Impact of the usage of social media in the workplace on team and employee performance

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ABSTRACT

How does the usage of social media in the workplace affect team and employee performance? To address this cutting edge and up-to-date research question, we ran a quasinatural field experiment, collecting data of two matched-sample groups within a large financial service firm in China. We find that work-oriented social media (DingTalk) and socialization-oriented social media (WeChat) are complementary resources that generate synergies to improve team and employee performance. The instrumental value provided by work-oriented social media is reinforced by the expressive value provided by socialization-oriented social media, which help firms to create business value from information technology investments.

Keywords: Social media in the workplace, work-oriented social media, socialization-oriented social media, team performance, employee performance, IT consumerization, business value of IT.

INTRODUCTION

Social media tools have increasingly penetrated workplaces, and companies have been strategically implementing such tools to support their employees and improve their business activities (Huang et al. 2015a, Braojos et al. 2019). For example, companies use popular, public, and personal social media, such as Facebook, Twitter, and LinkedIn, to enhance employee engagement, knowledge sharing, innovation, customer service, marketing, and talent recruitment (Dong and Wu 2015, Pan et al. 2015, Rueda et al. 2017). This trend of social media in the workplace refers to the use of emergent social software platforms by companies in pursuit

of their goals and business activities (McAfee 2006, Benitez et al. 2018a), and it is considered not only beneficial to employees but also promising for superior firm performance (Chui et al. 2012, Kumar et al. 2016). One of the most salient trends of social media in the workplace is that, in addition to the extension of general and public social media platforms (e.g., Facebook, Twitter) into work domains (Harris et al. 2012, Koffer et al. 2014), more specific and professional social media technologies are being developed and implemented in the workplace, such as Microsoft Yammer, DingTalk, Facebook Workplace, Slack, Jive, IBM Connections, etc. Consequently, different types of social media platforms can coexist in companies and both can be used by employees for work or in the work time, which may be perceived sometimes by executives and companies as controversial. How does the usage of these different social media in the workplace affect team and employee performance? This is the core and general research question this study addresses and answers.

The usage of social media by companies is a new phenomenon, and therefore the theoretical and empirical understanding of business value of social media is still in initial stages (Leonardi 2015, Benitez et al. 2018a, Braojos et al. 2019). Although this research topic is emerging and is receiving considerable attention, few studies have focused in examining the usage of multiple social media tools in the workplace (Forsgren and Bystrom 2018). Most Information Systems (IS) research on social media in workplace has primarily focused on a single social media technology (e.g., blog, wiki, or microblogs), often in isolation (Rode 2016). Our own review of prior IS literature shows a limited understanding about how multiple social media can be used in combination in the workplace and whether this joint usage enables or constrains the

performance of teams and employees. As that most people interact with multiple technologies to fulfill tasks (Lyytinen and Yoo 2002, Kane and Alavi 2008), it is rational to suggest that more effort should be undertaken to address the challenges and implications of social media in the workplace. Such effort is necessary to uncover the differences and the relationships between social media, as well as understanding how the joint use of multiple social media may influence employee practices and outcomes.

Social media are heterogeneous as there are corporate/enterprise social media (e.g., Microsoft Yammer) and personal social media (e.g., WhatsApp and WeChat). However, contemporary employees do not draw a line between corporate and personal social media. Motivated by the impact of the social media in the real world and based on this heterogeneity, we classify social media that can be potentially used in the workplace into work-oriented social media and socialization-oriented social media. *Work-oriented social media* refer to web-based platforms that can be used in the workplace to facilitate the creation of resources, collaboration, and the exchange of core work-related information and content, such as task management, the tracking of work and events, and formal internal corporate communication (Benitez et al. 2018a). *Socialization-oriented social media* refer to the web-based platforms that enable the exchange of social and personal information and facilitate expressive ties that influence individual identity through social and emotional support, and normative expectations.

This paper tries to answer the following specific research questions: 1) Does the combined usage of work-oriented and socialization-oriented social media generate synergies in the workplace? 2) Do these synergies influence team and employee performance? The core

theoretical proposition (thesis) of this study is that work-oriented social media and socialization-oriented social media can co-exist in the workplace and can positively influence team and employee performance. Work-oriented social media are a work instrument that may be complemented by socialization-oriented social media by providing expressive value (social and emotional support).

We use a qualitative grounded theory approach to uncover the underlying complementarity of social media technologies and to understand the synergistic effects of these technologies in the workplace. As IS research on the role of social media in the workplace is still in its infancy (Forsgren and Bystrom 2018), a qualitative study is recommendable. A grounded theory approach is viable given the paucity of theories that address the complementarity between social media and how the combined use of multiple social media in the workplace may affect team and employee performance. By doing so, we can identify and compare the heterogeneous elements of multiple social media and understand how these social media may be complementarily used to improve team and employee performance.

Specifically, we ran a quasinatural field experiment, collecting data of two matched-sample groups within a large financial service firm in China. We find that: 1) social media are heterogeneous in terms of their technical features and affordances, and this heterogeneity has critical implications for the behavior and performance of employees, 2) work-oriented (DingTalk) and socialization-oriented (WeChat) social media are complementary resources that generate synergies to improve team and employee performance. The instrumental value provided by work-oriented social media is reinforced by the expressive value provided by

socialization-oriented social media, which help firms to create business value from IT investments. This paper contributes to IS research by classifying social media that can be used in the workplace into work-oriented and socialization-oriented social media, illustrating, and providing anecdotal evidence on how the usage of multiple social media in the workplace improves team and employee performance.

THEORETICAL BACKGROUND AND DEVELOPMENT

Conceptualization and classification of social media in the workplace

Social media are web-based platforms that allow individuals share, post, edit, sort, and keep different types of messages, information, and knowledge (text, pictures, videos, documents, etc.) with other individuals. Social media have collaborative nature and are flexible, agile, spontaneous, unstructured, and informal (McAfee 2006). The usage of social media by companies and individuals has become a core trend for business activities (companies) and fun (individuals).

Social media that can be used by employees in the workplace are heterogeneous. We need to further understand the implications of this heterogeneity because such an understanding provides a theoretical base for the mechanism of "social homogeneity" (Kane et al. 2014), i.e., the phenomenon wherein users of the same social media behave similarly or achieve similar outcomes. In doing so, we can delineate the generic effects and implications associated with particular types of social media and their interactions in the workplace.

From the network content perspective, a typology consisting of social media focusing on either instrumental or expressive value (Ibarra 1995) has been widely adopted (Luo et al. 2018). Drawn on this framework, this study distinguishes between work-oriented social media and socialization-oriented social media. Work-oriented social media refer to web-based platforms that can be used in the workplace to facilitate the creation of resources, collaboration, and the exchange of core work-related information and content, such as task management, the tracking of work and events, and formal internal corporate communication (Benitez et al. 2018a, Braojos et al. 2019). The content conveyed through work-oriented social media includes task advice, work-related documents, and information (Ibarra and Andrews 1993, Podolny and Baron 1997). By using a work-oriented social media, employees can achieve positive job-related outcomes such as improved communication effectiveness, greater work-related knowledge, and enhanced work performance (Ali et al. 2015, Huang et al. 2015b, Lu et al. 2015). Related to their nature, work-oriented social media are private, corporate, and with less degree of informality or even being formal in some companies (Risius and Beck 2015). Examples of these social media are Microsoft Yammer, DingTalk, Facebook Workplace, Slack, WhatsApp Business, and IBM Connections.

On the other hand, socialization-oriented social media refer to the web-based platforms that enable the exchange of social and personal information and facilitate expressive ties that influence individual identity through social and emotional support, and normative expectations. These social media convey social expectations, social support, friendship, and deference (Xu et

al. 2012, Ali et al. 2015). Related to their nature, socialization-oriented social media are popular, public, personal, and very informal (e.g., Facebook, WeChat, Twitter, and WhatsApp).

Beyond their conceptualization and nature, we distinguish work-oriented and socialization-oriented social media along three dimensions, i.e., technical features, affordances, and supported ties. First, we need to differentiate social media in terms of their technical features. The technical features of social media are manifested in computer code, data, algorithms, protocols, interfaces, and platform-supported applications. From the system perspective, platform designers have control over the characteristics of the nodes and ties on a particular social media platform (Ibarra 1995). These technical decisions homogenize user behavior in common ways and likely have profound implications for the formation and outcomes of the networks developing on social media platforms. In other words, social media with different technical features can cultivate networks with different normative features and objectives. From the user's perspective, a social media tool presents technical features by offering a variety of technological applications and functions. Work-oriented social media are designed to present more technical features affording and reinforcing efficiency in communication and collaboration. For example, work-oriented social media allow users to be aware of the read/unread statuses of messages for improving communications efficiency. Message senders can send a notification to remind targeted recipients to read or respond to the message. Also, work-oriented social media facilitate more structured and accurate communication by offering communication tools based on organizational or team structures. Socialization-oriented social media, on the contrary, focus on the scope, richness and flexibility

of communication, and knowledge sharing. For example, WeChat allows users to create their personal emoticons and smiley faces to enrich communication and interaction. Users can easily share posts, files, and videos to others and view contents that are "liked" by their contacts. These technical features of social media can shape the patterns of user interaction on the platforms in different directions.

Second, work-oriented and socialization-oriented social media are different in terms of affordance flexibility. According to the theory of socio-materiality, technological affordances do not exist a priori but rather emerge through social practices (Orlikowski and Scott 2008). While technology represents a set of material features influencing its usage (Leonardi and Barley 2008), technological affordances – represented by technological performance – are subject to human interpretation and contextual influences. Social media enable various affordances, i.e., actions and what social media can achieve in practice, but the flexibility of these affordances, i.e., the degree to which affordances vary among users and contexts, differs among specific social media technologies. Work-oriented social media, designed and implemented by organizations for work purposes, usually have relatively rigid policies or rules on the use and functionality of these technologies, including what these technologies are used for and how to use these technologies and in what contexts these technologies can or should be used. In other words, the affordances of work-oriented social media are aligned with structures, norms, and formal policies or rules formally articulated by organizations (Jarrahi and Sawyer 2015) and remain relatively fixed. On the other hand, socialization-oriented social media allow flexible affordances and diverse interpretations of users when they are using these technologies to

engage in diverse social activities across personal life and work life. Take the affordance of availability as an example, both work-oriented and socialization-oriented social media afford users' availability, i.e., the extent to which a user can be reached by others on the platforms. Users of work-oriented social media may form a commonly shared definition of availability, and this could turn into a pressure for employees to respond immediately to work-related issues even during off work time at home (Golden 2013). However, users of socialization-oriented social media may have very diverse and even conflicting interpretations of availability and tolerate different degrees of responsiveness of others.

Third, work-oriented and socialization-oriented social media are different in supporting ties. Prior research (e.g., Borgatti et al. 2009, Kane et al. 2014) has identified four basic types of ties on social media: proximities, relations, interactions, and flows. Proximities, termed "similarities" in Borgatti et al. (2009), indicate shared physical or social spaces and attributes, such as physical distance, co-membership in groups, or shared attitudes toward one subject. Relations are ties that reflect persistent social connections between nodes, such as role-based connections (family, friends, and colleagues) or affective relations (likes and dislikes). Interactions include discrete, transitory, and relational events, such as liking or posting a comment on social media. Flows refer to tangible and intangible material (e.g., digital content such as information, knowledge, and emotion) that can be shifted during interactions. The different types of ties represent fundamentally different network environments, influencing network formation in distinct and predictable ways (Kane and Alavi 2008).

