

The Effect of the Dimensions of Technostress on Work Exhaustion and Contextual Performance of Employees Working Remotely. Technophobia as a Moderator

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Abstract

Technological advancements have led to stress and other psychological problems in workers working remotely. The current study investigated the effect of techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty on work exhaustion and contextual performance by employees working remotely. It furthermore examined the moderating role of technophobia. This quantitative study was based mainly on the Technostress Theory. A questionnaire was used to collect primary data while employing positivist philosophy and a deductive approach. The study population included 184

employees working remotely in Mumbai. The collected data from the respondents were analyzed descriptively using SPSS; furthermore, SmartPLS was used to conduct structural and measurement models analyses. Overall, the findings indicate that only techno-invasion and techno-insecurity had a significant effect on work exhaustion. Additionally, work exhaustion had no statistically significant effect on workers' contextual performance, while technophobia failed to moderate the relationship between technostress dimensions and work exhaustion. These findings suggest that the presence of technostress does not always function as a stressor related to psychological distress, nor does technophobia necessarily increase the psychological impacts of technostress when working virtually. The findings of the current study provide practical and theoretical implications related to the impact of technostress on employee burnout, specifically regarding the experience of techno-invasion and techno-insecurity among employees working remotely.

Keywords: Contextual Performance, Technostress, techno invasion, techno insecurity, techno overload.

1. Introduction

Globally, the IT industry is growing at a fast rate. In line with the global growth, the Indian IT industry is growing with an approximate contribution of 7.55 to India's GDP. India's Information Technology (IT) industry has proven to be one of the fastest-growing sectors in India's continuously expanding economy. The IT industry is slated to grow at an annual revenue of USD 245 billion by 2023 (IBEF, 2025). By 2025, India is also expected to export USD 210 billion worth of IT products. In addition, by 2027, the technology expenditure will reach USD 54.5 billion, creating the highest in the Asia Pacific. The net employment generated during this period by the IT sector reached 126,000 in 2025. This brought the total workforce in the sector to 5.80 million (NASSCOM, 2025).

In the IT sector, working remotely is increasing (Basu, 2025). Employees in the IT sector are also putting in longer hours online, while facing mounting expectations of availability, productivity, and flexibility (Singh, 2025). India Technology News (2025) reported that remote work is now a permanent feature. Telecommuting and working remotely have created a major change in how organizations operate and how they attract talent, but the rise of remote or hybrid work cultures has also resulted in some challenges. While telecommuting and working remotely can provide lower costs, greater productivity, and larger talent pools, working remotely has also created challenges related to work-life balance, as well as increased levels of workplace-related stress and performance issues (India Technology News, 2025). According to the study, it has been reported that 60% of the Indian workforce has reported feeling burnt out from the blurring of lines between work and leisure time. In addition, telecommuting has contributed to longer working hours due to the blurring of boundaries between professional life and personal life and has therefore created increased levels of workplace-related stress, as well as limited opportunities for social interaction. Furthermore, telecommuting has been identified as one of the main causes of post-work employee stress and burnout (Prasad et al., 2023).

Technostress has emerged as a negative mental and emotional experience when employees

are unable to manage technology requirements (Brod, 1984). There are five dimensions of the technostress construct (Tarafdar et al., 2007). The ETtech (2025) survey reported that 83% of Indian IT professionals suffer from symptoms of burnout, with more than 70% working more than 48 hours a week (ETtech, 2025). Remote working has further increased the effect of technostress due to the reduction of work-life separation, increase in screen time, and social isolation from colleagues (Deep, 2023). Past studies have revealed that technostress as a whole is significantly related to work exhaustion in remote employees (Rahman and Singh, 2024). The current literature does not provide much information regarding how each dimension affects the work exhaustion of remote employees in the IT sector; therefore, this study will investigate how these subdimensions of technostress affect the work-related exhaustion experienced by remote workers in the same industry.

Technostress can also affect the performance of employees either directly or indirectly through other constructs such as work exhaustion (Nayak and Budhwar, 2022). The study found that technostress was significantly related to performance and other outcomes. Most past studies are on the impact of work burnout or stress on employee performance. There is a dearth of studies that examined the effect of technostress on contextual performance specifically. Contextual performance focuses on the discretionary behavior of employees, such as cooperating with others (Borman and Motowidlo, 1997). This study will fill in the gap by studying the impact of the dimensions of technostress on work exhaustion and on the contextual performance of employees working remotely.

This study is made more unique with the inclusion of technophobia as a moderator. Technophobia is referred to as fear or anxiety towards new devices and technologies, as an irrational fear, anxiety, or aversion toward advanced technologies or complex devices that can affect their job (Khwanseh, 2018). Past studies have been done on technophobia as a moderator, but there is a lack of studies that have specifically shown technophobia as a moderator between the respective dimensions of technostress and work exhaustion experienced by employees working remotely. Therefore, this study will examine whether technophobia is a moderating factor based on the above.

