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What's in IT for employees? Understanding the relationship between use and performance in enterprise social software

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ABSTRACT

Despite enterprise social software platforms' (ESSPs) widespread diffusion in recent years, the impact of such systems on employee performance is not clear. This study explores the link between ESSP use and its potential performance impacts. Our findings show that ESSP use influences employee performance in two ways: through improved task performance and employee innovation. We also show that task equivocality moderates the relationship between ESSP use and employee performance outcomes, with ESSP use having a stronger impact on the performance of non-routine tasks. Finally, we show that using ESSPs for connecting within teams has a stronger effect on task performance, while using ESSP for connecting across teams has a stronger effect on employee innovation. These results can help researchers and practitioners better understand how ESSP use affects employee performance and the conditions best suited to achieve these performance outcomes in an enterprise setting.

Introduction

Social software applications – such as wikis, weblogs, and social networking sites (SNS) – have recently attracted organizational researchers' attention (e.g., Kane and Fichman, 2009; Kane et al., 2014a). The impressive growth of public social web sites, like Facebook and Twitter, has pressurized organizations to take their employees' changing communication behavior into account (von Krogh, 2012) and to provide them with intra-organizational social software applications (Healey, 2012). Currently, organizations are increasingly adopting a diverse mix of organizational social software applications (Chan and Morgan, 2011; Chui et al., 2012; Haefliger et al., 2011; Kim et al., 2010; Kiron et al., 2013; Majchrzak et al., 2009), which we refer to collectively as enterprise social software platforms (ESSPs).

Despite its impressive adoption growth, it is not clear whether or how ESSPs positively influence performance. Previous research has demonstrated that the link between information technology (IT) use and performance should not be taken for granted and can be influenced by complex factors. For example, IT will not have a positive performance impact if it goes unused (Devaraj and Kohli, 2003). Other research has suggested that the fit between task and technology is an important predictor of performance (Goodhue and Thompson, 1995). Different types of technologies may also have different types

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of outcomes (Kane and Alavi, 2007). The importance of the link between IT use and performance may be particularly salient for ESSPs, since many IT managers are also skeptical about ESSPs' benefit for employees and cannot truly justify their adoption (McAfee, 2009b). In addition, ESSPs can also be applied to a number of different types of tasks (Kane et al., 2014a), making the questions of task and environmental fit more complex. Organizations should therefore first develop a solid understanding of a technology's potential business benefits before adopting it or advocating its use (Denyer et al., 2011).

This study's research question therefore is: *How and under what conditions does ESSP use lead to performance benefits for employees?* More specifically, our research objectives are (1) to empirically validate a positive relationship between ESSP use and individual employee performance, (2) to investigate how employees' task equivocality (i.e. task non-routineness) moderates the relationships between the two, and (3) to determine whether different types of use (i.e. intra-team vs. inter-team use) have differential effects on individual employee performance (i.e. task performance vs. innovative performance). We study the relationship between ESSP use and the individual employee performance by means of a survey among 491 employees of an international media company headquartered in the UK. The company's ESSP had been in place for four years, with an adoption rate of more than 75% at the time of data collection (April/May 2013).

Our findings provide compelling evidence that ESSP use influences both employees' task performance and innovative performance and also reveal a far more nuanced story. We find that inter-team use has a greater impact on performance outcomes when used to support high equivocality tasks. Further, task equivocality moderates the relationship between intra-team use and performance outcomes, but we only find evidence of this moderating effect on innovative performance impact. Finally, intra-team use of ESSPs has a greater effect on task performance, while inter-team ESSP use has a greater effect on innovative performance. All these findings not only demonstrate the strong relationship between ESSP use and employee performance, but may also help managers better understand the conditions under which ESSPs are likely to have the greatest impact on performance.

Theory

The use-performance relationship

The information systems (IS) literature recognized the need to investigate the relationship between IS use and its performance impacts decades ago (e.g., DeLone and McLean, 1992; Devaraj and Kohli, 2003; Keen and Morton, 1978). Studies relating IS use on the individual level with individual-level outcome variables have, however, often yielded mixed results. The observed use-performance relationship ranges from strong, positive relations (e.g., Rai et al., 2002) to no, or only weak, relationships (e.g., Iivari, 2005). It has long been acknowledged that system use is central in the use-performance relationship (e.g., Trice and Treacy, 1988). Doll and Torkzadeh (1998) state that: "System-use is a pivotal construct in the system-to-value chain that links upstream research on the causes of system success with downstream research on the organizational impacts of information technology" (p. 171).

The use-performance relationship in enterprise social software use

Organizations' increasing adoption of social software led to empirical research on the enterprise social software phenomenon and its business impact. Since research surmised that, in an enterprise context, the practices and benefits of social software would probably be very different (Richter et al., 2011) from those of social software use in the private realm, we do not take the latter into account (e.g., Boyd and Ellison, 2007; DiMicco and Millen, 2007; Ellison et al., 2007; Valenzuela et al., 2009). We draw on the work of Leonardi et al. (2013, p. 2) when defining ESSPs as "[w]eb-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing." IBM's social software platform *IBM Connections*, the *Jive* platform, and Microsoft's *SharePoint 2010 Communities* are typical products in this segment (please refer to Drakos et al. (2013), or Koplowitz (2011) for recent market overviews of ESSPs). Please note that this research endeavor focuses on company-internal social software use and its impact.[3]

Various authors have identified various business impacts merging from different enterprise social software tools, for example, collaboration and communication, knowledge management, innovation, customer relationship management, training (Andriole, 2010), cost and time savings (Denyer et al., 2011), better recruiting, higher morale, better employee engagement (Leidner et al., 2010), improve work processes, collaboration, and knowledge reuse (Majchrzak et al., 2006). Others identify benefits for employees, such as potential contacts (Farzan et al., 2009; Steinfield et al., 2009), improved information sharing, enhanced co-ordination, and better possibilities for employees to express concerns (da Cunha and Orlikowski, 2008), community building, reputation building, sharing, feedback giving and receiving (Jackson et al., 2007), access to knowledge,

[3] For a broader background on enterprise social software and its differentiation from traditional knowledge management, please refer to Fulk and Yuan (2013), Leonardi et al. (2013), and Treem and Leonardi (2012).

fostering collaboration (Huh et al., 2007), and knowledge access, which is positively related to innovative performance and job performance (Ali-Hassan et al., 2011).

Based on our review of past research on social software benefits, we argue that the increased use of ESSP will generally lead to individual performance benefits. A robust research stream in the organizational (e.g., Burt, 1992) and the IS literature (e.g., Alavi and Leidner, 2001) has argued that better timing, access, and referral of knowledge will improve individual performance. The support of knowledge-seeking and knowledge-contribution features, which provide access to diverse knowledge pools, such as weblogs and wikis, is a defining characteristic of ESSPs (Kim et al., 2010; McAfee, 2009a). Several studies have shown that better knowledge access improves employees' performance (e.g., Cross and Cummings, 2004; Hansen, 1999; Kanawattanachai and Yoo, 2007; Lewis, 2004; Seibert et al., 2001; Sparrowe et al., 2001; Teigland and Wasko, 2003). In the currently knowledge-intensive work environment, individuals' performance depends greatly on access to the right knowledge sources within their organizational environment (e.g., Gray and Meister, 2004; Majchrzak et al., 2004). We therefore expect ESSP use to improve individual performance by increasing employees' access to organizational knowledge.

Differentiating ESSP use

Studies investigating individuals' IS use define and operationalize the IS use construct in various ways. The plethora of different measures of IS use is said to be one reason for the mixed conclusions about the use-performance relationship, (e.g., Petter et al., 2008). Research suggests that these measures and dimensions should be adapted to the specific field of study (Jasperson et al., 2005). Theories regarding intra-organizational collaboration (Cummings, 2004; Oh et al., 2004; Reagans and Zuckerman, 2001; Suh et al., 2011) suggest that ESSP researchers should differentiate between intra-team and inter-team use. Several studies have shown intra-team versus inter-team behaviors lead to distinct performance outcomes in the realm of offline social networks (e.g., Mehra et al., 2006; Uzzi and Lancaster, 2003). Intra-team collaboration is often improved if its members are fully connected, i.e. each member has a tie with each of the other members, as they benefit from the dense and embedded networks within their team (Oh et al., 2004). Such relationships facilitate within-group conformity to intra-group norms, cooperation, and information sharing (Hansen, 1999). Furthermore, strong intra-team relationships are associated with behaviors such as bounded solidarity, reciprocity norms, and trust (Hahn et al., 2008; Krackhardt, 1992). Likewise, sanctions against self-serving behaviors are expected to be more distinct than in relationships lacking such strong ties (Granovetter, 1985; Raghuram et al., 2001). Strong intra-team relationships can therefore facilitate knowledge transfer between the involved parties by decreasing potential imminent impediments (Reagans and McEvily, 2003).

In contrast, inter-team collaboration is often improved by connections that span multiple knowledge pools (e.g., multiple teams), thereby enabling individuals to gain access to a wide range of information, resources, and perspectives, which are distributed throughout a higher order entity (e.g., an organization) (Granovetter, 1983; Reagans et al., 2004). Such inter-team connections may connect heterogeneous people beyond their social entity (e.g., beyond the individual's team) (Oh et al., 2004). The bridging of structural holes, i.e. gaps between disconnected people in a network, is often used to describe advantageous inter-team collaborations (Burt, 1992, 1997, 2001). An individual with a larger number of contacts usually has more structural holes in his/her network and therefore has greater access to non-redundant information, ideas, and knowledge resources (Suh et al., 2011).

The organizational collaboration literature thus provides strong theoretical justification for ESSP researchers needing to differentiate between intra-team vs. inter-team use behavior, as they may potentially lead to different performance outcomes. We define intra-team use as the extent to which individuals use an ESSP for knowledge sharing, collaboration, and communication with their team members. In the same vein, inter-team use is defined as the extent to which individuals use an ESSP for knowledge sharing, collaboration, and communication with coworkers outside their team. We expect both ESSP use behaviors to have distinct, but complementary, effects on employees' performance outcomes.

