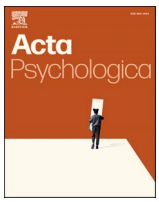
Acta Psychologica 255 (2025) 104875

Contents lists available at ScienceDirect

Acta Psychologica

journal homepage: www.elsevier.com/locate/actpsy



Technostress influence on innovative work behaviour and the mitigating effect of leader-member exchange: A moderated mediation study in the Indian banking industry

Sweta Jain [a,*], Virajanand Varma [a], Tata Sai Vijay [a], Clement Cabral [b]

[a] Indian Institute of Management, Prabandhan Nagar, Nayasarai Rd, Ranchi, Jharkhand, India
[b] Saint Paul's College, Kalamassery, Kochi, India

ARTICLE INFO

Keywords:
Technostress
Leader-member exchange
Innovative work behaviour
Work engagement
Innovation
Services

ABSTRACT

Purpose: The human capital in banks is an invaluable asset towards driving innovation and customer success and providing an edge over the competition. However, post-COVID-19 pandemic, rapid adoption of Information and Communication Technologies (ICTs) in Indian banks has increased employee technostress, resulting in adverse job outcomes. This study merges perspectives from psychology, information technology, and organisational behaviour to explore the impact of technostress and leader-member exchange (LMX) on innovative work behaviour (IWB), demonstrating the necessity of a cross-disciplinary approach to address contemporary workplace challenges.

Design/methodology/approach: The study leverages convenience sampling to select online and offline survey participants in leading Indian banks ($N = 250$). The dataset was analysed using the partial least squares structural equation modelling (PLS-SEM) technique and SmartPLS 4 software. It leverages the twin support of the job-demands resources framework and the celebrated social exchange theory.

Findings: The authors concluded that employees are experiencing adverse effects of the implementation of ICTs in Indian banks in a quest to achieve innovation. They are experiencing technostress which reduces the IWB of banking employees. Technostress also reduces work engagement which, in turn, leads to burnout and subsequent reduction in IWB. High-quality LMX relationships can promote IWB of bank employees by moderating the indirect effect of technostress on IWB via work engagement.

Originality/value: This research contributes significantly to the literature by exploring the causes of reduced IWB and strategies to foster innovation in the banking industry. The research is among the pioneer studies that empirically investigate the moderated mediation research model at the intersection of stress, innovation, and leadership literature in the context of the Indian banking industry. It also sets a foundation for future replications across different industries and geographies to explore the generalizability of these effects.

Practical implications: For improving employee IWB, managers and line-of-business leaders can monitor the technostress and work engagement levels against the standards. Organisations can invest in technostress research, develop suitable human resource strategies and training plans to improve work engagement and enable high-quality leader-member exchange to mitigate technostress and promote innovation. These initiatives can help maximise the benefits of ICT initiatives and teleworking implementation.

1. Introduction

Globally, the sectoral contribution of services to the gross domestic product of a country has grown steadily across developing and developed countries (Thakur & Hale, 2013). This is especially true for developing economies such as India, where the industry and service sectors contribute 80 % of gross value added (Niti Ayog, 2022). Financial institutions in emerging economies have established a position of strength and prominence within the services sector. The Indian banking industry is among the fastest-growing banking industries globally and is set to become the third largest by 2050 (IBEF, 2023). The industry encompasses public and private sector banks, fiercely competing to gain

* Corresponding author.
E-mail address: sweta.jainefpm18@iimranchi.ac.in (S. Jain).

https://doi.org/10.1016/j.actpsy.2025.104875
Received 9 November 2024; Received in revised form 6 February 2025; Accepted 4 March 2025
Available online 10 March 2025

market share and retain their customer base in a highly globalised and dynamic business environment (Garg & Dhar, 2017). Customer demand for improved offerings and services, is fuelling the necessity for continuous innovation in banks (Ahinful et al., 2023; Ahinful et al., 2024; Kindström et al., 2013). Innovative banks expect to grow 62 % over the next 5 years (PwC, 2020). In this quest, the human capital in banks becomes an invaluable asset towards driving innovation and customer success and for providing an edge over the competition (Koomson, 2024; Yu et al., 2019). Notably, Innovative Work Behaviour (IWB) has been characterised as "the production or adoption of useful ideas and idea implementation and begins with problem recognition and the generation of ideas or solutions" (Scott & Bruce, 1994). Hence, a vital focus of the senior management at the banks has been to promote positive behaviours and consequences, such as enhanced work engagement, which subsequently promotes IWB (Karatepe & Aga, 2016; Wirtz & Jerger, 2016). The managers try to enable and aid this focus on innovation by infusing new technologies into the organisation's tasks and process workflows. Banks are increasingly becoming digital in their processes and service delivery to their customers (Selimović et al., 2021). This trend was strengthened further by the COVID-19 pandemic, wherein banks are discovering the usefulness of technology in serving their customers remotely and on the go on their cell phones and other devices (Garg & Dhar, 2017). However, this rapid proliferation of technology also has adverse outcomes, such as an increase in technology-induced stress, termed technostress (Tarafdar et al., 2007). Survey evidence from Deloitte (Deloitte, 2022), indicated that 80 % of India's working population sample reported symptoms of poor mental health, and 47 % of the population stated work-related stress as the most prominent cause behind their poor mental well-being. This is causing a staggering $14B loss to Indian organisations due to poor mental health among employees. Hence, studying banking personnel's stress levels and well-being has emerged as a critical focal point for human resource management research, warranting comprehensive scholarly investigation (Mehta et al., 2023). Given the multifaceted implications of emerging organisational Information and Communication Technologies (ICTs) on innovation processes, the current research landscape presents a critical knowledge gap necessitating comprehensive scholarly examination.

Examining the extant literature on leadership, innovation, and technostress disciplines highlights four critical gaps this study seeks to address. First, existing literature has shown substantial interest in inquiring the association between stress and innovation-related constructs. Many scholars discovered a negative influence of stress and employees' innovative behaviour (Bani-Melhem et al., 2020; Montani & Staglianò, 2022; Ren & Zhang, 2015). A few scholarly studies investigated the negative influence of technostress on technology-enabled innovation and performance (Chandra et al., 2019; Tarafdar et al., 2015). However, there is a paucity of conclusive literature on workplace stress and IWB (Rafique et al., 2022). Specifically within the banking industry, while innovation is a crucial organisational objective, there is a scarcity of literature addressing IWB (Garg & Dhar, 2017; Saxena & Prasad, 2023). By addressing these research gaps, this study provides an initial empirical assessment on technostress and its detrimental effects on the IWB of Indian banking employees. Besides studying the direct influence of technostress on IWB, the scholarly inquiry endeavours to explore the indirect effect of technostress on IWB via work engagement. Prior studies have asserted the positive association of work engagement with IWB (Christian et al., 2011; Hakanen, Perhoniemi, & Toppinen-Tanner, 2008,Hakanen, Schaufeli, & Ahola, 2008). Scholars have posited a negative relation of technostress with work engagement (Wu et al., 2022). A critical gap remains in the current literature regarding the indirect influence of technostress on IWB through work engagement in the context of the Indian banking landscape. This scholarly inquiry provides pivotal insights for Indian banking organisations by demonstrating how rapid technological adoption can precipitate technostress, potentially undermining employee engagement and innovative capabilities in a highly competitive organisational ecosystem. Situating this study within the Indian banking sector—a digitally transforming industry facing increasing automation—this research expands the theoretical discourse on service innovation and employee adaptability in technology-intensive workplaces.

Second, the spurt in technostress levels has prompted an increased exploration of the mitigation mechanisms of technostress, including leadership behaviours (Tarafdar et al., 2010; Tarafdar et al., 2015). Leader-member exchange (LMX) denotes the nature of the exchange between a leader and a follower (Graen & Uhl-Bien, 1995). The LMX theory is founded on the premise of the social exchange theory (SET) (Blau, 1964). The theory posits that a high-quality leader-member exchange can help lower employee stress as leaders can provide necessary job resources to counter the job demands posed by technology adoption. Prior scholarly discourse has focused on investigating the direct influence of LMX on innovative behaviour (e.g., Hussain et al., 2019), the indirect influence of LMX on IWB (e.g., Bani-Melhem et al., 2022) and the evaluation of how LMX moderates the influence of employee engagement on IWB (Aryee et al., 2012). However, the scholarly community has yet to analyse the moderating influence of LMX on the technostress-innovation pathway in the banking industry. This influence is premised on the twin support of SET and the Job Demands-Resources (JD-R) theory (Bakker & Demerouti, 2007), which serve as crucial underpinnings of this study. The framework posits LMX as a key job resource that can assist bank workers in managing job demands and stress levels, thereby impacting job outcomes (Xia et al., 2022). Current research helps extend the leadership and innovation literature by corroborating theoretical and empirical impetus to the notion of LMX as a moderator of the influence of technostress on IWB in banks. The research significantly enriches existing theoretical perspectives on the JD-R framework by testing LMX as a job resource for banking employees.

In summary, the findings make a notable scholarly contribution by exploring the causes of reduced IWB and strategies to promote innovation in the banking industry, a rapidly growing industry in one of the largest developing economy. The study is among the seminal investigations at the convergence of technostress, innovation, and leadership domains in Indian banks. It also establishes a basis for future replications in various industries and regions to investigate the generalizability of these effects.

The following section encompasses an exhaustive review of relevant literature around the theoretical foundations of this study and the proposed hypotheses. Then, the authors summarise the research design, data and methodologies. The following section elaborates on the findings of the measurement and structural model assessments. Following sections propose implications and scholarly trajectories for future investigations.