Based on the above, there has been limited consideration in the literature of the effects of each dimension of technostress on work exhaustion and contextual performance. In addition, technophobia has not been considered a moderator (i.e., moderating variable) in past studies conducted to date. This study will address this gap by providing an empirical examination of the relationships between the five dimensions of technostress and work exhaustion and contextual performance in remote IT employees located in Mumbai. Furthermore, it will assess whether or not technophobia moderates those relationships. The findings of the study will provide meaningful contributions to both academic and industry practitioners in a timely fashion and will provide insight into the effects of technostress on remote IT employees in the current working environment

Literature Review

Theoretical Support

There are three primary theoretical concepts or models that this study focuses on. The first one is Technostress Theory, which was originally defined by Brod (1984) as a relatively new phenomenon of difficulty adjusting to changing technologies. In other words, this is the ability or inability to adjust to computers and other technological changes. Tarafdar et al. (2007) built upon this work by identifying five sub-dimensions of technostress. The sub dimensions are techno-overload, techno-invasion, techno-complexity, techno-insecurity, and lastly techno-uncertainty. These 5 dimensions of technostress appear to be present in today's highly automated work environments, such as teleworking or working remotely. Next the Job Demands-Resources Theory, as described by Bakker & Demerouti (2007), describes how work-related demands such as continuous connectivity can lead to feelings of exhaustion and therefore contribute to work exhaustion of remote employees. This is attributed to the absence of sufficient personal or organisational resources. Technostress can be classified as a job demand, while insufficient recovery time or emotional support leads to burnout. The Contextual Performance Theory (Borman & Motowidlo, 1997) can be relied on to explain how emotional fatigue prevents employees from engaging in discretionary behaviours that lead to contextual performance, such as teamwork, initiative, and flexibility. The three theories form an integrated foundation for the present study. The theories also underpin the hypotheses in this study that associate technostress dimensions with both work exhaustion and contextual performance and emphasize technophobia as a potential moderator.

Relationship between Techno-Overload and Work Exhaustion of Employees

Techno-overload represents a facet of technostress that may result in reduced continuance commitment and job satisfaction (Ragu-Nathan et al., 2008). Techno-overload refers to circumstances where ICTs compel users to operate more swiftly and for extended periods. Ragu-Nathan et al. (2008) stated that techno-overload equates to role overload. It signifies increased expectations for workers, resulting in stress-inducing situations. High demands or overload for remote workers have also been linked to weariness, irritability, and poor focus (Ingusci et al., 2021). The persistent expectations to be connected and productive might affect employees with limited recovery and relaxation time (Ayyagari et al., 2011).

Generally, prior research indicated a link between techno overload and employee exhaustion and burnout (Keltenegger et al., 2023). For instance, a study with a sample of 173 participants showed that techno overload was found as a stressor contributing to employee burnout from digital technologies and technology changes (Keltenegger et al., 2023). Additionally, the authors (Hao et al., 2024) found that mastery of job climate protected against the negative impact of techno overload that affected employee performance indirectly through work exhaustion. Additionally, the study by Hao et al. (2024) further revealed that it fortifies the positive indirect effect of techno-overload on task performance through work engagement. Thus, as employees working remotely have to disconnect from the digital work environment regularly while working, this may also contribute to employee exhaustion (Supriyadi et al., 2025). However, contrary to the previous studies cited here, one study showed that techno overload does not have any negative effect on employee exhaustion

(Zhang et al., 2022).

H1: Techno-overload has a positive influence on employees working remotely.

Relationship between Techno-Invasion and Work Exhaustion of Employees

Technological or techno invasion refers to a source of constant connectivity for many Information and Communication Technology (ICT) employees. The expected level of employee availability through technology can make it difficult for ICT employees to distinguish between work and personal contexts (Ragu-Nathan et al., 2008). The lines between work and personal lives get blurred. As indicated by Zhang et al. (2022), being constantly present and available (or “on”) creates a culture where disconnection from work mentally is challenging. Furthermore, employees, even at home, being interrupted by work due to elevated levels of demand from work, can result in burnout. Research has demonstrated that there is a relationship between techno-invasion and work exhaustion. For example, in a sample size of 378 employees, Dong et al. (2024) found that techno-invasion was a positive predictor of emotional exhaustion. Dalli et al. (2022) studied 135 employees and found a positive relationship between techno-invasion and employee cognitive/affective strain, which was negatively impacting job performance. Sadaf et al. (2022) studied 332 employees and found that techno-invasion had a significant impact on psychological distress.

H2: Techno-invasion has a significant effect on the work exhaustion of employees.

The relationship between Techno-Complexity and Work Exhaustion of employees

Techno-complexity is another dimension of technostress, and according to Ragu-Nathan et al. (2008), techno-complexity involves situations where the complexity of ICTs leads to employee feelings of inadequacy in their computer skills. It also creates situations where employees must invest additional time and effort to learn how to use these technologies. Previous research has shown that techno complexity has a strong positive effect on employees' level of burnout. Ragu-Nathan et al. (2008) found ample evidence that techno complexity was a strong predictor of employee burnout and exhaustion. Consiglio et al. (2023) also found sufficient evidence that techno complexity creates stress and leads to employee burnout, particularly for remote workers. Bondanini et al. (2020) concluded that the psychological demands of employees trying to catch up with complex ICT systems result in high levels of mental fatigue. In addition, employees who do not have enough time to take breaks will also be at risk for burnout. Employees who feel excluded and need to catch up experience increased psychological pressure, leading to high levels of employee exhaustion (Yasinta et al., 2024).