Differentiating individual performance impact

Drawing on Janssen and Van Yperen's (2004) work, we differentiate between (1) task performance outcomes and (2) innovative performance outcomes. While task performance outcomes are concerned with coordinating and solving organizational tasks targeted at organizational goals, innovative performance relates to the intentional generation, promotion, and realization of new ideas within a work role, work group, or organization (Janssen and Van Yperen, 2004). These outcomes have been shown to be relevant performance outcomes in organizational collaboration research (e.g., Perry-Smith, 2006; Reagans and Zuckerman, 2001; Tsai, 2001) and in the first empirical insights into enterprise social software performance outcomes (e.g., Chui et al., 2012; McAfee, 2009b). Nevertheless, these two types of performance outcomes have sometimes been found to trade one another off, with the long-term performance benefits associated with increased innovativeness often contradicting task performance benefits in the short term (e.g., Kane and Alavi, 2007; March, 1991).

To account for this possibility, we differentiate between these two types of performance outcomes when testing the relationship between ESSP use and employee performance. We define task performance impact as the extent to which ESSP use improves individuals' ability to accomplish their work tasks (i.e. their work efficiency) (adapted from Goodhue and Thompson (1995)). We define innovative performance impact as the extent to which ESSP use improves individuals' ability to generate, promote, and realize new or innovative ideas within their work role (i.e. their innovativeness) (adapted from Janssen and Van Yperen (2004)). Please note that both outcome variables measure ESSP use's impact on the relevant outcome category, namely task performance or innovative performance (see Goodhue and Thompson (1995), Iivari (2005), Sundaram et al. (2007), and Urbach et al. (2010) for similar conceptualizations of performance outcome variables).

We argue that both intra-team and inter-team use is positively associated with both types of individual performance outcomes, and therefore hypothesize:

Hypothesis 1 (*H1*). Employees' intra-team and inter-team ESSP use is positively related to their task and innovative performance impacts.

The moderating role of task equivocality

Nevertheless, the relationship between ESSP use and individual performance is not necessarily straightforward. Trice and Treacy (1988, p. 39) maintain: "[U]tilization is a necessary but insufficient condition for a system to affect performance." Considerable research has identified the organizational context as an important moderating factor in the relationship between IS use and performance (Burton-Jones and Straub, 2006; Jasperson et al., 2005). Therefore, when studying potential relationships between IT use and individual performance, it is important to take the working environment's characteristics into account (e.g., Durcikova et al., 2011; Leonardi and Barley, 2010). Although contextual factors are important for understanding behavioral phenomena, they have received limited attention in organizational research (e.g., Johns, 2006; Li et al., 2013; Orlikowski and Iacono, 2001; Venkatesh et al., 2011). Positive performance benefits further require a match between the requirements of a work task and an application's features (Jasperson et al., 2005). This is especially true of collaboration technology, like social software, since of ESSPs' free form character and the large number of use contexts allow a large variety of use scenarios (Kane et al., 2014a; McAfee, 2009a), thereby adding to the use-performance relationship complexity.

More specifically, the characteristics of an employee's tasks are a set of contextual factors that the management literature in general (e.g., Liden et al., 1997) and the IS literature in particular (e.g., Jarvenpaa, 1989; Vessey, 1991) have consistently found to be relevant for explaining performance. For example, based on the organizational information processing literature (e.g., Daft and Lengel, 1986; Tushman and Nadler, 1978), Goodhue and Thompson (1995) argue that the better the task-technology fit, the lower the cognitive information processing costs and, in turn, the greater the individual performance impact (Goodhue et al., 2000). They further find that better correspondence between a technology's characteristics and employees' normal tasks leads to more favorable outcomes regarding achieving individual and organizational goals (Goodhue, 1995; Goodhue and Thompson, 1995).We therefore argue that employees' task equivocality moderates the relationship between ESSP use and the individual performance impact.

The information processing literature introduces the task equivocality concept, also referred to as task non-routineness (e.g., Tushman and Nadler, 1978). We define it as the extent to which the tasks an individual typically carries out are non-routine. One basic theoretical underpinning of this concept is that the greater the equivocality in an employee's tasks, the greater the uncertainty, and, consequently, the greater the information processing and information needs (Daft and Macintosh, 1981). Task equivocality is thus an important source of variation in an employee's information demands (e.g., Huber, 1984). Beyond the various applications of task-technology fit (e.g., Karimi et al., 2004), several IS studies in fields such as knowledge sourcing (Gray and Meister, 2004), group communication systems (Shirani et al., 1999), and information presentation (Lim and Benbasat, 2000) have already proven the relevance of task equivocality in their research endeavors. Further studies have identified its positive moderating effect on the relationship between distinct antecedents and performance outcomes (e.g., Gladstein, 1984).

In the context of our study, we expect employees with high levels of task equivocality to have a higher demand for information than those with low levels of task equivocality. If employees' tasks are low in task equivocality, i.e. the tasks they work on are mostly routine, standard procedures can be applied and the need for knowledge exchange is likely to be low (Gladstein, 1984) and vice versa (Gray et al., 2011). Since one of the fundamental features of ESSPs is the possibility to effectively communicate and share content with coworkers throughout an organization (Drakos et al., 2013; Leonardi et al., 2013), we posit that ESSPs address stated needs in terms of information appropriation and interaction enabling (McAfee, 2009b). Thus, if the theory of task-technology fit (Goodhue and Thompson, 1995) is applied to employees with high levels of task equivocality using ESSPs, this should result in high levels of fit between the technology's and the tasks' characteristics (Jarvenpaa and Staples, 2000). In turn, higher levels of fit should result in a stronger relationship between ESSP use and individual performance outcomes (Vessey, 1991). Based on the above theorizing, we suggest that employees with higher levels of task equivocality should demonstrate a stronger relationship between ESSP use and the individual performance impact and vice versa. Consequently, we hypothesize that:

Hypothesis 2 (*H2*). Task equivocality positively moderates intra-team and inter-team ESSP use's influence on task and innovative performance impacts, with individuals with higher levels of task equivocality demonstrating a stronger effect.

The differential effect of intra- and inter-team use on task performance impact

Based on organizational behavior research studies that have found support for team members' positive influence on a focal employee's task performance, we further theorize that intra-team use has a stronger impact on task performance than inter-team use. Research on the social exchange process has shown that effective exchange relationships with teammates improve employees' task performance (e.g., Liden et al., 2000). Similarly, organizational socialization studies have found that supportive coworkers have a positive influence on employees' task performance (e.g., Bauer et al., 2007). Finally, social network research has indicated that employees' relationships with their coworkers with whom they have strong ties benefit their performance (Bowler and Brass, 2006). Other social network research studies have investigated strong intra-team relationships and their associations with group performance, finding positive relationships between the two (Reagans and Zuckerman, 2001; Sparrowe et al., 2001). Based on these findings, we expect intra-team use to be more strongly associated with relational support within a team than across teams, leading to a stronger link between intra-team use and task performance impact.

Conversely, inter-team use should have a weaker impact on task performance than intra-team use, due to higher coordination costs, leading to less efficient communication. Such team members are more likely to share certain similar characteristics, facilitating communication between them (Byrne, 1971; Perry-Smith, 2006). Conversely, employees engaged in inter-team relationships (by means of inter-team use) usually have lower levels of affect and interaction, and share fewer similarities (Granovetter, 1983; Reagans and McEvily, 2003). Research suggests that such loose relationships increase the probability of opportunism and the need for monitoring, thus leading to increasing coordination costs (Seers, 1989; Uzzi, 1997). Additionally, research has shown that knowledge exchange between people who do not frequently engage in mutual interactions (such as engaging in inter-team relationships) is likely to lead to higher coordination costs (i.e. the time and effort spent on an interaction) than knowledge exchange between people who interact frequently (Guzzo and Shea, 1992). Based on these arguments, we expect employees in inter-team use to face higher coordination costs than those involved in intra-team use. Together, these considerations lead to the following hypothesis:

Hypothesis 3 (*H3*). Intra-team use has a stronger effect on task performance impact than inter-team use.

The differential effect of intra- and inter-team use on innovative performance impact

We also posit that, relative to intra-team use, inter-team use has a stronger effect on an employee's innovative performance impact. Employees using ESSPs have access to a wide range of information sources. Using an ESSP to communicate with team-external colleagues therefore inherently provides individuals with greater access to resources outside their teams (e.g., Hansen, 1999; Tsai, 2001) by providing them with access to more non-redundant information (Granovetter, 1973) and enabling them to increase their domain-relevant knowledge (e.g., Glynn, 1996). Such a broad body of domain-relevant knowledge allows employees to tap into it when needed (Amabile, 1998; Mascitelli, 2000). Thus, greater access to domain-relevant knowledge undoubtedly provides employees with a rich foundation for understanding potential solutions' nuances. This may in turn enhance their creativity, given that creative ideas are likely to emerge at the confluence of diverse thought worlds (Mumford and Gustafson, 1988). Additionally, this exposure to divergent approaches and perspectives might trigger important cognitive processes related to innovative behavior, such as creative and flexible thinking (Perry-Smith, 2006). Recent research results support the notion that inter-team collaborations foster innovative performance. For example, in their investigation of scientists and engineers' innovative behaviors, Tortoriello and Krackhardt (2010) find that boundary-spanning behavior (i.e. behavior involving inter-team collaborations) fosters employees' innovative performance. The studies by Baer (2010), Hargadon and Sutton (1997), Perry-Smith (2006), and Zhou et al. (2009) also support this notion.

Conversely, strong intra-team relationships lead to various impediments, which we surmise might counter some of intra-team use's potential to lead to innovative performance impacts (Oh et al., 2004). Since teams with strong intra-team relationships tend to be rather homogeneous, high redundancy in terms of their connections, resources, and information might lead to limited exposure to novel ideas within them (Burt, 1992; Gargiulo and Benassi, 2000). Excessive intra-team interactions might lead to a positive in-team and a negative out-of-team bias, thus constraining access to more diverse resources and information beyond such teams' boundaries (Portes and Sensenbrenner, 1993). Lastly, strong intra-team relationships may lead to conformity (Krackhardt, 1992), which might hinder creativity by leaving little room for autonomy and independent, critical thinking (Amabile, 1996). We therefore expect that, relative to inter-team use, intra-team use has a lower effect on innovative performance impact:

Hypothesis 4 (*H4*). Inter-team use has a stronger effect on innovative performance impact than intra-team use.