2. Literature review

2.1. Theoretical background

2.1.1. Job demands-resources model

Work engagement has been fundamentally characterised as "a positive, fulfilling, work-related state of mind that is characterised by vigour, dedication, and absorption" (p. 74) (Schaufeli et al., 2002). It has attracted significant scholarly inquiry as it was predicted to be a more robust indicator of job performance than other attitudinal variables, namely organisational commitment and job satisfaction (e.g., Rich et al., 2010). JD-R theory encapsulates a dynamic representation of the interaction between work environment conditions namely job demands and job resources, with work engagement. It has a subsequent impact on the employee well-being and job performance (Bakker et al., 2003). Especially in the post-pandemic era, the JD-R framework has been the underpinning of many research studies on occupational stress and technostress to study the effects of technology in service encounters

(Christ-Brendemühl & Schaarschmidt, 2020).

Owing to the harmonious alignment of physical, emotional and cognitive energies, work engagement can positively influence IWB (Hakanen, Perhoniemi, & Toppinen-Tanner, 2008,Hakanen, Schaufeli, & Ahola, 2008). The trifecta nature of engagement encompassing vigour, dedication, and absorption aligns well with promoting innovative behaviour, which encapsulates "a change-oriented iteration of idea generation, promotion, and realisation to achieve something different and/or unprecedented" (Kwon & Kim, 2020).

Job demands at the workplace can be grouped into two categories: challenge demands and hindrance demands. Hindrance demands can constrict an individual's growth and slow down the accomplishment of goals. Challenge demands can promote personal growth and strategic objectives realization (Cavanaugh et al., 2000; Schaufeli & Taris, 2014). Further, the prevailing circumstances at the workplace can act as resources or demands/stressors for the employees (Demerouti et al., 2001). Employees find it difficult to effectively manage the continuous adaptations emanating from implementing technologies in an organisation and suffer technostress (Tarafdar et al., 2010). Technostress can reduce work engagement (Bakker et al., 2003), leading to exhaustion at the workplace (Gaudioso et al., 2017) and subsequent burnout (Maier et al., 2019). Technology-related stressors can, hence, be identified as hindrance demands caused by specific technology characteristics under consideration (Taser et al., 2022). There is a dearth of academic investigation on the potential influence of hindrance demands created by ICT adoption in organisations (Taser et al., 2022). Hence, we aim to offer insights to bridge this gap by framing technostress as a hindrance demand that has an adverse influence on employee engagement and IWB, as premised by the JD-R theory.

2.1.2. Social exchange theory (SET)

The conceptual foundation of SET is grounded on the norm of reciprocity (Gouldner, 1960). It postulates that an employee's relationship with the leader involves a mutually beneficial reciprocal exchange. The employee would feel obliged to reciprocate with favourable outcomes on receipt of support and benefits from the leader. The LMX theory is hinged on the SET and offers a foundational model for probing the associations between employees and their leaders. It states that workers embedded in high-quality leader-member dyads manifest amplified innovative potential than employees who experience a low-quality dyadic association because they receive challenging tasks and subsequent support and encouragement from the leaders (Tierney, 2008).

In line with the SET, the employees may demonstrate high work engagement when the leaders fulfil their social-psychological needs (Gruman & Saks, 2011). Though prior research established LMX as a key variable influencing employees' IWB, the scholarly exploration of leadership-innovation associations remains in nascent stage (Lee, 2008). Hence, the authors propose to further bolster this stream of research by investigating the moderating role of LMX on the indirect association between technostress and IWB via work engagement, grounded on the SET and JD-R theoretical frameworks.

2.2. Hypothesis development

2.2.1. Technostress and innovative work behaviour

Scholars have conducted significant research to explore the conceptual framework of stress as a psychological response to environmental attributes (MacIntyre et al., 2020). Alarmingly, more than half of all workers that suffer from extreme stress levels, while more than two-thirds face various complications in their jobs due to high-stress levels (Karatepe et al., 2018).

A few scholarly investigations explored the effect of diverse stress constructs on various employee innovation and performance-related constructs and established a clear linkage between stress and innovation. For example, Ren and Zhang (2015) found that stress negatively influenced innovative behaviour in the context of dominant factors like job insecurity. It was further established that job stress and employee innovation can have a negative association (Bani-Melhem et al., 2020; Montani & Staglianò, 2022). The prior scholarly investigation discovered that technostress negatively influences technology-enabled innovation and performance (Chandra et al., 2019; Tarafdar et al., 2015). Montani et al. (2020) explored the effect of workload on IWB through work engagement.

However, the academic landscape presents ample opportunity for a rigorous examination of the influence of technostressors on ICT-enabled employee innovation (Chandra et al., 2019). Past inquiries on elucidating the interrelationships between various types of stress, such as job stress or technostress, with innovative work behaviour are limited (Rafique et al., 2022). It has become even more pertinent to model this association in the backdrop of COVID-19 and its after-effects. The pandemic has given rise to teleworking and other hybrid working models enabled by the rapid proliferation of technologies in the organisation's workflows and processes (Marsh et al., 2022). The study of various technostressors such as techno-overload, techno-invasion and techno-complexity has become even more relevant as employees face negative consequences emanating from the work-life boundary attenuation. Increasing depression, anger and anxiety at work can deplete the employee creativity (Talaee et al., 2022). It can also cause increased stress, reduced energy and innovation ability. Additionally, JD-R theory provides a suitable frame to posit workplace technostressors as hindrance demands (Taser et al., 2022) which can impact the IWB of bank employees. The research intends to bridge the scarcity of literature on the influence of hindrance demands resulting from ICT implementation (Taser et al., 2022). Thus, the study hypothesises:

H1. Technostress is negatively related to the innovative work behaviour of employees.

2.2.2. Technostress and innovative work behaviour - mediating role of work engagement

Bank employees interface with customers, provide value-added and quality services and help them choose the right financial products (Iqbal et al., 2018). Customer service experience and value creation are fundamentally contingent upon employee attitudes and behaviours (Ghlichlee & Bayat, 2021). Hence, banks focus on creating a conducive environment to promote positive employee behaviours and outcomes such as enhanced work engagement (Wirtz & Jerger, 2016). High engagement is linked to proactiveness, quality work outcomes and a tendency to display in-role and extra-role behaviours (Bakker & Leiter, 2010; Hakanen, Perhoniemi, & Toppinen-Tanner, 2008; Karatepe, 2013). On the contrary, the failure of employees to innovate can be attributed to employee fatigue and burnout due to pervasive stressful demands and paucity of job resources (Christian et al., 2011).

Scholars have established the negative influence of technostress on employee engagement (Raza et al., 2022; Wu et al., 2022). Current inquiry posits the framing of technostress as a hindrance demand which can debilitate an employee's growth (Cavanaugh et al., 2000; Schaufeli & Taris, 2014). Besides, these demands are created by specific characteristics of information technologies, such as overload, complexity and invasiveness (Taser et al., 2022), which gradually exhaust individuals and cause burnout (Mahapatra & Pati, 2018).

Grounding itself in the JD-R framework, this research postulates that technostress can affect innovative work behaviour through a mediation process involving employees' work engagement. The theory posits that employee well-being is affected by a delicate equilibrium of job demands and job resources (Schaufeli & Taris, 2014). A disequilibrium between these work environment conditions can further affect their willingness and ability to drive innovative customer outcomes. Predicated on this robust theoretical framework and empirical evidence, the study hypothesises the mediation role of work engagement between technostress and IWB.

Hence, the study posits the following three hypotheses:

H2a. Technostress is negatively related to work engagement.

H2b. Work engagement is positively related to innovative work behaviour.

H2c. Work engagement acts as a mediator between technostress and innovative work behaviour.

2.2.3. LMX and its association with technostress, work engagement and innovative work behaviour

Past scholarly instances have primarily explored either the effect of LMX on IWB or its indirect effect through a mediator. They confirmed that leaders who exhibit empowering behaviour and have a positive social exchange with their employees drive employee-driven innovation (Echebiri & Amundsen, 2021). Similarly, other scholarly examinations have also established the direct influence of LMX on IWB (Hussain et al., 2019; Stoffers et al., 2019). A parallel line of inquiry has elucidated the indirect effect of LMX on IWB at the workplace (Bani-Melhem et al., 2022; Garg & Dhar, 2017; Hapsari et al., 2019; Mustafa et al., 2023; Park & Jo, 2018). Moreover, empirical (Sargent & Terry, 2000) and meta-analytic evidence (Harms et al., 2017) supports the contention that lower stress levels can be ascribed to a high-quality LMX association. Daily encouragement and support from the leaders can create a perception of a less stressful work environment by their subordinates (Lyons & Schneider, 2009). This study posits LMX as a crucial moderating variable that can influence the indirect effect of technostress on IWB. This proposition finds its underpinnings in the LMX perspective, grounded in the SET. The theory states that leaders tend to develop high-quality dyadic associations with employees, which leads to an increased sense of loyalty, a shared identity and a feeling of mutual support. In low-quality social exchanges, the relationship is characterised by transactional and short-term interactions. Thus, LMX acts as a noteworthy contextual and anchor variable against which employees pay heed to what their leaders aspire to or value. Hence, employees with a high-quality dyadic association with the leaders secure better access to their time, support and resources which is crucial for superior innovation capabilities. Conversely, in a low-quality association, employees perceive poor support for their aspirations, values and goals, which can weaken the positive engagement-innovation relationship (Erdogan et al., 2006; Maslyn & Uhl-Bien, 2001; Walumbwa et al., 2011). Additionally, the JD-R framework supports the conceptualisation of LMX as a potential job resource that can help employees cope with job demands and reduce burnout and stress, influencing job outcomes (Xia et al., 2022). These leaders in banking industry can provide sufficient job resources, such as decreased ambiguity, support and appreciation, to buffer against the job demands and provide a strong communication and feedback loop around the existence and perception of these stressors (Gregory & Osmonbekov, 2019). Conversely, a supervisor with poor leadership skills can potentially affect subordinates' health and stress levels by placing them in difficult situations and providing them with insufficient job resources (Blanchard, 1993). Hence, the theoretical foundations of JD-R and SET robustly substantiate the proposition that LMX can influence the direct and indirect effects of technostress on IWB.