H3: Techno-complexity has a significant impact on the work exhaustion of employees.

Relationship between Techno-Uncertainty and Work Exhaustion of Employees

Techno-uncertainty is another sub-dimension of technostress that stresses the continuous ICT changes that make employees anxious and lead to uncertainty. The feeling of uncertainty forces them to continuously educate themselves about new advances in ICTs (Ragu-Nathan et al., 2008). Ragu-Nathan (2008) explained that techno uncertainty is like role ambiguity. In

both situations, employees feel ambiguity about expectations and outcomes linked to conditions that cause stress. McGovern (2021) stated that due to the high frequency of advances in technology, employees are forced to use new systems with inadequate training. Therefore, the employees need to constantly learn and use new systems that can lead to confusion and stress. Such frequent instability or uncertainty creates emotional burnout and lower job satisfaction (McGovern, 2021). Past studies have shown that techno uncertainty harms employees psychologically (Ward et al., 2025). The outcome of a study by Ward et al. (2025) revealed that techno-uncertainty had a significant impact on the emotional and social well-being of employees. Another three-wave study of 235 employees by Wang et al. (2022) revealed that techno-uncertainty was one of the dimensions of technostress that resulted in a drop in employee well-being via work exhaustion. On the contrary, a study by Zhang et al. (2022) revealed that techno-uncertainty was not significantly related to work exhaustion.

H4: Techno-uncertainty significantly impacts the work exhaustion of employees.

Relationship between Techno-Insecurity and Work Exhaustion of employees working remotely

The last sub dimension, techno-insecurity, is linked to conditions where employees feel insecure about their jobs. They fear being left behind, replaced, or terminated due to advances in technology (Ragu-Nathan, 2008). This fear or insecurity is due to automation from ICTs or other employees who possess better knowledge of ICTs. The insecure employees tend to compare themselves with more skilled employees, and this results in stress and anxiety. The employees are more likely to get burnout as they are worried about their jobs (Yang et al., 2025). Past studies have generally shown a positive association between techno insecurity and work exhaustion (e.g., Yang et al., 2025). The study by Yang et al. (2025) of 2814 employees identified that techno insecurity was linked to a high level of burnout and mental health. Similarly, the study by Ward et al. (2025) revealed that techno-insecurity and the other dimensions of technostress were associated with work exhaustion and stress. Jungst's (2022) study further confirmed that work-related emotional exhaustion was the outcome of technological insecurity.

H5: Techno-insecurity positively and significantly affects the work exhaustion of employees.

Relationship between Work Exhaustion and Contextual Performance of Employees

According to Bakker and Demerouti (2007), Job Demands-Resources Theory, work exhaustion can be the outcome of continuous connectivity and its demands on the employee. Furthermore, when an employee has a low level of work exhaustion due to continuing connections and demands placed upon him/her by an organization will ultimately affect their performance at work, as illustrated through the use of the Maslach (2017) definition of burnout. Maslach explained that burnout is a complex and multifaceted syndrome that results from stress due to work, and this includes various symptoms such as exhaustion, cynicism, and other outcomes. Borman and Motowildo (1993) elaborate on the concept of contextual performance, which is defined as an employee's behaviors that contribute positively to the overall organization, social, and psychological environment in the workplace; this includes behaviors

such as teamwork and helping coworkers to handle additional tasks.

Past studies have shown that work exhaustion and contextual performance have a strong inverse correlation (Palenzuela et al., 2019). However, the results of the study by Palenzuela et al (2019) showed differences in the levels of contextual performance in different departments of the organization. This further shows that the degree of impact on contextual performance within different units in the same organization may differ. Lemonaki et al. (2021) further support the notion of the inverse impact of employee burnout on cognitive functioning; therefore, ultimately resulting in an inverse relationship between employee cognitive functioning and contextual performance over time.

H6: Work exhaustion negatively impacts the contextual performance of employees working remotely.

Technophobia as a Moderator between Techno-Overload and Work Exhaustion

Technophobia is demonstrated by employees in the form of fear, apprehension, or evasion of technology. Brosnan (1999) stated that technophobia refers to computer anxiety that emanates from perceived low self-efficacy and lack of skill by employees. The anxiety further influences the employees' attitudes towards the use of new technologies. Khasawneh (2018) added that technophobia is an attitude toward new technologies and is one component of computer phobia. Employees' refrainment from new technologies suggests that technophobia exists. Brosnan (1998) further added that technophobia is an outcome of affective states and cognitive appraisals by employees that affect their interaction or usage of information technology. Technophobia can be related to the Self-Efficacy Theory by Bandura (1977). This theory states that people's belief in their competence to carry out a task will influence their response. Brosnan (1999) explained that lower levels of self-efficacy exist when employees believe that they do not have the competence to use a technology. This triggers technophobia.

