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The Influence of Technostress, Learning Goal Orientation, and Perceived Team Learning Climate on Intra-Team Knowledge Sharing and Innovative Practices Among ICT-Enabled Team Members

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Abstract
In ICT-enabled teams, innovation involves intensive adoption of ICTs and knowledge sharing among all members rather than a few experts. However, ICTs bring not only efficiency but also technostress, which hinders knowledge sharing and innovative practices among team members. To investigate this paradox, we drew on the job demand-control (JDC) model derived from the control theory of occupational stress to construct a theoretical framework regarding the collective influence of technostress, learning goal orientation, perceived team learning climate, and intra-team knowledge sharing on the innovative practices of ICT-enabled team members. Our multiple regression analyses of 481 ICT consultants' responses show that intra-team knowledge sharing positively influenced innovative practices; perceived team learning climate positively moderated this relationship. Further, technostress negatively influenced intra-team knowledge sharing; learning goal orientation positively influenced intra-team knowledge sharing, although the relationship demonstrated an inverted U-shape. Finally, learning goal orientation negatively moderated the relationship between technostress and intra-team knowledge sharing. Our results shed light on the paradox regarding ICT adoption, with theoretical implications for employee-driven innovation, team learning climate, intra-team knowledge sharing, learning goal orientation, and managerial practices about the design and adoption of ICT-enabled jobs.

Keywords Technostress · Intra-team knowledge sharing · Learning goal orientation · Perceived team learning climate · Innovative practices · ICT consultants

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Introduction

As the world's economy transitions from production-centric into knowledge-centric, firms have increasingly become knowledge-intensive, relying on innovative knowledge for value creation (Anand et al., 2007). Innovation can be challenging to achieve, given the complexity embedded in the operations, employees, and customers of these firms. So far, innovation scholars have primarily investigated the roles of internal operations such as (Abbas et al., 2022), external collaborations such as alliance (Martínez-Noya & García-Canal, 2021; Papa et al., 2020), technology adoption such as digitalization (Endres et al., 2022), and customer demand such as user-led innovation (Saura et al., 2021). Nevertheless, firms increasingly realize that their innovation comes from not only knowledge experts but also ordinary employees (Laviolette et al., 2016). In other words, the innovation of a firm may hinge on employees' innovative practices. Drawing on Opland et al. (2022), we define team members' innovative practices as an employee's efforts to generate, develop, and execute ideas.

The literature has identified a number of factors that could influence employees' innovative practices, such as leadership and organizational support (Bäckström & Bengtsson, 2019), and intrinsic factors such as knowledge sharing among employees (Novitasari et al., 2021), as well as employees' intrinsic goal orientations (Kim & Lee, 2013). For instance, learning goal orientation (LGO) can explain employees' learning and adaptive behavior for various tasks (Lim & Shin, 2021; Shariq et al., 2019), such as knowledge sharing. Scholars suggest that firms should recognize employees' capabilities for innovative practices and provide opportunities (Haapasaari et al., 2017; Laviolette et al., 2016). Previous studies have recognized two essential factors that firms adopt to stimulate employees' innovative practices: embracing information and communication technologies (ICTs) (Chandra et al., 2020) and encouraging knowledge sharing among employees (Novitasari et al., 2021). Through ICT, managers have increasingly provided opportunities to convert employees' knowledge into articulated and codified documents that can be shared within firms (Tsai & Cheng, 2012). ICT also enables virtual collaborations among employees from multidisciplinary teams working from different locations (Ratcheva, 2009). However, the diverse nature of knowledge within a team could impede effective knowledge sharing (Orlikowski, 2002). Employees in the same team may also bear different perspectives and priorities that prevent them from sharing knowledge within the team, thereby negatively affecting the team's learning climate and constraining employees' innovative practices. Moreover, ICTs often bring more requirements for employees to continuously learn new knowledge and skills and entail constant monitoring and tracking of employee activities, thereby collectively leading to overtime work, privacy intrusion, and fatigue at work; a symptom known as technostress (Khuzaini et al., 2021; Tarafdar et al., 2010; Taser et al., 2022). This leads to a paradox where the ICTs enabling information flow and connectivity among team members may, at the same time, lead to the issue of technostress that hinders knowledge sharing and innovative practices among team members. In response, firms start to pay attention to employee motivations, especially employees' goal orientation, which can explain employees' various objectives and behaviors (Brett & VandeWalle, 1999). For instance, team members bearing learning goal orientation (LGO) may demonstrate positive efforts and persistence in challenging situations (e.g., technostress), with satisfaction from the mastery or completion of a task (DeShon & Gillespie, 2005). Against this backdrop, it is worth investigating the factors and their interactive mechanisms that affect the innovative practices among ICT-enabled team members. The objective of this research is thus to

provide an improved theoretical framework and an empirical examination regarding the collective influence of technostress, learning goal orientation, perceived team learning climate, and intra-team knowledge sharing on the innovative practices of ICT-enabled team members. Specifically, we adopt the model of motivation-knowledge-sharing-innovative practices, which lays the groundwork for specifying the conditions under which the perceived team learning climate moderates such a relationship.

The study was conducted in interdisciplinary teams from Chinese and Korean ICT consulting firms. This focus allowed us to address the ICT-enabled innovative practices among team members. A team-level investigation, compared to an organizational-level investigation, allows us to better address employees' innovative practices. Moreover, many firms develop innovative projects through teams, so measuring team members' innovative practices could allow us to explore the impacts of team-level environments on members' innovative practices (Hoegl et al., 2003), which are more likely to explain project innovations. The theoretical contributions of this study are two-fold: first, we contribute to the innovation literature by extending our knowledge about the employee-driven innovation practices among ICT-enabled team members. Our findings unravel the above-mentioned paradox embedded in ICT-enabled teams, and specify the joint impacts of technostress and learning goal orientation on ICT-enabled team members' intra-team knowledge-sharing behavior. Moreover, we examined whether and how intra-team knowledge-sharing behavior influences team members' innovative practices, as well as how this relationship is influenced by the way ICT-enabled team members perceive and evaluate the learning climate within the team. Our results about the curvilinear relationship between learning goal orientation and intra-team knowledge sharing contribute to an improved understanding of the boundary conditions through which team members' intrinsic motivation influences intra-team knowledge sharing and innovative practices.