To the best of our informed assessment, the academic literature demonstrates a paucity of investigations into the association between LMX and its moderating influence on the impact of technostress on IWB. This points to a significant research gap, particularly relevant to a technology-intensive and high-pressure industry like banking. Hence, we hypothesise:

H3a. LMX moderates the relationship between technostress and IWB, such that the relationship weakens when LMX is high and strengthens when LMX is low.

H3b. The indirect relationship of technostress on IWB via work engagement is conditional on LMX. The indirect effect is weaker for managers who report high LMX.

2.3. Theoretical model

Grounded in the proposed hypotheses, the study posits the research model for exploring technostress's direct and indirect influence on IWB. Further, it investigates the moderating role of LMX on the association between technostress and IWB.

The theoretical background dictates the directions of the paths in the research model (Fig. 1).

3. Data and methodology

The present research leveraged a descriptive research design, utilising online and offline surveys, to test the proposed model. The target population included employees in the Indian banking industry, selected through convenience sampling. It included employees of all ages and from private and public sector banks. Large-scale and leading banks, such as HDFC Bank Ltd. and SBI Bank Ltd., were enlisted to capture broad-based and widely applicable trends. The minimum sample size requirement was determined by leveraging the G*Power algorithm (Faul et al., 2009). The threshold was set at the recommended power 0.80 (Cohen, 1988). Additionally, an effect size of 0.05 and a significance level of 5 % were chosen. The software suggested a minimum sample size of 159. This study proposed a sample size of 270, significantly above the minimum threshold.

Consequently, the sample used for analysis ($N = 270$) consisted primarily of employees in front-line roles in the retail bank branches. Thorough data screening was performed to filter out the incomplete responses and the responses from individuals that did not match the sample criterion. As a result, a data set of $N = 250$ data points was obtained. Table 1 provides the categorisation of the sample characteristics. To analyse the research framework, partial least squares structural equation modelling (PLS-SEM) was leveraged for examining SEM indices (Lohmöller, 1989; Sarstedt et al., 2017; Wold, 1982). The PLS-SEM algorithm has been extensively adopted in business management studies (Richter et al., 2016), information systems research (Roldán & Sánchez-Franco, 2012), and behavioural sciences (Hair et al., 2019). It is a superior technique for testing mediation effects in a research framework (Cepeda-Carri'on et al., 2017). The study utilises the SmartPLS 4 software to analyse data (Ringle et al., 2015). Bootstrapping analysis with 10,000 random samples and a two-tailed test was performed to test significance. The study investigated common method bias (CMB) in the dataset. All inner variance inflation factor (VIF) values (for a model including all latent variables as predictors of a random dependent variable) were <3.3, hence indicating insignificant CMB (Kock, 2015).

The moderated-mediation analysis was conducted to evaluate the conditional effect of LMX on the indirect effect of technostress on IWB through work engagement, utilising the PROCESS module in SmartPLS 4 (Model 59; Hayes, 2017). Employing this module offers statistical evidence for the conditional indirect effect within the research model. The significance of the moderated-mediation effects was evaluated using a 95 % bias-corrected confidence interval based on 5000 samples. A significant moderated-mediation effect was confirmed if the confidence interval did not include zero (Hayes, 2017).

3.1. Measures

A five-point Likert-type format was used for measuring the chosen constructs. Respondents rated the items of innovative work behaviour, LMX, technostress and work engagement on a five-point Likert scale anchored from 1 (strongly disagree) to 5 (strongly agree).

A nine-item Utrecht Work Engagement Scale (UWES) (Schaufeli et al., 2006) was deployed to assess the mediating variable - Work Engagement. A typical sample item in the questionnaire is “At my work, I feel bursting with energy”. The nine-item scale for innovative work behaviour was suggested by Janssen (2000). A typical sample item in the questionnaire is “I always create new ideas for improvement in work.”.

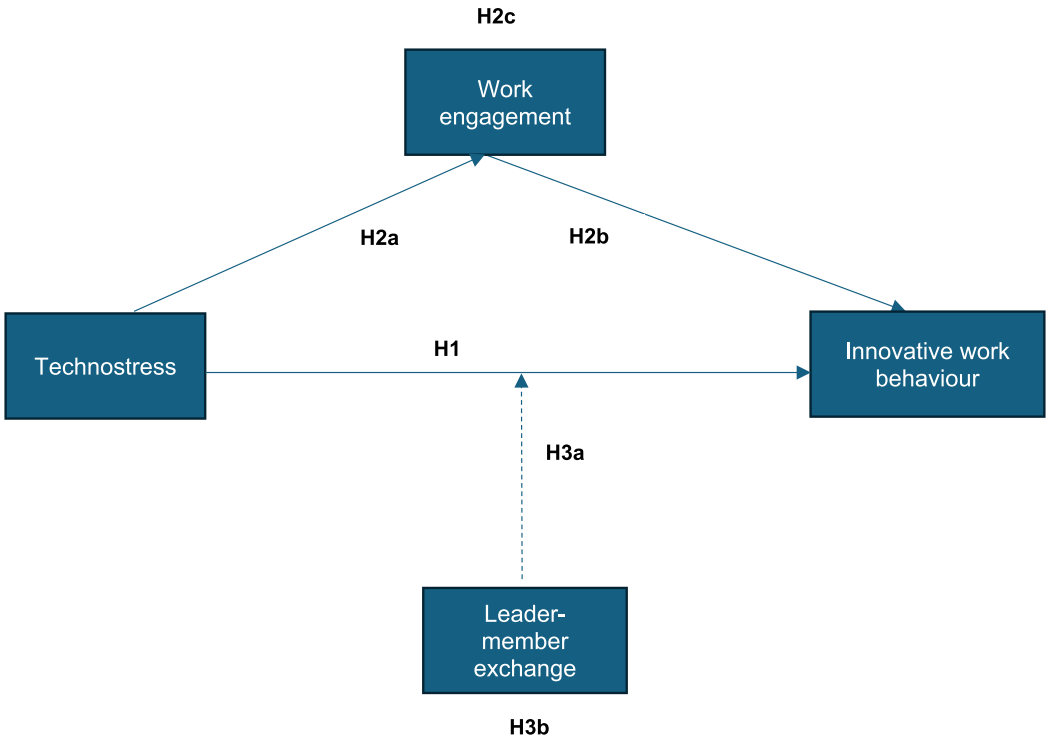


Fig. 1. The proposed research model.

Table 1
Demographic statistics of the sample.

	Frequency	Percent
Gender		
Male	195	78 %
Female	55	22 %
Education		
Graduate	55	22 %
Post graduate and others*	195	78 %
Age		
<25 years	32	12.8 %
25 to 35 years	132	52.8 %
35 to 45 years	69	27.6 %
45 and above years	17	6.8 %
Total	250	100 %

Source: Author's calculations.
* *Note*. Includes professional degrees such as Chartered Accountant.

The seven-item scale (Graen & Uhl-Bien, 1995) was used for LMX measurement. A sample item is "My leader fully understands my potentials.".

An adapted version of the technostress scale was leveraged from Tarafdar et al. (2007). For the analysis, the 22-item scale measures technostress through five technostressors: techno–overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). A sample item is 'I am forced by this technology to work much faster.' Based on an initial pilot qualitative study with banking employees, it was found that two technostressors, namely techno-invasion and techno-uncertainty, are less applicable in the Indian banking context. The front-line employees are required to spend long hours in the banks. Additionally, most of the roles require them to work from the branch to access confidential data and perform their duties. Hence, techno-invasion is less applicable in their context. Also, the core technologies or the core banking systems are not undergoing significant changes and many peripheral and communication technologies are embedded in the new adoption use cases. Hence, the employees are relatively less bothered by techno-uncertainty as a technostressor. Thus, this study adopted a contextually robust version of the technostress scale by adopting three relevant technostressors: techno–overload, techno-complexity, and techno-insecurity, with 15 items.

4. Empirical analysis

4.1. Measurement model assessment

The analysis and evaluation of the measurement model were aligned with the assessment guidelines laid down by Hair et al. (2022) and Hair et al. (2019). It includes four crucial analyses: indicator level consistency, reliability and convergent and discriminant validity. To assess the indicator reliability, the loadings for the indicators were measured for the four reflective constructs included in this study. All the indicator loadings exceeded the suggested value of 0.70 (Table 2), confirming the sufficiency of the indicator reliability in the research model (Sarstedt et al., 2017). Secondly, composite reliability and ρA were measured to assess internal consistency. The values for composite reliability and ρA lie in the range of 0.70 and 0.95 for LMX, supporting its internal consistency reliability (Hair et al., 2019). However, the values of innovative work behaviour, work engagement and technostress constructs were above 0.95, indicating the possibility of semantically redundant items for measuring the constructs (Hair et al., 2022). Hence, the items for these constructs were examined for high correlation, and the item with the highest correlation in each of these constructs was removed. The updated values of ρA for the above three constructs were equal to or below the threshold of 0.95. Average variance extracted (AVE) was measured to evaluate the convergent validity in PLS. All the constructs in the research model had an AVE value higher than the suggested minimum value of 0.5 (Table 3), suggesting satisfactory convergent validity of all four constructs. Finally, the heterotrait-monotrait ratio of correlations (HTMT) values were measured to assess the discriminant

Table 2
Measurement items and factor loadings for the constructs in the theoretical model.

