employees' basic demographic characteristics, including age, gender, education background and so on, have an influence on their job performance. Therefore, in our research, the following four variables—age, gender, education, and tenure—were employed as control variables. Age was measured as a continuous variable. Gender was measured as a dummy variable with 1 for male and 0 for female. Education was measured using a four-level (1 through 4) ordinal scale (1 = High School degree or less; 2 = Bachelor's degree; 3 = Master's degree; 4 = Doctoral degree or above). Job tenure was measured as a continuous variable representing the number of years that the employee had worked for the company.

In addition to the above factors, we try to understand whether the timing of ESM usage may affect employee job performance. Many researchers believed that wasting the daily working hours of employees on ESM will cause lower worker productivity. However, a few studies found empirical evidence to support the argument that employees who were more likely to engage in online activities during working hours would achieve lower performance than others did without preference for the timing of usage. A variety of moderator variables have been identified in our study to examine the moderating effect of the timing of ESM usage on the relationship of ESM usage and job performance, as follows.

(1) To test the hypothesis 4-a that the employees who were more willing to engage in information-sharing activities on ESM during working hours would achieve lower performance than would the general population, we identify the moderator variable *Share\_working* to represent the proportion of working time to the total time spent in information-sharing activities. *Share\_working* was measured using the percentage of the number of posts written by the employee during working hours.

(2) To test the hypothesis 4-b that the employees who were more willing to engage in information-seeking activities on ESM during working hours would achieve lower performance than would the general population, we identify the moderator variable *Seek\_working* to represent the proportion of working time to the total time spent in information-seeking activities. *Seek\_working* was measured using the percentage of the number of post subjects clicked by the employee during working hours.

(3) To test the hypothesis 4-c that the employees who were more likely to use ESM during working hours would achieve lower performance than would the general population, we identify the moderator variable *Use\_working* to represent the proportion of working time to the total time spent in using ESM. *Use\_working* was measured using the percentage of the number of total clicks by the employee during working hours.

**TABLE 2. Descriptive statistics of employee demographics.**

Variable	Item	Count	Percentage
Gender	male	1008	70.39%
	female	424	29.61%
Age	<=25	35	2.44%
	26-35	987	68.92%
	36-45	323	22.56%
	46-55	79	5.52%
	>55	8	0.56%
Education	High School degree or less	83	5.80%
	Bachelor's degree	361	25.21%
	Master's degree	759	53.00%
	doctoral degree or above	229	15.99%
Tenure	<=5	320	22.35%
	6-10	595	41.55%
	11-20	361	25.21%
	>=20	156	10.89%

**C. ANALYSIS METHOD**

In this research, we employed hierarchical regression analyses to investigate how the various usage behaviors of employees on ESM affect their job performance significantly. To test all hypotheses, we built various models with performance as the dependent variable based on different sets of independent variables.

In the first stage, model 1 contains only four control variables (Age, Gender, Education, and Tenure) as a benchmark for the following models. In the second stage, the independent variables (Share, Seek, and Use) were added to the regression models to test the effect of different usage patterns of ESM on employee job performance (hypotheses 1-3). In the third stage, the moderator variables (Share\_working, Seek\_working, and Use\_working) were added to the regression models to test the moderating effect of the timing of ESM usage on the relationship of ESM usage and job performance.

**V. RESULTS**

**A. SUMMARY STATISTICS**

Table 2 presents the summary statistics of employee demographics used in the study. The employee sample was composed of 1,008 males (70.39%) and 424 females (29.61%). Their mean age was 33.6 years old, and a majority of the employees (68.92%) were between 26 and 35 years old. For educational level, 83 held a high school degree or less (5.80%), 361 held bachelor's degrees (25.21%), 759 held master's degrees (53.00%), and 229 held doctoral degrees (15.99%), showing that employees with high levels of education constitute a majority of the population. The employee sample has an average of 10.6 years of working experience in the company and has a balanced distribution of employees in different job tenure groups.

Descriptive statistics of the independent variables measuring employee online behaviors are shown in Table 3. The average number of posts written by one user was 30.12,

**TABLE 3. Descriptive statistics of the independent variables.**

Variable	Min	Max	Mean	SD.
Share	0	1538	30.12	90.82
Seek	1	35262	1461.92	2321.69
Use	1	287322	4123.05	8549.89

**TABLE 4. Descriptive statistics of employee performance rating.**

Variable	Item	Count	Percentage
Performance	poor	0	0
	fair	3	0.11%
	average	1876	71.99%
	good	368	14.12%
	excellent	359	13.78%

of which 22.49 (74.66%) posts were written during working hours. The average number of posts read by one user was 1461.92, of which 1044.33 (71.43%) posts were read during working hours. The average number of uses of ESM by one user was 4123.05, of which 3005.95 (72.91%) times occurred during working hours.