Our final research model is depicted in Fig. 1.

Method

To test our hypotheses as shown in Fig. 1, we conducted a survey at an international media company (hereafter referred to as 'MediaCo') headquartered in the UK. Its 5500 employees are dispersed throughout the world, partly due to massive

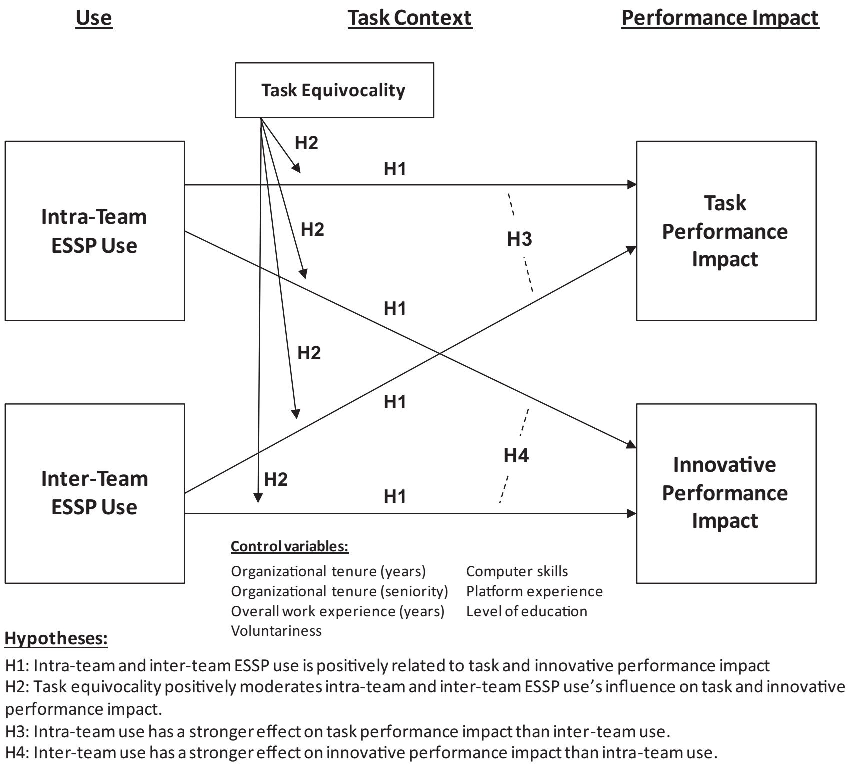

Fig. 1. Research model and hypotheses.

acquisitions within the past decade. In exchange for a report on the practical findings and implications of our study, the manager in charge of the company's social software initiative agreed to let us survey MediaCo's employees worldwide on their use of the company's ESSP.

At the time of data collection (April/May 2013), MediaCo's ESSP had been in place for four years, which eliminated possible problems with early-stage adoption (Cooper and Zmud, 1990). MediaCo's adoption rate (defined as the use of the platform at least once a month) was more than 75%. The ESSP is based on one of the market leaders in this software segment (Drakos et al., 2013) and provides MediaCo's employees with a rich set of social software features, such as social networking, profile pages, activity streams, weblogs, wikis, micro-blogging, social bookmarking, tagging, e-mail integration, team rooms, and online surveys. The platform additionally offers functionalities for finding colleagues ('yellow pages'), discussion forums, and document management, as well as access mobile device access to the platform. Employees used the platform for a little more than three hours per week on average. The most frequently used platform feature was social networking, followed by administrative information gathering (e.g., room reservation, workshop registration, employees' onboarding, and help desk requests). In sum, the ESSP supports employees' communication, coordination, and collaboration.

Instrument development

We followed the guidelines by Straub (1989) throughout the instrument development process. We adapted tested and proven measures from prior studies, as various researchers recommend (e.g., Kankanhalli et al., 2005; Stone, 1978), and modified the identified items for use in the ESSP context. We created initial item pools for each of the constructs, and conducted two research workshops with three of the involved researchers to restrict the number of items for the measurement instrument (MacKenzie et al., 2011). Each candidate item was evaluated with regard to its relevance for the potential target construct (Cronbach, 1971). We then conducted two rounds of card sorting and item ranking exercises (Moore and Benbasat, 1991) with a group of five IS researchers per round (see Appendix A for details). Lastly, we recruited ten social software users to help us test the questionnaire. We also conducted semi-structured interviews on its length, the format of the scales, potential question ambiguity, and other technical or non-technical concerns. Throughout this process, we constantly adjusted and refined the survey instrument, taking the feedback into consideration.

The task equivocality construct was adapted from Campion et al. (1993) and Goodhue and Thompson (1995). We followed an approach similar to the one that Sundaram et al. (2007) chose to conceptualize the constructs' focus on the performance outcomes. The task performance impact (TaskPerf) items were adapted from the items used by Goodhue and Thompson (1995), Iivari (2005), and Urbach et al. (2010). The items measuring innovative performance impact (InnoPerf) were adapted from the measures that Gray and Meister (2004) and Janssen (2001) used. The voluntariness measure was adapted from Moore and Benbasat (1991). We based our development of the items for intra-team use (IntraUse) and inter-team use (InterUse) on Cummings (2004). The intra-team use construct measures to the extent to which individuals use the ESSP that MediaCo provides for sharing knowledge, collaborating, and communicating with their team members. In the same vein, inter-team use measures the extent to which individuals use the ESSP for sharing knowledge, collaborating, and communicating with coworkers outside their team. With the exception of the demographic data, all the items were measured using seven-point Likert-type scales anchored on 1 (strongly disagree) and 7 (strongly agree). All the constructs were operationalized as reflective constructs. Appendix C shows all the items used in this study.

We included the individual characteristics, organizational tenure (years), organizational tenure (seniority), overall work experience (years), computer skills, platform experience (years), level of education, and voluntariness, as control variables. Organizational tenure and age have both been shown to be associated with employees' job performance (e.g., Brenner et al., 1988; Gould and Werbel, 1983; Tesluk and Jacobs, 1998). Since the two are usually correlated (Sykes et al., 2014), we argue that it is acceptable to only include organizational tenure as a control variable.[4]

Pre-study

Since most of the included constructs have not been applied in the enterprise social software context before, we conducted a preliminary study to validate the study's measures in the enterprise social software context – particularly in terms of reliability and validity – before collecting data at our main research site. This measurement validation study included 85 employees of an international company, headquartered in Germany, from the communications and high-tech industry (see the detailed analysis of the pre-study in Appendix B). After we had established, by means of the pre-study, that the psychometric properties of our model's constructs were sound, we proceeded to test the research model and the relevant hypotheses in our main empirical study.

Data collection

We provided our contact person at MediaCo (the manager in charge of its social software initiative) with the hyperlink to our survey, requesting him to distribute it to the company's 5500 employees. He did so, adding encouraging words and the information that the survey results would be beneficial to them and the company. In the e-mail and on the survey's landing page, we mentioned that all the data would be handled anonymously and strictly confidential. After 2.5 weeks, an e-mail reminder was sent to all the employees. We closed the online survey after four weeks.

Participants

In total, 529 of MediaCo's employees fully completed the online survey, leading to a response rate of 10%. Since all the questions had to be answered in order to proceed to the next page, we did not have to deal with missing or incomplete responses. However, during data cleansing, we decided to exclude a total of 38 data sets, because these participants answered the questions very similarly (e.g., all Likert-scaled items were answered with the same value), leading to a final total of 491 usable data sets. The response rate was as expected and comparable to studies with similar survey characteristics (e.g., Hanvanich et al., 2006; Wilden and Gudergan, 2015). We found no evidence of non-response bias in our data.

The survey respondents had on average worked for MediaCo for 6.5 years, while their overall professional work experience was an average of 16.3 years. On average, they had 21.6 months working experience with MediaCo's ESSP (see Appendix D for more insights into the respondents' demographic characteristics). Since all the data were obtained through a survey, we assessed the common method bias (CMB) by means of Harman's single-factor test (Podsakoff and Organ, 1986). The results showed that no single factor accounted for the majority of variance in the measures, and that the most variance that one factor explained was 38.97%. We therefore maintain that common method bias is unlikely to be a significant concern in our data.

Results

We used partial least squares (PLS), a component-based structural equation modeling technique, for the data analysis. PLS is particularly suitable for theory development purposes aimed at maximizing the explained variance in the outcome

[4] For data privacy reasons, the data collection site of our main empirical study did not allow us to collect the participants' age and gender data. Hence, we could not include these variables in the research model as control variables. We did, however, gather data on these demographic variables in our pre-study (see Appendix B). We thus took the following two measures: (1) Since we anticipated a correlation between employees' work experience (in years) and their age, we assessed the correlation between these two variables. The results of the Pearson correlation showed that there is a high correlation between work experience (in years) and age (0.74). (2) We also analyzed the pre-study data for age and gender's direct effects on task performance impact and innovative performance impact, but found no significant path between the two demographic variables and the two dependent variables. Hence, we conclude that not capturing the variables age and gender in our main study does not present a major limitation.

variables (Chin, 1998; Gefen and Straub, 2005). We chose SmartPLS 2.0 M3 as the analytical software (Ringle et al., 2005) to evaluate the research model and then tested the hypotheses. We followed the guidelines by Chin (1998), Gefen et al. (2011), Hair et al. (2012a,b) during the data analysis. Our analysis comprised one-tailed tests, since we had hypothesized the directional effects. When testing an association for which a direction of causality was hypothesized prior to calculation, it is known that the estimated value will be either positive or negative. Hence, the value of zero will always be either in the left tail, or the right tail, of the distribution, but not in both. Therefore, a one-tailed test is appropriate for testing directional effects (e.g., Roldán and Sánchez-Franco, 2012). Our study's operational research model is depicted in Fig. 1.