From a managerial standpoint, our results provide implications for ICT-enabled team leaders to stimulate intra-team knowledge sharing among multidisciplinary members to enhance members' innovation practices by establishing a positive team learning climate. Our research reminds these team leaders that the design and utilization of ICTs could lead to technostress, which hampers members' intra-team knowledge sharing and innovative efforts. This is particularly relevant during the current COVID-19 pandemic, which forces organizations to adopt ICT systems to meet the various self-isolation and social distancing protocols and regulations (Bohak Adam & Metljak, 2022).

Theoretical background and hypotheses

Innovative practices in ICT-enabled teams

Innovation has been defined as the deliberate introduction and application of new ideas, processes, products within an organization, aiming to benefit an organization, its members, and even society as a whole (West & Altink, 1996). Studies on firm-level innovations have primarily looked at the innovations in products and services, processes and business models, or the adoption of ICTs (Abbas et al., 2022; Centobelli et al., 2019; Endres et al., 2022; Luz Martín-Peña et al., 2018; Nylén & Holmström, 2015; Papa et al., 2020; Saura et al., 2021). These studies assume that innovation is primarily contributed by the dedicated executives and experts from specific departments (e.g., headquarters & R&D departments) exclusively responsible for the firms' innovation. This stream of literature is complemented

by the increasing attention to the contribution of ordinary employees (Chandra et al., 2020; Høyrup, 2010; Opland et al., 2022). According to Høyrup (2010), ordinary employees can contribute to firm innovation through activities that are non-R&D, non-technological, and highly involving; these activities could allow ordinary employees to acquire creative skills and problem-solving abilities inside and outside firms and apply them in employers' innovation, i.e., employee-driven innovation. As such, firms are suggested to stimulate employees to acquire and share ideas, skills, and experiences for the development of new products and services (Cangialosi et al., 2020; Smith et al., 2012). Drawing on Høyrup (2010), we define innovative practices as an employee's efforts to develop and promote innovative ideas related to the firm's operations.

Advances in digital technology and the recent COVID-19 pandemic have drawn increasing academic and managerial attention to the role of ICTs in employee-driven innovation (Chandra et al., 2019; Nambisan et al., 2017; Shirish et al., 2021). On the one hand, ICTs can facilitate the dissemination of special capabilities, skills, and knowledge of team members during the innovative processes, and support the interaction among team members, thereby collectively leading to innovation within the team (Shirish et al., 2019). On the other hand, ICTs could stress employees with constant knowledge upgrading, overtime, privacy breach, and exhaustion (Khuzaini et al., 2021; Taser et al., 2022). To address the paradox, we examine ICT-enabled team members' innovative practices as the dependent variable, with team members' technostress as the situational factor, learning goal orientation as the motivational factor, intra-team knowledge sharing and perceived team learning climate as the team-level factors to examine the underlying mechanisms.

Job demand-control model & employee knowledge sharing

A prevalent theory to investigate how employees perceive stress sources within organizations (especially in the ICT sector) has been the control theory of occupational stress (Benlian, 2020; Chandra et al., 2019). Control can be defined as an employee's ability to develop more than one choice in a specific situation (Ganster & Fusilier, 1989). According to the control theory of occupational stress, individuals' actual feeling of stress at work is influenced by their controls over the sources of stress (Spector, 1998). Drawing on the control theory of occupational stress, Karasek and Theorell (1992) further proposed the job demand-control (JDC) model to further elaborate the impact of job-related stressors on employees, highlighting employees' perceived control within the organization to reduce felt stress and thereby improve performance (Häusser et al., 2010). This study draws on the JDC model to answer the calls to investigate employees' positive response to technostress. Specifically, we examine how an ICT-enabled team member's perception of technostress is addressed through his or her internally felt controlling mechanism (i.e., learning goal orientation), and how such a mechanism further affects his or her intra-team knowledge sharing and innovative practices within the team.

Technostress as an inhibitor of intra-team knowledge sharing

Knowledge management studies have increasingly recognized the importance of ICT in knowledge sharing within and across firms (Eisenbardt, 2021; Hendriks, 1999; Van den Hooff et al., 2004). However, the rapid changes in ICT and employers' constant monitoring and tracking of employee activities could lead to the issue of technostress, i.e., employees' experience of stress due to the use of ICTs (Ragu-Nathan et al., 2008a, 2008b). For

instance, team members may (1) constantly find it challenging to timely catch up with the new and complex technologies (i.e., techno-complexity), (2) worry that they may lose their current jobs or receive reduced pay as new technologies bring increasing automation (i.e., techno-insecurity), and (3) confuse about their tasks and roles during the frequent technological changes (i.e., techno-uncertainty) (Ragu-Nathan et al., 2008a, 2008b). These symptoms of technostress are positively related to employee's mental and physical issues (e.g., burnout; Salanova et al., 2013), which are hard to recover since employees are not given enough time. Once they experience these mental and physical problems, team members become less likely to perform intra-team knowledge sharing, which takes additional time and energy from employees (Chang & Chuang, 2011). In addition, team members under technostress may consider catching up with the latest skills and knowledge to remain competent and competitive at work. In that case, sharing knowledge may become a less important task for team members. Finally, the recent work-from-home arrangement during the COVID-19 pandemic may blur the boundary between work and life, with ICTs bringing poor wellbeing and workplace pressure (Camacho & Barrios, 2022), leaving team members less time and energy to perform knowledge-sharing activities. As a result, the following hypothesis can be proposed:

H1 Technostress is negatively associated with intra-team knowledge sharing among ICT-enabled team members.