Despite social media support all of these types of ties, work-oriented social media and socialization-oriented social media facilitate these ties in different ways. Work-oriented social media emphasize the proximities among users based on their physical distance or on their shared work-related social spaces (organizations, departments, and teams). Instead of affective relationships, role-based connections – such as those between supervisor and subordinate, business partners, and colleagues – are more salient in work-oriented social media. With different purposes, work-oriented social media develop technical and normative features to support work-related and professional interactions among users. For example, functions are typically incorporated to enable synchronous, efficient, and interactive communication. Communication indicators such as last seen, message read notification, message delivery status, and message typing notification are added to maintain awareness of conversations and increase users' control over communication.

In a different way, socialization-oriented social media focus on the informal and expressive ties that influence individual and organizational identity, thus emphasizing social support and normative expectations (Chang and Chuang 2011, Shang et al. 2011). These social media convey the expectations of significant others, social support, friendship, and deference (Ibarra and Andrews 1993, Podolny and Baron 1997). As employees' activities in expressive networks help them obtain social support, share feelings, and cultivate trust, the psychological distance among employees can be reduced (Luo et al. 2018). For example, employees' blogging activities can contribute to their feeling "at home" within the organization and enhance their

organizational commitment (Luo et al. 2018). Table 1 presents a summary of the nature and ties supported by work-oriented and socialization-oriented social media.

Table 1: Classification of social media in the workplace

Type of social media	Nature	Ties between users				Examples
		Proximities	Human relationships	Social interactions	Flows	
Work-oriented social media	Private and corporate social media. Less degree of informality (formal in some companies). Focused on the employee	Physical spaces. Work-related social spaces (organization, department, and team)	Role-based connections (e.g., supervisor and subordinate)	Work-related/professional interaction focusing on efficient and interactive communication	Workflows	Microsoft Yammer, DingTalk, Facebook Workplace, Slack, Jive, IBM Connections, WhatsApp Business, Microsoft Video
Socialization-oriented social media	Popular, public, and personal social media. Very informal. Focused on the individual and customer.	Social spaces. Reduced psychological distance	Affective relationships (friends, followers, etc.)	Personal interaction (e.g., sharing, gaming, and expressing) with hedonic and social purposes	Information, beliefs, moods, and emotions	Facebook, WeChat, Twitter, and WhatsApp

Complementarity between work-oriented and socialization-oriented social media

The resource complementarity perspective suggests that the differential effect in explaining business benefits is the complementarity/interaction/interplay among the resources appropriated and/used by the firm. Complementarity between resources exists where the existence of a resource allows other resources exert their value (Benitez et al. 2018a). These complementary relationships are a potential driver of team and employee performance, and the joint outcome may differ from the sum of the individual effects treated in isolation (Benitez et al. 2018a). The

whole is more than the sum of its parts. Our central thesis is that the positive effect of work-oriented social media in the workplace can be amplified if the organizational members also use and capitalize socialization-oriented social media in the workplace. We argue that work-oriented and socialization-oriented social media are complementary resources in the workplace for the following reasons. First, the resource complementarity perspective suggests that the differential effect in explaining business benefits is the complementarity/interaction/interplay among the resources appropriated and/used by the firm. Work-oriented social media are an example of resource that can be deployed deliberately by a company, and the use of work-oriented social media is limited within the company. In that case, employees may find it difficult to contact or share relevant information with customers or external partners through the technology. Socialization-oriented social media are an example of resource that can be used at work through the self-initiative of employees and used across the boundary of a company. The openness of socialization-oriented social media complements work-oriented social media by expanding the scope of communication and networking of users. Complementarity between work-oriented and socialization-oriented social media may occur when two types of social media co-exist to form a balanced whole in the company (Huang et al. 2015b) and help improve communication and exchange across organizational boundaries.

Second, work-oriented social media and socialization-oriented social media have several technical features and affordances that facilitate instrumental and expressive ties, respectively, which can be critical in the workplace. Both types of social media are closely intertwined and informal discussions on both social media are a lubricant for more utilitarian purposes. The

socialization-oriented usage of social media, such as casual conversations with colleagues, can smooth other social interactions, reinforce perceptions of social capital (Ali et al. 2015), and thus ultimately lead to increased utilitarian usage. In this sense, the instrumental value provided by work-oriented social media is reinforced by the expressive value provided by socialization-oriented social media, which helps firms to create business value from IT investments.

Third, despite various social media are expanding their functional profiles by adding similar technical features and overlapping with one another, the users' interpretation and behavior when using specific social media are usually socially influenced and remain stable. This cognitive and behavioral rigidity provides room for the co-existence of multiple social media technologies. In other words, users tend to interpret and use one specific social media in a fixed way, no matter how many new material functions are added to the platform. For example, if users focus on the social use of a technology at the very beginning, then this behavioral propensity may shape their cognition and perception of the technology and remain unchanged. In the social media context, this rigidity in technology use may be more salient because norms and rules are often formally or informally established to eliminate deviant usage. Facebook, for example, is specifically designed for personal use and even adding new business-oriented features facilitating work use cannot easily shift its strong image as a tool for social and personal use. Therefore, technological convergence does not necessarily generate a corresponding convergence of user behavior. Work-oriented and socialization-oriented social media may be used simultaneously for different purposes.

The fourth reason underlying the complementarity between work-oriented and socialization-oriented social media is associated with the reinforced multiplexity of network ties afforded by multiple social media. Originating from median theory, multiplexity refers to the phenomenon wherein users may participate in latent social relationships by using social technologies (Huang and Liu 2017). A multiplexity of relationships can arise from different modes of interaction (Huang and Liu 2017). The manifestations of multiplex social media entail coworkers socializing outside of the workplace (Ibarra 1995), juxtaposing the different ties of family, friendship, and organization (Wellman and Wortley 1990), or nurturing mentoring and working relationships. In a single online social network, members can form explicit friendships and business relations, exchange content, and communicate with one another (Ansari et al. 2011). A single social media can afford various types of ties, but these ties are decoupled in IT-enabled social networks (Kane et al. 2014). For example, a user can follow another person's content without regard to any interaction or proximity. By jointly using various social media simultaneously, the activities of following or liking may ignite other types of ties, including interaction and developing additional relationships among users. In other words, the multiplexity of relationships can be intensified in the context of concurrent social media. Work-oriented social media afford communication opportunities for the development and maintenance of work-related relationships. Also, communication patterns are designed to maximize the efficiency, speed, and accuracy of communication, rather than provide for deep, intensively interactive, or affective communication. With the help of the organizational registry embedded in work-oriented social media, employees can easily search for and contact the

coworkers with whom they are less acquainted or with whom they have little opportunity to meet in person (e.g., colleagues in a distributed team). Furthermore, the communication features of work-oriented social media facilitate efficient communication, as does the message read notification feature. In contrast, socialization-oriented social media can complement work-oriented social media by focusing on affective communication and relationship development. For example, employees can use socialization-oriented social media to share their personal interests on sports, music, or other subjects. It is useful for employees to find colleagues with similar interests and to develop social relations based on those interests because this can shorten their emotional or psychological distance. While multiple social ties are decoupled in every single social media, a coupled and intertwined multiplexity can be found in the context of concurrent social media (Ansari et al. 2011). In this sense, work-oriented and socialization-oriented social media are complementary because the joint use of these two technologies helps employees engage in multiplex relationships with peers.

RESEARCH METHODOLOGY

Research context and design

We collected data by conducting a quasinatural field experiment (Shadish et al. 2002) at SW Payment (a pseudonym for anonymity), a large financial service company in Western China. SW Payment is a major financial outsourcing and integrated payment service provider operating in approximately 20 cities in Western China. SW Payment was chosen as an information-rich case (Patton 1990) of a contemporary knowledge-intensive company having

integrated both work-oriented (DingTalk) and socialization-oriented social media (WeChat) into the workplace.[1]

Before the field study, all employees at SW Payment had been voluntarily using WeChat, one of the most popular social media in China with 1 billion active users (Statista 2019). The use of WeChat for work purposes was completely a bottom-up initiative with no single call from senior management. The group chat function of WeChat had been extensively used for internal communication and collaboration by employees.

In May of 2016, the company decided to introduce and implement DingTalk, a business-oriented social media app (https://www.dingtalk.com/en) for organizational communication and collaboration. DingTalk has more than 100 million individual users and over 7 million enterprise users (Liao 2018). DingTalk consists of various functional modules such as "DING," task management, calendars, group charts, and attendance systems. The features of these modules are illustrated in Table A1 (in the appendix). By reviewing the major features of DingTalk, we can argue that the nature of DingTalk is as a work-oriented social media. Compared with WeChat, a socialization-oriented social media with strong features supporting social functions and providing expressive value, DingTalk supports work-related activities and delivers instrumental value.

[1] As SW Payment did not exhibit a high degree of usage of others work- and socialization-oriented social media, we only were able to focus on DingTalk and WeChat.

Before the formal investigation, two preliminary studies were conducted. First, we randomly invited some top and middle managers to answer the open-ended survey questions about the roles of social media in the workplace. Through this survey, we learned that various social media could be jointly used and play multiple roles in the workplace. Then, we interviewed two top executives (the Chief Executive Officer (CEO) and one Vice President) and two middle managers (one marketing manager and one human resource manager who were excluded from the following formal investigation) to understand the company's strategic planning about implementing social media in the workplace. These interviews lasting 30 to 70 minutes each were recorded and transcribed verbatim. The analyses of the interview transcripts indicated that WeChat was extensively used among employees and supported our proposition regarding the dichotomy between instrumental and expressive value created by work- and socialization-oriented social media, respectively.

To address our research questions, we implemented a pretest/posttest control group design to explore whether and how the usage of multiple social media generates synergies. In early June 2016, the IT Department at SW Payment decided to randomly select one group (i.e., Marketing Service Unit, in short Service) from the Marketing Division to participate in a pilot study before the formal enterprise-wide launch of DingTalk. This provided us an opportunity to conduct a field experiment to explore the differences between the stand-alone effects of socialization-oriented social media (WeChat) and the synergistic effects of socialization-oriented (WeChat) and work-oriented social media (DingTalk). By using a pre implementation/postimplementation research design, we evaluated the possible effects of the

use of DingTalk together with WeChat by comparing how the members of the Service group performed their work before and after the implementation of DingTalk.

Additional tests were required to control the possible effects of time and other unexamined influential factors. To this end, another Market Development group (in short, Development) from the same Marketing Division was selected as a control group. These Development and Service groups formed a matched sample because the two groups share the same roles, responsibilities, and had nearly identical demographic profiles with regard to age, gender, tenure at the company, job titles, and team and employee performance ratings. The members of Service were required to keep silent about the pilot study of DingTalk during the experimental period to reduce possible spillover effects.

