

Breaking down Techno-stress: Insights and a Strategic Agenda for Future Research

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Abstract—This study systematically reviews techno-stress research published between 2007 and 2024 using the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) protocol, analyzing 91 Scopus-indexed and Australian Business Deans Council (ABDC)-listed journal articles through descriptive and bibliometric techniques. The findings reveal a sharp rise in research after 2019, identify the dominant theoretical foundations and four major thematic streams, and highlight a strong focus on the negative consequences of techno-stress while positive adaptation mechanisms remain underexplored. The review also uncovers theoretical, methodological, and geographical gaps, particularly regarding artificial intelligence, cross-cultural contexts, and sustainable digital well-being, providing an integrated understanding of the field and a comprehensive agenda for future research.

Keywords—techno-stress, bibliometric analysis, Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR), digital well-being, workplace stress, digital transformation

I. INTRODUCTION

The rapid integration of digital technologies into contemporary workplaces has fundamentally transformed how organizations operate, communicate, and create value. Technologies such as cloud computing, Artificial Intelligence (AI), machine learning, enterprise information systems, collaboration platforms, and intelligent automation have become central to organizational functioning, enabling greater efficiency, flexibility, and connectivity. While these technological advancements have generated substantial benefits for organizations and employees, they have also introduced new challenges that affect employee well-being and work experiences [1].

One of the most significant consequences of increasing digitalization is the emergence of techno-stress, a form of stress arising from individuals' inability to effectively cope with the demands associated with information and communication technologies [2–4]. Techno-stress has become a critical concern for organizations because digital technologies increasingly permeate every aspect of employees' professional lives [5]. Employees are expected to continuously learn new systems, respond to persistent digital communications, adapt to technological change, manage information overload, and navigate increasingly complex digital work environments [5]. These challenges are often manifested through techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty, all of which have been associated with adverse psychological, behavioural, and organizational

outcomes.

The relevance of techno-stress has become even more pronounced following the widespread adoption of remote and hybrid work arrangements. The COVID-19 pandemic accelerated digital transformation initiatives across industries, resulting in unprecedented reliance on virtual collaboration platforms, digital monitoring systems, and technology-mediated communication. Simultaneously, recent advances in artificial intelligence, algorithmic management, intelligent automation, and generative AI technologies have introduced new workplace realities that continue to reshape employee experiences. Consequently, organizations increasingly face the challenge of balancing technological efficiency with employee well-being and sustainable work practices.

Given these developments, techno-stress has attracted growing scholarly attention across multiple disciplines, including information systems, organizational behaviour, psychology, human resource management, occupational health, and management studies. Existing research has examined a wide range of issues, including techno-stress antecedents, coping mechanisms, emotional and behavioural consequences, organizational outcomes, and intervention strategies. However, despite the expanding body of knowledge, the literature remains fragmented across disciplinary boundaries, theoretical perspectives, methodological approaches, and organizational contexts. As a result, obtaining a comprehensive understanding of the intellectual development and current state of the field remains challenging.

Several review studies have contributed to synthesizing aspects of techno-stress research. For example, Nisafani *et al.* [6] reviewed the causes, inhibitors, and consequences of techno-stress, while Nastjuk *et al.* [7] conducted a meta-analysis examining relationships among techno-stress creators and employee outcomes. More recently, Kumar [8] provided a narrative overview of techno-stress dimensions and management strategies, and Lin and Yu [9] focused specifically on techno-stress within higher education contexts. Although these studies have advanced understanding of particular dimensions of techno-stress, they primarily focus on specific contexts, theoretical relationships, or outcome variables. Consequently, there remains limited understanding of the broader intellectual structure of the field, including its theoretical foundations, conceptual evolution, influential contributors, and emerging research directions.

Furthermore, the techno-stress literature has evolved considerably in recent years due to rapid technological

advancements, increasing digital connectivity, and the emergence of AI-enabled work environments. Existing reviews provide valuable insights into selected aspects of the phenomenon but offer limited understanding of how the field has developed over time, which theoretical perspectives dominate current scholarship, how major research themes are interconnected, and where important knowledge gaps remain. Addressing these questions is particularly important as organizations continue to navigate increasingly complex digital ecosystems characterized by continuous technological change.

Against this backdrop, a comprehensive bibliometric review offers a valuable opportunity to synthesize accumulated knowledge and identify future directions for techno-stress scholarship. Unlike traditional narrative reviews, bibliometric techniques enable the systematic examination of publication trends, theoretical foundations, conceptual structures, influential contributors, and emerging research streams. Such analyses not only provide an overview of the field's intellectual development but also help identify underexplored areas and opportunities for future investigation.

Accordingly, this study employs the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) protocol and bibliometric analysis to systematically map the techno-stress literature published between 2007 and 2024. Specifically, the study seeks to address the following research questions:

RQ1: What are the publication trends in techno-stress research?