Table 4 shows the distribution of performance rating on a five-point scale: poor, fair, average, good, and excellent. Generally, employee's peers and supervisors tend not to give a poor performance evaluation. Only 2 employees in the company received the lowest rating, and they are not in the sample. Similarly, only 3 employees in the sample are rated "fair". In addition, a vast majority of the employees received an average or above performance rating; 359 employees (13.78%) received an "excellent" performance rating.

**B. CORRELATION ANALYSIS**

Table 5 presents the correlation matrix for all the measured variables, containing the dependent variable, the independent variables, and the control variables. As shown in Table 5, Tenure is highly, positively correlated with Age. It is reasonably well understood that only the older employees could possibly have worked for more years in the company. In addition, Seek and Use are highly correlated in the analysis of the correlations among independent variables. The reason might be that we used similar proxy measures for Seek and Use; we used the number of clicks on post subjects to measure Seek and the number of total clicks to measure Use. The two proxy measures have a similar nature, as they are based on click activities. The total click activities will inevitably increase with the number of clicks on post subjects, resulting in the highly positive correlation between Seek and Use. The correlations among other variables are not high, indicating no problem of high multicollinearity.

In the correlation between the dependent variable and other variables, the findings in Table 5 indicate that all control variables except education are significantly related to job performance and that all three independent variables are also significantly related to job performance.



TABLE 5. Correlation matrix for the variables.

Variable	Gender	Age	Education	Tenure	Share	Seek	Use	Performance
Gender	1							
Age	-0.0633*	1						
Education	0.1773*	-0.0274	1					
Tenure	-0.1167*	0.8844*	-0.3015*	1				
Share	-0.0250	-0.00750	-0.0444	0.0174	1			
Seek	0.0720*	0.0315	0.0917*	0.0278	0.3395*	1		
Use	0.0447	0.0279	0.0780*	0.0279	0.3492*	0.6868*	1	
Performance	0.1355*	-0.1345*	0.0464	-0.1262*	-0.1072*	-0.1201*	-0.1302*	1

\*Correlation is significant at the 0.05 level (2-tailed).

### C. RESULTS

We conducted classical assumption tests used in the analysis of multiple linear regression econometric models, including tests for multicollinearity, heteroscedasticity, and endogeneity. First, the variance inflation factors (VIF) of all coefficient estimates in the model for the multicollinearity test are between 1.81 and 6.36, well below the common cutoff of 10, indicating that multicollinearity does not contaminate the results. Second, the results of the heteroscedasticity test show that there is significant heteroscedasticity ( $\text{Prob} > \chi^2 = 0.0000$ ) in the original models. Hence, robust standard error estimates for the model parameters are employed in our study to make the models more robust. Finally, we adopted the instrumental variable method to deal with a possible endogeneity problem, and the results show there is no endogeneity problem in the models.

Table 6 presents the results of the hierarchical regression analysis. As the benchmark, Model 1 only contains the control variables. The results show that all four control variables, including age, gender, education, and tenure, significantly affect job performance. Age is positively related to job performance, indicating that the older employees have better job performance. Gender is positively related to job performance, indicating that male employees are more likely to have better performance. Education is negatively related to job performance, indicating that the employees with low education background have better job performance. Tenure is negatively related to job performance, a possible explanation for which is that the new employees are willing to work hard to improve their performance for future promotion.

Next, independent variables were added to the model to estimate the effects of ESM usage behaviors on job performance. Model 2 added information-sharing behavior Share to the benchmark model.

As shown in Table 6, the coefficient for Share is negative and significant, indicating that information-sharing behaviors on ESM have negative effects on job performance. Thus, Hypothesis 1 is not supported. Model 3 added information-seeking behavior Seek to the benchmark model. The coefficient for Seek is positive and significant, indicating that information-seeking behaviors on ESM have positive effects on job performance. Thus, Hypothesis 2 is supported. Model 4 added the above two distinct types of usage behaviors simultaneously, and the result is consistent with the above

models, illustrating the robustness of the findings. Model 5 added usage behavior of ESM Use, and the results show that Use is positively associated with job performance; thus Hypothesis 3 is supported.