There is a paucity of research on the moderation effects of technophobia across both technostress and job burnout. There are other related studies where technophobia moderates the relationship (e.g., Cavdar Aksoy et al., 2020). In Cavdar Aksoy et al. (2020) study, technophobia was a moderator between performance expectancy and attitude. However, in the same study, it did not positively and significantly moderate the degree or direction of the relationship between effort expectancy and one's attitude. Novitasari & Widayani (2025) found that technophobia had a non-significant moderating effect between UTAUT constructs and behavioral intentions. Zhong et al. (2025) further found that technophobia also had no impact on the relationship between perceived usefulness and initial trust. The collective ramifications of the aforementioned studies demonstrated the ambiguous nature of technophobia as a moderator, where it can be a moderator and vice versa. The following four hypotheses derive from these findings.

H7: The relationship between techno-overload and work exhaustion is moderated by technophobia.

H8: Technophobia significantly and positively acts as a moderator between techno-invasion and work exhaustion of employees working remotely.

H9: The relationship between techno-complexity and work exhaustion is significantly moderated by technophobia

H10: Technophobia significantly moderates the relationship between techno-uncertainty and work exhaustion.

H11: Technophobia moderates the impact of techno-insecurity on work exhaustion of employees working remotely.

The conceptual framework in Figure 1 explains the relationships among the constructs in this study.

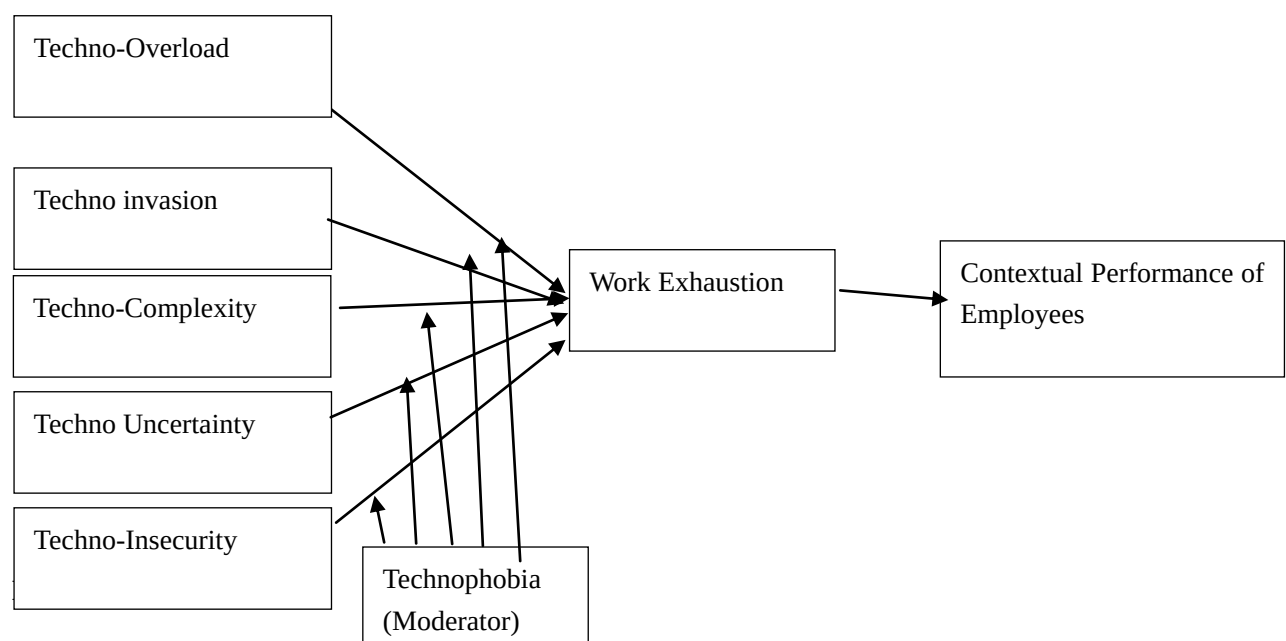


Figure 1. Conceptual framework of this study

Research Design

A quantitative study was more appropriate based on the positivist philosophy and a deductive approach, where hypotheses were developed based on theory and tested. Positivist philosophy allows researchers to induce objective, measurable knowledge through observation and study of events by means of systematic data (Saunders, Lewis & Thornhill, 2019). The deductive approach begins with established theory and tests hypotheses based on the theoretical foundations of this study. In this cross-sectional study, a ‘snapshot’ of primary data was collected using a survey strategy.

This quantitative study examined executives in the ICT sector in Mumbai. Since there wasn't a clear sampling frame and the target population was quite dispersed, convenience sampling was the method of choice. According to Green (1991), the minimum sample size needed was 110 ($N = 104 + m$, where m represents the number of independent variables). Kline (2005) noted that a sample size of 100-200 is considered medium, while Comrey and Lee (2013)

suggested that around 200 is a reasonable sample size. In this research, data were gathered from 187 respondents using convenience sampling, but three were omitted. As Cooper and Schindler (2011) pointed out, well-controlled non-probability sampling methods like convenience sampling can yield valid and meaningful results. A hybrid approach was utilized for data collection, where questionnaires were delivered by hand and electronically.

For this study, a self-administered questionnaire was created to gather data. Most of the questions were either adopted or adapted from earlier studies. The first group was demographic questions. The next group of questions focused on the five dimensions of technostress, measured using a 21-item scale developed by Ragu-Nathan et al. (2008). The work exhaustion construct was assessed with 5 items from the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981). To evaluate contextual performance, the modified or adapted 16-item scale from Koopmans et al. (2013) was used. For technophobia, a short computer anxiety scale consisting of six items (Lester et al., 2005) was used. All items were rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability and validity of all indicators (questions) were confirmed in past studies.