Learning goal orientation as a motivation for intra-team knowledge sharing

Individual motivation has been recognized as an important antecedent of knowledge sharing (Chumg et al., 2015; Hendriks, 1999; Nguyen et al., 2019). Indeed, employees perceiving potential rewards (e.g., promotion & awards) bear more motivation to share knowledge (Chumg et al., 2015; Nguyen et al., 2019). To better understand the sources of individual motives, researchers increasingly investigate individuals' goals, i.e., an aim that the individual is committed to and a predictor of his or her prospective behavior (Wigfield & Cambria, 2010). In team-based projects, team members bearing a lucid goal often develop a solid understanding of the expectations, values, and abilities related to work (Messarra et al., 2009). In this case, goal orientations can encourage team members to pursue different objectives and thus behave differently. For instance, some team members may share a learning goal orientation (LGO) while others bear a performance goal orientation (PGO) (Dweck & Leggett, 1988). Unlike PGO members, LGO members tend to demonstrate positive efforts and persistence in challenging situations, with satisfaction coming from the mastery or completion of a task (DeShon & Gillespie, 2005). In ICT-based projects, LGO members may demonstrate their self-motivation to acquire and apply new technical skills for new services and new problems (Messarra et al., 2009). In contrast, PGO members tend to evaluate how their abilities allow them to undertake tasks compared to teammates; that is, doing better than others is more important (Urdan, 1997). These PGO members are motivated by performance compared to colleagues and meeting supervisors' evaluations; as such, they are less likely to challenge themselves with challenging tasks and learning activities (Shamim et al., 2017). Additionally, LGO is more related to focused and adaptive behaviors, while PGO is more related to ego and defensive behaviors (DeShon & Gillespie, 2005). As this study aims to investigate how goal orientation drives team members into intra-team knowledge sharing, our focus is on LGO.

In ICT-based projects, team members with a high degree of intra-team LGO could be motivated to constantly acquire and renew the project-related knowledge, so they could meet the project requirements and even exchange with colleagues for new knowledge (Schmid & Schurig, 2003; Schulz, 2001). However, after a certain point, a high degree of LGO may no longer be helpful to knowledge sharing within the team. Indeed, intra-team knowledge sharing involves a complex process of understanding, internalization, and transfer (Obrenovic et al., 2020). Team members bearing LGO may be motivated to learn new knowledge, but find it challenging to share it with colleagues, especially in a multidisciplinary team where each member is specialized in different areas. Moreover, when the newly learned knowledge upgrades from explicit to tacit, some team members may cherish it as an asset (Amble, 2006), and feel that losing such an asset could deprive them of their power and non-substitutability within the team. Another misgiving that LGO team members may bear is that their shared knowledge is not reciprocated by free-riders who benefit from the shared new knowledge but contribute nothing in return (Cabrera & Cabrera, 2002; Sweeney, 1973). As such, although the relationship between LGO and intra-team knowledge sharing is positive at lower levels of LGO, it may become weaker and eventually disappear at higher levels of the construct. Beyond a certain threshold, higher LGO may no longer do knowledge sharing. Therefore, the following hypotheses can be predicted:

H2 LGO is positively associated with intra-team knowledge sharing (KS).

H3 The relationship between LGO and KS is curvilinear (inverted U-shape), with the best KS occurring at an intermediate level of LGO.

In addition to its direct influence, LGO has been found to alleviate the negative variables (e.g., abusive supervision & work stressors) that influence employee behavior (e.g., knowledge sharing & innovation) (Islam et al., 2020; Peng et al., 2019). When it comes to technostress, learning goal orientation becomes a significant motivator to explain how team members adapt their attitudes and behavior towards the five forms of stress in ICT-based teams. When faced with new tasks, team members may feel stressed to catch up with the latest technologies; however, LGO could affect the degree to which employees adapt their attitudes towards the new knowledge and change their behavior accordingly (Peng et al., 2019). Unlike teammates with a lower degree of LGO, members with a high degree of LGO bear more intrinsic motivation to acquire complex and in-depth knowledge, thus more likely to explore the methods that can lead to efficient knowledge learning (Tan et al., 2016). As a result, intra-team knowledge sharing in response to technostress (e.g., techno-overload, techno-complexity, & techno-uncertainty) is stimulated for team members with a high degree of LGO, yet restrained for team members with a low degree of LGO. In particular, when facing technostress, LGO team members are more energized to acquire the new knowledge related to the new technologies, thereby addressing the negative impacts of techno-invasion and techno overload; more importantly, the LGO team members may be motivated to share the newly acquired knowledge with other team members in exchange for additional knowledge. As a result, the following hypothesis can be proposed.

H4 LGO negatively moderates the relationship between technostress and intra-team knowledge sharing.