Data collection and analysis

Data collection: In August 2016, two months before the pilot implementation of DingTalk in Service, the first round of semistructured interviews was conducted with 10 employees from Service and 12 from Development. These informants were purposively selected to focus on their expected knowledgeability for the study topic and ensure sample diversity. Table 2 shows the demographic characteristics of these participants. To statistically test the demographical difference between the two groups, independent samples t-tests were conducted. The results show that all p-values of t-tests for demographic variables are greater than 0.05 ($p = 0.22$ for age, 0.51 for gender, 0.90 for education, 0.86 for organizational tenure, and 0.78 for job position), indicating no significant differences between two samples. In addition, the sample shows a mixture of age, gender, education, organizational tenure, and job position (Forsgren

and Bystrom 2018). The diversity of informants provided a rich understanding of the usage of work- and socialization-oriented social media and could avoid possible bias in single-informant retrospective interviews (Eisenhardt and Graebner 2007). The interviews followed a semistandard protocol comprised of four major sections. First, the informants were asked to describe their daily routines at work. Questions such as "What do you usually do in your daily work?" and "How are your team and employee performance evaluated and measured?" were designed to solicit understanding about the critical skills used for their work. Second, we asked them about the work activities oriented toward achieving team goals. The questions "What activities do you think are helpful for completing tasks and achieving team objectives at daily work?" and "What digital technologies do you prefer to support your work activities and why?" were asked. The third section asked informants about how they interact with teammates and build social resources at work. The fourth section included questions about the general perceptions of the roles of different social media in supporting their work. Each interview lasted between 35 and 75 minutes, with an average length of 45 minutes.

In April 2017, six months later after the pilot launch of DingTalk in Service, the second round of interviews was conducted with the same 10 employees from Service and the same 12 employees from Development. The same interview protocol used in the first round of interviews was repeated for all employees; however, additional questions were included regarding specific similarities and differences between work-related and socialization-related information since the last interview. The Service informants were also asked about how they used DingTalk for work over the last six months. In total, 44 interviews were conducted across

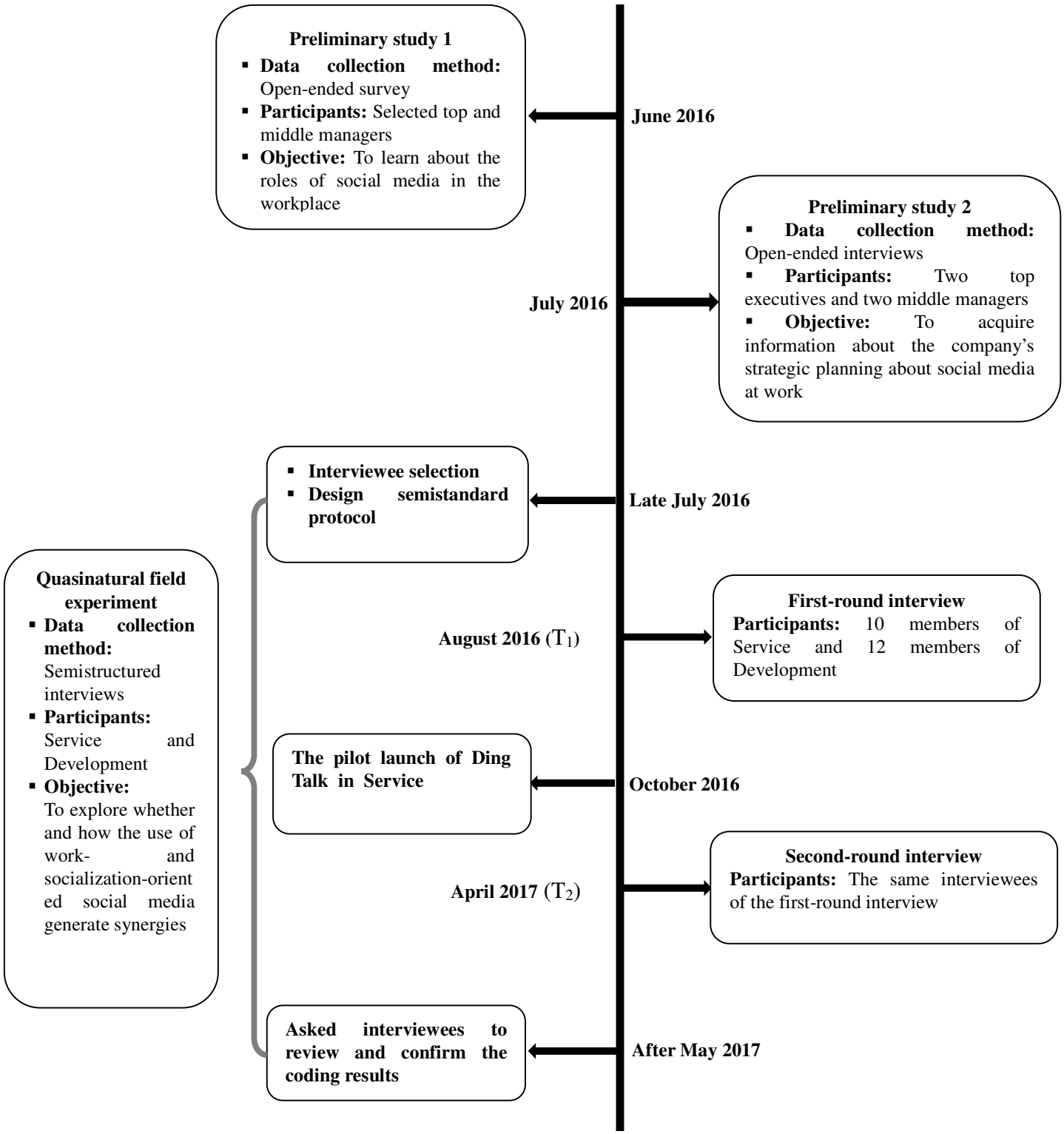
the two rounds (August 2016 and April 2017). With the consent of the informants, all interviews were audio-recorded and transcribed verbatim, producing a total of 407 pages (352,379 Chinese words) of transcripts for data analysis. The timeline of the data collection is presented in Figure 1.

Table 2: Demographic characteristics of informants

Group	Name	Age	Gender	Education	Tenure (Year)	Position
Service	Aaron	35	Male	Bachelor	8	Team leader
	Ablett	25	Male	Bachelor	3	Sales representative
	Bruce	25	Male	Associate	2	Sales representative
	Barret	30	Male	Bachelor	4	Sales representative
	Alice	27	Female	Bachelor	4	Sales representative
	Blake	31	Male	Bachelor	5	Department Head
	Calvin	29	Male	Bachelor	4	Sales representative
	Emily	25	Female	Bachelor	4	Administrative staff
	Chad	27	Male	Bachelor	4	Sales representative
	Daniel	27	Male	Bachelor	4	Team leader
Development	Evan	35	Male	Bachelor	3	Sales representative
	Gary	25	Male	Bachelor	2	Sales representative
	Basia	29	Female	Bachelor	5	Sales representative
	Harry	30	Male	Bachelor	8	Department Head
	Herbert	32	Male	Bachelor	7	Team leader
	James	28	Male	Bachelor	4	Sales representative
	Carol	26	Female	Bachelor	2	Sales representative
	Jeremy	26	Male	Bachelor	4	Sales representative
	Lambert	38	Male	Bachelor	6	Sales representative
	Matt	30	Male	Associate	4	Sales representative
	Dana	27	Female	Bachelor	4	Administrative staff
	Grace	36	Female	Bachelor	3	Team leader

Note: All names of informants are pseudonyms for anonymity.

Figure 1: Timeline of data collection



Prevention of positive bias in retrospective interviews: We prevented the appearance of potential positive bias in retrospective interviews in several ways. First, we interviewed informants at multiple levels and from multiple positions of the Marketing Division (Martin and Eisenhardt 2010). Second, we used open-ended questioning of highly knowledgeable informants focusing on recent, important activities to limit recall bias and enhance accuracy (Golden 1992). Third, we encouraged the informants to indicate if they did not remember information rather than forcing them to respond (Zhang et al. 2010). Fourth, we encouraged the informants to provide accurate information by granting confidentiality letters, visiting them at their convenience, and explaining the value of the project in detail (Zhang et al. 2010). Fifth, we used "courtroom questioning" that focused on factual accounts of what informants did or observed others doing (e.g., when, where, how, and who) (Huber and Power 1985) and avoided informant speculation. Finally, we triangulated our central proposition by using archival sources (such as the firm's internal documents and employee performance data) (Kumar et al. 1993).

This research design allows us to isolate the individual and joint effects of DingTalk and WeChat through a two-way comparison (Shadish et al. 2002). The diachronic comparison (i.e., comparison over time) was beneficial for understanding the changes in work and social activities that occurred in Service after the implementation of DingTalk. The synchronic comparison (i.e., comparison between two groups at the same time) between the Service and Development groups at T_1 (before the implementation of DingTalk) and T_2 (six months after the implementation) aimed to examine the changes in the Service group associated with the simultaneous use of DingTalk and WeChat by ruling out the effects of unexamined factors.

Data analysis: The data analysis was composed of three stages. The first stage aimed to uncover the different impacts of work-oriented and socialization-oriented social media. Interview data were analyzed by using multiple iterations of coding (i.e., open, axial, and selective coding) to uncover the different impacts of work-oriented and socialization-oriented social media. An open coding technique with no preconceived frameworks or theoretical concepts in mind was used for this purpose (Strauss and Corbin 1990, Glaser and Strauss 1999). We began by examining the transcripts of the Service (the treatment group) interviews at T_2. and identified instances demonstrating the roles of two types of social media in the workplace. We applied codes to each instance related to three themes: 1) how employees use social media to conduct work activities toward team goals, 2) how teams create and use social resources at work, and 3) the existence of synergies created by using work-oriented and socialization-oriented social media. When conducting coding analysis, the codes evolved (e.g., new codes were added and some codes were revised) on the basis of iterative comparisons between the newly analyzed and previously coded data (Strauss and Corbin 1998). Forty-three codes and 21 first-order concepts were generated from this open coding analysis. Axial coding was then conducted to find connections and relations between these emergent open codes (Corbin and Strauss 2008) by reassembling the coded data based on conceptual similarity (Charmaz 2006). Axial coding resulted in three second-order themes indicating how work-oriented social media facilitated work activities toward team goals (i.e., team reflexivity, team monitoring, and team effort), two second-order themes indicating how socialization-oriented social media promoted the formation and development of social resources

among teammates (i.e., social exchange and social support), and three second-order themes indicating the complementarities between socialization-oriented and work-oriented social media (i.e., differentiated market positioning, heterogeneous features and affordances, and complementary usage). After settling on a set of second-order themes, we identified two core categories – instrumental value and expressive value – emerging from second-order themes and serving as the basis of our conceptual model. The analysis of this stage shows that work-oriented social media create instrumental value, and socialization-oriented social media create expressive value. Following Miles and Huberman (1994), we asked the interviewees to review and check coding analysis results to ensure the accuracy and reliability of data interpretations. Our coding analysis results are shown in Figure 2, and the coding process details are illustrated in Table 3.