Assessment of the measurement model

In order to assess whether each of the measurement items relates to its respective construct better than to any other construct (Gerbing and Anderson, 1988), we conducted an exploratory factor analysis (EFA) using SPSS 21.0 (IBM Corporation, 2012). The results (see Appendix F) show that all the measurement items load highly on only one factor and that all the loadings are well above the suggested threshold of 0.600 (Gefen and Straub, 2005).

Table 1 shows the descriptive statistics (mean and standard deviation), composite reliabilities (CRs), average variances extracted (AVEs), and Cronbach's alpha (CA) values of all our research model's measures (see Appendix E for a correlation matrix of all the control variables). All Cronbach's alpha (Cronbach, 1951) and composite reliability (Chin, 1998) values were well above the recommended values of 0.50 and 0.70 (Nunnally and Bernstein, 1994), indicating all the constructs' high internal consistency. We further evaluated the model's convergent validity by assessing (1) the AVE (Fornell and Larcker, 1981) and (2) all the items' indicator loadings. The AVE of all the constructs was higher than the threshold of 0.50 (Fornell and Larcker, 1981). A bootstrapping procedure with 1000 resamples showed that all the indicator loadings were significant at the 0.001 level (see Appendix G). We further assessed the model's discriminant validity by (1) examining the items' cross-loadings and (2) by means of the Fornell–Larcker criterion (Fornell and Larcker, 1981). The items' loadings and cross-loadings (Table 2) show that all the items correlated most strongly with their intended constructs and that all the cross-loading differences were higher than the suggested threshold of 0.1 (Gefen and Straub, 2005). Furthermore, all the constructs loaded highest with their assigned items, as recommended by Chin (1998). The square root of the average variance extracted values of each construct exceeded all the respective interconstruct correlations (Table 1), thus meeting the Fornell–Larcker criterion (Fornell and Larcker, 1981).

When moderation effects need to be tested, Baron and Kenny (1986) recommend first assessing the potential moderators for their correlations with the predictor (independent) variables (to prevent false conclusions of the moderation effects in the presence of non-linear effects) (Carte and Russell, 2003). Table 1 shows that inter-correlations of inter-team use → task equivocality and intra-team use → task equivocality are only 0.20 and 0.10, thus on a rather low level. The inter-correlations between the moderating and the two independent variables are not, therefore, a concern in our data set.

Assessment of the structural model

With an adequate measurement model in place, we tested the structural model by means of a bootstrap analysis (1000 subsamples; sample size equal to sample size ($n = 491$)). In order to validate the structural model's quality, we (1) determined its cross-validated redundancy and (2) assessed its goodness of fit (GoF) measure. Using a blindfolding approach, we measured the cross-validated redundancy (Q^2) by means of a Stone–Geisser test (Geisser, 1975; Stone, 1974). The Q^2 results of the cross-validated redundancy were all greater than 0, suggesting that the model has good predictive validity. We then followed Tenenhaus et al.'s (2005) recommendations to calculate the model's GoF, which is defined as the geometric mean of the average cross-validated redundancy and the average R^2 (Wetzels et al., 2009). This provided a GoF of 0.54, which is well above the cutoff value of 0.36 suggested by Wetzels et al. (2009). These results allow us to conclude that our model performs well.

Results of main effect analysis

As a first step in our stepwise structural model assessment (Table 3), we assessed the control variables' effects on the performance outcome variables by estimating a model only including the research model's control variables (model M1in Table 3), while adding the main effects to the model in a second step. We found that work experience, computer skills, and voluntariness partially had significant effects on task performance impact and innovative performance impact, while the organizational tenure variables, platform experience, and level of education did not have any significant effects on the performance outcome variables (model M2 in Table 3). (1) All the corresponding path coefficients of work experience, computer skills, and voluntariness (except for the negative relationship between voluntariness and task performance impact) had values lower than 0.10 and (2) all of the explained variance of all the control variables only amounted to 5.8% (task performance impact) and 4.7% (innovative performance impact) of the performance outcome variables' variance (model M1 in Table 3). We therefore concluded that the control variables did not need further attention in the following data analysis and interpretation.

Next, we evaluated the main effects' structural paths to test research hypothesis H1. We considered associations regarding the model's hypothesized main effects to be supported if the corresponding path coefficients had the predicted sign, had

Table 1
Descriptive statistics and psychometric properties.

	Mean	SD	CR	AVE	CA	InnoPerf	InterUse	IntraUse	TaskPerf	TEQU	VOL
Innovative performance impact	3.67	1.42	0.98	0.93	0.96	**0.96**					
Inter-team use	4.20	1.77	0.96	0.88	0.93	0.55	**0.94**				
Intra-team use	4.43	1.89	0.98	0.93	0.96	0.48	0.51	**0.96**			
Task performance impact	3.92	1.54	0.98	0.92	0.97	0.66	0.42	0.49	**0.96**		
Task equivocality	4.78	1.37	0.91	0.76	0.85	0.16	0.20	0.10	0.18	**0.87**	
Voluntariness	4.11	1.74	0.88	0.79	0.81	−0.07	−0.04	−0.13	−0.18	−0.12	**0.89**

Notes: The diagonal elements (bold) represent the square root of the AVE; the off-diagonal elements are the correlations between the factors. The diagonal elements should be larger for discriminant validity than the off-diagonal elements (Fornell and Larcker, 1981).
All items underlying the above constructs were measured using seven-point Likert-type scales (1 = strongly disagree, 7 = strongly agree).
SD: Standard deviation; CR: Composite reliability; AVE: Average variance extracted; CA: Cronbach's alpha.
InnoPerf: Innovative performance impact; InterUse: Inter-team use; IntraUse: Intra-team use; TaskPerf: Task performance impact; TEQU: Task equivocality; VOL: Voluntariness.

Table 2
Item loadings and cross-loadings.

		InnoPerf	InterUse	IntraUse	TaskPerf	TEQU	VOL
Innovative performance impact	IPI1	**0.946**	0.513	0.441	0.604	0.168	−0.082
	IPI2	**0.970**	0.535	0.479	0.644	0.151	−0.054
	IPI3	**0.977**	0.534	0.482	0.650	0.153	−0.057
Inter-team use	ITE1	0.479	**0.912**	0.455	0.378	0.186	−0.036
	ITE2	0.532	**0.958**	0.508	0.417	0.197	−0.044
	ITE3	0.529	**0.949**	0.478	0.391	0.184	−0.034
Intra-team use	ITR1	0.471	0.496	**0.961**	0.495	0.107	−0.126
	ITR2	0.461	0.499	**0.976**	0.475	0.092	−0.120
	ITR3	0.471	0.485	**0.957**	0.441	0.101	−0.132
Task performance impact	TPI1	0.611	0.360	0.462	**0.938**	0.167	−0.147
	TPI2	0.628	0.398	0.472	**0.966**	0.189	−0.173
	TPI3	0.626	0.420	0.465	**0.970**	0.161	−0.182
	TPI4	0.651	0.433	0.473	**0.959**	0.174	−0.179
Task equivocality	TEQ1	0.116	0.173	0.082	0.120	**0.820**	−0.118
	TEQ2	0.114	0.158	0.085	0.145	**0.898**	−0.082
	TEQ3	0.181	0.192	0.101	0.192	**0.902**	−0.107
Voluntariness	VOL1	−0.084	−0.050	−0.126	−0.192	−0.126	**0.992**
	VOL2	0.038	0.019	−0.118	−0.060	−0.043	**0.775**

Notes: InnoPerf/IPI: Innovative performance impact; InterUse/ITE: Inter-team use; IntraUse/ITR: Intra-team use; TaskPerf/TPI: Task performance impact; TEQU/TEQ: Task equivocality; VOL: Voluntariness.
The items in bold indicate that they are designed to load on the construct in the relevant column. See Appendix C for the wording of the survey items.

values of 0.10 or higher, and were significant at the $p < 0.05$ level (Meehl, 1990). The effect size of each of the model's main effects was assessed by means of Cohen's (1988) f^2, which allows for determining an independent latent variable's substantial impact on a dependent latent variable. f^2 values exceeding the thresholds of 0.02, 0.150, and 0.350 can be labeled as small, medium, and large effects (Chin et al., 2003; Cohen, 1988; Gefen et al., 2011). As can be seen in Table 3, the results show that all paths between the two ESSP use variables and the two performance outcome variables were significant at the 0.001 level and had path strengths greater than 0.10 (model M2 in Table 3). The data thus fully supports Hypothesis H1, with effect sizes ranging between small for $\beta_{\text{IntraUse}\rightarrow\text{TaskPerf}}$ ($f^2 = 0.128$), $\beta_{\text{IntraUse}\rightarrow\text{InnoPerf}}$ ($f^2 = 0.091$), and $\beta_{\text{InterUse}\rightarrow\text{TaskPerf}}$ ($f^2 = 0.055$) to medium for $\beta_{\text{InterUse}\rightarrow\text{InnoPerf}}$ ($f^2 = 0.170$). The main effect model's squared multiple correlations (R^2) were 0.308 and 0.372 for task performance impact and innovative performance impact, meaning that the main effects explained 30.8% of task performance impact's variance and 37.2% of innovative performance impact's variance.

Results of moderation analysis

In the last step of the stepwise structural model assessment, we tested research hypothesis H2 by assessing our research model's suggested moderation effects. We followed Chin et al.'s (2003) and Carte and Russell's (2003) recommendations for analyzing moderation effects. After assessing the main effects model M2 (in Table 3), we estimated the task equivocality's moderating effect in the presence of the main effects (model M3 in Table 3). Following the recommendations by Aiken and West (1991), we also calculated the moderation effects' sizes (f^2). Regarding moderation effects' effect sizes, we followed Kenny's (2013) argument, as he deems Cohen's (1988) thresholds for categorizing f^2 values as small, medium, and large as not realistic when studying these effects (see also Aguinis et al., 2005). Consequently, we apply Kenny's (2013) proposed

Table 3
Results of stepwise structural model analysis (path coefficients).