Intra-team knowledge sharing and team members' innovation practices

Innovation within organizations often depends on sharing knowledge among employees (Castaneda & Cuellar, 2020). Knowledge sharing refers to the interactions among employees for the purpose of exchanging experiences, skills, and knowledge (Hoegl et al., 2003). Intra-team knowledge sharing in this study refers to a member's ability and desire to share the acquired experiences, information, and insights with other members within an ICT-enabled team. According to Holcomb et al. (2009), employees can acquire knowledge through former work experience, observing the practices of others, and on-the-job training. The relationship between employees' individual knowledge and innovative idea generation has been well documented in previous studies (Hana, 2013; Holcomb et al., 2009). For instance, team members' unique life and work experiences could continuously shape their current knowledge and skills (Tesluk & Jacobs, 1998). A team member's current knowledge, combined with the knowledge learned from teammates or formal training, could enable him or her to understand the various market needs and operational requirements that collectively constitute innovative ideas. Knowledge sharing often involves a reciprocal relationship where team members share some knowledge to reciprocate the knowledge learned from teammates (Hansen, 1999; Venkatesh et al., 2021). Innovative ideas from employees' knowledge and experience could generate creative insights that help individuals to identify new opportunities in the team (Carland & Carland, 2000). This has been confirmed by Cardoso et al. (2014), whose empirical results confirmed a positive association between employee tenure (i.e., on-the-job experience) and the number of constructive suggestions that employees have proposed. In an ICT-enabled team, the existing knowledge and newly acquired knowledge collectively empower a team member to sense the innovation needs at work and perform innovative practices that could eventually benefit the project. As such, the following hypothesis can be proposed:

H5 Intra-team knowledge sharing is positively associated with team members' innovative practices.

The moderating role of perceived team learning climate

Despite the hypothesized association between intra-team knowledge sharing and team member innovative practices, this relationship is dependent on different factors. One important factor that influences the relationship between innovation and performance is organizational climate, which is defined as an employee's perception of the systems, procedures, policies, leadership, and working environment within an organization (Hamidianpour et al., 2015). By the same token, team members' perceived learning climate could also affect the relationship proposed in H1. Perceived learning climate refers to ICT-enabled team members' shared perceptions of whether the systems, procedures, policies, leadership, and environment within the team could support the learning of new knowledge, which can be shared within the team and enable team members to develop innovative ideas. Previous studies have confirmed the role of learning climate (e.g., relieving job-related stress & enhancing trust) reflect, suggesting that a desirable learning environment is positively associated with the adaptive behaviors of employees (Han & Williams, 2008; Peng et al., 2022). According to Nikolova et al. (2014), a strong team learning climate exposes members to the various knowledge within the team (e.g., knowledge shared by teammates).

Moreover, a strong team learning climate can improve mutual trust and reciprocity among team members, and relieve team members' misgivings for proposing underdeveloped ideas (Han & Williams, 2008). As such, members of an ICT-enabled team with a strong learning climate could be less afraid of bringing up new ideas and more open-minded to the mistakes of their teammates (i.e., innovative practices). The above discussion can lead to the following hypothesis:

H6 Perceived team learning climate positively moderates the relationship between intra-team knowledge sharing and team member innovative practices.

The above hypotheses lead to a theoretical framework (presented in Fig. 1) which was examined in this research.

Methods

Sample and data collection

Our survey sample included 481 employees from ICT consulting firms that operate in South Korea and China. We first approached the human resource (HR) departments of eight South Korean and 20 Chinese ICT consulting firms, sending each firm an invitation letter describing the purpose of this study. Eventually, 21 firms agreed to participate. Data were collected between the 1st of September 2020 and the 31st of May 2022. We first contacted consultants via work email to seek their agreement to participate. A total of 967 ICT consultants were sent an invitation by their HR departments to volunteer for the study, out of whom 693 offered to participate. We invited the HR administrator of each firm to distribute the questionnaires to ensure confidentiality. Survey links were sent to the respondents' work email accounts to complete the survey. 498 surveys were returned, giving a response rate of 72%. We then screened the data for missing values and outliers, and after the deletion of missing data and outliers, 17 survey sheets were rejected, leaving

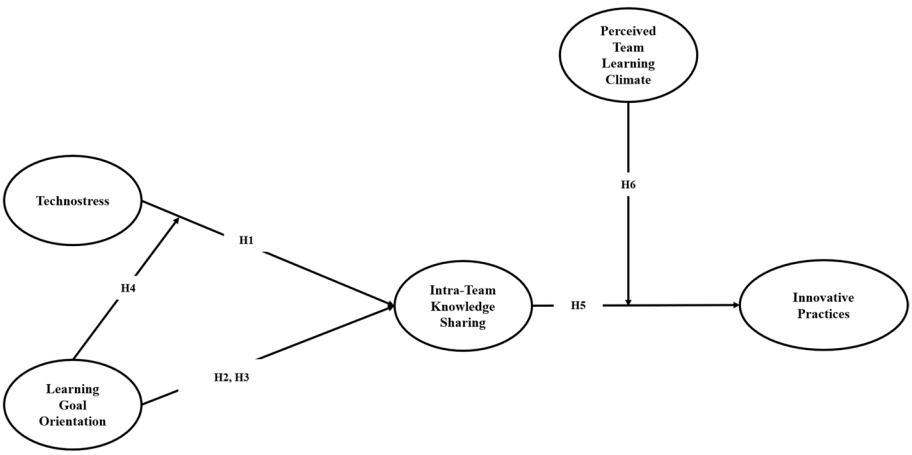

Fig. 1 Theoretical framework

481 usable surveys. Among the 481 respondents, 58.2% were male, 45.7% of the respondents were aged between 25 and 30 years, 54.1% were Chinese, 50.7% held a bachelor's degree, 31.4% had been in their organization for 4–6 years, 84.4% were non-managers. People were in different kinds of industries, such as Digitization, Advanced Manufacturing & Artificial Intelligence, or IOT/Smart Cities.

Table 1 presents the demographic information of the 481 respondents.