Figure 2: Data coding structure

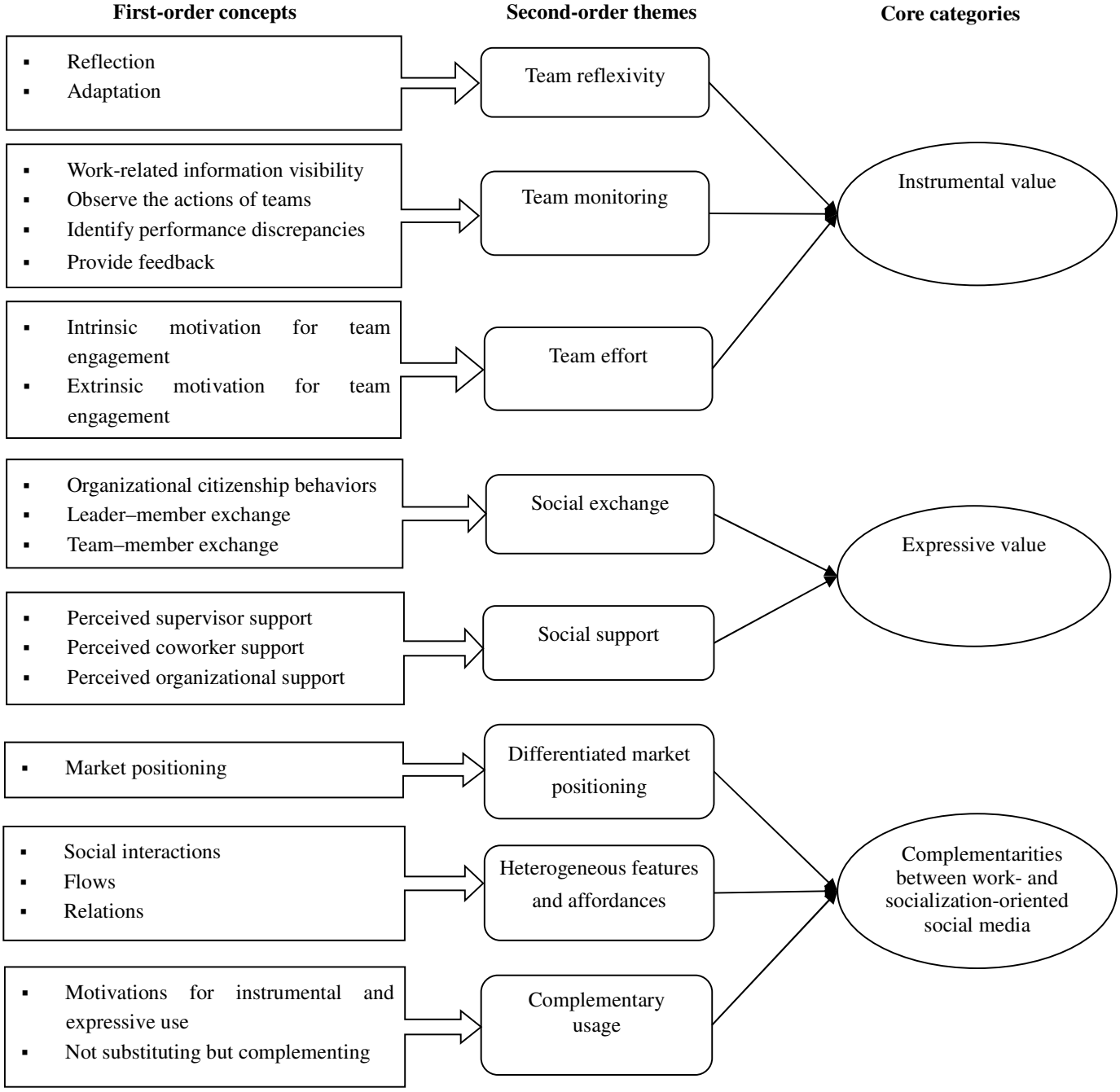


Table 3: The results of open coding, axial coding, and selective coding

Core categories	Second-order themes	First-order concepts	Initial codes
Instrumental value	Team reflexivity	Reflection	Employees reflect on their past work
			Evaluate and review team work
			An employee's work logs are accessible to coworkers and supervisor
		Adaptation	Adjust work methods to fit the corporate's overall strategy
			Adapt work and management methods to external changing environment
			Adjust team work plans according to the outcomes of previous work
	Team monitoring	Work-related information visibility	Visualize employees' work progress
			Visualization of task assignment and workload
			Clock in/out in the field
			Streamline approval processes
			Write and upload work logs
		Observe the actions of teams	Track work progress timely
			Track the status of receiving and sending information
			Give detailed reports about tasks
		Identify performance discrepancies	Benchmarking
			Summarize employees' performance indicators
			Review performance discrepancies
		Provide feedback	Provide prompt feedback
			Provide assistance when needed
	Team effort	Intrinsic motivation for team engagement	Intrinsic motivation to engaging in team tasks
		Extrinsic motivation for team engagement	Eliminating hindrance stressors to inspire teams work harder
			Enhancing challenger stressors to inspire teams work harder
		Behavioral manifestations of team effort	Teams devote more time to complete team tasks
			Teams overcome difficulties to complete team tasks
			Teams work harder even when others are holding back
Expressive value	Social exchange	Organizational citizenship behaviors	Focus on team goals instead of personal interests
			Fight for the whole team's honor
		Leader–member exchange	High-quality leader–member exchange
		Team–member exchange	Share happiness and sorrow
			Emotional attachment to the team
			Establish reciprocity between members and teams
			If one member suffers, all suffer together; if one member is honored, all rejoice together
	Social support	Perceived supervisor support	Leaders give support to subordinates (e.g. giving encouragement and inspiration when there is a sign of low staff morale)

		Perceived coworker support	Receive support and assistance from team members when encountering difficulties
			Instruct, help, and guide new staff
		Perceived organizational support	Family feeling within the team
Complementarities between work- and socialization-oriented social media	Differentiated market positioning	Market positioning	DingTalk is a work-oriented social media. WeChat is a socialization−oriented social media
	Heterogeneous features and affordances	Social interactions	Social interactions on DingTalk are formal and efficient. Social interactions on WeChat are informal and casual
		Flows	The flows on DingTalk are mainly work-related materials. The flows on WeChat are diverse, including information, emotion, and jokes
		Relations	DingTalk contributes to role-based interactions at work. WeChat is conducive to establishing and maintaining affective relations
	Complementary usage	Motivations for instrumental and expressive use	DingTalk is used for satisfying instrumental needs. WeChat is used for meeting expressive needs
		Not substituting but complementing	WeChat is the complement of DingTalk in conducting work
			WeChat is a lubricant or “refresher” for utilitarian purposes

The second stage aimed to confirm that the improvement in instrumental and expressive values that arose from using DingTalk and WeChat was limited to the Service group at T_2. Following an analytical induction process (Glaser 1965), we examined the other transcripts (Development at two points of time and Service at T_1) to ascertain whether the changes that the Service informants experienced after using DingTalk were similar to their experiences before DingTalk, and whether the same was true for the Development participants at either time. To verify that Development was an acceptable comparative set to Service, we compared the coverage percentages of second-order themes generated from the T_1 interviews with the two groups. Both groups shared similar coverage percentages of the second-order themes in the T_1 interviews. This indicated that the Development group was truly an appropriate and reliable comparative set. Then, we were able to compare the changes that occurred naturally over time in Development with the changes that occurred over time in Service. We then concluded that the changes in Service at T_2 were associated with the joint usage of DingTalk and WeChat.

We compared the coverage percentage of five codes in two groups at T_1 and T_2 to ensure whether the changes regarding the instrumental value and expressive value in Service may be attributed to the simultaneous use of DingTalk and WeChat. The coverage percentages of team effort, team monitoring, and social exchange of Service at T_2 were 60.57%, 50.28%, and 40.69%, respectively, almost double the figures for Service at T_1 and for Development at T_1 or T_2 (see Figure 3). In addition, the coverage percentage of team reflexivity in Service increased sharply from T_1 (15.67%) to T_2 (33.26%), while improved slightly from T_1 to T_2 in Development (from 21.36% to 29.71%). Lastly, the percentages of social exchange and social

support in Service also increased from 19.99% to 40.69% and from 25.06% to 33.03%, respectively. The analysis of the second stage shows how instrumental and expressive values are generated by the complementarity between work-oriented and socialization-oriented social media and how the synergies between instrumental and expressive values improve team performance. Figure 4 shows the conceptual research model built from the second stage analysis. In the third stage, we analyzed archival data to examine whether the instrumental value and expressive value created by the joint use of DingTalk and WeChat contributed to employee performance. Independent samples t-tests were conducted to examine whether the employee performance of two groups differed significantly. Table 4 presents a summary of the stages of the data analysis.

Table 4: Data analysis

Stage	Goal	Data	Coding procedures		Comparison procedures			Findings
			Open	Axial and selective	Analytic induction	Percentage coverage	t-test	
1	To explore the research question about how work-oriented social media (DingTalk) and socialization-social media (WeChat) create value in the company	10 interviews with Service employees at T_2	43 codes and 21 first-order concepts describing how employees use social media to conduct work activities for team goals, how teams create and use social resources, and how the joint usage could result in synergies	1) Three second-order themes showing how instrumental value is created by work-oriented social media 2) Two second-order themes indicating how expressive value is generated from socialization-oriented social media 3) Three second-order themes illustrating the complementarities between work- and socialization-oriented social media	NA	NA	NA	1) Instrumental value includes team reflexivity, team monitoring, and team effort. Expressive value includes social exchange and social support 2) Work-oriented social media create instrumental value. Socialization-oriented social media create expressive value
2	To confirm that findings from stage 1 were limited to those who used DingTalk and WeChat simultaneously at work	1) 20 interviews with Service informants (10 at T_1 and 10 at T_2) 2) 24 interviews	NA	NA	Compare coverage percentages of second-order themes generated from Service and	Examine the coverage percentages of five second-order themes	NA	Instrumental and expressive value is driven by the complementarity between work-oriented and

		with Development employees (12 at T_1 and 12 at T_2)			Development interviews at T_1	indicating changes of instrumental and expressive value in Service at T_2 and compared to the ratios in all other transcripts		socialization-oriented social media. The synergies between instrumental and expressive values improve team performance
3	Examining the research question about whether the instrumental value and expressive value created by the simultaneous usage of DingTalk and WeChat contributed to employee performance	All participants performance data from Service and Development during T_1 and T_2	NA	NA	NA	NA	Calculate the difference in employee performance between T_1 and T_2 for all informants and conduct t-test to verify whether treatment and control groups are significantly different in term of employee performance (employee salary)	The difference in quarterly and monthly salary of employee (performance) between treatment and control groups is statistically and significantly different