Data editing was done before further analysis was done. Demographic data was developed by using SPSS. Other tests to clean the data include normality testing, and outliers were identified. The measurement model and structural model testing were done using n SmartPLS. In the measurement model, reliability, validity, and multicollinearity testing were done. Bootstrapping using 5000 sub-samples was done to generate the hypothesis testing (Hair et al., 2021).

Results

Demographic Profile

There were 184 respondents. The gender split was almost even, where 50.66% being females and 49.34% being males. The respondents were divided into five age groups, showing a broad age spectrum among remote workers. The biggest percentage was over 41 years old (32.89%), followed by 32.24% of the 21-25 age group, 13.82% of the 26-30 group, and 10.53% of the 31-35 and 36-40 age groups. According to qualifications, the majority held at least a bachelor's degree, with 52.63% graduates and 40.13% postgraduates. In addition, 6.58% of them held diplomas, and only 0.66% held a doctoral degree. This justifies the highly educated nature of the remote IT workers. The experience held at work was divided as 39.47% with more than 10 years of experience, 19.74% with less than one year of experience, 17.11% with 1-3 years of experience, 13.82% with 4-6 years of experience, and 9.87% with 7-10 years of experience. The wide range of working experience means that IT remote employment in Mumbai covers professionals from all levels of their career, from new entrants to experienced experts.

Internal Consistency Reliability

The composite reliability and Cronbach's alpha values generated by the SmartPLS system were used to confirm the reliability of the data. As shown in Table 1, all the values were above 0.70. This is above the threshold or cut-off point of 0.70 that was suggested by Hair et

al. (2021). This confirmed the reliability of the data used in this study. The measures were all greater than the recommended 0.70, indicating excellent internal consistency.

Table 1. Internal Consistency Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Contextual Performance	0.937	0.946	0.944
Techno Complexity	0.827	0.876	0.877
Techno Insecurity	0.815	0.819	0.871
Techno Overload	0.848	0.905	0.889
Techno Uncertainty	0.879	0.886	0.917
Techno Invasion	0.890	0.899	0.923
Technophobia	0.903	0.929	0.925
Work Exhaustion	0.931	0.931	0.947

Convergent Validity

Based on the values generated by SmartPLS and the measurement model, a scrutiny was done to look at the factor loadings of each item. This activity ended up removing two items due to their low factor loadings. To view the average variance extracted (AVE) values for all the items and constructs, see Table 2. This was used to assess convergent validity. The benchmark that was targeted was a value of 0.50 or higher (Hair et al., 2021). As shown in Table 2, all the values comfortably exceed that 0.50 threshold. Therefore, it can be confidently confirmed that convergent validity is established.

Table 2. Convergent Validity

Variable	Average Variance Extracted (AVE)
Contextual performance	0.496
Techno-complexity	0.594
Techno-insecurity	0.575
Techno-overload	0.618
Techno-uncertainty	0.734
Techno-invasion	0.751
Technophobia	0.670
Work Exhaustion	0.783

Discriminant Validity

As stated by Henseler et al. 2015), discriminant validity refers to the establishment of distinct latent constructs in a structural equation model that truly measure different concepts. This is

the heterotrait–monotrait ratio of correlations (HTMT) values. As explained by Henseler et al. (2015), an HTMT value below 0.9 shows strong discriminant validity. As shown in Table 3, all the values are below 0.80. This means that in this study, the constructs are statistically distinguishable.

Table 3. Heterotrait-Monotrait (HTMT) Correlation Ratio

	CP	TC	TIS	TO	TU	TI	TP	WE
Contextual Performance								
T Complexity	0.161							
T Insecurity	0.153	0.569						
T Overload	0.221	0.511	0.432					
T Uncertainty	0.402	0.105	0.403	0.314				
Techno Invasion	0.174	0.491	0.550	0.698	0.377			
Technophobia	0.336	0.603	0.394	0.317	0.069	0.195		
Work Exhaustion	0.096	0.337	0.626	0.398	0.269	0.599	0.167	

Multicollinearity

The multicollinearity problem happens when the predictors are highly correlated, leading to unstable estimates. The Variance Inflation Factor or VIF value was utilized to check the existence of multicollinearity. Hair et al. (2021) suggested $VIF \leq 5.0$ as acceptable, but VIF values of less than 3.0 to ensure robust results. In this study, all the VIF values were below 5. This confirmed the absence of multicollinearity problems. The Inner Model VIF values were assessed to check the presence of common method bias as proposed by Kock (2015). As shown in Table 4, all VIF values ranged between 1.024 and 3.254, well below the conservative threshold of 3.3. The results indicate that common method bias is not a serious concern in this study.