Measures

The questionnaire for this study included five constructs: technostress, learning goal orientation, intra-team knowledge sharing, perceived team learning climate, and innovation performance. The surveys were administered in both Korean and Chinese. All of the measures were adapted from existing measures validated both in English and Korean by previous

Table 1 Demographics

	Frequency	Percentage
Gender		
Male	280	58.2
Female	201	41.8
Age		
25–30	220	45.7
31–35	120	24.9
36–40	75	15.6
41 above	66	13.7
Nationality		
China	260	54.1
Korea	221	45.9
Edu		
Associate degree or below	111	23.1
Bachelor degree	244	50.7
Master degree	107	22.2
Doctorate degree	19	4.0
Tenure		
1–3 years	147	30.6
4–6 years	151	31.4
7–9 years	87	18.1
10 years and above	96	20.0
Occupation		
Non-managers	406	84.4
Managers	75	15.6
Industry		
Digitization (IT, Software and Computer and Cloud Services)	293	60.9
Advanced Manufacturing & Artificial Intelligence	169	35.1
IOT/Smart Cities	19	4.0

research. To ensure consistency in translation, the Korean translations were reviewed by two Korean native speakers and then back-translated into English by two English native speakers. All items were measured on 5-point-Likert-scales (1: strongly disagree-5: strongly agree).

Technostress

The technostress (TECH) scale came from Ragu-Nathan et al., (2008a, 2008b). The three dimensions (techno-complexity, techno-insecurity, and techno-uncertainty) of technostress were revised to meet the research scope of this study. The items include, 'I do not know enough about this technology to handle my job satisfactorily', 'I feel constant threats to my job security due to new technologies', and 'There are always new developments in the technologies we use in our organization'. The Cronbach alpha of this measure was .770 (techno-complexity), .780 (techno-insecurity) and .830 (techno-uncertainty).

Learning goal orientation

The learning goal orientation (LGO) scale was adapted from Matzler and Mueller (2011). The three items in this scale were revised and adjusted to meet the research scope of this study. The items include, 'Making a tough project is very satisfying', 'An important part of being a good employee is continually improving our skills' and 'I put in a great deal of effort sometimes in order to learn something new.' The Cronbach alpha of this measure was .91.

Intra-team knowledge sharing

The intra-team knowledge sharing (KS) scale was adapted from Matzler and Mueller (2011). The five items in this scale were used to measure knowledge sharing among employees within the same team. These items include 'general overviews (e.g., the projects in general, responsibilities within the team),' 'specific requirements and data,' 'techniques (e.g., project management, know-how, training, process, and tools),' 'progress and reports (e.g., updates on the project, budget, & employees),' and 'project results (e.g., preliminary & final reports).' The Cronbach alpha of this measure was .93.

Perceived team learning climate

The perceived team learning climate (PTLC) scale was adapted from Maruping and Magni (2014). The five items in this scale were used to measure the perceived team learning climate in ICT consultants. The sample items include 'In this team, errors are considered a source of learning', 'In the team, there is the freedom to experiment,' 'My team makes its lessons learned available to all members.' The Cronbach alpha of this measure was .790.

Innovative practices

The innovative practices (IP) scale was adapted from Ritala et al. (2015). The four items in this scale include employees' efforts to generate and promote innovative ideas related to 'services to the customers', 'service methods and processes', 'workplace management practices', and 'marketing analysis practices' (1 = never; 5 = often). Following Janssen

(2000), we adopted the self-reported scale from ICT consultants rather than supervisor-rated scores because (1) an employee may be more capable of reporting the subtle cognitive representation of ideas, as well as the contextual and intentional background of his or her work practices than his or her supervisor (Jones & Nisbett, 1987); (2) employees' innovative practices, as discretionary behaviors at work, are analogous to the various forms of subjective evaluations that are susceptible to the idiosyncrasies of different evaluators (Organ & Konovsky, 1989); and (3) supervisors are more likely to capture the innovative practices that an ICT consultant intentionally behaves to impress them, than the innovative practices that the ICT consultant genuinely performs (Organ & Konovsky, 1989). The Cronbach alpha of IP was .740.

Control variables

In selecting variables, we focused on those variables that could be viewed as alternative explanations for knowledge-sharing behavior or employee job performance. We controlled for age, gender, tenure, nationality, education, occupation, and industry, which are widely accepted predictors of employee performance (Button et al., 1996; Ng & Feldman, 2010).

Results

Common method bias

To check the problem of common method bias, we conducted Harman's single-factor test. The analysis returned seven factors with eigenvalues greater than 1, with the first factor explaining less than 40% of the variance (26.25% of 76.95%). Therefore, our findings provided no serious indications of common method variance (Podsakoff et al., 2003).

Validity and reliability

We conducted a confirmatory factor analysis (CFA) to examine the composite reliability, convergent validity, and discriminant validity of the instruments. Convergent validity was ensured with composite reliability (CR) above 0.80 and AVEs over 0.50 (Fornell & Larcker, 1981). Table 2 shows that all CRs are higher than the suggested 0.80 and all AVE values are higher than the suggested 0.50, indicating a good convergent validity and reliability of the measurement model. The square roots of factors' AVEs were higher than their correlation coefficients with other factors that strongly support the discriminant validity (Fornell & Larcker, 1981) in Table 3.

Correlation analysis

Means, standard deviations, and correlations of all variables used in this study are provided in Table 3. In the correlation matrix provided in Table 3, learning goal orientation was significantly and positively correlated with intra-team knowledge sharing ($r = .359$, $p < .05$), partially supporting the hypotheses. In addition, intra-team knowledge sharing was significantly correlated with perceived team learning climate ($r = .294$, $p < .05$), and innovative practices ($r = .462$, $p < .05$).