Finally, to examine whether the timing of ESM usage might moderate the relationship between ESM usage and job performance, a variety of moderator variables were added to the models. As shown in Table 6, model 6 added the moderating variable Share\_working and the interaction between Share\_working and Share. The results show that the coefficient of Share is positive and significant which has the opposite sign compared with the Share in model 2, and the coefficient of interaction is negative and significant. These results indicate that employee information-sharing activities on ESM during working hours have a significantly negative effect on their job performance. As the proportion of working time to total time spent in information-sharing activities increases, the positive effect of online information-sharing activities on job performance weakens and then becomes negative. Hence, Hypothesis 4-a is supported. Model 7 added the moderating variable Seek\_working and the interaction between Seek\_working and Seek. The results show the coefficient of interaction is negative and significant, indicating that employee information-seeking activities on ESM during working hours has a significant and negative effect on their job performance and that increasing the proportion of working time spent in information-seeking activities will weaken the positive relationship between ESM usage and job performance. Hence, Hypothesis 4-b is supported. Model 8 added the above two moderating variables and their interactions; the result is consistent with the above models, illustrating the robustness of the findings. Model 9 added the moderating variable Use\_working and the interaction between Use\_working and Use. The results show the coefficient of interaction is negative and significant, indicating that the use of ESM during working hours negatively moderates the influence of ESM on job performance. Hence, Hypothesis 4-c is supported.

We conducted further tests of the model results, shown in Table 6. Goodness of fit is assessed through the adjusted R-square value, indicating the percentage of the variability in the dependent variable that can be accounted for by the predictors. The results show that adjusted R-square in all models was significant, as indicated by the significant

**TABLE 6. Hierarchical regression for job performance.**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
<i>Demographics</i>									
Age	0.386*** (0.092)	0.386*** (0.092)	0.292*** (0.094)	0.273*** (0.094)	0.330*** (0.096)	0.398*** (0.092)	0.300*** (0.094)	0.285*** (0.094)	0.320*** (0.094)
Gender	1.198*** (0.316)	1.207*** (0.317)	1.159*** (0.314)	1.171*** (0.313)	1.225*** (0.314)	1.126*** (0.321)	0.770** (0.322)	0.795** (0.323)	0.768** (0.323)
Education	-0.871*** (0.259)	-0.871*** (0.259)	-0.781*** (0.258)	-0.762*** (0.258)	-0.825*** (0.260)	-0.902*** (0.259)	-0.874*** (0.257)	-0.855*** (0.257)	-0.886*** (0.258)
Tenure	-0.397*** (0.084)	-0.396*** (0.084)	-0.321*** (0.085)	-0.305*** (0.085)	-0.353*** (0.087)	-0.410*** (0.084)	-0.325*** (0.085)	-0.313*** (0.086)	-0.339*** (0.086)
<i>ESM usage</i>									
Share		-1.183** (0.498)		-2.472*** (0.492)		7.044* (4.050)		0.6416 (4.068)	
Seek			0.142*** (0.026)	0.171*** (0.028)			0.441*** (0.134)	0.426*** (0.141)	
Use					0.0291** (0.013)				0.209*** (0.049)
<i>Moderating role</i>									
Share_working						-0.191 (0.439)		0.170 (0.451)	
Share*Share_working						-10.69** (5.159)		-3.782 (5.235)	
Seek_working							-2.165*** (0.741)	-2.142*** (0.761)	
Seek* Seek_working							-0.385** (0.169)	-0.330* (0.179)	
Use_working									-2.045*** (0.780)
Use* Use_working									-0.224*** (0.065)
Constant	66.93*** (1.618)	67.01*** (1.616)	68.20*** (1.636)	68.62*** (1.639)	67.70*** (1.652)	67.08*** (1.638)	70.03*** (1.724)	70.23*** (1.736)	69.69*** (1.741)
<i>Model evaluation</i>									
R <sup>2</sup>	0.015	0.017	0.029	0.035	0.023	0.018	0.039	0.044	0.037
Adjusted R <sup>2</sup>	0.014	0.015	0.027	0.032	0.021	0.015	0.036	0.040	0.035
F-value	9.95***	8.76***	15.32***	15.50***	10.85***	6.77***	15.00***	11.88***	14.41***
ΔR <sup>2</sup>		0.002	0.014	0.020	0.008	0.001	0.010	0.009	0.015
F-value for ΔR <sup>2</sup>		5.63**	30.25***	24.84***	4.80**	2.51*	12.55***	6.04***	18.08***