Figure 3: Coverage percentages of codes generated from interviews

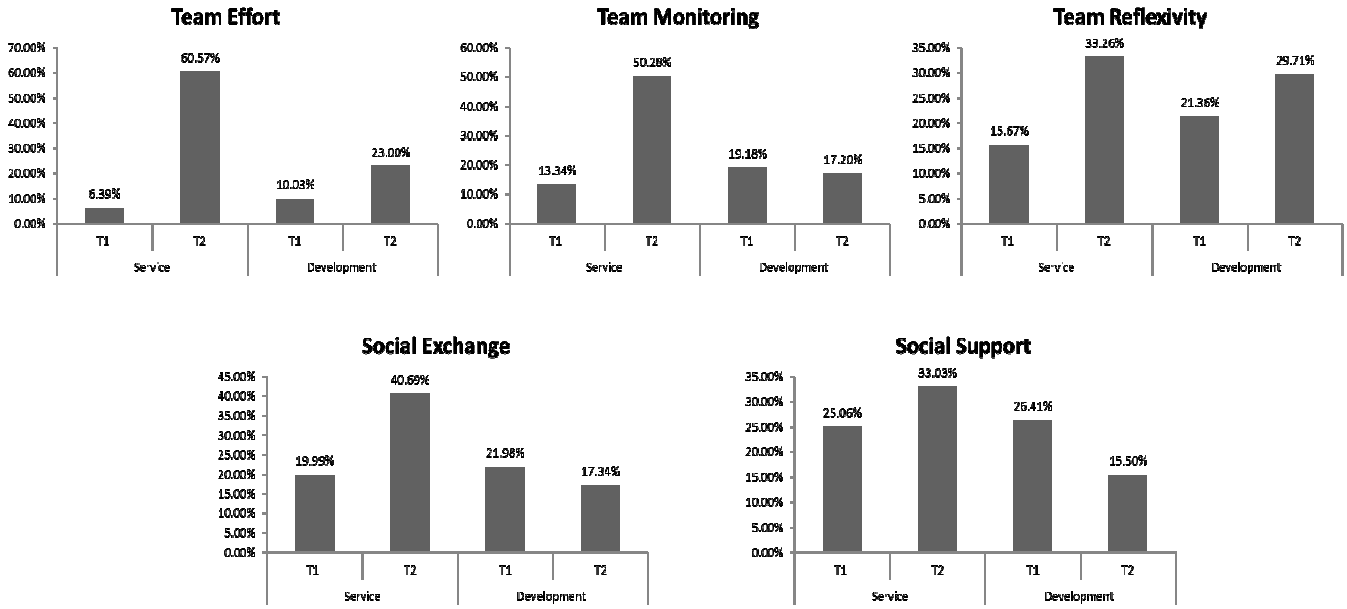
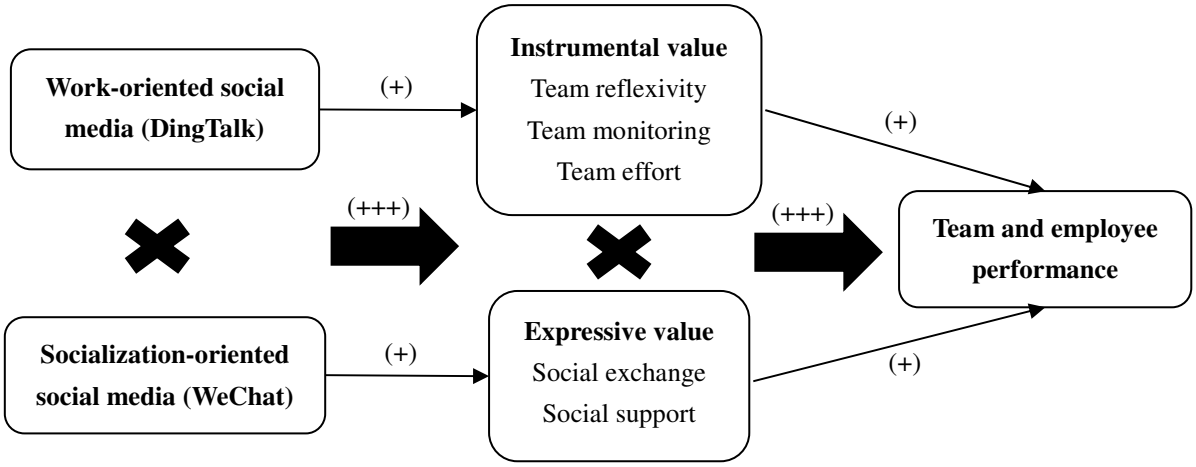


Figure 4: Conceptual research model[2]



Coders and data saturation point: Following Butterfield et al. (1996), one of the authors who did not participate in the field study was responsible for coding. We used NVivo QSR 10 to keep track of all the open, axial, and selective coding described above. After coding 40 interviews, we found no new codes to emerge, indicating some evidence for "theoretical

[2] Figure 4 shows the conceptual research model that was built from the second stage of the data analysis. However, this figure should be understood with caution as our research design and data analysis are only able to present anecdotal evidence. Future IS empirical research should test whether this conceptual model is supported through causal inference.

saturation" – the point at which "subsequent data incidents that are examined provide no new information" (Locke 2000, p. 53). To verify the accuracy of our coding results, a Ph.D. student, well-trained and with expertise in both coding and the research topic, repeated the same coding procedure independently. The Ph.D. student was not informed about the study before coding. To ensure consistency, we initially reviewed the codes generated by the Ph.D. student after she coded four randomly assigned transcripts. Then, we held an in-depth discussion with the Ph.D. student about the understanding of these codes, especially regarding their divergence. This helped to reach a consensus on the proper interpretation and application of each code. The Ph.D. student then recoded the four and all remaining transcripts. After finishing all of the transcripts, we calculated the consistency of the two coders (one of the authors of the team and the Ph.D. student) using Cohen's kappa embedded in NVivo QSR 10. The final Cohen's kappa, 0.84, was well above the 0.70 threshold, indicating acceptable inter-coder consistency (Fleiss 1971, Leonardi 2014).

KEY FINDINGS

These key findings are mainly extracted from the interviews of the 10 Service informants conducted after the joint implementation of DingTalk and WeChat. The additional 34 interviews that were analyzed allowed us to attribute the changes occurred in Service to the subsequent use of DingTalk. Key findings are illustrated by following the sequence of the research model of Figure 4. Consistent with other qualitative research, we present power quotes throughout the main text to support our points (Pratt 2008, Sonenshein et al. 2014).

Work-oriented social media and instrumental value

Work-oriented social media and team reflexivity: Team reflexivity is a process in which team members collectively reflect on their team's objectives, strategies, and processes, and then adapt accordingly (West 2000). Prior research has found that team reflexivity (i.e., team debriefings or after-event reviews) (De Rue et al. 2012) is positively related to team performance (Schippers et al. 2015). Team reflexivity requires team members to periodically: 1) review past performance processes, events, and outcomes; 2) evaluate and review the work of others; and 3) expose themselves to direct and public review (Chen et al. 2018). The visibility afforded by social media makes profiles, content, and activities transparent and available to employees themselves and others (Van Osch and Steinfield 2016).

With the help of DingTalk, employees create or review schedules to guide their activities more frequently via writing daily logs. Daily writing and uploading work logs can reinforce team reflexivity by: 1) exposing employees to other members' review, and 2) enabling employees to evaluate the work status of others.

In addition, teams need to respond and adapt to the uncertain and dynamic business environment. DingTalk can enable team members to modify their objectives, task schedules, and reports with DingTalk. Specific examples indicating the role of DingTalk in enhancing team reflexivity are summarized in Table 5.

Table 5: Examples of the impact of DingTalk on team reflexivity

Problem	Why this problem exists	Consequences	How DingTalk addresses the problem	Benefits
Employees sometimes repeat the same mistakes at work	Employees do not periodically reflect on their past work practices	Loss of efficiency	Writing daily logs enables employees to reflect on work methods used in the past and outcomes	Preventing employees from reinventing the wheel
Employees fail to recognize the discrepancy between current performance and expectations	Employees have no chance to fully communicate with other team members regarding their own work progress and work methods	No improvement in work methods and processes	Writing daily logs can visualize work-related information	Exposing employees to other members' direct and public review
Teams have insufficient knowledge about what others are doing	No proper tools exist to afford the visibility into other's work progress	Social loafing and ineffective benchmarking	Supervisors can review employees' work data (e.g., logs) at any time or even in their spare time. They also share their work methods and experience by distributing work logs to all team members	Enabling supervisors and employees to evaluate the work status of others and provide instant feedback
Existing managerial practices cannot contribute to the company's competitive advantages	The competition in the financial industry is so intense and teams are required to continuously innovate and update their managerial practices	Requiring fine-grained updates in management	Writing logs, clock in/out, task management, and other functions on DingTalk enable teams to reassess what and how they have done and how their behaviors relate to the outcomes in a more detailed way	Adjusting management methods to adapt to external changing environment
What employees are doing is off track	No proper tools to enable employees regularly assess whether their efforts are on track or in the right direction	Cannot ensure effective goal achievement	Teams use candlestick charts to keep employees on track with corporate strategy. When deviations occur, they adapt work methods and pace of work to achieve team goals	Ensuring the alignment between actual work practices and the company's goals and helping team members better understand expectations on them
Lack of the ability to develop effective solutions to emerging problems and challenges	Team members do not receive sufficient feedback about their performance and also do not regularly reflect on the past work processes	Cannot improve work practices	Via DingTalk, employees can easily understand what they are doing, what they need to do next, what others are doing, why others are doing better, and how they should change to follow others' schedule	Adjusting work practices by reviewing outcomes in the past and analyzing emerging conditions

Work-oriented social media and team monitoring: Team monitoring involves observing the actions of team members, watching for discrepancies in performance, and providing feedback and assistance to team members in need (De Jong and Elfring 2010). Despite the team leaders at SW Payment had been encouraged to perform effective team monitoring, the result was not satisfactory. The challenge in this area is related to the difficulties in visualizing work-related information, i.e., tracking and monitoring the behavior, progress, and performance of on-site team members. This became evident during the interviews: "*We wanted to improve our management methods for a long time but lacked the proper tools. If employees perform their duties in the field, we have no way to track what they are doing"* (Blake, supervisor from Service). *"Every Monday morning we have a departmental meeting to discuss the questions or issues we encountered in the previous week. Everyone contributes to the discussion and helps to make a quick solution to the questions. You know, however, the meeting is too short to learn about the detailed work progress of other colleagues"* (Barret).

The challenge of team monitoring lies in observing and tracking the behavior and work progress of others. Despite being powerful in enhancing communication and collaboration, the socialization-oriented social media WeChat is inappropriate for work-related communication because it hardly affords the effective tracking and following of messages. In addition, WeChat does not offer an attendance function, making it difficult for team leaders to check whether field employees have met their responsibilities. For example, as Daniel explained: "*For some sales representatives, they prefer to hold business meetings with clients in places like cafes or teahouses. Sometimes, I wonder whether every member in our team engages equally in the work. I find some colleagues spend the whole afternoon in a teahouse*

or cafe, but I am not sure whether they are meeting clients or just relaxing. It is hard to tell considering the flexibility of sales work."

Without DingTalk, team leaders must resort to traditional ways, such as oral reports, written work logs, and standing meetings, to gather information about the status and progress of team members. Employees can get information about the work progress of other colleagues through informal talk or regular meetings. The drawbacks of these traditional ways are obvious. Comparing how the Service group conducted team monitoring before and after the implementation of DingTalk and considering the changes in team monitoring in Development over time, we can see that employees can obtain information about teammates' behavior and progress more effortlessly by using DingTalk. In addition, team leaders can easily check whether team members follow the planned task schedule and provide feedback on time using DingTalk.

DingTalk can enable employees to write and submit their daily logs so that team leaders can follow up subordinates' status and performance data in real time. The increased awareness of who is doing what and what progress has been achieved can significantly improve team monitoring, including observing the actions of teammates, watching for performance discrepancies, and providing feedback and assistance to those in need. Specific examples indicating the role of DingTalk in enhancing team monitoring are summarized in Table 6. This analysis shows that work-oriented social media enable team monitoring.