Dependent variable	Model M1		Model M2		Model M3	
	TaskPerf	InnoPerf	TaskPerf	InnoPerf	TaskPerf	InnoPerf
Control variables						
Organizational tenure (years)	−0.043[n.s.]	−0.005[n.s.]	−0.041[n.s.]	−0.012[n.s.]	−0.045[n.s.]	−0.017[n.s.]
Organizational tenure (seniority/hierarchy level)	0.082*	0.166***	−0.014[n.s.]	0.043[n.s.]	−0.040[n.s.]	0.026[n.s.]
Overall work experience	−0.100*	−0.129**	−0.061[n.s.]	−0.071*	−0.067[n.s.]	−0.074*
Computer skills	−0.091*	−0.096*	−0.090**	−0.094**	−0.108**	−0.104**
Platform experience	0.075*	0.029[n.s.]	0.030[n.s.]	−0.021[n.s.]	0.027[n.s.]	−0.021[n.s.]
Education	−0.026[n.s.]	0.006[n.s.]	−0.005[n.s.]	0.018[n.s.]	−0.002[n.s.]	0.020[n.s.]
Voluntariness	−0.176**	−0.056[n.s.]	−0.130**	−0.015[n.s.]	−0.109**	−0.005[n.s.]
Main effects						
Intra-team use			**0.354***	**0.283***	0.356***	0.280***
Inter-team use			**0.234***	**0.391***	0.217***	0.384***
Task equivocality					0.139***	0.097***
Interaction effects						
IntraUse∗TEQU					**0.038[n.s.]**	**0.066***
InterUse∗TEQU					**0.098***	**0.105****
R^2	5.8%	4.7%	30.8%	37.2%	**33.5%**	**39.8%**

Notes: One-tailed tests were performed since the directional effects had been hypothesized.
IntraUse: Intra-team use; InterUse: Inter-team use; TEQU: Task equivocality; TaskPerf: Task performance impact; InnoPerf: Innovative performance impact. TEN_Y: Organizational tenure (years); TEN_S: Organizational tenure (seniority); EXP_W: Overall work experience (years); SKIL: Computer skills; EXP_P: Platform experience; EDU: Level of education; VOL: Voluntariness.
Results in bold are used for the evaluation of the hypotheses and in Fig. 2 (depicting the overall results of the analyses).
* $p < 0.05$||.
** $p < 0.01$|.
*** $p < 0.001$|.
n.s. Not significant.

thresholds of 0.005, 0.01, and 0.025 for small, medium, and large effects, when labeling our model's moderation effects. To calculate each moderating effect, we (1) standardized the indicators of the independent (X) and the moderating (Z) construct, (2) created all pair-wise product indicators (i.e. each indicator of X was multiplied with each indicator of Z), and (3) used the product indicators to reflect the interaction construct (XZ), which Chin et al. (2003) suggest.

The analysis of the moderating role of task equivocality provided mixed results (Table 3). While the moderating effect of task equivocality on $\beta_{\text{IntraUse}\rightarrow\text{TaskPerf}}$ ($\beta = 0.038$, $p > 0.10$) is not significant, task equivocality significantly moderates $\beta_{\text{IntraUse}\rightarrow\text{InnoPerf}}$ ($\beta = 0.066$, $p < 0.05$; $f^2 = 0.005$, effect size: small), $\beta_{\text{InterUse}\rightarrow\text{TaskPerf}}$ ($\beta = 0.098$, $p < 0.01$, $f^2 = 0.01$, effect size: medium), and $\beta_{\text{InterUse}\rightarrow\text{InnoPerf}}$ ($\beta = 0.105$, $p < 0.01$, $f^2 = 0.01$, effect size: medium) (model M3 in Table 3). We therefore conclude that hypothesis H2 is only partly supported. Task equivocality moderates the use-performance relationship of inter-team ESSP use, so that inter-team use leads to greater performance outcomes for employees with highly equivocal tasks. Further, task equivocality moderates the relationship between intra-team use and performance outcomes, but our data support only supports this moderating effect on innovative performance impact.

The final model comprising the main and moderation effects (model M3 in Table 3) yields R^2 values of .335 for task performance impact and .398 for innovative performance impact. When the R^2 values of this final model were compared to those of the model only containing the main effects (model M2 in Table 3), task performance impact's overall explained variance increased by 2.7 percentage points (from 30.8% to 33.5%) and by 2.6 percentage points (from 37.2% to 39.8%) regarding innovative performance impact. Fig. 2 illustrates the combined results of the main effect and the moderation analyses. It combines the main effects' results taken from model M2 (Table 3) with the squared multiple correlations (R^2) and the moderation effects' results taken from model M3 (Table 3).

In order to provide a better insight into the nature of the moderating effects, we followed various researchers' suggestions (e.g., Aiken and West, 1991; Cohen et al., 2003; Dawson, 2014) and calculated simple regression equations for the relationships between intra-team use and inter-team use regarding task performance impact and innovative performance impact at low, i.e. minus one SD (standard deviation), and high levels, i.e. plus one SD, of the moderator variable task equivocality. The resulting interaction diagrams are shown in Figs. A1–A3 in Appendix I. In summary, the results above show that H2 is partially supported, and only significant regarding the moderating effect of task equivocality on inter-team use relations.

Results of path comparison tests

Since "no conclusions can be drawn about main effects in the presence of moderating effects" (Carte and Russell, 2003, p. 495), we tested hypotheses H3 and H4 by means of the main effect model (model M2 in Table 3). We compared the individual paths' coefficients between the use variables (intra-team use and inter-team use) and the performance outcomes

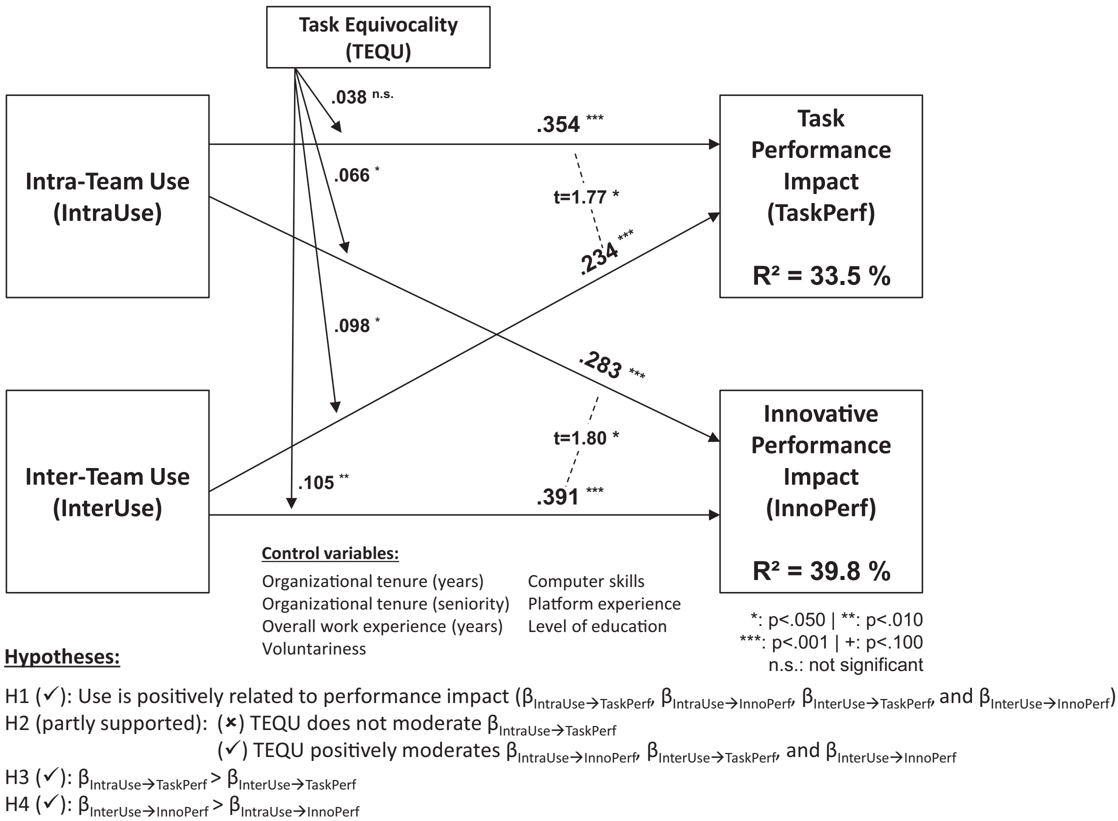

Fig. 2. Results of stepwise structural model analysis.

(task performance impact and innovative performance impact) by means of the pooled standard error method for path comparison, which Chin (2004) suggests (see Appendix H for the relevant formula).

To further confirm the results, we also applied the Satterthwaite method (Satterthwaite, 1946). The results are consistent with Chin's (2004) assumption that with sufficient sample size, which is given in our case, results obtained from the two tests should be similar. Table 4 shows the relevant results of the two path comparison tests as: (1) intra-team use has a stronger impact on task performance impact than inter-team use and (2) inter-team use has a stronger impact on innovative performance impact than intra-team use. Therefore, both H3 and H4 are supported. In total, the results fully support three of the four hypotheses (H1, H3, and H4), while we found only partial support for hypothesis H2 (Fig. 2).

Discussion

We pursued three general hypotheses in this paper. First, we hypothesized that ESSP use has a positive impact on employee performance. Second, we hypothesized that contextual environment – specifically employee task equivocality – moderates the relationship between ESSP use and performance. Third, we hypothesized that different types of use (i.e. intra- vs. inter-team use) influence different types of outcomes (i.e. task vs. innovative performance). In general, we found good support for our hypotheses. We found that ESSP use did positively influence performance and that task equivocality positively moderated this relationship in all but one instance. ESSPs seem to be better suited for supporting non-routine tasks than routine ones. We also found that intra-team use was more strongly associated with improved task performance, while inter-team use was more strongly associated with innovative performance. Contrary to our expectations, task equivocality's moderating effect on the relationship between intra-team use and performance outcomes was only partially supported. While its moderating effect on the relationship between inter-team use and innovative performance impact was given, the moderating effect of the association between intra-team use and task performance impact could not be shown. A possible reason for this insignificant relationship might be because, given high task equivocality, intra-team use's demand for information was presumed to be substantially lower (due to their tasks' non-routineness). Given that employees engaging in intra-team ESSP use are more likely to work in a virtual environment (e.g., Brunelle, 2012; Gibson et al., 2011), they might already have a rather high level of information need for their team-internal interaction and coordination, with little possibility of increasing their demand for information.

