

INDIVIDUAL PSYCHOLOGICAL EFFECTS OF TECHNOSTRESS

DESDOBRAMENTOS INDIVIDUAIS DO ESTRESSE TECNOLÓGICO

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ABSTRACT

Objective: This study aimed to analyze how the factors that generate technostress influence workers' negative feelings.

Provocation: Given the undesirable side effects caused by the intensive use of technologies in organizations, how do the factors that generate technostress relate to the negative feelings experienced by workers?

Theoretical Approach: The study begins by recognizing technostress as a multidimensional conceptual construct, focusing on the factors that generate this technological stress, but also by theoretically explaining its emotional and behavioral manifestations.

Method: This is a survey study with a quantitative approach, conducted with 274 professionals who use organizational information systems. Structural equation modeling (PLS-SEM) was used as the analytical technique, observing the criteria of construct validity, reliability, convergent validity, and discriminant validity.

Results: The results indicated that factors such as technocomplexity, techno insecurity, techno overload, and techno invasion are associated with negative emotional consequences in workers.

Conclusion: This study expands understanding of the impacts of technostress by empirically demonstrating how its triggers are related to different negative emotional dimensions among employees. The study also offers practical recommendations for mitigating these impacts, contributing to the development of management strategies that promote well-being in the digital workplace and reduce resistance to technological adoption.

Keywords: Technostress. Stress. Technology. Negative Feelings.

RESUMO

Objetivo: Este estudo teve como objetivo analisar como os fatores geradores do tecnoestresse influenciam sentimentos negativos dos trabalhadores.

Provocação: Diante dos efeitos colaterais indesejados provocados pelo uso intensivo das tecnologias nas organizações, como os fatores que geram o tecnoestresse se relacionam com os sentimentos negativos vivenciados pelos trabalhadores?

Abordagem teórica: O estudo parte do reconhecimento do Tecnoestresse como uma construção conceitual multidimensional, concentrada nos fatores que geram esse estresse tecnológico, mas também pela exposição teórica de suas manifestações emocionais e comportamentais.

Método: Trata-se de um estudo survey com abordagem quantitativa, realizado com 274 profissionais usuários de sistemas organizacionais de informação com a utilização da modelagem de equações estruturais (PLS-SEM) como técnica analítica com observância aos critérios de validade de construto, confiabilidade, validade convergente e discriminante.

Resultados: Os resultados indicaram que fatores como tecnocomplexidade, tecnoinsegurança, tecnosobrecarga e tecnoinvasão estão associados a consequências emocionais negativas nos trabalhadores.

Conclusão: Este estudo amplia a compreensão dos impactos do Tecnoestresse ao mostrar empiricamente como seus fatores geradores estão relacionados a diferentes dimensões emocionais negativas dos profissionais. O estudo também oferece recomendações práticas para mitigar tais impactos, contribuindo para a formulação de estratégias de gestão que promovam o bem-estar no ambiente de trabalho digital e reduzam a resistência à adoção tecnológica.

Keywords: Tecnoestresse. Estresse. Tecnologia. Sentimentos Negativos.

1 INTRODUCTION

Digital transformation has profoundly changed how work is structured and conducted in organizations in recent years. The intensive adoption of information and communication technologies (ICT) has contributed to the flexibility of time and space, increased productivity, and optimized operational processes. However, although these technologies bring numerous benefits, their intensive use has also revealed adverse effects on the health and well-being of workers (Okolo et al., 2019).

Among these effects, Technostress stands out, a concept that dates back to Brod's (1984) definition of a "modern disease of adaptation caused by the inability to deal with new technologies healthily". This type of stress is related to the overload of demands, the complexity of systems, the feeling of invasion of personal life, and insecurity in the face of constant technological changes. Constant connectivity makes it easier for tasks and responsibilities to invade personal time, resulting in an imbalance that can lead to reduced life satisfaction (Ficapal-Cusí et al., 2025). In

organizational environments marked by high dependence on ICT, these factors can compromise professional performance, emotional health, and job satisfaction (Tarafdar et al., 2007; Crispim & Cappelozza, 2019).

Studies show that Technostress can trigger a series of negative feelings in workers, such as anxiety, disbelief, fatigue, and a feeling of ineffectiveness (Severo & Carlotto, 2021; Paula & Cappelozza, 2021). These feelings compromise psychological well-being and reduce engagement and professional performance (Carlotto, 2010). Technostress compromises workers' cognitive and affective capacities, thereby reducing psychological well-being and weakening the positive relationship between trust and performance (Jaiswal et al., 2024). Despite the recognition of these effects, few studies still investigate the factors that generate Technostress and its emotional consequences in an integrated manner, especially using validated measurement instruments. This gap limits the formulation of more effective organizational strategies for preventing and mitigating this phenomenon.