Table 2 Results of reliability and validity analysis

	Variable	Item	STD.Estimate	CR	AVE	Cronbach's Alpha
Technostress	Techno-complexity	TC1	.876	.930	.689	.928
		TC2	.832			
		TC3	.761			
		TC4	.850			
		TC5	.823			
		TC6	.833			
	Techno-insecurity	TI1	.879	.901	.647	.901
		TI2	.845			
		TI3	.781			
		TI4	.746			
		TI5	.761			
	Techno-uncertainty	TU1	.761	.907	.710	.906
		TU2	.902			
		TU3	.881			
		TU4	.820			
Learning goal orientation		LGO1	.866	.905	.760	.904
		LGO2	.859			
		LGO3	.890			
Intra-team knowledge sharing		KS1	.877	.941	.761	.935
		KS2	.797			
		KS3	.887			
		KS4	.928			
		KS5	.867			
Perceived team learning climate		PTLC1	.801	.907	.661	.906
		PTLC2	.801			
		PTLC3	.780			
		PTLC4	.845			
		PTLC5	.836			
Innovative practices		IP1	.870	.909	.715	.908
		IP2	.802			
		IP3	.878			
		IP4	.830			

Hypothesis testing

We tested our hypotheses through hierarchical regression analyses using SPSS 25. Table 4 shows the analysis results of the hypotheses. To address multicollinearity, we used centered values of the independent variables (described above) in all the regression models (Aiken et al., 1991).

According to Table 4, the effect of technostress for the regression model (Model 2) predicting intra-team knowledge sharing was statistically significant ($\beta = -.16$, $p < .001$), supporting Hypothesis 1. Learning goal orientation had a positive impact on

Table 3 Results of correlation and discriminant validity analysis

		Mean	S.D	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Gender	1.42	0.49														
2	Age	1.97	1.08	0.013													
3	Nationality	1.46	0.5	0.039	− 0.016												
4	Edu	2.07	0.78	0.021	− 0.047	0.061											
5	Tenure	2.27	1.1	− 0.012	− 0.018	− 0.006	− 0.018										
6	Occupation	1.16	0.36	− 0.039	− 0.021	0.064	0.035	0.044									
7	Industry	1.43	0.57	0.041	− 0.073	− 0.023	0.002	0.044	− 0.043								
8	TC	2.31	0.95	− 0.054	− 0.029	0.088	0.042	0.048	0.004	0.034	.830						
9	TI	2.46	1.04	− 0.007	− 0.073	0.084	0.04	0.047	− 0.016	.128**	.475**	.804					
10	TU	2.36	1.04	− 0.049	0.014	0.019	0.052	0.016	0.031	0.039	.383**	.427**	.843				
11	LGO	3.6	0.91	− 0.013	− 0.01	− .100*	− 0.047	− 0.008	0.001	0.014	− .171**	− .135**	− .156**	.872			
12	KS	3.73	0.96	− 0.046	0	− 0.063	− 0.011	− 0.074	0.013	− 0.006	− .193**	− .167**	− .180**	.359**	.872		
13	PTLC	3.76	0.91	− 0.059	− 0.044	0.052	0.041	0.007	− 0.038	0.021	− 0.073	− 0.007	− 0.009	.092*	.294**	.813	
14	IP	3.69	0.98	0.014	− 0.077	− 0.08	0.024	− 0.074	− 0.007	0.002	− .100*	− 0.081	− .124**	.423**	.462**	.266**	.846

TC techno-complexity, *TI* techno-insecurity, *TU* techno-uncertainty, *LGO* learning goal orientation, *KS* intra-team knowledge sharing, *PTLC* perceived team learning climate, *IP* innovative practices

The value on the diagonal is the square root of AVEs

*$p < 0.05$; **$p < 0.01$

Table 4 Examining the relationships between TECH and KS as moderated by LGO

Predictor	KS			IP		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gender	− .04	− .05	− .05	.02	.04	.04
Age	.00	.00	.00	− .08	− .08	− .07
Nationality	− .06	− .02	− .01	− .08	− .06	− .06
Edu	− .01	.01	.02	.02	.03	.02
Tenure	− .08	− .07	− .04	− .08	− .04	− .05
Occupation	.02	.02	.00	.00	− .01	− .01
Industry	.00	.01	.01	.00	.00	.00
TECH		− .16***	− .14**			
LGO		.32***	.23***			
LGO*LGO			− .18***			
TECH*LGO			.14**			
KS					.46***	.41***
PTLC						.16***
KS*PTLC						.12**
R^2	.01	.16	.21	.02	.23	.26
Adj.R^2	.00	.15	.19	.01	.21	.24
ΔR^2	.01	.15***	.05***	.02	.21***	.03***
F	.82	10.12***	11.36***	1.33	17.21***	16.41***

TECH technostress, *LGO* learning goal orientation, *KS* intra-team knowledge sharing, *PTLC* perceived team learning climate, *IP* innovative practices

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

intra-team knowledge sharing ($\beta = .32$, $p < .001$), supporting Hypothesis 2. The quadratic effect of learning goal orientation in Model 3 for the regression model predicting intra-team knowledge sharing was statistically significant ($\beta = -.18$, $p < .001$). Plots describing the quadratic effect of learning goal orientation on intra-team knowledge sharing are presented in Fig. 2 (Aiken et al., 1991). According to the result, the signs of the quadratic effects were negative for learning goal orientation and intra-team knowledge sharing, indicating that the relationships resemble an inverted-U shape. This means that an increase in learning goal orientation will initially lead to intra-team knowledge sharing. However, the relationships became weaker and eventually become the opposite when learning goal orientation increases past a certain point. Such a result provides support for Hypothesis 3.