Table 4
Results of path comparison tests.

Hypothesis	Path coefficient	Pooled standard error method	Satterthwaite method	Conclusion
H3	$\beta_{IntraUse \to TaskPerf}$ vs. $\beta_{InterUse \to TaskPerf}$ = 0.354 *** vs. 0.234 ***	$t = 1.772^{*}$	$t = 1.770^{*}$	$\beta_{IntraUse \to TaskPerf} > \beta_{InterUse \to TaskPerf}$
H4	$\beta_{InterUse \to InnoPerf}$ vs. $\beta_{IntraUse \to InnoPerf}$ = 0.391 *** vs. 0.283 ***	$t = 1.800^{*}$	$t = 1.798^{*}$	$\beta_{InterUse \to InnoPerf} > \beta_{IntraUse \to InnoPerf}$

Notes: One-tailed tests were performed since the directional effects had been hypothesized.
IntraUse: Intra-team use; InterUse: Inter-team use; TaskPerf: Task performance impact; InnoPerf: Innovative performance impact.
$^{+}p < 0.10$.
* $p < 0.05$||.
** $p < 0.01$|.
*** $p < 0.001$|.

Theoretical implications

This study makes several important contributions to the research literature. First, it provides powerful evidence of the relationship between ESSP use and employee performance. The link between IT and performance is oftentimes quite elusive, like described in the classic "productivity paradox" of decades ago (Brynjolfsson, 1993). Researchers cannot assume that ESSPs will necessarily have a positive effect – or any effect – on employee performance. In this paper, we provide strong initial evidence that ESSP use can be positively related to employee performance.

Second, we also show that the task context matters when it comes to the relationship between ESSP use and employee performance. Previous research has shown that task characteristics are important for understanding the performance impact of IS (Goodhue, 1995; Goodhue and Thompson, 1995). Yet, ESSPs are a general-purpose technology that can be used for a variety of use scenarios (Kane et al., 2014a). Companies are increasingly applying ESSPs for diverse tasks such as marketing, innovation, leadership, and operations (Kane et al., 2014b), and it is not clear which of these tasks are a good "fit" for ESSPs. Our findings suggest that ESSPs are best suited for non-routine tasks, for which the requirements or solutions are not immediately known. Future research should explore what other types of task characteristics moderate the relationship between ESSP use and performance.

Third, we also demonstrate that the way that ESSPs are used is also important to the performance impacts. Previous research has called for accounting for multilevel approaches to understanding the impact of IS in organizations (Burton-Jones and Gallivan, 2007). Previous research has also suggested that knowledge flows very differently within organizational boundaries than across them (Brown and Duguid, 2001). This paper unifies these two approaches by showing that ESSP use has somewhat different outcomes whether it is applied in intra-team vs. inter-team settings, the former being more suited to task performance and the latter for innovative performance. These differential outcomes correspond generally to the tradeoff between knowledge exploration and exploitation (March, 1991). Exploration is associated with discovering new knowledge at the expense of short-term outcomes, while exploitation is leveraging knowledge for short-term performance in ways that limit the discovery of new knowledge. In contrast with previous studies that suggest the type of technology predicts the knowledge outcomes (Kane and Alavi, 2007), this study shows that the same technology can have differential effects depending on how it is used.

Fourth, taking our results as a whole demonstrates that technology is only part of the story when it comes to ESSP success. Environmental and organizational factors also play an important role in understanding how ESSP use affects employee performance. While such a socio-technical perspective of IS success goes back to the founding of our field (e.g., Bostrom and Heinen, 1977), recent work has emphasized the need to focus on the technological elements in IS research (Orlikowski and Iacono, 2001). This paper serves as an important counterweight to the technological-centric approach to IS research, reminding researchers that the context and culture of an organization also matters for understanding the relationship between IS use and performance.

Managerial implications

Our research has various strategic and operational implications for organizations and managers dealing with the introduction, maintenance, or organization-wide diffusion, of ESSPs. Early reports suggested that enterprise social software initiatives would have difficulty achieving performance implications. For example, the consulting firm Gartner claimed that as many as 80% of such initiatives would fail to achieve their stated goals (Mann et al., 2012). In contrast, our study finds that ESSPs can have positive effects on employee performance, when they are used. Many managers fear that ESSPs will have a negative relationship to employee performance, serving as a time waster that provides employees with the excuse to socialize rather than do their work (e.g., Leidner et al., 2010). Thus, our findings provide managers with some confidence that, if employed in the right setting and to the right tasks, ESSPs can have a positive impact on employee performance. Consequently, our study supports managers by justifying ESSP investment decisions and by articulating compelling value propositions for future organizational ESSP adoption. Furthermore, our study's insights enable organizations to better shape their social software strategies and social software initiatives' goals by pointing to areas of decision and evaluation criteria in the realm of organizational structures (i.e. intra-team vs. inter-team ESSP use) and performance impacts (i.e. task vs. innovative performance).

In addition, by identifying what types of tasks are most strongly associated with positive ESSP impact on employee performance, our study provides guidance for managers thinking what kinds of employees and roles might benefit most from ESSPs. Specifically, ESSPs will best serve employees that experience high task equivocality. Our study also provides guidance for how to implement ESSPs depending on the desired outcomes. If the goal of an ESSP initiative is to improve task performance, managers would be well served to encourage employees to focus on using ESSP to support relationships within their teams. For example, the chemical company BASF focused on rolling out their ESSP within project teams, and banned email on those teams to encourage ESSP use (Kane et al., 2014b). If the goal of an ESSP initiative is to improve innovation, however, managers would be well served to encourage employees to focus on using ESSPs across intra-organizational boundaries. These cross-boundary connections can be difficult to cultivate, however, since people's natural networking tendencies are to connect with people like them (Kane et al., 2014b).

Limitations and future research

Despite its contributions to theory and practice, our study has a number of limitations that point towards possible future research. While we focused on task equivocality in our research, clearly other factors could moderate the relationship between ESSP use and performance. Future research should investigate further ESSP use types (e.g., hedonic or social use), other moderating factors, such as different task characteristics or organizational climate factors, and other outcome types (e.g., employee connectedness or decision-making performance). Eventually, future research could examine which features of ESSP particularly facilitate completing innovative tasks more effectively and, ultimately, can possibly lead to higher creativity. Future research could also conduct additional data analyses – for example to determine variance in splits of the data – to further enrich our interpretations, in particular in case of the non-significant task equivocality's moderating effect on the relationship between intra-team ESSP use and task performance impact.

Another limitation is that the design of our study is cross-sectional It only captures information at a certain point in time, leaving the question of the actual causality of IS use behaviors and performance outcomes rather open. We therefore encourage researchers to conduct a longitudinal research study to replicate, or extend, our findings with a richer data set.Our data collection approach is limited, because we collected data by means of survey-based, self-reported data. Given that just one survey respondent at a time was responsible for the perception-based assessment of the independent and dependent constructs, common method bias is a potential threat to our results' validity. We addressed this threat by (1) taking procedural remedies recommended by Podsakoff et al. (2003, 2012), such as ensuring the respondents' anonymity and reducing their evaluation apprehension, and (2) statistically testing for this potential issue. Since we can, however, not fully guarantee that our results are unbiased in this regard, we suggest that future research should validate our findings by obtaining data that use (a) different sources to gain independent and dependent variables and (b) objective (as opposed to perception-based) measures of the variables (e.g., actual system use measures, or employees' supervisor-based performance assessments), wherever possible.

Another study limitation is that the data were collected in only one organization, leaving the question of our results' generalizability to a broader population of organizations open (Lee and Baskerville, 2003). Similarly, we only investigated one ESSP, which further limits the generalizability of these findings to organizations with different technological platforms. Further, the way we operationalize the dependent variables might limit this study's results, since both outcome variables measure ESSP use's impact on the relevant outcome category, namely task performance or innovative performance (see Goodhue and Thompson (1995), Iivari (2005), Sundaram et al. (2007), and Urbach et al. (2010) for similar conceptualizations of performance outcome variables).

Conclusion

Our research studied the relationship between ESSP use and the individual employee performance of 491 employees of an international media company headquartered in the UK. We found strong evidence to suggest that ESSP use does influence employees' task performance impact and their innovative performance impact. Our work further reveals that inter-team use has a greater impact on performance outcomes when used to support tasks with high equivocality. We also find that task equivocality moderates the relationship between intra-team use and performance outcomes, but we only find evidence of this moderating effect on innovative performance impact. Additionally, demonstrated that different types of use (i.e. intra-team vs. inter-team use) have differential effects on individual employee performance (i.e. task performance vs. innovative performance). More specifically, we found that intra-team use of ESSPs has a greater effect on employees' task performance impact, while inter-team ESSP use has a greater effect on employees' innovative performance impact. Our work thus advances the IS literature in general by shedding light on various aspects of the use-performance relationship, and the social software literature by offering rich insights into the linkage between two distinct ESSP use behaviors and their impacts on employees' performance outcomes.