In this context, this study seeks to contribute to the field by integrating two instruments established in the literature: the technological stressors scale of Tarafdar *et al.* (2007) and Carlotto's (2010) RED/TIC Scale, which assesses the negative feelings associated with Technostress. Uniting these two approaches in a conceptual model is intended to shed light on the mechanisms by which Technostress affects professionals emotionally.

In addition to posing a risk to workers' mental health, Technostress also imposes relevant managerial challenges. Organizations have faced difficulties balancing the productivity gains arising from digital transformation with the emotional impacts caused by technological overload, especially in contexts of high connectivity and expectation of constant availability (Camarena & Fusi, 2022). The COVID-19 pandemic has intensified this scenario by accelerating the digitization of processes and instituting remote and hybrid work models, often without the adequate preparation of teams and leaders (Satpathy *et al.*, 2021). Understanding the subjective effects of the continuous use of technologies becomes essential in this context to sustain healthy, innovative, and productive work environments.

Despite the conceptual advances on the subject, empirical studies still have fragmentation that addresses Technostress. Part of the literature focuses on the factors that generate this stress (such as technocomplexity, technooverload, and technoinvasion), while another focuses on its emotional and behavioral manifestations. However, few studies integrate these two dimensions into robust analytical models, capable of evidencing the links between the sources of technological stress and their affective consequences in individuals (Pirkkalainen *et al.*, 2019; Ríglea *et al.*, 2021). This gap compromises the development of more accurate and grounded organizational interventions. Thus, by proposing the articulation between stressors and negative feelings related to using ICT in the corporate environment, the present study seeks to fill this gap and broaden the understanding of the phenomenon.

Thus, the following research question is formulated: *How do the factors that generate Technostress relate to the negative feelings experienced by workers?* To answer this question, the general objective of the study is to analyze the influence of technostress-generating factors on negative feelings in the organizational context through a quantitative approach and with the support of structural equation modeling.

2 THEORETICAL FOUNDATION

2.1 Digital transformation and intensification of the use of ICTs

Digital transformation in organizational environments represents a continuous movement of structural, cultural, and operational reconfiguration, driven by the strategic adoption of Information and Communication Technologies (ICTs). More than implementing technological tools, it is about rethinking management models, work processes, and professional skills, in search of greater adaptability, innovation, and digital integration in corporate daily life (Santos et al., 2023).

This process is amplified by introducing emerging and disruptive technologies, such as artificial intelligence, cloud computing, and big data, which aim to increase efficiency, reduce operating costs, and foster organizational competitiveness. However, such innovations also impose significant challenges, such as the growth of systems complexity and the intensification of the pace of work, requiring agile responses and faster team decision-making (Orlandi et al., 2021).

In this context, the digital intensification of work emerges, characterized by employees' perceptions of an increase in cognitive and operational demands, acceleration of processes, and multiplication of tasks (Chesley, 2014). Continuous exposure to ICTs in increasingly dynamic environments can trigger adverse effects on worker health, including overload, fatigue, and a specific type of stress related to digital transformation, known as *digital transformation stress* (Borle et al., 2021; Makowska-Tłomak et al., 2023).

This scenario demands from organizations not only technical adaptations, but also the strengthening of digital and emotional skills on the part of employees. Strategies to manage digital stress become essential to mitigate negative impacts and preserve performance and well-being at work (Martínez-Navalón et al., 2023).

From an individual point of view, workers face symptoms such as mental fatigue, difficulties in time management, and conflicts between the personal and professional spheres, often related to information overload and the need for constant adaptation (Sousa & Cappellozza, 2019). At the organizational level, digital transformation requires profound restructuring, focusing on creating a culture that favors continuous learning, innovation, and team resilience (Martínez-Navalón et al., 2023).

Therefore, although digital transformation provides significant benefits, such as process optimization, flexibility, and innovation, it also intensifies demands and pressures that can compromise employees' health. Organizations' effectiveness in dealing with these challenges is linked to the adoption of a holistic approach, which combines technological investment with the development of people and management practices aimed at health and sustainability at work (Chesley, 2014; Makowska-Tłomak et al., 2023; Martínez-Navalón et al., 2023).

2.2 Technostress: origin and measurement

Technostress refers to the adverse responses — psychological, physiological, and behavioral — resulting from the difficulty of adapting to the demands imposed by the intensive use of Information and Communication Technologies (ICTs) in different contexts. The concept was

introduced by Craig Brod in the 1980s when describing the harmful effects of the rapid pace of technological innovations on the health of individuals (Brod, 1984). Since then, understanding the phenomenon has expanded, incorporating different dimensions that help explain its complexity (Ragu-Nathan et al., 2008; Salanova et al., 2012).