Construct	Measurement items	Sources	Factor loadings
Innovative Work Behaviour	I create new ideas for improvement in work	Janssen's (2000)	0.844
	*I search out for new working methods, techniques or instruments		
	I generate original solutions for problems		0.858
	I mobilize support for my innovative ideas		0.870
	I acquire approvals for my innovative ideas		0.843
	I try to make key organisational members enthusiastic about my innovative ideas		0.844
	I transform innovative ideas into useful applications		0.861
	I introduce my innovative ideas in the work environment in a systematic way		0.858
	I evaluate the utility of my innovative ideas at work		0.895
Work Engagement	At my work, I feel bursting with energy	Schaufeli et al. (2006)	0.849
	*At my job, I feel strong and vigorous		
	When I get up in the morning, I feel like going to work		0.817
	I am enthusiastic about my job		0.827
	My job inspires me		0.863
	I am proud of the work that I do		0.820
	I feel happy when I am working intensely		0.857
	I am immersed in my work		0.878
	I get carried away when I'm working		0.884
Leader-Member Exchange	I know whether my leader is satisfied with my work or not	Graen and Uhl-Bien (1995)	0.809
	My leader understands my job problems and needs		0.874
	My leader recognizes my potential		0.841
	Regardless of his/her formal authority, my leader uses his/her power to help me solve my problems at work		0.868
	Regardless of his/her formal authority, my leader helps and supports me at his/her expense		0.828
	I have enough confidence to defend and justify my leader's decisions if he/she is not present to do so		0.831
	I have an effective working relationship with my leader		0.868
Technostress	I am forced by this technology to work much faster	Tarafdar et al. (2007)	0.735
	I am forced by this technology to do more work than I can handle		0.821
	I am forced by this technology to work with very tight time schedules		0.766
	I am forced to change my work habits to adapt to new technologies		0.796
	I have a higher workload because of increased technology complexity		0.776
	I do not know enough about this technology to handle my job satisfactorily		0.746
	I need a long time to understand and use new technologies		0.775
	I do not find enough time to study and upgrade my technology skills		0.731
	*I find new recruits in my organisation know more about computer technology than I do		
	I often find it too complex for me to understand and use new technologies		0.770
	I feel constant threat to my job security due to new technologies		0.811
	I have to constantly update my skills to avoid being replaced		0.805
	I feel threatened by coworkers with newer technology skills		0.803
	I do not share my knowledge with my coworkers for fear of being replaced		0.828

Note. All items were measured on a 5-point Likert scale. The original scale ranged from 1 (lowest response) to 5 (highest response).
* *Note*. marked items indicate deleted items with highest correlation with other items.

Table 3
Reliability and validity.

Construct	Cronbach's alpha	rhoA (ρ_A)	Composite Reliability	Average Variance Extracted
Innovative Work Behaviour	0.949	0.950	0.958	0.738
Leader-Member Exchange	0.934	0.935	0.946	0.715
Technostress	0.947	0.948	0.953	0.612
Work Engagement	0.945	0.945	0.954	0.722

validity of the constructs. Table 4 posits that all values were found to be lesser than the suggested limit value of 0.85, as prescribed by Henseler et al. (2015). Cross loadings of all the items vis-à-vis their constructs were also examined (Table 5), and it was ascertained that the items had higher loadings corresponding to their respective constructs. Hence, the overall measurement validity of the model was satisfactorily established.

4.2. Assessment of the structural model

The study follows the guidelines as laid by Hair et al. (2019); Hair et al., 2022) for assessing the structural model. This entails examining aspects such as ensuring the absence of collinearity issues in the model, assessing the relationships' path coefficients and evaluating the research model's explanatory and predictive power (Hair et al., 2020). The current study adopted the bootstrapping procedure with 10,000 bootstraps

Table 4
Heterotrait-monotrait (HTMT) ratio of correlations.

Construct	Innovative Work Behaviour	Leader-Member Exchange	Technostress	Work Engagement
Innovative Work Behaviour				
Leader-Member Exchange	0.566			
Technostress	0.683	0.693		
Work Engagement	0.695	0.609	0.679	

Table 5
Table of cross loadings.

	Innovative work behaviour	Leader-member exchange	Technostress	Work engagement
IWB1	**0.844**	0.504	−0.603	0.563
IWB3	**0.858**	0.444	−0.583	0.584
IWB4	**0.870**	0.421	−0.528	0.569
IWB5	**0.843**	0.388	−0.496	0.544
IWB6	**0.844**	0.452	−0.516	0.559
IWB7	**0.861**	0.519	−0.569	0.551
IWB8	**0.858**	0.455	−0.585	0.548
IWB9	**0.895**	0.495	−0.589	0.608
LMX1	0.455	**0.809**	−0.501	0.423
LMX2	0.413	**0.874**	−0.498	0.458
LMX3	0.447	**0.841**	−0.526	0.484
LMX4	0.497	**0.868**	−0.585	0.529
LMX5	0.458	**0.828**	−0.621	0.470
LMX6	0.419	**0.831**	−0.542	0.494
LMX7	0.474	**0.868**	−0.590	0.528
TComp1	−0.488	−0.492	**0.746**	−0.444
TComp2	−0.467	−0.469	**0.775**	−0.516
TComp5	−0.504	−0.548	**0.770**	−0.509
TLoad1	−0.468	−0.492	**0.735**	−0.502
TLoad2	−0.535	−0.563	**0.821**	−0.488
TLoad3	−0.476	−0.479	**0.766**	−0.465
TLoad4	−0.456	−0.481	**0.796**	−0.494
TLoad5	−0.528	−0.500	**0.776**	−0.500
TSec1	−0.549	−0.537	**0.811**	−0.568
TSec2	−0.561	−0.477	**0.805**	−0.536
TSec3	−0.502	−0.558	**0.803**	−0.499
TSec4	−0.591	−0.590	**0.828**	−0.573
Tcomp3	−0.475	−0.452	**0.731**	−0.434
WE1	0.527	0.478	−0.545	**0.849**
WE3	0.534	0.469	−0.529	**0.817**
WE4	0.571	0.457	−0.511	**0.827**
WE5	0.575	0.517	−0.555	**0.863**
WE6	0.531	0.495	−0.554	**0.820**
WE7	0.599	0.524	−0.576	**0.857**
WE8	0.573	0.487	−0.548	**0.878**
WE9	0.564	0.466	−0.559	**0.884**

Note. Bold values represent cross loading of items pertaining to their respective constructs to represent discriminant validity at the item level.

to determine the *p*-value of the hypotheses. Age, gender and education were hypothesised as control variables. Further, the study found that the effects of age, gender and education on innovative work behaviour, the dependent variable, were insignificant. All the VIF values were <3.33, indicating that collinearity was insignificant (Diamantopoulos, 2008; Hair et al., 2017). Rasoolimanesh et al. (2017) and Shahi et al. (2021) proposed a value of 0.2 for R^2 as an acceptable lower limit in Social Sciences studies. The R^2 of innovative work behaviour, the endogenous construct, was significant at 0.528. The path coefficients were discovered to be statistically significant ($p < 0.01$). Additionally, the f^2 effect sizes were low except for work engagement with a moderate f^2 effect (Table 6). Future researchers studying IWB can consider work engagement as an essential independent variable in their research models. The model fit index SRMR value (Hair et al., 2020) of 0.054 for the estimated model was below the recommended threshold of 0.08, establishing an excellent explanatory power.

Fig. 2 outlines a negative association between technostress and IWB (ß = −0.368), implying high technostress reduces IWB. Also, increasing technostress reduces work engagement (ß = -0.644). Reducing work engagement reduces innovative work behaviour (ß =0.389). Hence, hypotheses H1, H2a, and H2b are proved.

Additionally, for establishing the out-of-sample predictive relevance of the research model for IWB, $PLS_{predict}$ (Danks & Ray, 2018; Shmueli et al., 2019) was leveraged. It yielded positive Q_2 values (Table 8). RMSE values were compared against the linear model benchmark as the prediction errors were symmetrically distributed. The results indicated that $RMSE_{LM}$ values were higher than $RMSE_{PLS}$ values for most indicators (Table 8), indicating a moderate to high predictive power for IWB (Hair et al., 2019).

The current inquiry further incorporated an assessment of mediating role of work engagement in PLS-SEM, which involved multiple analysis steps. Firstly, the indirect effect was assessed. Then, the bootstrapping approach was utilised to determine the direct effect for evaluating the strength and significance of the associations. Further, the type of mediation is determined by the direction and significance of the direct effects (Cepeda-Carri'on et al., 2017). The analysis indicated that the direct and indirect effects were significant and negative, indicating a complementary partial mediation (Table 6), supporting hypothesis H2c. Table 7 provides the summary of all direct effects. The study established that technostress has a direct effect (ß = -0.368) and an indirect effect (ß = −0.251) on employees' innovative work behaviour via their engagement.