Table 4. Inner Model Multicollinearity

	VIF
Techno Complexity -> Work Exhaustion	1.949
Techno Insecurity -> Work Exhaustion	1.951
Techno Overload -> Work Exhaustion	2.031
Techno Uncertainty -> Work Exhaustion	1.465
Techno Invasion -> Work Exhaustion	2.654
Technophobia -> Contextual Performance	1.024
Technophobia -> Work Exhaustion	1.801
Technophobia x T Complexity -> Work Exhaustion	2.363
Technophobia x T Insecurity -> Work Exhaustion	2.171
Technophobia x T Overload -> Work Exhaustion	3.128

Technophobia x T Uncertainty -> Work Exhaustion	1.470
Technophobia x Techno Invasion -> Work Exhaustion	3.254
Work Exhaustion -> Contextual Performance	1.024

Coefficients of Determination (R^2)

The R-squared value is the level of variance that is contributed by the independent variable to the outcome or dependent variable. In this study, the work exhaustion R-square value is 0.431. This means that 43.1% of the variance in work exhaustion was explained by the five dimensions of technostress. This represents a moderate level of prediction. Therefore, the predictors that are the five dimensions of technostress in this model are meaningfully related to work exhaustion of employees. The adjusted R² reduction to 0.386 is very small. This indicates that all the predictors are adding some incremental value. For contextual performance, the R-squared value of 0.127 is low. This indicates that only 12.7% of the variance in contextual performance is explained by work exhaustion. This may be due to other predictors like leadership, motivation, or work engagement. As explained by Hair et al. (2021), the low R-squared values are accepted in behavioral and organizational studies because of the complexity and multifaceted nature of human behavior.

Table 5. Coefficients of Determination (R-squared)

Variables	R-square	R-square adjusted
Contextual Performance	0.127	0.115
Work Exhaustion	0.431	0.386

Path Coefficients and Hypothesis Testing

In Table 6 and Figure 2, the level of significance for the independent variables (predictors) with respect to their effect on the dependent variable is found. H1 was not supported, as there was no significant effect of techno overload or work exhaustion ($\beta = 0.013$, $p = 0.995$). However, techno invasion was supported because there was a significant positive effect on employee remote work exhaustion ($\beta = 0.360$, $p = 0.003$), where the correlation coefficient value is 0.360. The blurring of boundaries between self, work, and family lines does affect employee exhaustion in relation to where they are working. H3 was not supported either; techno complexity was not significant ($\beta = -0.029$, $p = 0.758$). Furthermore, H4 was not supported since there was no significant effect of techno uncertainty on employee remote work exhaustion ($\beta = 0.012$, $p = 0.896$). H5 was supported because techno insecurity had a significant positive effect on employee remote work exhaustion ($\beta = 0.383$, $p < 0.000$). Techno insecurity based on the correlation coefficient had a much greater effect on employee exhaustion. H6 was not supported because there were no significant ($\beta = 0.149$, $p = 0.507$) effects between work exhaustion and contextual performance.

The next group of hypotheses was related to the moderating effect of technophobia. Technophobia had a moderate, negative, and significant direct effect on contextual

performance. This shows that employees with higher levels of technophobia will exhibit lower contextual performance or discretionary behaviour. However, technophobia did not exhibit a significant direct effect on work exhaustion. The moderating effect of technophobia between the five dimensions of technostress and work exhaustion of employees was examined. The results showed that the moderating effect of technophobia was not significant. Therefore, hypotheses H7-H11 were not supported, meaning that technophobia does not moderate the relationships between the five techno stressors and employee work exhaustion in the ICT industry. It can be interpreted that the effect of technostress dimensions stressors on work exhaustion is not significant, regardless of employees' level of technophobia.

Table 6. Path Coefficient

	Original sample	Sample mean	Standard deviation	T statistics	P values
T Complexity -> Work Exhaustion	-0.029	-0.011	0.095	0.308	0.758
Techno Insecurity -> Work Exhaustion	0.383	0.386	0.108	3.558	0.000
Techno Overload -> Work Exhaustion	0.013	0.028	0.108	0.120	0.905
Techno Uncertainty -> Work Exhaustion	0.012	0.019	0.091	0.130	0.896
Techno Invasion -> Work Exhaustion	0.360	0.350	0.121	2.967	0.003
Technophobia -> Contextual Performance	-0.355	-0.382	0.068	5.240	0.000
Technophobia -> Work Exhaustion	-0.030	-0.040	0.089	0.340	0.734
Technophobia x T Complexity -> Work Exhaustion	0.031	0.015	0.100	0.307	0.759
Technophobia x T Insecurity -> Work Exhaustion	-0.020	-0.013	0.113	0.177	0.860
Technophobia x T Overload -> Work Exhaustion	0.026	0.026	0.128	0.201	0.840
Technophobia x T Uncertainty -> Work Exhaustion	0.138	0.121	0.097	1.418	0.156
Technophobia x Techno Invasion -> Work Exhaustion	-0.098	-0.084	0.141	0.690	0.490
Work Exhaustion -> Contextual Performance	0.117	0.124	0.087	1.337	0.181