The current literature recognizes Technostress as a multidimensional construct, with five main associated factors: *techno-overload*, *techno-invasion*, *techno-complexity*, *techno-insecurity*, and *techno-uncertainty*. These elements are articulated in an interdependent way and allow us to understand both the harmful effects and, in some instances, positive adaptive reactions — such as the so-called *techno-eustress* — although the predominant focus of studies still falls on the negative consequences (Aziz & Yazid, 2021; Tarafdar et al., 2017). In general, an individual's appraisal of technostress can significantly influence their feelings about it. For example, perceiving the technostress situation as an obstacle tends to increase anxiety at work, whereas a positive appraisal of the technostress situation as a challenge to be overcome can boost work engagement (Zhang et al., 2025).

The exchange of knowledge, support, and expertise among workers through management-facilitated situations is considered an effective practice for helping employees better cope with technostress, as it provides a variety of heterogeneous resources to support technological organizational demands (Wang et al., 2023).

The combination of technostressors can make the effects of another technostressor more intense on workers: for instance, feeling overwhelmed by frequent electronic messages, characterized as technooverload, can lead to burnout when receiving these messages during the worker's leisure time, which is characterized as a situation of technoinvasion (Pflügner et al., 2024; Salo et al., 2019).

About measurement, several initiatives have sought to translate these dimensions into valid and reliable instruments. One of the most widely used models is the one proposed by Ragu-Nathan et al. (2008), which relates technological stressors to variables such as job satisfaction, organizational commitment, and intention to stay. Subsequent studies, such as the one by Aziz and Yazid (2021), reinforced the multifactorial structure of the construct through psychometric analyses, demonstrating the consistency of the dimensions in different organizational contexts.

Despite these advances, the literature points to considerable heterogeneity in the evaluation methods used. Recent systematic reviews have identified a variety of scales applied to different audiences — such as professionals, teachers, and students — varying in terms of items, grouping of dimensions, and validation criteria (Borle et al., 2021; Salazar-Concha et al., 2021). In this sense, studies such as the one by Vega-Muñoz et al. (2022) reinforce the importance of considering contextual and cultural aspects in the adaptation of instruments to ensure accuracy in capturing the manifestations of Technostress.

Thus, the conceptual and methodological evolution of Technostress contributes significantly to the understanding of the impacts of digital transformation on individuals. The construction of robust models and specific scales makes it possible not only to analyze the effects of the phenomenon but also to develop mitigation strategies that promote more balanced and healthy work and learning environments (Aziz & Yazid, 2021; Vega-Muñoz et al., 2022; Salazar-Concha et al., 2021).

2.3 Consequences of Technostress for Workers

The effects of Technostress are broad and multifaceted, ranging from physical and emotional symptoms to significant organizational impacts. Among the most common manifestations in workers are anxiety, fatigue, irritability, sleep disorders, technological disbelief, feelings of ineffectiveness, and, in more severe cases, emotional exhaustion and burnout (Carlotto, 2010; Marchiori et al., 2020; Paula & Cappellozza, 2021).

Technostress refers to the adverse psychological and physiological effects experienced by workers due to the overwhelming use of technology in the workplace. These impacts are mainly due to factors such as techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Tarafdar et al., 2007; Talib et al., 2022), which directly affect employees' mental health, job satisfaction, performance, and overall well-being (Bernburg et al., 2024). Technostress can also trigger personal problems for workers with reduced quality of life caused by work-family conflicts (Cappellozza et al., 2019).

Recent studies point out that Technostress intensifies conflicts between work and personal life, generating a spiral of loss of resources, in which the stress experienced in one domain negatively affects another (Riglea et al., 2021). Individuals exposed to high levels of Technostress report emotional exhaustion, decreased engagement, and lower job satisfaction (Harris et al., 2023; Harris et al., 2021). In addition, the perception of disbelief, fatigue, and ineffectiveness tends to increase, impairing performance and fostering feelings of frustration and demotivation (Severo & Carlotto, 2021).

These consequences are not limited to the individual but have repercussions in the organizational sphere, contributing to increased turnover, decreased productivity, and retraction behaviors (Shintri & Kumar, 2022). The context of the COVID-19 pandemic has aggravated this scenario by accelerating digitalization and establishing remote work on a massive scale, increasing dependence on digital tools, and enhancing techno-invasion and techno-overload (Bottaro et al., 2024; Torre et al., 2020). The occurrence of technostressful situations in the workplace, or those that impact the way work is organized or performed, can lead to an increase in counter-productive behaviors among workers (Kot, 2022).