Appendix A. Description of card sorting exercise

During the instrument development stage, we conducted two rounds of card sorting and item ranking exercises according to the procedures described by Moore and Benbasat (1991) and Kankanhalli et al. (2005) with a group of five IS researchers per round. In the card sorting stage, a group of judges (in our case a group of IS researchers) is provided with a number of cards containing the definition of one target construct each. In addition, each judge receives a number of cards, each containing one of the proposed items for the constructs. The judges are then asked to independently assign each item card to one of the construct cards. The goal of the card sorting stage is to assess the convergence and divergence of items within categories. If, for example, one item is consistently placed within a particular category, this is considered to demonstrate convergent validity with the related construct, and discriminant validity with the other constructs (Moore and Benbasat, 1991). If, however, certain items do not meet the validity criteria, modification, or removal, of these items should be considered. In addition to the card sorting exercise, each judge is asked to rank all the items she/he assigned to a certain construct according to their representativeness in terms of the construct (item ranking exercise). Items that appear to represent their respective construct weakly should be modified or removed.

Instead of physically handing the judges cards and ranking points, we decided to provide them with a computer-based spreadsheet tool that allowed them to assign the items to the available constructs and to subsequently rank the items accordingly. The tool allowed the judges to either assign the items to one of the constructs, or to indicate that they could not match the item with any of the available constructs, thus ensuring that they did not force fit any item to a particular construct (Moore and Benbasat, 1991). In order to assess the consistency of the item-to-construct-assignments, we calculated the item placement ratio (IPR) of each construct. The IPR is the percentage with which the judges have correctly assigned all the items to the intended target construct (Moore and Benbasat, 1991). Five IS researchers participated in the first round of the card sorting and item ranking exercise. Altogether, the five judges assigned 87 of the 110 items to the correct targeted constructs, i.e. the first round produced an IPR of 79%. However, some changes in the items were required after this round, since the judges felt that these items were ambiguous, or their meaning was not clear. Therefore, two items of the *task equivocality* construct and one item of *innovative performance impact* construct were modified. Table A1 shows the detailed results of the first round of card sorting and the IPRs of the first and second round of card sorting.

The second round of card sorting was subsequently conducted by another five IS researchers. As a result of this card sorting round, one item of the *innovative performance impact* construct, one item of the *task equivocality* construct, as well as two items of the *task performance impact* construct were removed from the item pool. This card sorting stage yielded an IPR of 89%, showing significant improvement in the IPRs of the constructs containing the modified items. Generally, a high degree of construct validity and potential reliability was achieved (Moore and Benbasat, 1991).

Appendix B. Pre-study results

The pre-study – aiming at measurement validation – included 85 employees of an international company, headquartered in Germany, from the communications and high-tech industry (hereafter referred to as "ComTec"). It has about 700 employees, who are mainly located in Germany and in some smaller offices around the world. The manager in charge of ComTec's social software initiative agreed to let us survey the company's employees regarding their ESSP use. At the time of data collection, ComTec's ESSP had been in place for about 18 months.

In total, 89 of ComTec's employees fully completed the online survey. Since all the online survey questions had to be answered in order to proceed to the next page, we did not have to deal with missing or incomplete responses. However, during the data cleansing, we had to delete a total of four data sets, because the respondents had obviously followed certain

Table A1
Card sorting results (1st round) and item placement ratios (1st and 2nd round).

Actual category	Target Category						Total # of Items	IPR 1st Round (%)	IPR 2nd Round (%)
	InnoPerf	InterUse	IntraUse	TaskPerf	TEQU	VOL			
Innovative performance impact	15						20	75	65
Inter-team use		14	1				15	93	93
Intra-team use		1	10				15	67	87
Task performance impact				23			30	77	93
Task equivocality					15		20	75	100
Voluntariness					1	10	10	100	100
Other	5		4	7	4				
Overall item placement ratio (IPR)								79	89

Notes: IPR: Item placement ratio.
InnoPerf: Innovative performance impact; InterUse: Inter-team use; IntraUse: Intra-team use; TaskPerf: Task performance impact; TEQU: Task equivocality; VOL: Voluntariness.

Table A2
Pre-study: Respondents' demographic characteristics.

	Organizational tenure [years]	Overall work experience [years]	Platform experience [months]
Average/STD	2.1/1.4	7.1/5.2	9.3/6.6

Table A3
Pre-study: Descriptive statistics and psychometric properties.

	Mean	SD	CR	AVE	CA	InnoPerf	InterUse	IntraUse	TaskPerf	TEQU	VOL
Innovative performance impact	1.96	1.26	0.97	0.90	0.95	**0.95**					
Inter-team use	1.97	1.54	0.97	0.90	0.95	0.42	**0.95**				
Intra-team use	1.47	1.05	0.98	0.93	0.96	0.50	0.71	**0.97**			
Task performance impact	1.89	1.27	0.99	0.97	0.99	0.71	0.54	0.58	**0.98**		
Task equivocality	4.82	1.39	0.93	0.81	0.89	0.16	0.21	0.12	0.11	**0.90**	
Voluntariness	5.73	1.40	0.84	0.73	0.72	−0.13	−0.33	−0.29	−0.20	−0.09	**0.85**

Notes: The diagonal elements represent the square root of the AVE; the off-diagonal elements are the correlations between the factors. The diagonal elements should be larger for discriminant validity, than the off-diagonal elements (Fornell and Larcker, 1981).
All items underlying the above constructs were measured using seven-point Likert-type scales (1 = strongly disagree, 7 = strongly agree).
SD: Standard deviation; CR: Composite reliability; AVE: Average variance extracted; CA: Cronbach's alpha.
InnoPerf: Innovative performance impact; InterUse: Inter-team use; IntraUse: Intra-team use; TaskPerf: Task performance impact; TEQU: Task equivocality; VOL: Voluntariness.

Table A4
Pre-study: Item loadings and cross-loadings.

		InnoPerf	InterUse	IntraUse	TaskPerf	TEQU	VOL
Innovative performance impact	IPI1	**0.923**	0.418	0.530	0.640	0.148	−0.125
	IPI2	**0.980**	0.431	0.519	0.726	0.156	−0.158
	IPI3	**0.946**	0.332	0.374	0.644	0.145	−0.082
Inter-team use	ITE1	0.376	**0.953**	0.678	0.504	0.182	−0.268
	ITE2	0.408	**0.964**	0.723	0.527	0.187	−0.324
	ITE3	0.408	**0.936**	0.622	0.500	0.241	−0.341
Intra-team use	ITR1	0.441	0.690	**0.960**	0.535	0.146	−0.262
	ITR2	0.484	0.705	**0.978**	0.581	0.106	−0.313
	ITR3	0.532	0.664	**0.961**	0.569	0.092	−0.274
Task performance impact	TPI1	0.714	0.506	0.584	**0.976**	0.077	−0.216
	TPI2	0.701	0.542	0.554	**0.991**	0.130	−0.209
	TPI3	0.685	0.524	0.568	**0.984**	0.119	−0.184
	TPI4	0.686	0.541	0.585	**0.986**	0.121	−0.195
Task equivocality	TEQ1	0.184	0.185	0.134	0.137	**0.925**	−0.087
	TEQ2	0.111	0.230	0.073	0.096	**0.900**	−0.122
	TEQ3	0.094	0.159	0.091	0.034	**0.872**	−0.025
Voluntariness	VOL1	−0.037	−0.274	−0.175	−0.052	−0.068	**0.694**
	VOL2	−0.142	−0.311	−0.296	−0.223	−0.092	**0.985**

Notes: InnoPerf/IPI: Innovative performance impact; InterUse/ITE: Inter-team use; IntraUse/ITR: Intra-team use; TaskPerf/TPI: Task performance impact; TEQU/TEQ: Task equivocality; VOL: Voluntariness.
The items in bold indicate that the items are designed to load on the construct in the relevant column. See Appendix C for the wording of the survey items).

answering patterns when filling out the survey, leading to a final number of 85 usable data sets. The respondents' demographic characteristics are shown in Table A2.

Table A3 shows the descriptive statistics (mean and standard deviation), composite reliability (CR), average variance extracted (AVE), and Cronbach's alpha (CA) of the seven constructs. Since the values of CA and CR were all above the recommended values of 0.50 and 0.70 (Nunnally and Bernstein, 1994), and the values of the AVE were all higher than 0.50 (Fornell and Larcker, 1981), this indicates the constructs' high internal consistency and convergent validity. Their discriminant validity is also supported, because (1) the square root of the AVE of each construct exceeded all the relevant interconstruct correlations (Table A3) and (2) the item loadings on their own construct were significantly higher than their cross-loadings on any other construct (Table A4) (Chin, 1998; Fornell and Larcker, 1981; Gefen and Straub, 2005). The above evidence suggests that the model's constructs have acceptable psychometric properties.

Table A5
Conceptualization of constructs used in this study.

Construct	Item	Question	Literature Sources
Innovative performance impact	IPI1	By using ≪the system≫, I more often create new ideas for improvements	Gray and Meister (2004) and Janssen (2001)
	IPI2	Using ≪the system≫ improves my ability to generate innovative solutions to problems	
	IPI3	Using ≪the system≫ makes me more often produce innovative ideas for work improvement	
Inter-team use	ITE1	I use ≪the system≫ for knowledge sharing with coworkers outside my team	Cummings (2004)
	ITE2	I use ≪the system≫ to collaborate with coworkers outside my team	
	ITE3	I use ≪the system≫ to communicate with coworkers outside my team	
Intra-team use	ITR1	I use ≪the system≫ for knowledge sharing with my team members	Cummings (2004)
	ITR2	I use ≪the system≫ to collaborate with members of my team	
	ITR3	I use ≪the system≫ to communicate with my team members	
Task performance impact	TPI1	Using ≪the system≫ enables me to accomplish tasks quicker	Iivari (2005), Urbach et al. (2010), and Venkatesh et al. (2003)
	TPI2	Using ≪the system≫ enhances my job effectiveness	
	TPI3	Using ≪the system≫ increases my productivity	
	TPI4	Using ≪the system≫ improves my job performance	
Task equivocality	TEQ1	I often deal with ad-hoc, non-routine business problems	Campion et al. (1993) and Goodhue and Thompson (1995)
	TEQ2	The tasks I work on change frequently.	
	TEQ3	My job frequently requires me to perform tasks that are new to me	
Voluntariness	VOL1	Although it might be helpful, using ≪the system≫ is certainly not compulsory in my job	Moore and Benbasat (1991)
	VOL2	Using ≪the system≫ is voluntary in my organization	

Notes: The placeholder ≪the system≫ represents the actual name of MediaCo's ESSP, which appeared in the online survey that its employees filled out.
All items were measured using seven-point Likert-type scales (1 = strongly disagree, 7 = strongly agree).
All constructs are measured as reflective constructs.