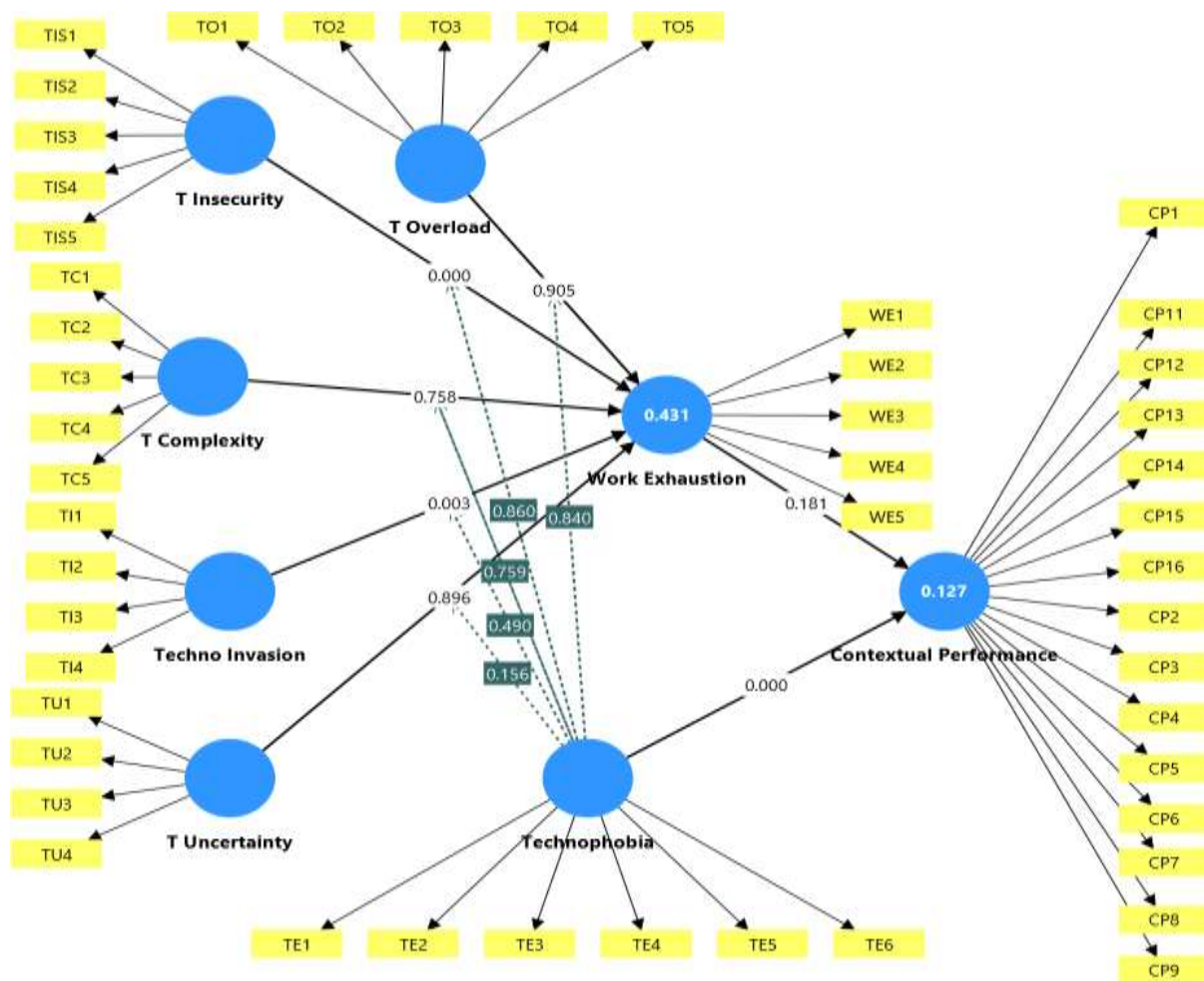


Figure 2. Path Diagram after bootstrapping

Discussion, Implications, Limitations, And Recommendations

Discussion of Findings

In the first hypothesis, it was hypothesized that techno-overload would have a positive relationship with work exhaustion. Based on the result ($\beta = 0.013$, $p = 0.905$), the hypothesis was not supported. This finding deviated from previous research results. Past research has shown that techno-overload is generally positively correlated with employee burnout (Keltenegger et al., 2023; Hao et al., 2024). However, both Zhang et al. (2022) and this study showed that techno-overload does not significantly correlate with work exhaustion. In other words, ICT employees who have higher workloads with longer periods working at a faster pace do not experience additional stress or performance. Another possible explanation for this result may be the presence of supportive and coping resources that mitigate the negative effects of techno-overload. Techno-overload can serve a role in stimulating innovation and learning, rather than creating exhaustion and/or negative stress, as Cavanaugh et al. (2000) indicated that techno-overload may be viewed as a challenge stressor.

Conversely, techno-invasion was found to have a strong positive and significant impact on work exhaustion ($\beta = 0.360$, $p = 0.003$). The findings align with past studies by Di Dalmazi et

al. (2022) and by Sadaf et al. (2025). This means the presence of continuous connectivity and loss of boundaries or blurred boundaries between personal life and work-related tasks can lead to higher levels of stress and burnout. The results further support that employees who are expected to be present and responsive at any time can experience stress and work exhaustion.

Techno-complexity had a negative and insignificant impact on work exhaustion ($\beta = -0.029$, $p = 0.758$). The findings deviated from past studies (e.g., Consiglio et al., 2023; Bondanini et al., 2020) that revealed that techno-complexity was a critical creator of stress that results in burnout among remote workers. The results mean that ICT employees' feelings of inadequacy with their computer competencies and the need for them to spend time and effort in learning ICTs do not necessarily lead to stress and exhaustion. Cavanaugh et al. (2000) also classified techno-complexity as a challenge stressor that can stimulate learning and innovation rather than work exhaustion.