Table 6: Examples of the impact of DingTalk on team monitoring

Problem	Why this problem exists	Consequences	How DingTalk addresses the problem	Benefits
Some of employees may go off to do their personal business when performing field duties	No technique or system afforded supervisor and coworker the ability to track field staff's behavior or task status efficiently. It is difficult for a manager or team leader to monitor whether staffs are performing on-target	Inducing social loafing	Employees can check in when performing field duties on the app with location tracking feature. Managers or team leaders can track the location of field staff and the status of their tasks in real time	Eliminating employee cheating and increasing the effectiveness of monitoring
The company used a biometric fingerprint attendance system for employees including field staff. It is inconvenient and time consuming for field staff to go back to the business location for clock out	SW Payment is well-known for its' responsiveness in customer service and requires employees to deal with customers' problems quickly. It is often the case that a customer encounters a technical problem at 3-4pm and employees need to go to the customer's location 30 miles away and return to the company's location for clock out even in the late night	Inefficient work and complaints among employees	Employees can clock in/out on the DingTalk app at anytime and anyplace. With the detailed information of location where employees clock in or out, managers can track employee's attendance	Time-saving and high-efficiency in conducting tasks, and efficient and accurate job attendance management
Important work-related messages or notices on WeChat or QQ (another socialization-oriented social media) are often missed by employees	Some employees miss the important notices or messages distributed in the group chat of WeChat, which are usually flooded with massive messages. Senders of the message or managers have no idea about whether employees without response intentionally ignore or simply miss the information	Employees do not respond to notices or messages on time	Message read notification on DingTalk indicates whether the receivers have read the message. The DING message function can allow users to send important messages by using push notification	Ensuring the delivery and reading of important messages
The company used to process manually the approval of business trips, leaves, and reimbursements, causing time-delay and low-efficiency	Paper works are distributed to several managers for personal signatures	Wasting time and inefficiency	With the approval system on DingTalk, employees can submit their applications for leaves, business trips, and reimbursement and be notified the status of approval at any time. Employees can also push their applications to managers by using DING message if it is an emergency	Reducing time lag and increasing efficiency
Managers cannot track team progress and whether employees perform their activities in an immediate and efficient way	Managers get the information about team work via weekly meetings and private one-to-one communication	Low efficiency of supervision and increased management cost	Task management and planning functions on DingTalk enable managers to assign tasks, monitor task status in real time	Increasing the efficiency of task management and monitoring

Managers cannot keep close track of whether everyone performs as expected	Employees write and submit work logs every week which may neglect some important details in the work and cannot enable managers to identify and respond to problems on time	Inconvenient for supervisors to provide feedback and assistance to those staff in need	Log function on DingTalk enables employees to write and upload logs very easily. As a result, SW Payment requires employees to upload daily logs, which is beneficial for supervisors to monitor work progress. In addition, the app can generate employee's performance indicator report automatically	Beneficial to monitor progress for managers in an efficient and timely way and providing support to those in need timely
Effective benchmarking has not been implemented within the team	Employees are unable to observe how colleagues behave in the work and have no way to learn from each other	Field employees do not have many opportunities to improve their skills by learning from each other	Managers can share the work diaries of star employees and other learning materials timely and conveniently by using DingTalk	Enhancing peer comparison and employee learning. Potential to implement digital gamification (being fun and competition are two key principles in gamification) projects in the future

Work-oriented social media and team effort: Team effort refers to the extent to which team members devote their resources (i.e., energy, attention, and time) to team tasks (Yeo and Neal 2004, De Jong and Elfring 2010). Also, team effort involves maintaining and demonstrating individual motivation to exert effort toward realizing team goals, even when one experiences frustration or when others are holding back. The main goal of SW Payment is to *"explore potential clients and maintain existing clients,"* which is largely decided upon by the efforts of employees and by their influence on team performance. However, how to inspire team and employee effort remains a managerial challenge. Daniel (team leader in Service) highlighted the importance of inspiring and motivating teams and employees: *"We have accumulated extensive knowledge and skills in the traditional payment field. After the transformation of our business, we need to spend a lot of time and energy to learn new knowledge and skills related to online payment and financing services to reach the company's objectives. Most employees experience pressure related to this. We need to do a lot of things to inspire them to work harder and eliminate their inertia in exploring new things."*

DingTalk can be used to enhance challenge stressors and thereby push employees to work hard, which is beneficial for teams seeking to reach their goals and improve team and employee performance. As Daniel said: "*Our performance data are displayed on DingTalk, and everyone in our team can have access to others' performance data. I will feel shamed if I lag behind. As a result, I try my best to complete my tasks."* Calvin expressed a similar opinion: *"DingTalk is not only a data collection system but also a real-time locating and recording system. I can edit, revise, and submit daily logs by using my mobile phone and*

record my work status with photos when performing a task at the customers' location. These functions push me to concentrate on my work during work hours."

DingTalk can also be used to reduce employees' hindrance stressors to conducting new tasks, which encourages employees to exert more time, energy, and attention in reaching team goals: "*DingTalk provides strong abilities of enhancing communication and coordination, which are useful for eliminating or resolving problems at work. We can easily search for colleagues with specialties on DingTalk and directly phone or message them to get information or knowledge we want. As sales representatives, we often need to contact office-based technical staffs to resolve the technical problems at our customers' locations. DingTalk helps a lot"* (Blake).

From managers' perspectives, DingTalk with affordances of instant feedback and prompt rewarding can also inspire employees to exert more effort. According to Blake: "*Employees are required to submit important documents and applications for customer discounts for approval. We used to ask employees to hand in the written application forms in person and finish the entire procedure, which requires the signatures of multiple managers at different levels. The process was time-consuming and lowered responsiveness in customer service. Sometimes the long approval process negatively affected employees' performance and thus lowered their morale. With the help of DingTalk, we can process applications in real time… In addition, we can share information about best practices or the excellent performance achieved by star employees. This encourages our employees and motivates them to stay on the right track."*

The function of instant communication and strong coordination enabled by DingTalk has reduced emotional resistance to performing tasks, and created an atmosphere inspiring employees to devote more effort and create highly efficient workflows, resulting in instant feedback and rewards. In this sense, this provides anecdotal evidence to the impact of the usage of work-oriented social media on team effort. Overall, we find that the usage of DingTalk has a positive influence on team reflexivity, team monitoring, and team effort, thus providing instrumental value.

Socialization-oriented social media and expressive value

Socialization-oriented social media and social exchange: Social exchange is defined as voluntary, beneficial actions that are expected to create a desire to give back on the part of the other (Blau 1968). Blau (1964) categorized social associations into social exchange and economic exchange, arguing that social exchange represented a relationship based on -and motivated by- unspecified obligations, over an open-ended and long-term timeframe (Colquitt et al. 2014). Exchange partners can use social media to establish and sustain social capital and thereby obtain many benefits, such as assistance, advice, and appreciation. For instance, if one provides support to the other, then subsequent acts of giving advice by the other could constitute reciprocal behavior, defined here as voluntary, beneficial actions by one that are believed to be mutually reinforcing.

WeChat, as a widely used social media with a strong ability for association, allows personal connections among employees. These personal associations in the workplace can build rapport, establish high quality working relationships, and generate organizational citizenship behavior (Koch et al. 2012). As Calvin highlighted: "*The high association*

afforded by WeChat helped our team members to develop friendships. Our team is like a family, and our team members are brothers and sisters. We have developed an emotional attachment to our colleagues and our team. So, I often share my work experiences and information with the team members with whom I have built good personal relationships. In addition, we are not concerned over who takes this task and who does not because we understand that we need to work as a team."

These activities enabled by WeChat can further enhance employee attachment and belonging, which are positively associated with affective commitment to the team or the company: "*Our team members share a vision: we need to work hard to become outstanding and not pull down the whole team. Some members are willing to fight for the team's honor to support its growth and success"* (Barret).

Regarding the interaction between team leaders and members, employees can perceive high-quality social exchange relationships when their leaders continuously offer help and inspiration, value their contributions, value their goals, and care about their well-being. WeChat is a useful and appropriate platform for high-quality social relationships between managers and employees: *"I usually send red envelopes [monetary gifts] on WeChat to my team members as a small reward for their achievements or improvements. Even though the amount of money in the red envelopes is small, I just want them to know that we value any contributions our employees make"* (Blake). Barret said: "*If I find some colleague is not in a good mood, I will privately message or chat with him/her on WeChat or simply send emoji to cheer him/her up. Sometimes a non-face-to-face way is much easier for communication.*

When employees go out to work in the hot sun, I will send messages in group chat to remind them of sunstroke and to drink water."

High-quality social exchange relationships, enabled by the use of WeChat, can induce proactive work behavior among employees. Employees who feel an affective commitment to their teams and the company eventually perform more productively, achieve higher performance, and show strong loyalty and low turnover intention. In this sense, the WeChat-enabled social exchange in the workplace can be converted in greater team performance.

The joint use of DingTalk and WeChat can further enhance social exchange among users. One informant in Service who simultaneously uses DingTalk and WeChat said: "*Last month, by reviewing my team members' daily logs, I found that Barret had encountered a problem when his first deal with one client (Bank A) was stuck because the senior manager of this client did not trust Barnett. Bank A has a good partnership with Bank B, with which I have had a strong relationship for many years, and was highly satisfied by our company's high-quality products and services. To tackle the problem, I recommended Barret to the manager of Bank B, who referred Barret to Bank A with a professional endorsement of our company's high-quality products and services. Ultimately, Barret successfully sealed the deal with Bank A."*

Support from team leaders helps employees to develop an emotional attachment to their teams and feel like a family. The visibility and transparency of employees' work status can allow managers to exert timely feedback, correction, and support, which, in turn, can benefit employees and make them build stronger social exchange relationships with their leaders and

colleagues (Langfred and Moye 2004). In this sense, we find that socialization-oriented social media affect social exchange, thus providing expressive value. This effect is positively reinforced in the presence of work-oriented social media.

Socialization-oriented social media and social support: Social support has been defined as "the availability of helping relationships and the quality of those relationships" (Wang et al. 2010). Social support in workplace has different forms, such as supervisor support, coworker's support, and organizational support (Shanock and Eisenberger 2006, Liaw et al. 2010). Perceived social support can influence individuals' appraisal of stressful situations, whereby difficulties and setbacks at work are appraised as more manageable and less threatening (Lu et al. 2015, Maier et al. 2015, Kuem et al. 2017). Employees can use social media to establish social relationships and obtain social supports from others. For instance, sharing entertaining jokes or positive life experiences on social media can create mutual enjoyment among individuals. These connections can lead to strong socially supportive relationships (e.g., enduring friendship). Prior research has illustrated that supportive relationships can prevent negative responses and maladaptive coping behaviors when employees feel frustrating and enhance positive experience at work (Wang et al. 2010). As a result, social support can contribute to superior employee and team performance.

The interactions and flows on socialization-oriented social media focus on affective communication and relationship development. WeChat, as a socialization-oriented social media, enables employees to build high-quality social relationships with supervisors and coworkers, and these social bonds can benefit them. Specifically, supervisors can initiate casual conversations or show a personal concern for the wellbeing of one subordinate on

WeChat, which can strengthen the perceived support among the employee and others. As Grace (team leader in Service) indicated: "*When employees encounter setbacks or frustrations in their work life and in their personal life, I inspire them by sending WeChat messages. When team morale is low, I instill positive emotional energy into employees by sharing some encouraging materials and jokes in our group chat*."