RQ2: What theoretical frameworks have been utilized to explain techno-stress?

RQ3: What is the conceptual structure of techno-stress research?

RQ4: Who are the most influential authors, journals, articles, countries, and institutions contributing to the field?

RQ5: What theoretical, methodological, and contextual directions should guide future techno-stress research?

By addressing these questions, this study makes several contributions. First, it provides a systematic assessment of the intellectual evolution of techno-stress research. Second, it identifies the dominant theoretical foundations and highlights areas of theoretical fragmentation. Third, it maps the conceptual structure of the field and reveals emerging thematic directions. Fourth, it examines geographical and institutional patterns of knowledge production, highlighting regional imbalances and opportunities for broader scholarly participation. Finally, it develops an evidence-based future research agenda that can guide scholars, practitioners, and policymakers seeking to understand and manage techno-stress in increasingly digital work environments.

The remainder of the paper is organized as follows. The next section outlines the research methodology and review procedures. Subsequently, the findings related to publication trends, theoretical foundations, conceptual structures, and influential contributors are presented and discussed. The paper then develops a future research agenda, discusses theoretical and practical implications, and concludes with recommendations for future techno-stress scholarship.

II. RESEARCH METHODOLOGY

This study adopts the SPAR-4-SLR protocol (see Fig. 1)

proposed by Paul *et al.* [10] to ensure methodological transparency, rigor, and reproducibility. The SPAR-4-SLR framework comprises three sequential stages: Assembling, Arranging, and Assessing, which collectively facilitate systematic identification, refinement, and evaluation of the literature [11]. In addition, the bibliometric procedures employed in this study follow the recommendations of Donthu *et al.* [12] for conducting high-quality bibliometric reviews.

A. Assembling

The assembling stage involved identifying the research domain, developing review questions, selecting appropriate databases, and retrieving relevant publications. The review focuses on techno-stress research in organizational and workplace settings and seeks to address five research questions related to publication trends, theoretical foundations, conceptual structure, influential contributors, and future research directions.

Scopus was selected as the primary database because of its extensive multidisciplinary coverage, robust citation indexing capabilities, and compatibility with bibliometric software such as VOSviewer. Previous bibliometric studies have highlighted Scopus as one of the most comprehensive databases for business and management research, often providing broader journal coverage than alternative databases [11, 13]. Furthermore, the objective of this review was to map the intellectual structure of techno-stress research within the business, management, and accounting disciplines, making Scopus particularly suitable for the study's scope.

The search was conducted in January 2025 and covered all publications indexed until December 2024. To maximize retrieval accuracy, the search strategy incorporated multiple techno-stress-related keywords identified from seminal and recent literature. The search string included:

("TECHNO-STRESS" OR "TECHNOSTRESS" OR "TECHNO-STRESSOR*" OR "TECHNO-COMPLEXITY" OR "TECHNO-INVASION" OR "TECHNO-INSECURITY" OR "TECHNO-OVERLOAD" OR "TECHNO-UNCERTAINTY" OR "TECHNO-UNRELIABILITY")

The search was performed across article titles, abstracts, and keywords. This process initially yielded 220 publications.

B. Arranging

The arranging stage focused on organizing and refining the dataset through predefined inclusion and exclusion criteria. To ensure quality and disciplinary relevance, only peer-reviewed journal articles published in English were retained. Consistent with the study's focus on organizational and managerial implications of techno-stress, publications were restricted to the Business, Management, and Accounting subject category.

Further quality screening was conducted using the Australian Business Deans Council (ABDC) Journal Quality List. Only journals ranked A*, A, B, or C were included. Conference proceedings, book chapters, editorials, notes, and non-English publications were excluded.

The screening process involved three sequential stages. First, duplicate records were removed. Second, titles and abstracts were reviewed to eliminate studies unrelated to

techno-stress. Third, full-text assessment was conducted to confirm conceptual relevance and methodological suitability. Following this process, 91 articles were retained for final analysis.

To enhance transparency and reduce selection bias, the

inclusion and exclusion criteria were applied consistently throughout the screening process. Although the review was conducted by the authors, they independently verified the final set of retained articles during the full-text assessment stage to enhance transparency and reduce selection bias.