Next, the moderating effect exerted by LMX on the association between technostress and IWB was tested. It involved conducting a simple slope analysis to assess the influence of moderator. This influence was measured at mean level, high level (one SD above the mean) and low level (one SD below the mean) (Aiken & West, 1991). LMX showed a mild moderating effect as the negative relation between technostress and IWB was dampened with an increase in LMX. However, as depicted in Table 6, the influence exerted by LMX as a moderator was insignificant on the association between technostress and IWB, hence the hypothesis H3a is not supported. Current research recommends further exploration of this moderation relationship in different contexts to establish generalisation.

A moderated mediation analysis was performed to investigate the conditional indirect effect of technostress on IWB through work engagement. Specifically, this analysis assessed the indirect effect at representative values of the moderator to explore the conditions (i.e., low, medium, and high) under which mediation occurs or does not occur (Hayes, 2017; Preacher et al., 2007). As presented in Table 9, the conditional indirect effect is significant and weaker at higher LMX levels, while it is significant but stronger at lower LMX levels, supporting hypothesis H3b.

5. Results and discussion

This research meaningfully advances scholarly understanding of the interconnected dynamics between technostress, IWB, and LMX. The research extends contemporary academic knowledge via four critical

Table 6
Structural model assessment.

Outcome	Hypothesis		Std. beta	Confidence interval	Significance?	f^2	VIF
IWB (R^2 = 0.528)	H1 (−)	TS➔IWB	−0.368	[−0.512;-0.195]	Yes	0.108	2.658
	H2b (+)	WE➔IWB	0.389	[0.260;0.517]	Yes	0.173	1.846
	H2c	TS➔WE➔IWB	−0.251	[−0.345;-0.165]	Yes		
	H3a (+)	LMXxTS➔IWB	0.037	[−0.049;0.120]	No	0.003	1.590
WE (R^2 = 0.415)	H2a (−)	TS➔WE	−0.644	[−0.715;-0.553]	Yes	0.710	1.000

Note. Confidence interval = 95 % bootstrap confidence interval, IWB = innovative work behaviour, WE = work engagement, TS = technostress, LMX = leader-member exchange.
Path coefficient (*$p < 0.01$, **$p < 0.05$, ***$p < 0.001$).

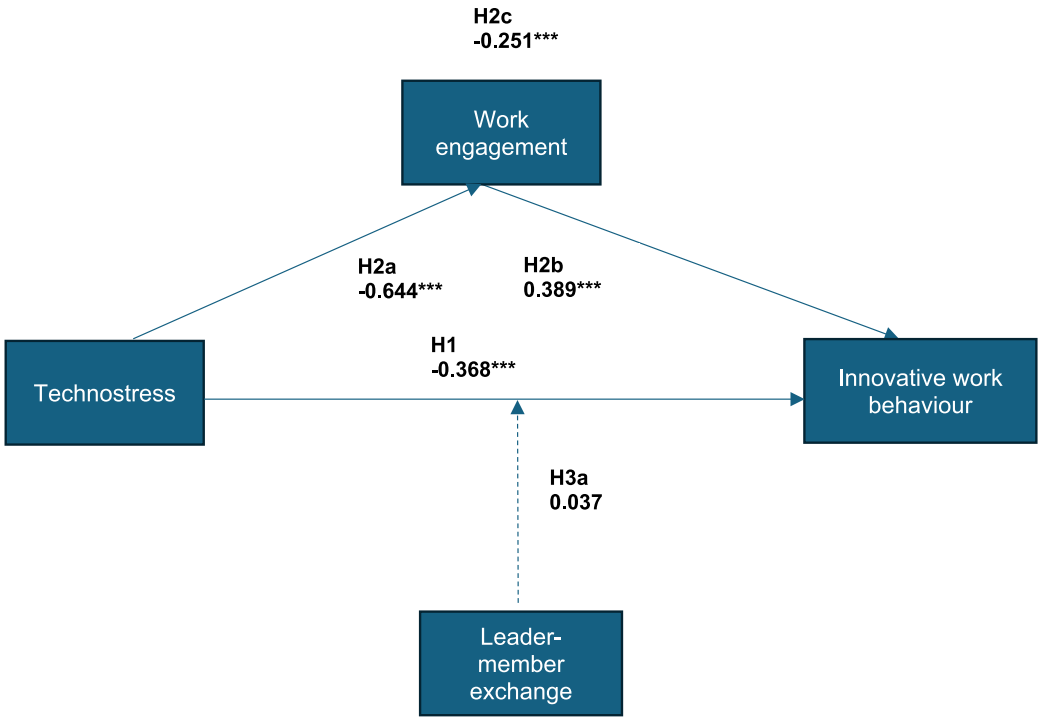


Fig. 2. *Theoretical model and results*
Note. *** = $p < 0.01$.

Table 7
Total effects.

Hypothesis		Std. beta	Confidence interval	Significance
H2a (−)	TS➔WE	−0.644	[−0.715;-0.553]	Yes

Note. Confidence interval = 95 % bootstrap confidence interval.

Table 8
PLS predict analysis results.

Construct	Indicator	PLS		LM	PLS-LM
		RMSE	$Q^2_{predict}$	RMSE	RMSE
Innovative work behaviour	IWB1	0.995	0.363	1.020	−0.025
	IWB3	1.076	0.335	1.111	−0.035
	IWB4	1.055	0.272	1.102	−0.047
	IWB5	1.119	0.234	1.171	−0.052
	IWB6	1.141	0.268	1.201	−0.060
	IWB7	0.991	0.334	1.020	−0.029
	IWB8	1.069	0.335	1.087	−0.018
	IWB9	1.072	0.351	1.101	−0.029

pathways.

First, this study critically extends existing scholarly discourse by validating the inverse association between technostress and innovative behaviour for the bank employees. This is a timely and pertinent research finding for Indian banks operating against the contextual realities imposed by COVID-19 and striving to achieve strategic innovation by leveraging their human capital and ICT implementation. Current academic discourse has predominantly explored the association between IWB and other stress-related constructs such as pandemic job stress, work-related stress, mobile workplace stress and role stressors (Bani-Melhem et al., 2018; Bani-Melhem et al., 2020; Montani et al., 2017; Rafique et al., 2022; Wang et al., 2021). The research offers an initial investigation on the association between technostress and IWB at the workplace. Additionally, there is a limited literature with mixed findings on the job stress-IWB relation (Rafique et al., 2022). Hence, our findings contribute to the ongoing debate on whether stress facilitates or inhibits innovation by suggesting that technostress—unlike general job stress—predominantly hinders IWB in the banking industry. Future scholars can investigate the U-shaped technostress-innovation relationships to understand the non-linear influence of job demands on job outcomes.

Second, empirical evidence confirmed that higher technostress reduced work engagement. Moreover, reducing engagement led to a decrease in IWB at the workplace. These observations align with prior studies confirming the positive influence exerted by work engagement on IWB (Christian et al., 2011; Hakanen, Schaufeli, & Ahola, 2008) and the negative association of technostress with work engagement (Raza et al., 2022; Wu et al., 2022). This scholarly exploration validates these observations for Indian banks. Furthermore, the research enhances existing research by demonstrating that technostress indirectly influences IWB via work engagement. The empirical analysis established the mediating influence of work engagement when assessing the effect of technostress on IWB. These actionable insights on work engagement are crucial for Indian banking organisations striving for rapid results and

Table 9
Result of conditional indirect effect of LMX (TS➔WE➔IWB conditional on LMX).

	Sample mean	Standard deviation	Confidence interval	T statistic	Significance?
TS➔WE➔IWB conditional on LMX at -1SD	−0.193	0.059	[−0.328; −0.096]	3.259	Yes
TS➔WE➔IWB conditional on LMX at +1SD	−0.234	0.051	[−0.343; −0.142]	4.531	Yes
TS➔WE➔IWB conditional on LMX at Mean	−0.214	0.051	[−0.328; −0.126]	4.130	Yes

Note. Confidence interval = 95 % bootstrap confidence interval.

target achievements. The swift and extensive adoption of technology contributes to technostress, which may diminish employee engagement and contribute to burnout. Consequently, this can adversely impact key organisational outcomes, including employee innovative behaviour. Future scholars can validate this finding in the context of manufacturing organisations, as there may be sectoral differences in innovation characteristics.

Third, prior studies have primarily focused on exploring the direct causal relationship of LMX with innovative work behaviour (e.g. Atwater & Carmeli, 2009), the indirect positive influence via work engagement (e.g., Garg & Dhar, 2017) and as a construct with positive moderating influence on work engagement-IWB relationship in the telecommunication sector in China (Aryee et al., 2012). This study advances such exploration by investigating the positive moderating influence exerted by LMX on the negative effect of technostress on IWB. An examination of the direct interaction effect indicates an insignificant moderation by LMX on the direct association between technostress and IWB. These results suggest that under conditions of intense technostress, employees may not change their innovative behaviour even if they experience elevated levels of reciprocal engagement with their superiors. In addition to promoting strong leadership behaviours, banks need to take more direct and proactive steps to manage technostress itself (e.g., better technology, training, streamlined processes, and support). This observation may be ascribed to the phenomenon that in the Indian banking industry, leaders are more focused on job-specific near-term target achievements. Employee-driven innovation does not happen on its own, as leaders need to exert constant impetus to inspire and motivate their subordinates to consider employee innovation as a strategic organisational priority (Echebiri & Amundsen, 2021). Moreover, the leaders are less aware of the employee stress induced by ICT implementation. Consequently, organisational leadership fails to provide adequate job resources to mitigate the technological stressors that function as significant job demands.