In addition, WeChat can enable employees to take some breaks from work during particular busy work schedules and thus build a sense of togetherness. This sense of community can enable coworkers to provide employees with work-related assistance to aid in the execution of job tasks. Such effects were reflected by Grace: "*The annual motor show is an important event for us to expand our markets and maintain customer relationships. After five or six hours of intensive work, we talk about interesting topics in our WeChat group, which helps us temporally escape from the pressure of work. Chatting on WeChat provides a balance between work and social activity, recharges us, and allows us to carry on efficiently."* Furthermore, the supportive team climate on WeChat can obtain socioemotional benefits such as caring: "*Employees invest effort and dedication to their organization for social benefits such as a sense of community and belonging*."

For employees, the joint use of DingTalk and WeChat can exert a complementary effect on social support. Informants has noted that "*WeChat can be used as a channel to provide social support as well as entertainment and the affordances of DingTalk enable us to provide instant feedback and assistance to those who need a favor.*" Perceived social support can enhance the in-role and extra-role behaviors of employees, and then increase their productivity.

Complementarity of work-oriented and socialization-oriented social media and business benefits

Impact on team performance: We find anecdotal evidence on the complementarity between DingTalk and WeChat, and its effect on team performance. In workplace, employee uses work-oriented social media to obtain instrumental value such as gathering professional information and promoting successful team monitoring (Kim et al. 2013, Leftheriotis and Giannakos 2014). Employee's use of socialization oriented-social media, on the other hand, is to satisfy their expressive needs, for example, the need for entertainment, social support, and community feelings. DingTalk and WeChat represent work- and socialization-oriented social media, respectively, which they have the following heterogeneous features (Table 7).

Table 7: Quotations for the heterogeneous features among DingTalk and WeChat

Social interactions	Barret: *"The social interactions on DingTalk are formal and we usually use it for approval, write and upload daily work diaries, and do some reviews of previous work*"
	Alice: *"The communications on WeChat are casual and relaxing. We can send emoji and animation characters, such as Tuzki. We sometimes use WeChat as a "refresher" by making some jokes and sharing some office gossip… The interactions on DingTalk are formal compared with WeChat"*
Flows	Daniel: *"DingTalk is more professional than WeChat (in office automation). Specifically, WeChat is a 'large and all-inclusive' platform and we share various contents on this platform. On the contrary, DingTalk focuses on improving office efficiency and we usually share work-related materials, like work diaries, on this platform"*
	Bruce: *"Apart from work-related interaction, we also share things unrelated to work on WeChat, like motivational nonsense (chicken soup for the soul) and gossipy news. For DingTalk, we just use it for work-related purposes"*
Relations	Emily: "*DingTalk is used for role-based interactions in work (such as cross-sectoral linkages and relationships) and WeChat is useful to establish and maintain affective relations"*

Although DingTalk and WeChat have heterogeneous features that promote instrumental and expressive ties, respectively, these ties are conducive to completing work tasks. Socialization-oriented apps can complement work-oriented apps by enabling employee to relax and refresh, leading to a greater concentration and higher efficiency for a day's work

and, as a result, increased productivity: "*We use WeChat as a refresher by making some jokes and sharing some office gossip. DingTalk is a formal platform by which we keep close track of work progress and improve work efficiency… The social interactions between employees smoothed by the causal and informal activities in WeChat serve as the lubricant for more instrumental and utilitarian goals at work enabled by DingTalk."*

On the other hand, work-oriented social media can complement socialization-oriented social media in daily work and task management. It is impossible for DingTalk to replace WeChat and vice versa: "*Either WeChat or QQ are instant messaging tools that can be used to communicate and share information. It is worth noting that some functions on DingTalk are conductive to improve work efficiency and productivity. For example, online clock-in allows employees to check in online instead of going back to the company's location. The message 'read' identifier enables me to know who does not read the messages. Online approval, location track, corporate chart, and other tools are useful for improving management and achieving higher performance. DingTalk is supplementary to WeChat at work."*

In addition, the cognitive and behavioral rigidity serve as another reason for the complementary relationship between work- and socialization-oriented social media. As Barret argued: *"We use WeChat to satisfy our social needs at the very beginning, and then this behavioral propensity has shaped our perception of this platform which remains unchanged. Although we use DingTalk frequently at work, it is unrealistic that we use DingTalk for social use."* Alice expressed the same view: "*Although many functions of DingTalk and WeChat are overlapped, it's not the wastage of resources. The most important reason is that we become*

accustomed to using WeChat for informal interactions and using DingTalk for work-related exchanges." This inertia in using heterogeneous social media provides room for complementarity rather than substitution.

Finally, employee's choices about using heterogeneous social media are motivated by their desire to gratify a wide range of needs in workplace (Park 2010, Joo and Sang 2013). Hence, studying employee's motivation to use heterogeneous social media can shed light on the complementarity between work- and socialization-oriented social media (Kim et al. 2013, Leftheriotis and Giannakos 2014). In the workplace, employees use DingTalk to "*obtain instrumental value such as gathering professional information and promoting teamwork."* The use of WeChat, on the other hand, is to *"satisfy their expressive needs, for example, the need for entertainment, social support, and community feelings."*

These statements describe how employees use work-oriented and socialization-oriented social media for different purposes at work and how both types of social media are complementary and beneficial for team and employee performance. DingTalk is a formal work-oriented platform on which employees can perform various activities to achieve their collective goals, such as team monitoring. In contrast, WeChat is an informal socialization-oriented platform on which employees can talk about a multitude of interesting topics and build social relationships. In this sense, DingTalk and WeChat play different roles at work and complementarily contribute to team and employee performance.

Test of robustness: Impact on employee performance: As a test of robustness, we further use employee salary as a proxy of employee performance to evaluate whether the complementarity of work-oriented and socialization-oriented social media had affected

employee performance. However, salaries in different years may be incomparable because the change in the annual salary of employees largely depends on the growth of firm's revenues. Thus, we calculated the ratio of total annual salary (2.28 million RMB) to the total annual revenue (30 million RMB) contributed by all marketing employees in 2016, which is 7.6% in comparison to 6.35% in 2017. We then discount the performance data in 2017 (T_2) back to the data in 2016 (T_1) by using an appropriate discount rate[3] so that the performance data at the two points of time are comparable. Furthermore, we used quarterly salary instead of monthly data, as the informants explicitly illustrated that they sometimes took more than one month to close a deal, and quarterly performance data have high reliability and objectivity[4]. Therefore, we used all of the informants' performance data in the third quarter of 2016 and the second quarter of 2017 as raw data at T_1 and T_2 separately after the first round of interviews were conducted in August 2016 and second round in April 2017.

Because our research method is a pretest/posttest design, we first calculated the difference between time points for all informants, and then we used an independent t-test to verify whether there are significant differences in employee performance (salary) between the treatment and control groups. A statistically significant difference was detected between the pretest and posttest in the experimental group and the control group ($t = 3.99$, $p \leq 0.001$) (the t-test using monthly performance data also shows a significant result, $t = 3.22$, $p = 0.004$). This test of robustness shows that the difference in quarterly employee salary between the experimental group and the control group is statistically significant, thus illustrating that the

[3] The discounted performance data at T_2 = (Original performance data at T_2 * 228 * 3100) / (3000 * 197).
[4] We also repeated this analysis by using monthly performance data, which yields identical results (see Table A2 in the appendix).

complementarity in the usage of work-oriented and socialization-oriented social media had improved employee performance in the experimental group significantly. In other words, compared with informants in Development only using socialization-oriented social media, informants in Service who simultaneously use work- and socialization-oriented social media have higher employee performance.

Table 8: Quarterly employee's salary in experimental and control group

	Informant	**Experimental group at T_1**	**Experimental group at T_2**	**Difference (T_2 - T_1)**	**Informant**	**Control group at T_1**	**Control group at T_2**	**Difference (T_2 - T_1)**
	Aaron	37200.50	43532.78	6332.28	Evan	16106.06	18328.86	2222.80
	Ablett	18474.00	23211.98	4737.98	Gary	12578.69	13812.54	1233.85
	Bruce	8220.00	10177.44	1957.44	Basia	16551.25	14947.81	-1603.44
	Barret	16107.00	19920.76	3813.76	Harry	43777.81	37498.18	-6279.63
	Alice	15007.00	18473.67	3466.67	Herbert	31539.55	27876.14	-3663.41
	Blake	37319.00	54903.77	17584.77	James	17068.59	19035.93	1967.34
	Calvin	18357.00	21896.45	3539.45	Carol	21580.12	24851.51	3271.39
	Emily	16865.00	20104.33	3239.33	Jeremy	21861.11	18855.27	-3005.84
	Chad	16107.00	20279.54	4172.54	Lambert	29079.47	20108.23	-8971.24
	Daniel	23098.25	28820.94	5722.69	Matt	19111.26	21603.72	2492.46
	Aaron	37200.50	43532.78	6332.28	Dana	30727.58	23684.45	-7043.13
					Grace	29471.14	26590.79	-2880.35
					Evan	16106.06	18328.86	2222.80
Mean		20675.48	26132.17	5456.69		24121.05	22266.12	-1854.93
S.D.		9485.12	13277.63	4442.10		8941.45	6456.66	4142.95

Note: Salary is expressed in RMB.

DISCUSSION AND CONCLUSIONS

Discussion of results

How does the usage of social media in the workplace affect team and employee performance? To address this critical IS research question, we ran a quasinatural field experiment, collecting data of two matched groups within a large financial service firm in China. We find that work-oriented social media (DingTalk) and socialization-oriented social media (WeChat) are complementary resources that generate synergies to improve team and employee

performance. This general research question was divided in two specific research questions. The first question is whether the combined usage of work-oriented and socialization-oriented social media generates synergies in the workplace. To answer this question, we classified social media in the workplace into work-oriented and socialization-oriented social media and elaborate the rationale behind this complementarity. Work-oriented social media (e.g., Microsoft Yammer and DingTalk) refer to web-based platforms that can be used in the workplace to facilitate the creation of resources, collaboration, and the exchange of core work-related information and content, such as task management, the tracking of work and events, and formal internal corporate communication. Socialization-oriented social media (e.g., Facebook, WhatsApp, and WeChat) refer to the web-based platforms that enable the exchange of social and personal information, and facilitate expressive ties that influence individual identity through social and emotional support, and normative expectations. Work-oriented social media are corporate, private, "formal," and for professional interactions. Differently, socialization-oriented social media are personal, public, very informal, and for personal, social, and emotional interactions.

The usage of social media by companies and individuals has become a core trend for business activities (companies) and fun/socialization (individuals). Most employees expect both work-oriented and socialization-oriented social media can co-exist in the workplace. The joint use of both work-oriented and socialization-oriented social media has greater value because socialization enabled by social media becomes a routine and necessity in employees' work and complement and smooth instrumental activities at work. This suggests that

work-oriented and socialization-oriented social media complementarily co-exist and create synergies in the workplace.