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

F-Values (Adjusted R<sup>2</sup> > 0.015, P < 0.01). The change in R-square evaluates how much explanatory power was added to the model by each new variable. We found that adding independent variables (Share, Seek, Use) to the benchmark model increases the R-square by approximately 0.2% (Model 2), 1.4% (Model 3), 2.0% (Model 4) and 0.8% (Model 5). The changes in R-square were all significant, as indicated by the significant F-Values (P<0.01), indicating that all three independent variables have significant explanatory power in the models. Similarly, after adding moderating variables and their interaction terms, the R-squared values increase by 0.1% (Model 6), 1.0% (Model 7), 0.9% (Model 8) and 1.5% (Model 9). The changes in R-square were all significant, as indicated by the significant F-Values (P<0.01), indicating that all three moderating variables have significant explanatory power in the models.

**D. ROBUSTNESS CHECKS**

We conducted several tests to check the robustness of our results. One concern about the results is whether annual

evaluation used in our study is a reliable and valid measure of job performance. To address this concern, we consider alternative measures of job performance to assess whether the results are robust. Based on the obvious fact that the employees with high performance would probably be awarded some honors, professional titles, or obtain some technical qualifications and promotion, we aggregate these variables and use weighted scores to measure job performance and re-estimate the alternative model. Table 7 reports the results of the alternative specification. The statistical significance of the coefficients on the three independent variables Share, Seek, and Use is similar to the results in Table 5, indicating that the inclusion of the additional variables measuring job performance does not have a significant impact on the relationship between ESM usage and job performance. However, the coefficients on the three interactions remain negative and statistically significant, which further validates the robustness of our results.

In another robustness test, considering that information-sharing behaviors depend on not only the quantity but also

**TABLE 7. Robustness test for the measure of job performance.**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
<i>Demographics</i>									
Age	0.245** (0.099)	0.246** (0.099)	0.184* (0.101)	0.165 (0.101)	0.212** (0.101)	0.263*** (0.099)	0.194* (0.101)	0.183* (0.101)	0.209** (0.101)
Gender	1.760*** (0.345)	1.773*** (0.345)	1.735*** (0.344)	1.747*** (0.344)	1.776*** (0.344)	1.657*** (0.351)	1.335*** (0.353)	1.347*** (0.354)	1.319*** (0.353)
Education	-0.635** (0.277)	-0.635** (0.276)	-0.577** (0.277)	-0.557** (0.276)	-0.608** (0.277)	-0.678** (0.276)	-0.678** (0.275)	-0.665** (0.274)	-0.684** (0.275)
Tenure	-0.314*** (0.090)	-0.314*** (0.090)	-0.265*** (0.092)	-0.248*** (0.092)	-0.288*** (0.092)	-0.333*** (0.091)	-0.270*** (0.092)	-0.263*** (0.092)	-0.280*** (0.092)
<i>ESM usage</i>									
Share		-1.633** (0.643)		-2.555*** (0.619)		10.22** (4.283)		4.679 (4.520)	
Seek			0.0922*** (0.027)	0.123*** (0.029)			0.346** (0.137)	0.306** (0.144)	
Use					0.0173* (0.010)				0.158*** (0.050)
<i>Moderating role</i>									
Share_working						-0.252 (0.473)		0.176 (0.489)	
Share*Share_working						-15.40*** (5.483)		-9.193 (5.813)	
Seek_working							-2.475*** (0.802)	-2.397*** (0.823)	
Seek* Seek_working							-0.323* (0.175)	-0.232 (0.185)	
Use_working									-2.508*** (0.813)
Use* Use_working									-0.174*** (0.064)
Constant	71.61*** (1.753)	71.72*** (1.749)	72.43*** (1.778)	72.87*** (1.778)	72.07*** (1.777)	71.80*** (1.769)	74.48*** (1.861)	74.62*** (1.870)	74.32*** (1.847)
<i>Model evaluation</i>									
R <sup>2</sup>	0.020	0.022	0.025	0.030	0.022	0.025	0.034	0.039	0.034
Adjusted R <sup>2</sup>	0.019	0.021	0.023	0.028	0.021	0.022	0.031	0.035	0.031
F-value		11.96***	13.30***	13.56***	11.93***	9.45***	13.07***	10.55***	13.03***
ΔR <sup>2</sup>		0.002	0.005	0.010	0.002	0.002	0.009	0.009	0.012
F-value for ΔR <sup>2</sup>		6.44**	11.79***	15.25***	3.11*	4.54**	11.45***	6.03***	15.05***