According to Table 4, the interaction effect between technostress and learning goal orientation of the model (Model 3) predicting intra-team knowledge sharing was statistically significant ($\beta = .14$, $p < .01$). A simple slopes test presented in Fig. 3, indicates that the effect of LGO on KS is significant (Low- LGO: $B = -.34$, $p = .000$; High- LGO: $B = .01$, $p > 0.5$), thus supporting H4.

According to Table 4, the effect of intra-team knowledge sharing (Model 5) for the regression model predicting innovative practices was statistically significant ($\beta = .46$, $p < .001$), supporting H5. The interaction effect between intra-team knowledge sharing and perceived team learning climate of Model 6 predicting innovative practices was statistically

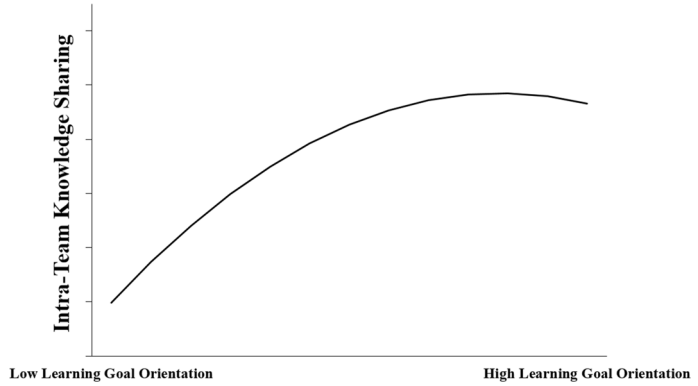

Fig. 2 Relationships between LGO and KS

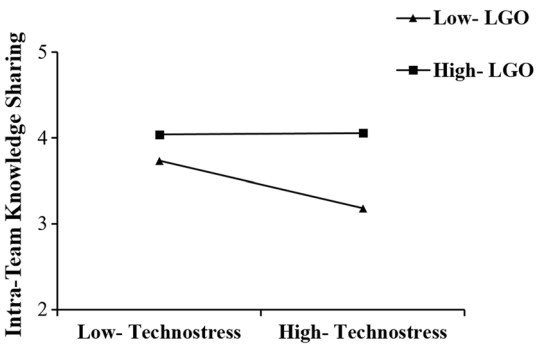

Fig. 3 The moderating effect of LGO between TECH and KS

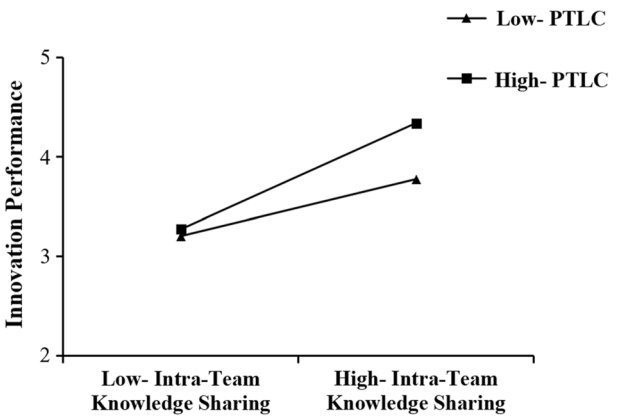

Fig. 4 The moderating effect of PTLC between KS and IP

significant ($\beta = .12$, $p < .01$). The simple slopes test in Fig. 4, indicates that the effect of PTLC on IP is significant (Low- PTLC: $\beta = .27$, $p = .000$; High- PTLC: $\beta = .57$, $p = .000$), thus supporting H6.

Discussion

Knowledge-intensive firms need innovation to address complex situations in their operations, employee practices, and customer demands. Previous studies primarily examined the impacts of ICT adoption, alliance, technology adoption, and customer demand on firm innovation (Abbas et al., 2022; Endres et al., 2022; Papa et al., 2020; Saura et al., 2021), with recent attention to the innovative practices of ordinary employees (Opland et al., 2022). Ordinary employees become an important source of innovation in today's multidisciplinary teams that rely on ICTs to achieve virtual collaborations (Ratcheva, 2009). While ICT adoption and intra-team knowledge sharing are positively related to employee innovative practices (Novitasari et al., 2021), ICT-enabled teams often require knowledge of diverse disciplines among employees of different perspectives and priorities (Orlikowski, 2002), as well as new knowledge and skills related to ICTs; these could collectively lead to technostress (Taser et al., 2022), which may discourage intra-team knowledge sharing. Therefore, the intrinsic factors and their interactive mechanisms that affect the innovative practices among ICT-enabled team members are worth investigating.

Drawing on the job demand-control (JDC) model derived from the control theory of occupational stress, this study examined the roles of technostress, learning goal orientation, intra-team knowledge sharing, and perceived team learning climate on the innovative practices of ICT-enabled team members. In the unique context of ICT-enabled teams, our results provided empirical support to the hypothesized model, thereby validating the JDC model (Karasek & Theorell, 1992). Second, we identified team members' learning goal orientation as the underlying mechanism that enables employees to maintain controls in their ICT-facilitated tasks and reduce the impact of technostress, thus adding to the social support suggested in the literature (Häusser et al., 2010) when it comes to buffering the negative impact of technostress. Third, our results suggested reduced intra-team knowledge sharing as another consequence of technostress, in addition to impaired wellbeing and reduced motivation suggested in the literature (Camacho & Barrios, 2022; Chang & Chuang, 2011). Our subsequent results concerning the role of learning goal orientation on intra-team knowledge sharing extended the knowledge-sharing literature (e.g., Nguyen et al., 2019) regarding the intrinsic sources for ICT-enabled team members to acquire and apply new knowledge. Not only did our results prove the association between learning goal orientation and intra-team knowledge sharing (H2), but they also confirmed a complex situation: as the newly acquired knowledge becomes more complicated and valuable, team members' knowledge sharing with teammates grows weaker (H3). Fourth, our results on the moderating effect of learning goal orientation between technostress and intra-team knowledge sharing unraveled how learning goal orientation enables team members to address the challenges presented by technostress. This extends previous findings (Khuzaini et al., 2021) that only investigated the negative impact of technostress.