Among other adverse consequences of the abusive use of ICT, it is known that there is a possibility that the user may develop problems related to sleep, headaches, psychological disorders, exhaustion (Crispim & Cappellozza, 2019), in addition to favoring the lack of effectiveness and productivity in their professional functions (Sousa & Cappellozza, 2019). In addition to the emotional consequences, Technostress can manifest itself in dysfunctional behaviors in the workplace, such as digital distraction (Cappellozza, Moraes & Muniz, 2017). Furthermore, technostress can reduce the positive effects of trust in management on psychological well-being and employee performance (Jaiswal et al., 2024).

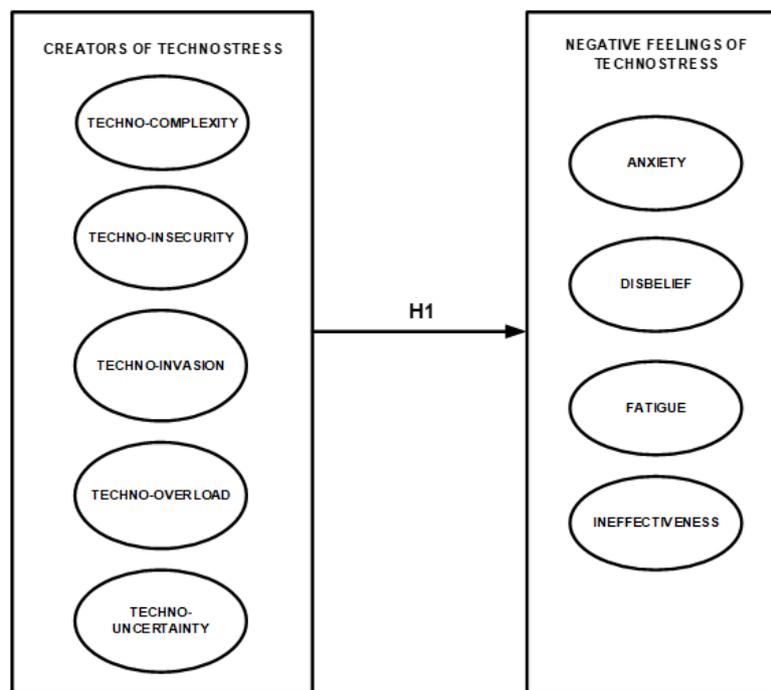
Given this, organizational interventions become urgent. The literature suggests that training sessions, technical support, and actions to manage technological stress are practical in mitigating their adverse effects. Such measures strengthen employees' coping mechanisms and promote healthier work environments (Saleem et al., 2021; Gemmano et al., 2023).

Thus, promoting a more harmonious alignment between the use of technologies and the individual resources of workers is essential to prevent illness, sustain productivity, and ensure the sustainability of the organizational environment in the face of the challenges of digital transformation. In this sense, based on the factors that create Technostress (Tarafdar et al., 2007) and the consequences reflected in negative feelings by workers (Carlotto, 2010) presented in the theoretical foundation of this study, the hypothesis of this study is elaborated:

Hypothesis 1 (H1): Creators of Technostress positively influence the negative feelings resulting from Technostress.

All the generating factors and the negative feelings resulting from Technostress can be visualized in the conceptual research model presented in Figure 1.

Figure 1 - Conceptual Research Model.



3 METHODOLOGICAL PROCEDURES

This study adopted a quantitative, confirmatory, and cross-sectional approach. Quantitative research allows for describing phenomena and testing hypotheses based on objective data (Lozada & Nunes, 2018).

Data was collected through a questionnaire, and the survey research method was chosen. To define the sample size and statistical power, the recommendations of Hair et al. (2017) were followed, considering five predictor variables related to a latent Variable, significance level of 5%, statistical power of 0.8, and average effect size ($f^2 = 0.15$), the minimum sample size was estimated at 92 respondents.

The final sample consisted of 274 participants, selected by convenience, based on the following inclusion criteria: men and women aged between 20 and 60; occupying the same position for at least one year in the same organization; formal employment relationship; and daily use of technologies in their professional activities. It should be noted that the participation was anonymous.

In this study, the scale of Tarafdar et al. (2007) was adopted to measure the factors that generate Technostress and to capture the emotional effects associated with the phenomenon, the RED/ICT scale was used, validated by Carlotto (2010), which includes negative feelings such as anxiety, disbelief, fatigue and ineffectiveness. The combination of these two instruments allows the measurement of the phenomenon reliably and the support of organizational strategies aimed at mitigating its effects and promoting well-being at work.