Techno uncertainty also had an insignificant impact on work exhaustion. The results deviated from past studies by Ward et al. (2025) and Wang et al. (2022). However, the study by Zhang et al. (2022) also showed that techno-uncertainty was not significantly related to work exhaustion. The deviation in results may also be because the respondents of this study are in the ICT sector, which continuously faces uncertainties. These respondents may be familiar with constant changes. Therefore, the continuous advancements in technology may not lead to stress and work exhaustion.

Techno-insecurity also emerged as a significant predictor of work exhaustion ($\beta = 0.383$, $p = 0.000$). The results are aligned with past studies (e.g., Yang et al., 2025; Ward et al., 2025). The results mean that ICT employees feel insecure about their jobs due to automation. The feelings of insecurity can lead to work exhaustion. The employees' fear of being left behind, replaced, or terminated due to advances in technology is real, based on the results of this study. The insecure employees tend to compare themselves with more skilled employees, and this results in work exhaustion.

Work exhaustion or burnout had no notable impact on the contextual performance, as illustrated by the correlation coefficient and statistical insignificance associated with both. This result goes against other research that typically demonstrates a positive and significant relationship between work exhaustion and contextual performance (Palenzuela et al., 2019). This means there are situations when the level of work exhaustion experienced by an employee in the case study may not lead to a negative behaviour that impacts contextual performance. The behaviors encompass volunteering time, handling duties other than his/her core-duty responsibilities, and/or participating in end-of-work referrals (i.e., to co-workers).

Moreover, the technophobia level was not identified to moderate the relationship between the technostress dimensions and work exhaustion within this study ($p > 0.05$), and therefore, all hypotheses related to the moderating effect of technophobia were not supported (H7-H11). This may have been attributed to the high level of digital skills of this study sample, as well as the technical support structures provided by the case organisation. Thus, overall, technophobia was deemed not to affect the magnitude or the direction of the relationships between the technostress dimensions and work exhaustion.

In this study, work exhaustion was increased primarily by the techno-invasion and techno insecurity dimensions of technostress. These two dimensions of technostress affect the employees' work-life boundaries and the stability of their jobs. The results showed that the techno invasion dimension places work demands on the personal time of employees as a result of being connected to work at all times. The result of this constant connection is little or no time to recover from work. The techno insecurity dimension causes anxiety regarding job loss or being incompetent. The other three technostressors may relate to skills of and experiences of employees or organizational support. Therefore, the three dimensions have less of an effect on employees' experiences of work exhaustion

Theoretical Implications

This study extends Technostress Theory (Brod, 1984; Tarafdar et al., 2007) through the understanding that only selected dimensions of technostress impact employees' work exhaustion. The results showed that only techno-invasion and techno-insecurity had a significant impact on work exhaustion. This finding revealed that the Technostress Theory should differentiate between different types of technostress instead of viewing them as a single construct. The results also support Cavanaugh et al.'s (2000) Challenge–Hindrane Stressor Framework, that suggest that the techno overload and techno complexity dimensions are the challenge stressors that can be beneficial and not necessarily harmful. The findings also align with the Job Demands–Resources (JDR) Theory by Bakker & Demerouti (2007), which states that job demands like constant connectivity or technology replacement fears could lead to work exhaustion unless supported with adequate resources. Technophobia as a non-significant moderator between the five sub-dimensions of technostress provided new insights into current knowledge. Another new insight was the insignificant impact of work stress on the contextual performance of ICT sector employees working remotely. The lack of moderation by technophobia challenges assumptions in the Self-Efficacy Theory by Bandura (1977)

Practical Implications

The study offers a practical understanding for employers and human resource managers in the ICT sector who hire employees who are required to work remotely. Based on the results of this study, the focus should be on techno-invasion and techno-security. Organizations in the ICT sector should develop policies and procedures to reduce fears of job security due to advances in technology. In this aspect, constant communication, engagement, and training programs are essential. The interventions should also focus on the blurred lines between work and the personal lives of employees working remotely. Continuous interventions to upskill the employees and career development opportunities are also important. The provision of adequate tools and support infrastructure can reduce the stress associated with techno insecurity and techno invasion. Lastly, HR managers implement workshops, like stress management workshops and flexible work arrangements, to maintain the mental health of employees working remotely.

Limitations

This was a holistic study, but some limitations were noted in this study. Firstly, the model only tested five dimensions of technostress as predictors of work exhaustion. The inclusion of other predictors like organizational support, digital self-efficacy, and work environment can increase explanatory power. There were no mediators in this study. Future studies should consider mediators like work engagement. There was only one moderator that is technophobia. Future studies should consider categorical moderators like gender and continuous moderators like digital literacy. This study used a cross-sectional design to collect a snapshot of the data. Longitudinal studies are recommended to understand the changes over time. In addition, only two of the outcomes, work exhaustion and contextual performance, were examined. There are likely more outcomes influenced by technostress, such as work engagement, emotional intelligence, or leadership style, that must be examined in future studies.

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