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

the quality of posts, we redefine the independent variable Share as the number of words in the posts written by one user. Similarly, for the measure of information-seeking behavior, we redefine the independent variable Seek as the number of words written in all the posts clicked by one user. Table 8 reports the results of this robustness analysis. The coefficients on all independent variables and their interaction with moderating variables in the alternative models are statistically significant, and their signs remain unchanged except for the coefficients of independent variable Share in model 6. The coefficients of Share remain positive but fall in significance with the inclusion of moderating variable Share\_working. One possible reason is that many posts were copied from other websites and not originally written by the post authors, so the length of posts may less accurately measure information-sharing behavior compared to the number of posts. This provides additional proof that the number of posts is a reliable and valid measure of information-sharing behaviors. Overall, the results from the alternative models appear to be broadly consistent with the results from the original model.

### E. DISCUSSION

First, the results of this study support the argument that the usage of social media within enterprises could help improve employee job performance, which agrees with the previous studies. The finding will help enterprise managers to realize the importance of ESM and motivate them to make full use of ESM.

We further divided the online behaviors on ESM into information-seeking behavior and information-sharing behavior and found that the two online behaviors have opposite effects on job performance. On one hand, we conclude that information-seeking behaviors on ESM have positive effects on job performance. The finding proves that ESM could provide an efficient information platform where employees could gain much valuable work-related information and practical experience of others to make them become more productive and professional. Meanwhile, it usually takes very little time and effort for information-seeking activities; they would not result in an apparent decrease in total employee productivity. To a certain extent, the results could help ease employer worries that ESM is a time-waster and

**TABLE 8. Robustness test for the measure of online behaviors.**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
<i>Demographics</i>									
Age	0.386*** (0.092)	0.383*** (0.092)	0.159* (0.094)	0.125 (0.093)	0.330*** (0.096)	0.381*** (0.092)	0.161* (0.094)	0.126 (0.094)	0.320*** (0.094)
Gender	1.198*** (0.316)	1.196*** (0.316)	1.140*** (0.310)	1.129*** (0.310)	1.225*** (0.314)	1.189*** (0.317)	1.012*** (0.316)	1.021*** (0.316)	0.768** (0.323)
Education	-0.871*** (0.259)	-0.872*** (0.259)	-0.581** (0.258)	-0.548** (0.258)	-0.825*** (0.260)	-0.873*** (0.259)	-0.615** (0.258)	-0.579** (0.258)	-0.886*** (0.258)
Tenure	-0.397** (0.084)	-0.393*** (0.084)	-0.207** (0.085)	-0.177** (0.085)	-0.353*** (0.087)	-0.392*** (0.084)	-0.206** (0.085)	-0.176** (0.085)	-0.339*** (0.086)
<i>ESM usage</i>									
Share		-0.164** (0.073)		-0.366*** (0.075)		0.120 (0.189)		-0.062 (0.187)	
Seek			0.702*** (0.071)	0.784*** (0.074)			1.190*** (0.253)	1.139*** (0.252)	
Use					0.0291** (0.013)				0.209*** (0.049)
<i>Moderating role</i>									
Share_working						-0.013 (0.024)		-0.006 (0.024)	
Share*Share_working						-0.326* (0.196)		-0.333* (0.194)	
Seek_working							-0.353 (0.246)	-0.422 (0.266)	
Seek* Seek_working							-0.449* (0.234)	-0.321 (0.234)	
Use_working									-2.045*** (0.780)
Use* Use_working									-0.224*** (0.065)
Constant	66.93*** (1.618)	67.12*** (1.618)	66.16*** (1.586)	66.48*** (1.580)	67.70*** (1.652)	67.14*** (1.620)	66.14*** (1.614)	66.58*** (1.613)	69.69*** (1.741)
<i>Model evaluation</i>									
R <sup>2</sup>	0.015	0.017	0.051	0.059	0.023	0.018	0.054	0.063	0.037
Adjusted R <sup>2</sup>	0.014	0.015	0.049	0.057	0.021	0.015	0.052	0.059	0.035
F-value	9.95***	8.88***	28.12***	27.35***	12.17***	6.79***	21.30***	17.37***	14.41***
ΔR <sup>2</sup>		0.002	0.036	0.044	0.008	0.001	0.003	0.003	0.015
F-value for ΔR <sup>2</sup>		5.03**	97.91***	57.42***	4.80**	1.51	4.32**	2.61**	18.08***