The Technostress scale presented by Carlotto (2010) consists of a 16-question questionnaire in which he evaluates workers in four dimensions: disbelief, anxiety, fatigue, and technological ineffectiveness. The instrument adapted from Tarafdar et al. (2007) was used to measure the factors that generate Technostress. Both instruments were previously validated and published in scientific journals.

Data analysis was conducted using Structural Equation Modeling with Partial Least Squares (PLS-SEM), using the SmartPLS 3.0 M3 software (Ringle, Wende & Becker, 2015). The choice of PLS-SEM is justified by its predictive character, which is suitable for models with multiple constructs and relationships (Hair et al., 2019).

4 RESULTS

4.1 Analysis of Hypotheses by Structural Models

Among the sample collected, 41% of the sample was found to have male respondents (111 people) and 59% of female respondents (163 people). Regarding the age group of the respondents, it was observed that the mean age of the participants was 29 years with a standard deviation of 10.44 years. Regarding the length of experience in the current job, it was calculated that the average is 4.41 years with a standard deviation of 6.50 years among the professionals surveyed.

After identifying the sample profile, the data analysis procedure followed three main stages: (I) evaluation of the measurement scales and descriptive statistical analysis of the indicators, (II) evaluation of the measurement model (first and second stages), and (III) evaluation of the structural model. Table 1 presents the results of the analysis of the distribution of the research data through descriptive statistics.

Table 1 - Descriptive statistics.

Item		Median	Average	Standard deviation
Techno-overload				
TS1	The technologies of my work make me to work faster	4,000	3,580	1,140
TS2	The technologies in my job force me to perform more tasks than I can handle	3,000	2,766	1,302
TS3	The technologies of my work force me to work under tight deadlines	3,000	3,131	1,289
Techno-invasion				
TINV1	I spend less time with my family due to the technologies in my work	3,000	2,847	1,331
TINV2	Due to technology, I have to be in touch with my work even during my vacation.	3,000	2,748	1,411
TINV3	I feel like my personal life is invaded by the systems of my work	2,000	2,606	1,416
Techno-complexity				
TC1	I need much time to understand and use new technologies	2,000	3,708	1,178
TC2	I think newbies from this organization know more about computer technology than I do	2,000	3,153	1,275
TC3	I often find it too complex to understand and use the technologies in my work	2,000	2,303	1,132
Techno-insecurity				
TINS1	I feel threatened by co-workers who deal better with new technologies	2,000	2,471	1,261
TINS2	I do not share my knowledge of technologies with my co-workers for fear of being replaced	1,000	2,248	1,115
TINS3	I feel that colleagues do not share knowledge of technologies for fear of being replaced	2,000	2,602	1,358
Techno-uncertainty				
TINC1	There are always new developments in the systems we use in our organization	4,000	1,318	0,783
TINC2	There are constant changes in technologies in our organization	3,000	2,193	1,271
Technological Disbelief				
DESC1	Over time, I have lost interest in technology.	3,000	2,799	1,642
DESC2	I feel less and less involved with the use of technologies	2,000	2,376	1,553
DESC3	I have become more skeptical about whether technologies contribute to my work.	2,000	2,354	1,473
DESC4	I have doubts about the meaning of working with these technologies	2,000	2,420	1,620

Item		Median	Average	Standard deviation
Technological Fatigue				
FAD1	I have a hard time relaxing after a day of work with the technologies of my work	3,000	3,485	1,928
FAD2	When I am done working with technologies, I feel drained	3,000	3,383	1,934
FAD3	I feel so tired when I finish working with technologies that I cannot do anything else	3,000	3,091	1,909
FAD4	I have a hard time concentrating on my free time after having worked with technologies	2,000	2,942	1,964
Technological Anxiety				
YEARS1	I feel tense and anxious when working with technology	3,000	3,369	1,900
YEARS2	It scares me to think that I can destroy a large amount of information by misusing it	4,000	4,007	1,991
YEARS3	I have doubts about using technologies for fear of making mistakes that are difficult to correct by myself	3,000	3,204	1,914
YEARS4	Working with technologies makes me feel uncomfortable, irritable, and impatient	2,000	2,814	1,756
Technological Ineffectiveness				
INEF1	In my opinion, I am ineffective in using technologies	2,000	2,219	1,461
INEF2	It is difficult to work with information and communication technologies	3,000	2,985	1,718
INEF3	People say I am ineffective at using technology	1,000	1,664	1,091
INEF4	I feel insecure about completing my tasks effectively when I use technology	2,000	2,453	1,731

The indicators' convergent validity, discriminant validity, and reliability were verified to evaluate the proposed measurement model. The extracted mean variance (EMV) with a value greater than 0.50 and the composite reliability (CR) of each construct with a value greater than 0.70 are recommended for validation of the measurement model (Hair et al., 2019). Another indicator of discriminant validity refers to the square root of the mean variance extracted from the constructs (highlighted diagonally in bold in Table I), which must be greater than the correlation between latent variables (Fornell & Larcker, 1981).