LMX does exert a conditional effect on the adverse influence of technostress on IWB via work engagement. A high-quality LMX can moderate against the adverse impact of technostress by creating a supportive environment and empowering the employee to deal with these stressors, which results in higher engagement and, therefore, higher IWB. Thus, unlike the direct effect, the indirect effect of technostress on IWB is reduced in high LMX conditions compared to low LMX conditions. By uncovering the unique and intricate association between technostress, leader-member exchange, and IWB, this research enriches the existing literature and offers a practical perspective for the banking industry. The current study acknowledges the moderation effect's contextual constraints, primarily attributable to the distinctive evolutionary trajectory of the Indian banking sector's technological landscape. Our findings underscore the necessity for comprehensive cross-industry investigations and comparative research across diverse geographical contexts in the future.

Fourth, several technostress studies (Christ-Brendemühl & Schaarschmidt, 2020; Rayburn et al., 2021; Taser et al., 2022) during the COVID-19 period leveraged the Job Demands-Resources (JD-R) theory. Current research enhances the JD-R framework by empirically validating the integrated conceptualisation of LMX as a potential job resource moderating the negative influence of technostress as a job demand on IWB as the intended job outcome via work engagement. Furthermore, it contributes to Social Exchange Theory (Blau, 1964) by demonstrating that high-quality LMX fosters resilience against technology-induced stress by promoting employee engagement and enhancing innovative potential at work. Though scholars have acknowledged the importance of 'service innovation' research in the banking industry (Fujii et al., 2014), there is a paucity of empirical investigations in studying the innovative behaviour of banking employees (Garg & Dhar, 2017; Saxena & Prasad, 2023). The study suggests that LMX-based interventions could serve as strategic tools to sustain innovation amid digital disruptions. Exploring the causes of technostress and its mitigation to promote the IWB of employees in an industry experiencing unprecedented growth in a developing economy, is a vital contribution of this research.

5.1. Practical implications

The article provides insightful practical implications relevant to strategic and policy decision-makers. The dataset on Indian banking employees pointed to a high mean level of technostress. Additionally, it indicated low mean levels of work engagement and IWB of bank employees. This is problematic as Indian banks have implemented various technology initiatives during and post-pandemic to promote innovation as an edge over the competition. The research established a direct and indirect link between technology-induced stress and innovation at an employee level. This implies that IT and human resource managers in organisations need to be mindful of the stress induced by ICTs when planning and implementing the roadmaps for new ICTs. Merely focusing on technological advancements without addressing the human side and the quality of LMX relationships can negatively affect employees' innovative work behaviour. Organisations should prioritise technological systems and tools that are intuitive, user-friendly, and designed to reduce cognitive overload and complexity. Additionally, organisations can incorporate mitigation and stress intervention mechanisms for individual technostressors in the organisational workflows and processes to boost IWB. This also holds for current ICT implementations, and the managers can periodically assess and monitor the employees' stress levels to ensure minimal deviations from the standards.

Secondly, implementing positive leader-follower relationships in organisations can further decrease technostress. This is essential as this study found a low mean value for leader-member exchange. This result has noteworthy inferences for bank managers and operational supervisors. They must realise that in a fiercely competitive industry, bank employees withstand intense psychological strain to learn and implement technological changes and deliver superior customer service. To motivate them and increase their engagement, the managers need to articulate an employee's work linkages with the broader organisational goals and vision. They need to promote frequent one-on-one and team conversations with the employees to provide support and address any concerns and issues of employees. This can give employees a sense of self-importance and increase their engagement (Gruman & Saks, 2011). Managers should provide a psychologically safe environment where their subordinates can discuss the technological challenges they face without fear of judgment or sanctions. A holistic approach to technostress mitigation in the banking industry is needed, which includes investment in user-friendly technologies, providing adequate training and resources to users and leaders, and establishing clear guidelines for technology use.

Third, the existence of positive association between work engagement and IWB points to the need for necessary interventions to enhance the work engagement of employees. Human resource managers can monitor employees' vigour and dedication through organisational climate surveys or manager feedback surveys. Then, they can develop and implement engagement strategies such as flexible work schedules, well-being programs, personalised training sessions, etc., tailored to individual specific needs aligned with their digital work demands. Additionally, they can implement necessary rewards and incentives, ergonomic and adaptive digital workspaces, stress-reducing interventions, opportunities for professional growth, and establish suitable channels for feedback for addressing individual concerns and problems.

6. Limitations and suggestions for future research

The hypothesised relations were analysed in the backdrop of the banking industry in India, a developing country. It implies potential scope exists for validating and generalising the research model in the

context of other industries and developing and developed economies. Future scholars can also focus on broadening the scope of this study to include other industries in financial services, such as insurance, mutual funds, and other allied services.

Future research can leverage longitudinal research designs to evaluate time-dependent changes in the relationships between technostress and its inhibitors and assess the long-term chronic effects of technostressors (Rayburn et al., 2021). It can also explore interventionist approaches to allow pre and post-inhibitor implementation tests. Methodically, this study leveraged the first-order conceptualisation of technostress. Future scholarly works can leverage the second-order modelling of technostress to assess the different interaction effects of technostressors on the endogenous construct. Our research design incorporated controls for critical demographic factors influencing innovative work behaviour. This opens avenues for subsequent scholarly investigations to incorporate the influence of demographic variables on other key constructs, such as technostress and leader-member exchange. Additionally, the scholars can focus on integrating theoretical constructs pertaining to diverse leadership types, such as transformational leadership etc. (Amankwah-Amoah et al., 2021) and other inhibitors of technostress, such as organisational support, and support from co-workers (Jain et al., 2024).

CRediT authorship contribution statement

Sweta Jain: Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Virajanand Varma:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Tata Sai Vijay:** Writing – review & editing, Visualization, Supervision, Conceptualization. **Clement Cabral:** Writing – review & editing, Visualization, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that there is no competing interest.

Data availability

The data that has been used is confidential.

References

Ahinful, A. A., Opoku Mensah, A., Koomson, S., Cobblah, C., Takyi, G., & Kwarteng, A. H. (2024). Achieving banking industry innovation performance using total quality management: An empirical study. *The TQM Journal.*. https://doi.org/10.1108/TQM-10-2023-0327

Ahinful, A. A., Opoku Mensah, A., Koomson, S., Nyarko, F. K., & Nkrumah, E. (2023). A conceptual framework of total quality management on innovation performance in the banking sector. *The TQM Journal, 36*(4), 1193–1211. https://doi.org/10.1108/TQM-11-2022-0334

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* London: Sage.

Amankwah-Amoah, J., Khan, Z., Wood, G., & Knight, G. (2021). COVID-19 and digitalization: The great acceleration. *Journal of Business Research, 136*, 602–611. https://doi.org/10.1016/j.jbusres.2021.08.011

Aryee, S., Walumbwa, F. O., Zhou, Q., & Hartnell, C. A. (2012). Transformational leadership, innovative behavior, and task performance: Test of mediation and moderation processes. *Human Performance, 25*(1), 1–25. https://doi.org/10.1080/08959285.2011.631648

Atwater, L., & Carmeli, A. (2009). Leader–member exchange, feelings of energy, and involvement in creative work. *The Leadership Quarterly, 20*(3), 264–275. https://doi.org/10.1016/j.leaqua.2007.07.009

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology, 22*(3), 309–328. https://doi.org/10.1108/02683940710733115

Bakker, A. B., Demerouti, E., De Boer, E., & Schaufeli, W. B. (2003). Job demands and job resources as predictors of absence duration and frequency. *Journal of Vocational Behavior, 62*(2), 341–356. https://doi.org/10.1016/S0001-8791(02)00030-1

Bakker, A. B., & Leiter, M. P. (2010). *Work engagement: A handbook of essential theory and research.* Psychology Press.

Bani-Melhem, S., Abukhait, R. M., & Mohd. Shamsudin, F.. (2020). Does job stress affect innovative behaviors? Evidence from Dubai five-star hotels. *Journal of Human Resources in Hospitality & Tourism, 19*(3), 344–367. https://doi.org/10.1080/15332845.2020.1737769

Bani-Melhem, S., Al-Hawari, M. A., & Quratulain, S. (2022). Leader-member exchange and frontline employees' innovative behaviors: The roles of employee happiness and service climate. *International Journal of Productivity and Performance Management, 71*(2), 540–557. https://doi.org/10.1108/IJPPM-03-2020-0092

Bani-Melhem, S., Zeffane, R., & Albaity, M. (2018). Determinants of employees' innovative behavior. *International Journal of Contemporary Hospitality Management, 30*(3), 1601–1620. https://doi.org/10.1108/IJCHM-02-2017-0079

Blanchard, M. (1993). Managing for wellness: There is no substitute for healthy boss-subordinate relationships. *Executive Excellence, 10*, 8.

Blau, P. M. (1964). *Exchange and power in social life.* New York, NY: John Wiley.

Cavanaugh, M. A., Boswell, W. R., Roehling, M. V., & Boudreau, J. W. (2000). An empirical examination of self-reported work stress among U.S. *Managers. Journal of Applied Psychology, 85*(1), 65–74.