We found that intra-team knowledge sharing is positively associated with innovative practices of ICT-enabled team members (H5). This finding concurred with Laviolette et al. (2016) concerning ordinary employees as important sources of firm innovation; moreover, it refines previous findings on the relationship between employee knowledge sharing and employee innovation (Tsai & Cheng, 2012) to the ICT-enabled teams, which are often featured with multidisciplinary knowledge and technology intensity. Moreover, we confirmed the moderating role of perceived team learning climate on the relationship between intra-team knowledge sharing and innovative practices (H6). In doing so, we confirmed the importance of employee perception of organizational climate (Hamidianpour et al., 2015),

therefore explaining the mechanism (e.g., relieving job-related stress, mutual trust, & reciprocity) that stimulated knowledge sharing, as well as innovative practices.

Theoretical implications

This study has provided contributions to theory and research that can provide a new comprehensive explanation of innovative practices among ICT-enabled team members. First, this study extends the innovation literature (e.g., Abbas et al., 2022; Endres et al., 2022) to consider the factors that explain the innovative practices of ordinary employees, rather than the dedicated executives and experts of R&D departments. While some scholars (e.g., Høyrup, 2010) have recognized the importance of ordinary employees in firm innovation, it is unclear how team members develop innovative practices in ICT-enabled teams, where both inhibitors (e.g., technostress) and motivators (e.g., team learning climate) exist. This study provides a complete picture of these factors and their interactive mechanisms in the context of ICT consulting firms, where ICT consultants often work as a team in interdisciplinary projects, and consultants' innovative practices serve as potential sources of project innovation. Unlike colleagues, team members often work for a limited period of time, so their intra-team knowledge sharing may only persist for a limited time. Our empirical results suggest that intra-team knowledge sharing interacted with the perceived learning climate to influence innovative practices. One possible explanation is that perceived team learning climate can improve team members' communication frequencies, enhance their mutual trust, and encourage them to propose innovative ideas without worrying about mistakes and blames from team mates.

Second, we contributed to the goal orientation literature (Kim & Lee, 2013) by examining the boundary conditions of learning goal orientation on intra-team knowledge sharing among ICT-enabled team members. Our results about the inverted U-shape between LGO and intra-team knowledge sharing unravel the intrinsic element that determines an ICT-enabled team members' sharing of knowledge. We concurred with Chandra et al. (2020) regarding the impact of technostress (i.e., spatial intrusion) on the innovation of ICT-enabled employees, yet differ with these authors regarding the sources (e.g., techno-complexity, techno-insecurity, & techno-uncertainty) of technostress. Our moderating analysis indicates that team members' learning goal orientation allows them to address the negative impact of technostress on intra-team knowledge sharing. Our results suggest that learning goal orientation enables ICT-enabled team members to adapt their attitudes towards the challenging task of keeping pace with new technologies, worries about the threats from new technologies, and confusion during constant technological changes. The adapted attitude and subsequent behavior can help ICT-enabled team members to acquire new knowledge related to technologies, address the issue of burnout, and share knowledge with teammates in exchange for additional knowledge, thereby addressing the paradox brought about by ICTs.

Managerial implications

This study suggests some implications for ICT-enabled team leaders who seek innovation from the general team members rather than dedicated experts. First, as our results suggest that team members' innovative practices could become essential sources of team innovation, team leaders should create supportive procedures, and leadership that team members perceive as friendly or convenient for their knowledge acquisition and open enough for

them to bring up innovative ideas. Second, team leaders are advised to encourage intra-team knowledge sharing, as well as its inhibitor and motivator. In particular, team leaders should understand the different perspectives and priorities shared by team members, moderate among these members, and encourage intra-team knowledge sharing. Meanwhile, ICT-enabled team leaders should realize the various sources of stress that ICT adoption may impose on team members. For instance, team leaders should raise reasonable expectations from team members, allow a certain degree of autonomy in team members' tasks, and portray a clear profile for each team member to remove the unnecessary tension related to ICTs. Third, our results suggest that team leaders could develop programs to stimulate team members' learning goal orientation, which could help them to share knowledge in the team and address complexity. Nevertheless, team leaders should not take learning goal orientation as a panacea to clearing the blocks in intra-team knowledge sharing, as its effect wanes at a certain point.

Limitations and suggestions for future research

Some limitations in this study should be listed. First, we did not control for leadership when exploring the influence of technostress, learning goal orientation, intra-team knowledge sharing, and perceived team learning climate. Future studies could explore the moderating effect of leadership on team members' innovative practices. Second, we relied on self-reported data to examine ICT-enabled team members' assessment of felt technostress, learning goal orientation, team learning climate, and innovative practices. While team members can better perceive their motivation, stress, and behavior changes, their responses could be subjective, especially in evaluating innovative practices. To improve reliability, we suggest that future research could adopt joint evaluations of team leaders and team members.

Conclusion

Based on the technostress and innovation literature, as well as motivation theory, we developed a theoretical framework regarding the collective influence of technostress, learning goal orientation, perceived team learning climate, and intra-team knowledge sharing on the innovative practices of ICT-enabled team members. We concluded that intra-team knowledge sharing positively influenced innovative practices; perceived team learning climate moderates this relationship. Intra-team knowledge sharing is (1) negatively affected by technostress, (2) positively affected by learning goal orientation, whose impact shows an inverted U shape, and (3) learning goal orientation negatively moderated the relationship between technostress and intra-team knowledge sharing.

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