One indicator of each factor, Disbelief, Techno-overload, and Techno-insecurity, and two indicators of Techno-uncertainty, had factor loadings below 0.7 and were excluded from the final analysis. With these exclusions, it was understood that the Techno-uncertainty factor with a single indicator could contain measurement limitations, and this factor was excluded from the subsequent analyses. The values of these validation metrics are presented in Table 2 and indicate that, by meeting the measurement model's validation criteria, these results allow for further analyses.

Table 2 - Evaluation of the Measurement Model - first stage

Dimensions	ANS	DESC	FAD	INEF	TC	TINS	TINV	TS
ANS	0,842							
DESC	0,738	0,828						
FAD	0,755	0,586	0,859					
INEF	0,792	0,790	0,586	0,795				
TC	0,554	0,530	0,358	0,640	0,779			
TINS	0,354	0,183	0,479	0,157	0,235	0,782		
TINV	0,431	0,346	0,508	0,324	0,278	0,499	0,876	
TS	0,432	0,346	0,508	0,323	0,278	0,388	0,499	0,876
DC.								
	0,879	0,867	0,918	0,873	0,821	0,789	0,824	0,868
E.M.V.								
	0,708	0,685	0,737	0,633	0,607	0,652	0,612	0,768

Note: n = 274; ANS: Anxiety; DESC: Disbelief; FAD: Fatigue; INEF: Ineffectiveness; TC: Techno-complexity; TINS: Techno-insecurity; TINV: Techno-invasion; TS: Techno-overload; DC: Composite Reliability; V.M.E: Extracted mean variance.

To evaluate the importance of the independent variables for each dependent variable of the structural model, the size of the total effects of the analyzed variables was calculated. The results of the effect sizes can be seen in Table 3.

Table 3 - Total effects

Dimensions	ANS	DESC	FAD	INEF
TC	0,366	0,392	0,257	0,523
TINS	0,209	0,189	0,229	0,184
TINV	0,112	-0,060	0,396	-0,096
TS	0,193	0,194	0,407	0,155

Note: n = 274; ANS: Anxiety; DESC: Disbelief; FAD: Fatigue; INEF: Ineffectiveness; TC: Techno-complexity; TINS: Techno-insecurity; TINV: Techno-invasion; TS: Techno-overload.

To perform the analysis of the second stage of the measurement model with the treatment of the Technostress Generator construct as a second-order factor, the factorial loading scores of the first-order constructs were calculated and inserted as new variables in the second-order factor (as recommended by Hair et al., 2019 and Sarsted et al., 2019). At this stage, it was considered a formative construct (Generators of Technostress); the same validation criteria used in the analysis of the first stage were used in this second stage, and the results are presented in Table 4.

Table 4 - Evaluation of the Measurement Model – second stage

Dimensions	ANS	DESC	FAD	INEF	TECS
ANS	0,841				
DESC	0,739	0,828			
FAD	0,755	0,590	0,859		
INEF	0,798	0,790	0,594	0,795	
TECS	0,654	0,581	0,543	0,649	FORM
DC.	0,879	0,867	0,918	0,873	FORM
E.M.V.	0,708	0,685	0,737	0,633	FORM

Note: n = 274; ANS: Anxiety; DESC: Disbelief; FAD: Fatigue; INEF: Ineffectiveness; TECS: Technostress Creators (2nd Order); DC: Composite Reliability; V.M.E: Extracted mean variance.

The next step was to analyze the formative measurement model regarding the collinearity of its indicators, using the Variance Inflation Factor. The results obtained are also within adequate standards and lower than 3.0, which allows us to conclude that the collinearity of the formative constructs is not at critical levels (Hair et al., 2019). Regarding evaluating the structural model (stage III), we sought to measure the model's ability to predict the variance of the dependent variables. Thus, the measurements for R² were calculated, as well as the Student's t-statistic and the p-value, which are shown in Table 5.

Table 5. Structural Model Coefficients.

Relationship	Average	D.P.	Statistic T	p-value	R ²
TECS -> ANS	0,661	0,036	18.090	0,000	0,428
TECS -> DESC	0,588	0,042	13.995	0,000	0,338
TECS -> FAD	0,549	0,046	11.927	0,040	0,295
TECS -> INEF	0,649	0,035	18.531	0,000	0,421

Note: n = 274; ANS: Anxiety; DESC: Disbelief; FAD: Fatigue; INEF: Ineffectiveness; TECS: Technostress Creators (2nd Order).