The second question is whether these synergies influence team and employee performance. We find that the interaction between work-oriented and socialization-oriented social media generates synergies that improve team and employee performances. The instrumental value provided by work-oriented social media is reinforced by the expressive value provided by socialization-oriented social media, which helps firms to create business value from IT investments. Specifically, work-oriented social media provide specific business benefits such as more effective communication, better work-related information, job monitoring, and formal and instrumental ties. These benefits have a greater positive impact on team and employee performance when employees also have social and emotional connections, affective relationships, trust, and less psychological distance, which are enabled by socialization-oriented social media.

Contributions to IS research

The usage of social media by companies is a new phenomenon, and therefore, the theoretical and empirical understanding of business value of social media is still in initial stages (Benitez et al. 2018a, Braojos et al. 2019). First, our study contributes to the literature on social media in workplace in the following ways by highlighting the heterogeneous types of social media and categorizing social media into work-oriented and socialization-oriented social media. Our own review of prior IS literature shows a limited understanding about how multiple social media can be used in combination in the workplace and whether this usage enables or constrains the performance of teams and employees. One exception to this scarcity of

research is Forsgren and Bystrom's (2018) work. They perform a case study in a Scandinavian software development company and find that the usage of multiple social media brings coherence in work activities in a decentralized work environment in terms of sharing work-related information and improving ambient awareness. Among studies on the roles of social media at work mainly from a single technology perspective, Forsgren and Bystrom's (2018) work is one exception recognizing the co-existence of multiple social media at work. They examine internal social media (Dokuwiki, Microsoft Yammer, and Vanilla Forum) and external social media (LinkedIn, Facebook, Twitter, and Misc). However, the co-existence of multiple social media is only viewed as the contextual factor in their study. There is only literal meaning, rather than theoretical implication of the term "multiple" as no efforts have been conducted to theorize the differences and interrelationships among various social media. Drawn on the Forsgren and Bystrom's (2018) work, we examine the impact of the usage of social media in the workplace on team and employee performance. In a different way to Forsgren and Bystrom (2018), we focus on the usage of DingTalk (work-oriented social media) and WeChat (socialization-oriented social media) in a large financial service company in China. We classify social media in the workplace into work-oriented and socialization-oriented social media. This classification of social media in the workplace allows us to distinguish heterogeneous value created by these social media and surface the interaction between them. This is the primary contribution to IS research[5]. The categorization

[5] Forsgren and Bystrom (2018) find that knowledge employees of a Scandinavian software development use Microsoft Yammer (a work-oriented social media in our study) *informally* and in a similar way to Facebook (a socialization-oriented social media in our study), which improves the employee's sense of community, togetherness, and family. In a different way, the employees of SW Payment (the company of our study) perceived the usage and narrative of DingTalk as *formal*, and they brought the informal, emotional, family (personal) sense through WeChat. These interesting differences (informal vs. formal narrative and usage) may be based on the different industries (software development vs. financial services) and/or different national

of work- and socialization-oriented social media provides a framework to analyze the complexity and dynamics of social media use and impacts.

Worldwide IT investment has been projected to total $3.7 trillion in 2018, an increase of 4.5% from 2017, according to the latest forecast by Gartner Inc. (Gartner 2018). In this sense, companies invest millions Euros/Dollars/RMB in IT resources, but not all of them generate the expected business benefits (Benitez et al. 2018b, Benitez et al. 2018c, Benitez et al. 2018d). Prior IS research on business value of IT has argued that it is more important how firms use IT resources and initiatives than how much they invest in IT resources and initiatives (Chen et al. 2015, 2017). Our study contributes to the research on business value of IT by showing the theoretical arguments and the anecdotal evidence on how firms can capitalize their efforts and capabilities to deploy work-oriented social media (*corporate emphasis: DingTalk*) in combination with socialization-oriented social media (*personal emphasis: WeChat*) to create business value. In particular, this study uncovers the mechanism of value creation of social media by identifying that work-oriented social media generate instrumental value and socialization-oriented social media provide expressive value. The approach to differential value created by various social media not only offers further evidence for the heterogeneity of social media but also serves as a theoretical base to understand the synergistic effect of social media in improving performance. This is the second contribution of this study to IS research.

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cultures (Scandinavia vs. China). Exploring how the impact of the social initiatives on companies differ by industries and national cultures (attitude toward job) seems to be a fantastic research line to explore in IS research and to develop our study.

The finding of the synergistic effect of the joint usage of work- and socialization-oriented social media at work further contributes to IS research on social media. This body of IS literature has long questioned the legitimacy of nonwork-related use of social media at work and considered it as a typical form of IT misuse, which could bring negative impacts on productivity and should be deterred by companies (D'Arcy and Hovav 2007). On the contrary, some scholars propose the nonwork-related use of social media is a new form of business value creation (e.g., McAfee 2006) as this may help form an expressive network and bring affective benefits for employees (Ibarra and Andrews1993, Podolny and Baron 1997). This study contributes to this body of IS research by theorizing the mechanisms through which work-oriented social media (affording instrumental ties) and socialization-oriented social media (affording affect-laden expressive ties) jointly contribute to improve team and employee performance.

Lessons learned for the real world

Heterogeneous information technologies coexist and are jointly used by individuals and companies, which has substantial implications for IT usage, management, governance, and value appropriation. The ubiquitous coexistence of multiple social media in a single company is one of the most salient demonstrations of IT democratization. This study provides lessons learned for the modern financial service company and executives. First, social media that can be used in the workplace are heterogeneous as they have different technical features, affordances, and supported ties. We classify them in work-oriented social media and socialization-oriented social media. The implementation of work-oriented social media depends on firms' strategy related to IT, human resource, and knowledge workplace design.

On the contrary, socialization-oriented social media are personal, and its usage depends on the self-initiative of employees. Financial service companies should implement work-oriented social media by considering the alignment between social media and user characteristics, task demands, and usage contexts, as this is critical for the success and value appropriation of social media in the workplace. Second, we study the usage of one work-oriented social media (DingTalk) and one socialization-oriented social media (WeChat) in the workplace in a large financial service in China. Our analysis shows that the joint usage of DingTalk and WeChat generates positive synergies, which, in turn, help to improve team and employee performance. Viewing socialization-oriented social media as an obstacle to work productivity, some companies may forbid the usage of socialization-oriented social media at work. In our study, we find that its usage complements the usage of work-oriented social media as it brings the social support and social exchange that complement team reflexivity, team monitoring, and team effort facilitated by work-oriented social media. This co-existence of work-oriented and socialization-oriented social media improves team and employee performance and creates business value in the financial service company.

Limitations and future directions for IS research

This study has the following limitations. First, although the absence of prior IS research on this topic highly recommended running a case study, the research focused only on one company and its results is less generalizable. Second, although the study focuses on two very relevant social media in the Chinese workplace (DingTalk and WeChat), the findings on the usage of multiple social media in the workplace can be only extended to these specific social media. We see the following promising avenues for future research to develop this topic and

study. First, our understanding on the conceptualization, design, and effects of the digital workplace is in its infancy. Future IS research should aim to clarify what a digital workplace is and how it affects employee engagement and performance. Second, although the usage of both work-oriented and socialization-oriented social media has been shown to positively affect team and employee performance, future IS research should run empirical, and econometrics studies to explore how this effect evolve if we add more collaboration tools to the equation (e.g., Microsoft Office 365). Can knowledgeable employees suffer technological overlap at work? What type of policies should companies design to avoid this possible technological overlap? Companies should select carefully the collaboration tools to implement at work by considering the digital skills of the organizational members, the integration user's demand and challenges, and the firm's IT investment budget. The study of the role of social media and other IT-enabled collaboration tools in the workplace seems to come with very promising research questions to explore in our field.

Key conclusions

How does the usage of social media in the knowledge workplace affect team and employee performance? Motivated by this critical research question, we ran a quasinatural field experiment on a large financial service firm in China. We theorize and classify social media in the workplace into work-oriented social media and socialization-oriented social media. The analysis of DingTalk (work-oriented social media) and WeChat (socialization-oriented social media) in our study shows that both social media are complementary at work and generate positive synergies to improve team and employee performance. This is explained because the combination of instrumental value and expressive value as a whole is better than the sum of

its parts in terms of team and employee performance. In this sense, social media at workplace work.

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APPENDIX

Table A1: Major features of DingTalk

Features	Description
Communication features	
Message read identifier	All types of messaging display read/unread status for improving communications efficiency. The system also presents the number and the list of receivers who do not read the sent message
Phone	Allow users to make free in-system phone calls
Group chat	Allow users to freely form groups
Organization chart	View organization's structure in a glance, find people and contacts by their names, job positions, and departments
Corporate/department group chat	Enrolled employees are automatically enlisted as members
Video-conferencing	Allow users to make multi-party video conferences on the group chat
Secret chat	Send a traceless secret message which will be automatically deleted 30 seconds after being read. No copy and paste is allowed during secret chat mode. Both profiles of users within the secret chat are masked, hence the identities remain concealed
Office automation features	
Approval	Employees can submit their requests for leaves, applications for business trips or reimbursements, which will be processed in real time
Log	Employees can write and submit their daily work reports with the app, and the system can generate individual employee performance reports automatically
Calendar	Managers can follow up the work data (such as attendance and log) of employees at any time
Clocking-in and out	An attendance system tracking employees' GPS-based location information and allowing user-friendly, remote clocking-in and out
DING-drive	The cloud-based file system that makes file saving and sharing quick and easy between mobile devices and computers
Announcement	Members will receive notifications once organizational or departmental announcement has been posted
Collaboration features	
DING message	Send important messages via SMS, phone, or in the app
DING tasks	Create and assign work tasks to self or others
External contacts	Allow users to add external contacts to DingTalk by importing phone contacts, scanning business cards or adding manually
DING meetings	Book offline meetings, videoconferences and conference calls

Table A2: **Monthly employee's salary in experimental and control group**

	Informant	**Experimental group at T_1**	**Experimental group at T_2**	**Difference (T_2 - T_1)**	**Informant**	**Control group at T_1**	**Control group at T_2**	**Difference (T_2 - T_1)**
	Aaron	12433.50	13195.39	761.89	Evan	5596.71	6542.66	945.95
	Ablett	6158.00	6641.05	483.05	Gary	3857.50	5075.99	1218.49
	Bruce	2760.00	3408.43	648.43	Basia	5877.03	5396.14	-480.89
	Barret	5319.00	5942.62	623.62	Harry	15274.12	11372.72	-3901.40
	Alice	4909.00	5320.73	411.73	Herbert	10964.13	9289.89	-1674.24
	Blake	12532.00	16826.26	4294.26	James	5394.94	6540.93	1145.99
	Calvin	5619.00	6342.06	723.06	Carol	7692.97	5982.12	-1710.85
	Emily	5627.00	5938.44	311.44	Jeremy	7665.77	5582.44	-2083.32
	Chad	5319.00	5942.62	623.62	Lambert	9618.14	7602.85	-2015.29
	Daniel	7832.75	8291.45	458.70	Matt	6642.70	6592.22	-50.48
					Dana	10405.13	8997.55	-1407.58
					Grace	10263.61	7839.56	-2424.06
Mean		6850.93	7784.91	933.98		8271.06	7234.59	-1036.47
S.D.		3216.28	4083.70	1189.27		3171.20	1874.91	1602.52

Note: Salary is expressed in RMB and the names of informants are pseudonyms for anonymity.