Cepeda-Carri'on, G., Nitzl, C., & Rold'an, J. L. (2017). Mediation analyses in partial least squares structural equation modeling: Guidelines and empirical examples. In H. Latan, & R. Noonan (Eds.), *Partial least squares path modeling* (pp. 173–195). Cham: Springer. https://doi.org/10.1007/978-3-319-64069-3_8

Chandra, S., Shirish, A., & Srivastava, S. C. (2019). Does technostress inhibit employee innovation? Examining the linear and curvilinear influence of technostress creators. *Communications of the Association for Information Systems, 44*(1), 299–331. https://doi.org/10.17705/1CAIS.04419

Christ-Brendemühl, S., & Schaarschmidt, M. (2020). The impact of service employees' technostress on customer satisfaction and delight: A dyadic analysis. *Journal of Business Research, 117*, 378–388. https://doi.org/10.1016/j.jbusres.2020.06.021

Christian, M. S., Garza, A. S., & Slaughter, J. E. (2011). Work engagement: A quantitative review and test of its relations with task and contextual performance. *Personnel Psychology, 64*(1), 89–136. https://doi.org/10.1111/j.1744-6570.2010.01203

Cohen, J. (1988). *Statistical power for the behavioral sciences.* Hillsdale, NJ: Erlbaum.

Danks, N. P., & Ray, S. (2018). Predictions from partial least squares models. In F. Ali, S. M. Rasoolimanesh, & C. Cobanoglu (Eds.), *Applying partial least squares in tourism and hospitality research* (pp. 35–52). Emerald Publishing Limited. https://doi.org/10.1108/978-1-78756-699-620181003.

Deloitte. (2022). Mental health and well-being in the workplace. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-mental-health-2022-report-noexp.pdf.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology, 86*(3), 499–512. https://doi.org/10.1037/0021-9010.86.3.499

Diamantopoulos, A. (2008). Formative indicators: Introduction to the special issue. *Journal of Business Research, 61*(12), 1201–1202.

Echebiri, C. K., & Amundsen, S. (2021). The relationship between leadership styles and employee-driven innovation: The mediating role of leader–member exchange. *Evidence-Based HRM: A Global Forum for Empirical Scholarship, 9*(1), 63–77. https://doi.org/10.1108/EBHRM-10-2019-0091

Erdogan, B., Liden, R. C., & Kraimer, M. L. (2006). Justice and leader-member exchange: The moderating role of organizational culture. *Academy of Management Journal, 49*(2), 395–406.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Fujii, H., Managi, S., & Matousek, R. (2014). Indian bank efficiency and productivity changes with undesirable outputs: A disaggregated approach. *Journal of Banking & Finance, 38*, 41–50. https://doi.org/10.1016/j.jbankfin.2013.09.022

Garg, S., & Dhar, R. (2017). Employee service innovative behavior: The roles of leader-member exchange (LMX), work engagement, and job autonomy. *International Journal of Manpower, 38*(2), 242–258. https://doi.org/10.1108/IJM-04-2015-0060

Gaudioso, F., Turel, O., & Galimberti, C. (2017). The mediating roles of strain facets and coping strategies in translating techno-stressors into adverse job outcomes. *Computers in Human Behavior, 69*, 189–196. https://doi.org/10.1016/j.chb.2016.12.041

Ghlichlee, B., & Bayat, F. (2021). Frontline employees' engagement and business performance: The mediating role of customer-oriented behaviors. *Management Research Review, 44*(2), 290–317. https://doi.org/10.1108/MRR-11-2019-0482

Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American Sociological Review, 25*(2), 161. https://doi.org/10.2307/2092623

Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *The Leadership Quarterly, 6*(2), 219–247. https://doi.org/10.1016/1048-9843(95)90036-5

Gregory, B., & Osmonbekov, T. (2019). Leader–member exchange and employee health: An exploration of explanatory mechanisms. *Leadership and Organization Development Journal, 40*(6), 699–711. https://doi.org/10.1108/LODJ-11-2018-0392

Gruman, J. A., & Saks, A. M. (2011). Performance management and employee engagement. *Human Resource Management Review, 21*(2), 123–136. https://doi.org/10.1016/j.hrmr.2010.09.004

Hair, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*, 101–110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3 ed.). Thousand Oaks, CA: Sage.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hakanen, J. J., Perhoniemi, R., & Toppinen-Tanner, S. (2008). Positive gain spirals at work: From job resources to work engagement, personal initiative and work-unit innovativeness. *Journal of Vocational Behavior, 73*(1), 78–91. https://doi.org/10.1016/j.jvb.2008.01.003

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The job demands-resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress, 22*(3), 224–241. https://doi.org/10.1080/02678370802379432

Hapsari, C., Stoffers, J., & Gunawan, A. (2019). The Influence of Generational Diversity Management and Leader–Member Exchange on Innovative Work Behaviors Mediated by Employee Engagement. Journal of Asia-Pacific Business, 20(2), 125–139. doi:https://doi.org/10.1080/10599231.2019.1610684.

Harms, P. D., Credé, M., Tynan, M., Leon, M., & Jeung, W. (2017). Leadership and stress: A meta-analytic review. *The Leadership Quarterly, 28*(1), 178–194. https://doi.org/10.1016/j.leaqua.2016.10.006

Hayes, A. F. (2017). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach* (Second edition). Guilford Publications.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hussain, T., Iren, P., & Rice, J. (2019). Determinants of innovative behaviors among self-initiated expatriates. *Personnel Review, 49*(2), 349–369. https://doi.org/10.1108/PR-09-2018-0321

IBEF. (2023). Banking. https://www.ibef.org/industry/banking-india.

Iqbal, M., Nisha, N., & Rashid, M. (2018). Bank selection criteria and satisfaction of retail customers of Islamic banks in Bangladesh. *International Journal of Bank Marketing, 36*(5), 931–946. https://doi.org/10.1108/IJBM-01-2017-0007

Jain, S., Varma, V., Vijay, T. S., & Cabral, C. (2024). Technostress at workplace: Antecedents, decisions and outcomes (ADO) and future research pathways through a systematic literature review. *Asian Journal of Business Research, 14*(3).

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness and innovative work behaviour. *Journal of Occupational and Organizational Psychology, 73*(3), 287–302. https://doi.org/10.1348/096317900167038

Karatepe, O. M. (2013). High-performance work practices and hotel employee performance: The mediation of work engagement. *International Journal of Hospitality Management, 32*, 132–140. https://doi.org/10.1016/j.ijhm.2012.05.003

Karatepe, O. M., & Aga, M. (2016). The effects of organization mission fulfillment and perceived organizational support on job performance: The mediating role of work engagement. *International Journal of Bank Marketing, 34*(3), 368–387. https://doi.org/10.1108/IJBM-12-2014-0171

Karatepe, O. M., Yavas, U., Babakus, E., & Deitz, G. D. (2018). The effects of organizational and personal resources on stress, engagement, and job outcomes. *International Journal of Hospitality Management, 74*, 147–161. https://doi.org/10.1016/j.ijhm.2018.04.005

Kindström, D., Kowalkowski, C., & Sandberg, E. (2013). Enabling service innovation: A dynamic capabilities approach. *Journal of Business Research, 66*(8), 1063–1073. https://doi.org/10.1016/j.jbusres.2012.03.003

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration (ijec), 11*(4), 1–10.

Koomson, S. (2024). Do total quality management and external factors matter? The effect of innovation behaviour on innovation performance in banks. *European Business Review,, 36*(6), 981–996. https://doi.org/10.1108/EBR-01-2024-0037

Kwon, K., & Kim, T. (2020). An integrative literature review of employee engagement and innovative behavior: Revisiting the JD-R model. *Human Resource Management Review, 30*(2), Article 100704. https://doi.org/10.1016/j.hrmr.2019.100704

Lee, J. (2008). Effects of leadership and leader-member exchange on innovativeness. *Journal of Managerial Psychology, 23*(6), 670–687. https://doi.org/10.1108/02683940810894747

Lohmöller, J.-B. (1989). *Latent variable path modeling with partial least squares.* Heidelberg: Physica.

Lyons, J. B., & Schneider, T. R. (2009). The effects of leadership style on stress outcomes. *The Leadership Quarterly, 20*(5), 737–748. https://doi.org/10.1016/j.leaqua.2009.06.010

MacIntyre, P. D., Gregersen, T., & Mercer, S. (2020). Language teachers' coping strategies during the Covid-19 conversion to online teaching: Correlations with stress, wellbeing and negative emotions. *System, 94*, Article 102352. https://doi.org/10.1016/j.system.2020.102352

Mahapatra, M., & Pati, S. P. (2018, June). Technostress creators and burnout: A job demands-resources perspective. In *proceedings of the 2018 ACM SIGMIS conference on computers and people research.* 70-77.

Maier, C., Laumer, S., Wirth, J., & Weitzel, T. (2019). Technostress and the hierarchical levels of personality: A two-wave study with multiple data samples. *European Journal of Information Systems, 28*(5), 496–522. https://doi.org/10.1080/0960085X.2019.1614739

Marsh, E., Vallejos, E. P., & Spence, A. (2022). The digital workplace and its dark side: An integrative review. *Computers in Human Behavior, 128*, Article 107118. https://doi.org/10.1016/j.chb.2021.107118

Maslyn, J. M., & Uhl-Bien, M. (2001). Leader–member exchange and its dimensions: Effects of self-effort and other's effort on relationship quality. *Journal of Applied Psychology, 86*(4), 697–708. https://doi.org/10.1037/0021-9010.86.4.697

Montani, F., Courcy, F., & Vandenberghe, C. (2017). Innovating under stress: The role of commitment and leader-member exchange. *Journal of Business Research, 77*, 1–13. https://doi.org/10.1016/j.jbusres.2017.03.024

Montani, F., & Staglianò, R. (2022). Innovation in times of pandemic: The moderating effect of knowledge sharing on the relationship between COVID-19-induced job stress and employee innovation. *R&D Management, 52*(2), 193–205. https://doi.org/10.1111/radm.12457

Montani, F., Vandenberghe, C., Khedhaouria, A., & Courcy, F. (2020). Examining the inverted U-shaped relationship between workload and innovative work behavior: The role of work engagement and mindfulness. *Human Relations, 73*(1), 59–93. https://doi.org/10.1177/0018726718819055

Mustafa, G., Mubarak, N., Khan, J., Nauman, M., & Riaz, A. (2023). Impact of leader-member exchange on innovative work behavior of information technology project employees; role of employee engagement and self-efficacy. *Employee Responsibilities and Rights Journal, 35*(4), 581–599. https://doi.org/10.1007/s10672-022-09429-y

Niti Ayog (2022). Workforce Changes and Employment (Some findings from PLFS Data Series).