Additionally, in this study, the effects of gender and length of experience in the current job on the effects of the model-dependent variables were controlled. After the analyses, no significant differences were detected between the relationships of the structural model through multigroup analysis between the genders of the participants. However, some significant differences were found in the relationships of the structural model when controlling for the participant's time in the current work, as shown in Table 6.

Table 6 - Control Variable: Time at Current Job

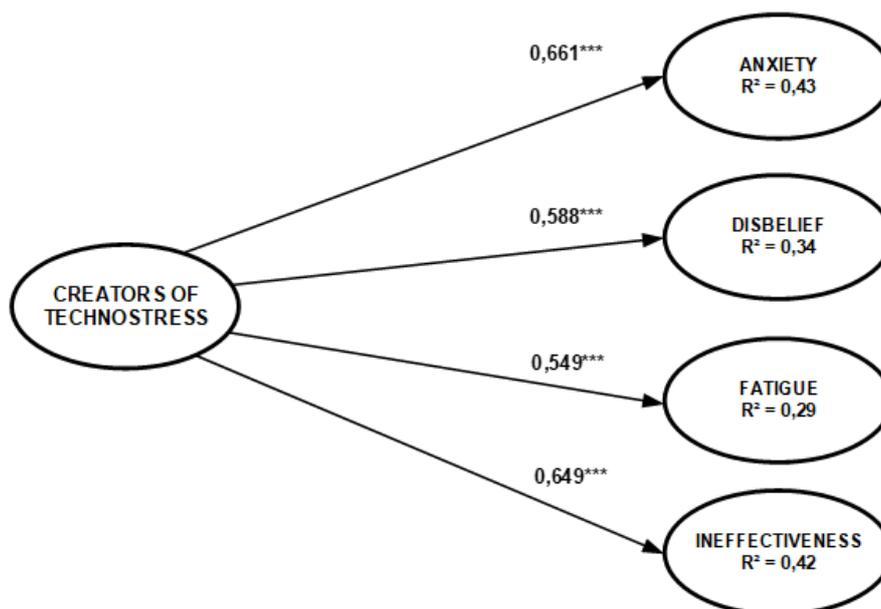
Relationship	Average	D.P.	Statistic T	p-value
TECS → ANS	-0,139	0,046	3,055	0,002
TECS → DESC	-0,012	0,056	0,233	0,816
TECS → FAD	-0,100	0,059	1,711	0,087
TECS → INEF	-0,099	0,036	2,879	0,004

Note: n = 274; ANS: Anxiety; DESC: Disbelief; FAD: Fatigue; INEF: Ineffectiveness; TECS: Technostress Creators (2nd Order).

Given that the p-values of the coefficients of the structural model relationships present values lower than 0.05, Morettin and Bussab (2007) certified the nullity of the hypothesis raised in this study.

After obtaining the coefficients, the analysis of the detection of bias of the common method due to the way the data was collected was conducted (Podsakoff & Organ, 1986; Woszczyński & Whitman, 2004). It is recommended to calculate the ratio of mean variance substantively explained by the indicators on the mean variance due to the method for detecting bias cited (Liang *et al.*, 2007; Podsakoff *et al.*, 2003). In this case, the calculated ratio of the substantive variance to the variance due to the method was equal to 19:1, which makes it unlikely that the data collection method was responsible for any bias in the results obtained. Finally, the results of the structural model can be seen in Figure 2.

Figure 2. Structural Model Results.



Among the four relationships analyzed, it was observed that all relationships associated with the factors that generate Technostress exert a significant influence on the consequences associated with technological stress, which manifests success in the selection of the study's independent variables.

The results of this study confirm the primary hypothesis that the factors that generate Technostress positively influence the negative feelings resulting from it, such as technological anxiety, disbelief, fatigue, and ineffectiveness.

5 DISCUSSION OF THE RESULTS

The results confirm the central hypothesis of this study: the factors that generate Technostress directly influence the negative feelings experienced by workers, especially anxiety, disbelief, fatigue, and ineffectiveness. These findings corroborate the literature that points to the relationship between continuous exposure to ICTs and damage to the emotional health of professionals (Carlotto, 2010; Severo & Carlotto, 2021; Paula & Cappellozza, 2021).

In line with Brod (1984) and Tarafdar et al. (2007), the use of technology was intensifying. Although it provides organizational advances, it causes emotional overload, especially when there is no technical support or clarity about the benefits of these tools. Anxiety and the perception of technological inefficiency were the consequences most impacted by technostress factors, being particularly influenced by technocomplexity and technoinsecurity. This result reinforces the observations of Aziz and Yazid (2021), who identified the complexity of the tools as one of the primary negative emotional triggers.