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

will weaken productivity. On the other hand, the results show that information-sharing behaviors on ESM have negative effects on job performance, which contradicts earlier studies. One important reason is that it will take much more time and effort to write posts than to read posts. Much non-work-related recreation and leisure information that employees share on ESM has little value for the improvement of their job performance. The findings support the idea that addictive and excessive use of ESM, especially in non-work-related activities, can be blamed for reducing productivity.

Finally, to find a practical management approach that how to effectively utilize ESM, this study considered whether limited-use policies should be implemented. A valuable finding is that the usage of ESM during working hours negatively moderates the relationship between ESM usage and job performance. Using information-sharing behaviors as an example, though this kind of online behavior could bring employees certain indirect benefits that may positively affect their job performance, it will inevitably take much work time and result in weakening the positive effect of

information-sharing behaviors on job performance when the behaviors occur during working hours.

## VI. CONCLUSION AND IMPLICATIONS

The rapid development of social media creates a dilemma for managers; they must decide whether to deploy social media within the company. If used properly, ESM as an information communication platform could help employees share and obtain knowledge and work experience. In contrast, inappropriate or excessive use of ESM may bring unfavorable consequences. In this paper, we adopted an empirical approach to explore the effect of ESM on employee job performance and have produced interesting results, shown in Table 9. The findings have significant implications for ESM managers, as follows.

First, ESM should be not perceived as a time-waster or rejected by enterprise managers because of much time-consuming. Our studies provide empirical evidence that, overall, the usage of social media within enterprises could help improve employee job performance.



TABLE 9. Summary of results.

Hypothesis Description	Coef.	P> z	Tested in	Result
Hypothesis 1: The employees who engage in information-sharing activities on ESM would achieve higher performance than other employees.	-1.183	0.018	Model 2	Not Supported
Hypothesis 2: The employees who engage in information-seeking activities on ESM would achieve higher performance than other employees.	0.142	0.000	Model 3	Supported
Hypothesis 3: The employees who participate more in ESM would achieve higher performance than other employees.	0.029	0.029	Model 5	Supported
Hypothesis 4-a: The employees who were more willing to share information on ESM during working hours would achieve lower performance than those without preference for the timing of information-sharing activities.	-10.688	0.038	Model 6	Supported
Hypothesis 4-b: The employees who were more willing to seek information on ESM during working hours would achieve lower performance than those without preference for the timing of information-seeking activities.	-0.385	0.023	Model 7	Supported
Hypothesis 4-c: The employees who were more willing to use ESM during working hours would achieve lower performance than those without preference for the timing of usage.	-0.224	0.001	Model 9	Supported

Therefore, enterprise managers should make full use of social media technology and consider implementing an integrated social media platform within the enterprise that is appropriate to their specific conditions.

Second, ESM managers should have a better understanding of different usage patterns of ESM and their effects on job performance. Our experiments provided insights into how online behaviors affect job performance. The results demonstrate that information-seeking behaviors on ESM have positive effects on job performance, but information-sharing behaviors on ESM have negative effects on job performance. Therefore, ESM managers do not have to worry too much about information-seeking activities and should encourage employees to search and browse valuable information and the practical experience of others through ESM platforms. In contrast, ESM managers should be aware of the negative effect of information-sharing behaviors on job performance and take measures to restrict the amount of time spent on information-sharing activities.

Third, the findings have valuable managerial implications for the use of ESM. The results show that the usage of ESM during working hours negatively moderates the relationship between ESM usage and job performance. Therefore, ESM managers may consider limiting the use of ESM during working hours but instead encourage employees to participate in ESM in their spare time or off-work hours. Corresponding control policies could be implemented to effectively utilize ESM to help employees improve their job performance while avoiding unfavorable consequences.