Appendix C. Measures

See Table A5.

Appendix D. Respondents' demographic characteristics

See Table A6.

Table A6
Respondents' demographic characteristics.

	Category	Frequency	Percentage [%]	Average	STDEV
Organizational tenure [years]	⩽2 years	176	36	6.5	6.4
	3–5 years	107	22		
	6–10 years	96	20		
	11–15 years	63	13		
	16–20 years	33	7		
	21–25 years	11	2		
	>25 years	5	1		
Overall work experience [years]	⩽2 years	25	5	16.3	10.3
	3–5 years	48	10		
	6–10 years	100	20		
	11–15 years	87	18		
	16–20 years	85	17		
	21–25 years	60	12		
	>25 years	86	18		

(*continued on next page*)

Table A6 (*continued*)

	Category	Frequency	Percentage [%]	Average	STDEV
Platform experience [months]	⩽1 months	32	7	21.6	21.7
	1–3 months	42	9		
	4–6 months	64	13		
	7–12 months	91	18		
	13–18 months	33	7		
	19–24 months	74	15		
	>24 months	155	32		
Organizational tenure [Seniority]	Administrative staff	40	8	Not applicable	Not applicable
	Entry-level position	50	10		
	Professional	161	33		
	Lower management	86	17		
	Middle management	117	24		
	Top management	37	8		
Education	None	3	1	Not applicable	Not applicable
	Elementary	6	1		
	High school diploma	56	11		
	Bachelor degree	328	67		
	Master degree	93	19		
	PhD degree	5	1		

Table A7
Results of correlation analysis.

	Inno Perf	Inter Use	Intra Use	Task Perf	TEQU	VOL	TEN_Y	TEN_S	EXP_W	SKIL	EXP_P	EDU
Innovative performance impact	1.00											
Inter-team use	0.55	1.00										
Intra-team use	0.48	0.51	1.00									
Task performance impact	0.66	0.42	0.49	1.00								
Task equivocality	0.16	0.20	0.10	0.18	1.00							
Voluntariness	−0.07	−0.04	−0.13	−0.18	−0.12	1.00						
Organizational tenure (years)	−0.02	0.04	0.03	−0.04	0.08	0.00	1.00					
Organizational tenure (seniority)	0.14	0.21	0.13	0.07	0.27	−0.11	0.24	1.00				
Overall work experience (years)	−0.08	−0.04	0.01	−0.08	0.11	−0.01	0.54	0.29	1.00			
Computer skills	−0.09	0.00	0.02	−0.07	0.17	−0.06	−0.08	−0.01	−0.03	1.00		
Platform experience	0.04	0.10	0.10	0.06	0.12	−0.04	0.35	0.20	0.15	0.08	1.00	
Level of education	0.05	0.08	−0.03	0.02	0.05	−0.11	−0.13	0.19	−0.06	0.07	0.08	1.00

Notes: InnoPerf: Innovative performance impact; InterUse: Inter-team use; IntraUse: Intra-team use; TaskPerf: Task performance impact; TEQU: Task equivocality; VOL: Voluntariness; TEN_Y: Organizational tenure (years); TEN_S: Organizational tenure (seniority); EXP_W: Overall work experience (years); SKIL: Computer skills; EXP_P: Platform experience; EDU: Level of education.

Appendix E. Interconstruct correlations

See Table A7.

Appendix F. Results of exploratory factor analysis

See Table A8.

Table A8
Rotated component matrix (principal component analysis with Kaiser normalization).

	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
IPI1	.832	.243	.172	.334	.076	–.007
IPI2	.831	.254	.206	.372	.052	.017
IPI3	.838	.249	.208	.377	.052	.017
ITE1	.168	.859	.199	.166	.089	.002

Table A8 (*continued*)

	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
ITE2	.212	.875	.243	.183	.097	.011
ITE3	.231	.877	.213	.153	.084	.006
ITR1	.155	.226	.880	.260	.038	−.045
ITR2	.151	.230	.906	.232	.017	−.054
ITR3	.193	.216	.893	.183	.034	−.072
TPI1	.244	.100	.205	.875	.070	−.041
TPI2	.242	.141	.196	.899	.090	−.047
TPI3	.233	.175	.180	.904	.058	−.069
TPI4	.272	.184	.184	.875	.070	−.063
TEQ1	.030	.084	.026	.026	.850	−.029
TEQ2	.008	.050	.031	.066	.913	−.009
TEQ3	.085	.074	.014	.099	.845	−.056
VOL1	−.041	−.013	−.024	−.130	−.087	.907
VOL2	.054	.027	−.093	−.003	−.002	.918

Notes: ITR: Intra-team use; ITE: Inter-team use; TEQ: Task equivocality; TPI: Task performance impact; IPI: Innovative performance impact; VOL: Voluntariness.
Extraction method: principal component analysis. Rotation method: varimax with Kaiser normalization.

Table A9
Item weights of constructs.

Construct	Item	Loading	*t*-Value
Innovative performance impact	IPI1	0.946	103.627
	IPI2	0.970	169.617
	IPI3	0.977	320.255
Inter-team use	ITE1	0.912	68.277
	ITE2	0.958	172.611
	ITE3	0.949	136.307
Intra-team use	ITR1	0.961	154.294
	ITR2	0.976	248.283
	ITR3	0.957	124.790
Task performance impact	TPI1	0.938	79.324
	TPI2	0.966	169.237
	TPI3	0.970	207.423
	TPI4	0.959	136.277
Task equivocality	TEQ1	0.820	17.535
	TEQ2	0.898	41.615
	TEQ3	0.902	37.588
Voluntariness	VOL1	0.992	7.482
	VOL2	0.775	5.107

Appendix G. Indicator reliability

See Table A9.

Appendix H. Formula for path comparison tests

As suggested by Chin (2004), we utilized the following formula in order to compare the differential effects of intra-team use and inter-team use on task performance impact and innovative performance impact (‘pooled standard error method’):

$$t = \frac{Path_{sample\_1} - Path_{sample\_2}}{\left[\sqrt{\frac{(m-1)^2}{(m+n-2)} * S.E.^2_{sample1} + \frac{(n-1)^2}{(m+n-2)} * S.E.^2_{sample2}}\right] * \left[\sqrt{\frac{1}{m} + \frac{1}{n}}\right]}$$

Appendix I. Interaction diagrams

See Figs. A1–A3.

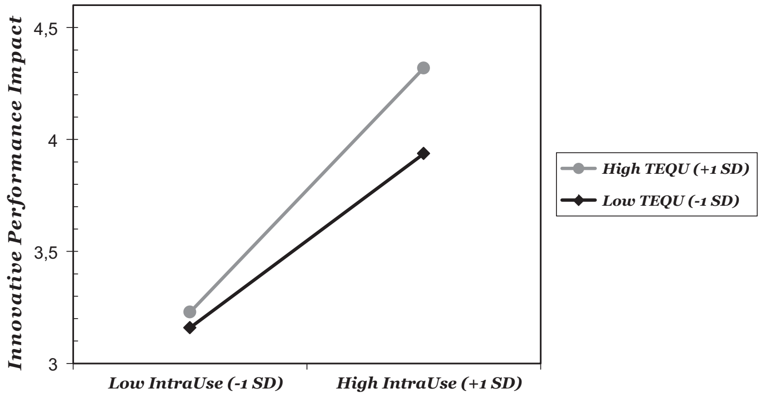

Fig. A1. Interaction diagram: Task equivocality moderates intra-team use → innovative performance impact.

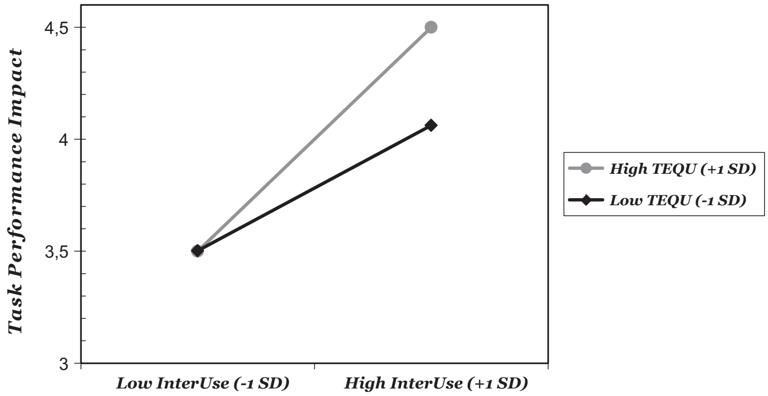

Fig. A2. Interaction diagram: Task equivocality moderates inter-team use → task performance impact.

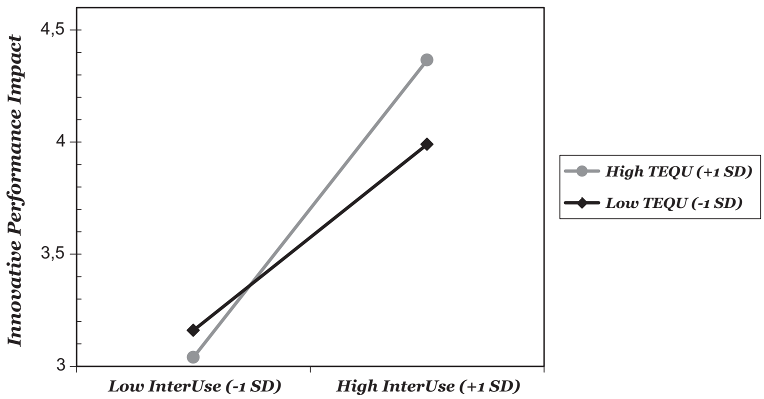

Fig. A3. Interaction diagram: Task equivocality moderates inter-team use → innovative performance impact.

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