Techno-complexity also stood out as an influential factor in technological disbelief, especially when associated with techno overload. This combination can generate in workers the perception that systems increase complexity and workload rather than facilitating their tasks—a criticism already pointed out by Orlandi et al. (2021) and reinforced by Okolo et al. (2019), who advocate a sociotechnical approach to minimize these effects. Workers who are likely to adopt new technologies, express greater confidence in their digital skills, and their ability to manage technostress tend to experience less technocomplexity, which mitigates perceived feelings of exhaustion (Kamel, 2025).

Technological fatigue was most significantly associated with technooverload and techno-intrusion, indicating that the pressure for constant availability and the intrusion of technology into personal life impair workers' rest and recovery. This finding dialogues with Bottaro et al. (2024) and Gemmano et al. (2023), who warn of the effects of digital work on work-life balance, especially in post-pandemic scenarios of remote work and hyperconnectivity.

The pressure to adapt to new digital tools and challenges, such as information overload and constant connectivity, can lead to anxiety and burnout, impacting job satisfaction and employee performance (Vijayalakshmi & Arulkumar, 2024). In this sense, the increase in technostress results from the rapid integration of new digital tools, which requires workers to adapt quickly to these resources, and from the blurring of boundaries between professional and personal life in remote work contexts, which reduces the separation between access to professional tasks and household chores (Nguyen et al., 2024).

Another relevant point concerns the role of experience time in the organization, which has been shown to mitigate the adverse effects of anxiety and ineffectiveness. This suggests the importance of the learning curve and progressive adaptation to technological routines, as Martínez-Navalón et al. (2023) noted when discussing digital resilience in organizations.

Although the benefits of ICTs are widely recognized, the data presented here reinforce the need for specific organizational actions to mitigate their side effects. Tarafdar et al. (2010) and Saleem et al. (2021) propose that strategies such as technical training, clear communication, emotional support, and policies for the conscious use of technologies can contribute to reducing technostress and promoting well-being.

The challenge of reducing counterproductive behaviors at work must include actions to inhibit technostress, such as facilitating the improvement of digital literacy among workers or providing technical support in the event of technological difficulties as a way to protect against employee disruptions, thus reducing the likelihood of their occurrence in the organization (Kot, 2022). For organizations implementing hybrid or remote work arrangements, managers must strike a balance between the benefits of these arrangements and employee well-being, achieved through digital literacy and minimizing digital overload (Nguyen et al., 2024).

6 FINAL CONSIDERATIONS

The intensive use of Information and Communication Technologies (ICT) has provided significant gains to organizations, but it also has negative implications when not accompanied by proper management. This study achieved its objective by analyzing the negative feelings associated with the factors that generate Technostress, confirming that techno-complexity, techno overload, techno-insecurity, and techno-invasion directly influence feelings of anxiety, disbelief, fatigue, and ineffectiveness among workers.

Among the findings, the most significant impacts of the technocomplexity and technoinsecurity factors on technological anxiety and technocomplexity and technooverload on disbelief stand out. Technological fatigue, in turn, is strongly related to techno-invasion and techno-overload, while the feeling of ineffectiveness stems mainly from techno-complexity and techno-insecurity.

These results reinforce the need for managerial actions that reduce the adverse effects of Technostress, such as training, clear communication about the use of ICTs, and strategies that promote work-life balance. In addition, the data indicate that the length of experience in the organization acts as a moderator, mitigating the perceived adverse effects, suggesting the importance of the learning curve and progressive adaptation.

This study broadens the understanding of the impacts of Technostress by empirically showing how its generating factors are related to different negative emotional dimensions. The integration between theory and empirical data allows us to conclude that, in addition to investments in technological infrastructure, it is essential to have a managerial look at the subjective conditions of use of ICTs — an indispensable condition for healthier, more sustainable, and productive work environments.

From a practical point of view, the study offers targeted recommendations for each negative sentiment observed, allowing for more precise intervention in organizational policies. In the theoretical field, it contributes by integrating different dimensions of Technostress into a robust empirical model, offering subsidies for future research.

As a limitation, the use of cross-sectional analysis is highlighted, which restricts the analysis of causality between the variables. To advance this understanding, it is recommended that longitudinal and qualitative studies be carried out that explore the subjective experiences of workers with ICT. In addition, future investigations could include moderating variables, such as digital skills or organizational characteristics, deepening the understanding of the mechanisms that intensify or mitigate Technostress.

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