## VII. ETHICS

Collecting social media data produced in social media platforms has several strengths compared to traditional approaches that mainly use surveys and interviews to collect data, including the benefit that using large amounts of data can mitigate the effect of spurious information or extreme views, which makes the research more accurate. However, social media scholars propose that of particular importance to the online data collection approach is the need to determine best practices around ethical considerations involving

human subjects. According to the US federal regulation for the protection of human subjects, research involves human subjects only if it collects “identifiable private information.” As suggested by Kraut *et al.* [50], we believe that people who post in some social media platforms should have no reasonable expectation of privacy, and researchers should be able to treat online communication as public behavior. In the context of the enterprise social media investigated in our study, we consider employee engagement in the ESM platform as public behavior inside the enterprise. Accordingly, we concluded that there was little risk of breach of confidentiality when gathering employees’ online behavioral data. Furthermore, given that ethical considerations in human subjects also include undue harm as a consequence of participation in research, we think that our practice could minimize the harm to human subjects compared to other methods because our research does not involve the direct involvement of users and therefore does not harm users.

Another key ethical issue in our study is whether gathering data related to job performance through an HRM system may pose a potentially high risk to human subjects. We approached the issue from two perspectives. First, we collected annual performance evaluation data instead of pay-for-performance data to measure employee job performance, considering that pay-for-performance is sensitive data but that performance evaluation data are much less sensitive because employee performance evaluation was conducted by their supervisors and peers, and the evaluation results were open to all employees of the enterprise. The performance evaluation data are not regarded as protected private information in the context of the enterprise. Second, we think that a greater risk to confidentiality might result from possible disclosure of performance evaluation data outside of the research context. For example, researchers may mistakenly distribute the data outside the enterprise, while performance evaluation data are accessible only within the enterprise but are not open to the public. Considering the potential risk to privacy and confidentiality, researchers are prohibited from accessing personal sensitive information. Instead, in the course of data processing, the IT department is responsible for separating identifying information from research data, integrating

ESM usage data and job performance data to produce the final data available for analysis, and then providing them to the researchers. Thus, the researchers are never in possession of identifying information that could harm the subjects, ensuring that there is no risk of sensitive information disclosure.

In addition, we provide a detailed overview of our study in the informed consent document sent to each participating employee in order to avoid possible misunderstanding. First, We explained that the purpose of the study is to investigate whether employee engagement in ESM will affect their job performance, rather than take their ESM usage as a criterion for judging their job performance. Second, we made it clear that the approach used in our study is based on statistical hypothesis testing and thus does not require identifiable information. Employees' personal information including ESM usage and job performance was not used to identify participants and was also protected from being misused. Therefore, it is not necessary for participating employees to worry that we will use their ESM behavior data to assess their performance. Third, some possible benefits have been described in the informed consent document to make the employees feel that they are likely to benefit from the research findings, such as better understanding the advantages and disadvantages of ESM, eliminating the worry about the use of ESM is a waste of time, and using it in the right way to improve their job performance.

In summary, as suggested by Kraut *et al.* [50], our data collection approach is not inherently riskier to human subjects than more traditional research styles; in some respects, it may even be less risky. Therefore, we believe that our research has minimal risk to human subjects and have followed the core ethical principles; we thus should be able to fulfill the ethical requirements.

### VIII. LIMITATIONS AND FUTURE RESEARCH

This study also has limitations. First, the measurement of some variables used in the study may not be accurate enough. For example, we used the number of total click activities as the measure of user involvement in ESM. However, some users probably write or read long posts that take much time but require few clicks; we could not collect such information from users' online behavioral data. Therefore, we hope to use multiple data sources and methods of data collection in future research, such as combining online behavioral data with self-report survey data, to improve the validity and reliability of the study and gain an in-depth understanding of the research phenomenon. Second, we only divided the user online behaviors on ESM into information-sharing and information-seeking behaviors according to their different motivations for involvement in ESM. However, this division is somewhat rough, since users have a wide variety of motivations. Another frequently used division is between utilitarian and hedonic motivations. Accordingly, user online behaviors could be divided into work-related behaviors and non-work-related behaviors. However, it is difficult to find the appropriate indicators to measure these two behaviors. Third,

we could have access to ESM data. However, employees may participate in other external social media; we could not collect such data. We consider collecting such information through surveys and questionnaires to extend the model for a more robust analysis. Finally, the dataset used in our study is only from one large equipment manufacturing company, which may limit the generalizability of the results. Future studies may need to collect more data from other enterprises and then compare the effects of ESM on job performance between samples from different enterprises to generalize the results.

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