Park, S., & Jo, S. J. (2018). The impact of proactivity, leader-member exchange, and climate for innovation on innovative behavior in the Korean government sector. *Leadership and Organization Development Journal, 39*(1), 130–149. https://doi.org/10.1108/LODJ-09-2016-0216

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research, 42*(1), 185–227. https://doi.org/10.1080/00273170701341316

Pwc (2020). Retail Banking 2020 Evolution or Revolution.

Rafique, M. A., Hou, Y., Chudhery, M. A. Z., Waheed, M., Zia, T., & Chan, F. (2022). Investigating the impact of pandemic job stress and transformational leadership on innovative work behavior: The mediating and moderating role of knowledge sharing. *Journal of Innovation & Knowledge, 7*(3), Article 100214. https://doi.org/10.1016/j.jik.2022.100214

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research, 19*(4), 417–433. https://doi.org/10.1287/isre.1070.0165

Rasoolimanesh, S. M., Jaafar, M., Kock, N., & Ahmad, A. G. (2017). The effects of community factors on residents' perceptions toward world heritage site inscription and sustainable tourism development. *Journal of Sustainable Tourism, 25*(2), 198–216. https://doi.org/10.1080/09669582.2016.1195836

Rayburn, S. W., Badrinarayanan, V., Anderson, S. T., & Gupta, A. (2021). Continuous techno-training and business-to-business salesperson success: How boosting techno-efficacy enhances sales effort and performance. *Journal of Business Research, 133*, 66–78. https://doi.org/10.1016/j.jbusres.2021.04.066

Raza, A., Ishaq, M. I., Zia, H., & ur-Rehman, Z., & Ahmad, R.. (2022). Technostressors and service employees outcomes: A longitudinal study. *The Service Industries Journal, 42*(13–14), 1030–1053. https://doi.org/10.1080/02642069.2022.2081685

Ren, F., & Zhang, J. (2015). Job stressors, organizational innovation climate, and Employees' innovative behavior. *Creativity Research Journal, 27*(1), 16–23. https://doi.org/10.1080/10400419.2015.992659

Rich, B. L., Lepine, J. A., & Crawford, E. R. (2010). Job engagement: Antecedents and effects on job performance. *Academy of Management Journal, 53*(3), 617–635. https://doi.org/10.5465/amj.2010.51468988

Richter, N. F., Cepeda Carrión, G., Roldán, J. L., et al. (2016). European management research using partial least squares structural equation modeling (PLS-SEM): Editorial. *European Management Journal, 34*(6), 589–597.

Ringle, C. M., Wende, S., & Becker, J.-M. (2015). *SmartPLS 3.* Bön- ningstedt: SmartPLS.

Roldán, J. L., & Sánchez-Franco, M. J. (2012). Variance-based structural equation modeling: Guidelines for using partial least squares in information systems research. In M. Mora, O. Gelman, A. L. Steenkamp, et al. (Eds.), *Research methodologies, innovations and philosophies in software systems engineering and information systems* (pp. 193–221). IGI Global: Hershey, PA.

Sargent, L. D., & Terry, D. J. (2000). The moderating role of social support in Karasek's job strain model. *Work & Stress, 14*(3), 245–261. https://doi.org/10.1080/02678370010025568

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2017). Partial least squares structural equation modeling. In C. Homburg, M. Klarmann, & A. Vomberg (Eds.), *Handbook of market research.* Heidelberg: Springer.

Saxena, A., & Prasad, A. (2023). Exploring the influence of dimensions of workplace spirituality on innovative work behaviour: Role of sense of god. *International Journal of Ethics and Systems, 39*(2), 183–212.

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-National Study. *Educational and Psychological Measurement, 66*(4), 701–716. https://doi.org/10.1177/0013164405282471

Schaufeli, W. B., Salanova, M., Lez-Roma, V. G., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies, 3*(1), 71–92.

Schaufeli, W. B., & Taris, T. W. (2014). A critical review of the job demands-resources model: Implications for improving work and health. In G. F. Bauer, & O. Hämmig (Eds.), *Bridging occupational, organizational and public health: A transdisciplinary approach* (pp. 43–68). Netherlands: Springer. https://doi.org/10.1007/978-94-007-5640-3_4.

Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal, 37*(3), 580–607. https://doi.org/10.2307/256701

Selimović, J., Pilav-Velić, A., & Krndžija, L. (2021). Digital workplace transformation in the financial service sector: Investigating the relationship between employees'

expectations and intentions. *Technology in Society, 66*, Article 101640. https://doi.org/10.1016/j.techsoc.2021.101640

Shahi, S. K., Shiva, A., & Dia, M. (2021). Integrated sustainable supply chain management and firm performance in the Indian textile industry. *Qualitative Research in Organizations and Management: An International Journal, 16*(3/4), 614–635. https://doi.org/10.1108/QROM-03-2020-1904

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J.-H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. *European Journal of Marketing, 53*(11), 2322–2347. https://doi.org/10.1108/EJM-02-2019-0189

Stoffers, J., Hendrikx, K., Habets, O., & Van Der Heijden, B. (2019). Employability and innovative work behaviours in SMEs in a Euroregion: A cross-national comparison between Belgium and the Netherlands. *Personnel Review, 49*(1), 167–187. https://doi.org/10.1108/PR-10-2018-0387

Talaee, N., Varahram, M., Jamaati, H., Salimi, A., Attarchi, M., Kazempour Dizaji, M., … Seyedmehdi, S. M. (2022). Stress and burnout in health care workers during COVID-19 pandemic: Validation of a questionnaire. *Journal of Public Health, 30*(3), 531–536. https://doi.org/10.1007/s10389-020-01313-z

Tarafdar, M., Pullins, E. B., & Ragu-Nathan, T. S. (2015). Technostress: Negative effect on performance and possible mitigations. *Information Systems Journal, 25*(2), 103–132. https://doi.org/10.1111/isj.12042

Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2007). The impact of technostress on role stress and productivity. *Journal of Management Information Systems, 24*(1), 301–328. https://doi.org/10.2753/MIS0742-1222240109

Tarafdar, M., Tu, Q., & Ragu-Nathan, T. S. (2010). Impact of technostress on end-user satisfaction and performance. *Journal of Management Information Systems, 27*(3), 303–334. https://doi.org/10.2753/MIS0742-1222270311

Taser, D., Aydin, E., Torgaloz, A. O., & Rofcanin, Y. (2022). An examination of remote e-working and flow experience: The role of technostress and loneliness. *Computers in Human Behavior, 127*, Article 107020. https://doi.org/10.1016/j.chb.2021.107020

Thakur, R., & Hale, D. (2013). Service innovation: A comparative study of US and Indian service firms. *Journal of Business Research, 66*(8), 1108–1123.

Tierney, P. (2008). Leadership and employee creativity. In J. Zhou, & C. E. Shalley (Eds.), *Handbook of organizational creativity* (pp. 95–123). New York, NY: Erlbaum.

Walumbwa, F. O., Cropanzano, R., & Goldman, B. M. (2011). How leader–member exchange influences effective work behaviors: Social exchange and internal–external efficacy perspectives. *Personnel Psychology, 64*(3), 739–770. https://doi.org/10.1111/j.1744-6570.2011.01224

Wang, X., Zhang, Z., & Chun, D. (2021). How Does Mobile Workplace Stress Affect Employee Innovative Behavior? The Role of Work–Family Conflict and Employee Engagement. *Behavioral Science, 12*(1), 2. https://doi.org/10.3390/bs12010002

Wirtz, J., & Jerger, C. (2016). Managing service employees: Literature review, expert opinions, and research directions. *The Service Industries Journal, 36*(15–16), 757–788. https://doi.org/10.1080/02642069.2016.1278432

Wold, H. O. A. (1982). Soft modeling: The basic design and some extensions. In K. G. Jöreskog, & H. O. A. Wold (Eds.), *Systems under indirect observations: Part II* (pp. 1–54). Amsterdam: North- Holland.

Wu, W., Chin, W., & Liu, Y. (2022). Technostress and the smart hospitality employee. *Journal of Hospitality and Tourism Technology, 13*(3), 404–426. https://doi.org/10.1108/JHTT-01-2021-0032

Xia, N., Ding, S., & Yuan, J. (2022). The impact of a challenging work environment: Do job stressors benefit citizenship behavior of project managers? *International Journal of Project Management, 40*(3), 205–217. https://doi.org/10.1016/j.ijproman.2022.01.007

Yu, Q., Yen, D. A., Barnes, B. R., & Huang, Y. A. (2019). Enhancing firm performance through internal market orientation and employee organizational commitment. *The International Journal of Human Resource Management, 30*(6), 964–987.

Mehta, A. K., Purohit, D., Trivedi, P., & Panda, R. (2023). Outcomes of psychological contract breach for banking employees during COVID-19 pandemic: moderating role of learned helplessness. *International Journal of Sociology and Social Policy, 43*(11/12), 1008–1028. https://doi.org/10.1108/IJSSP-11-2022-0288