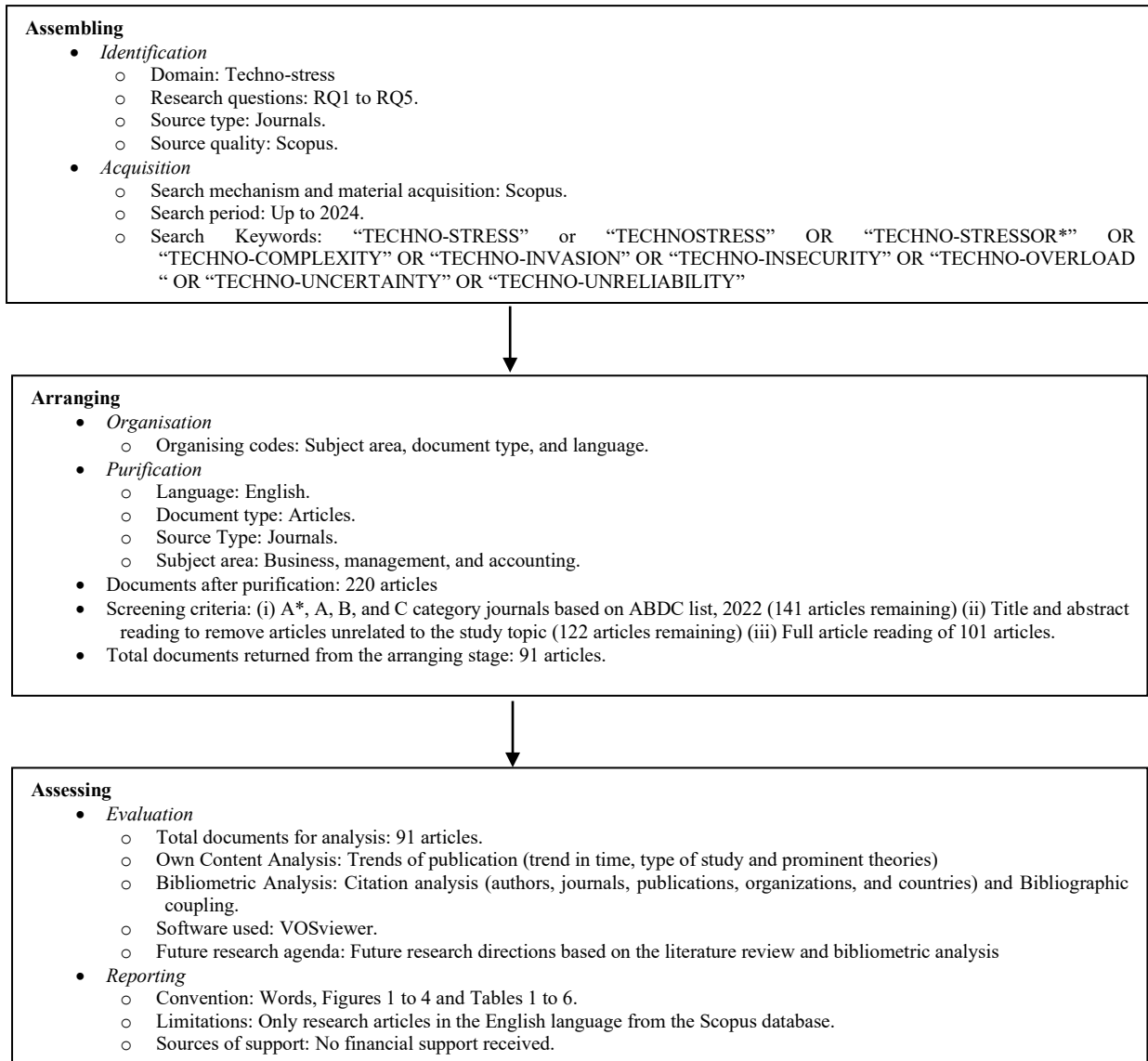


Fig. 1. SPAR-4 SLR protocol.

C. Assessing

The assessing stage involved both descriptive and bibliometric analyses. Descriptive analysis was employed to examine publication trends, methodological characteristics, and dominant theoretical foundations. Bibliometric analysis was subsequently undertaken to investigate the intellectual and conceptual structure of the techno-stress literature.

Citation analysis was used to identify influential authors, journals, articles, institutions, and countries. Bibliographic coupling was employed to examine thematic relationships among publications and uncover the conceptual structure of the field. Compared with co-citation analysis, bibliographic coupling is particularly useful for emerging research domains because it captures relationships among recent publications and reflects contemporary research directions [12].

The bibliometric analysis was conducted using VOSviewer version 1.6.20. To ensure meaningful network

construction, a minimum publication threshold of three documents per node was applied. Cluster formation was generated using the association strength normalization technique available in VOSviewer [13]. The stability of the clustering solution was assessed through multiple iterations using alternative threshold values. The resulting cluster structure remained largely consistent across runs, suggesting adequate robustness.

Cluster interpretation followed an iterative procedure. First, the most influential publications within each cluster were identified. Second, dominant themes, concepts, and research topics represented within each cluster were examined. Finally, cluster labels were assigned based on the substantive content of the publications and cross-validated against prevailing techno-stress literature. This approach enhanced the interpretive validity of the conceptual mapping exercise.

The reporting stage presents findings through figures,

tables, and narrative interpretation in accordance with established bibliometric review guidelines [12]. The analysis provides insights into the evolution, theoretical foundations, conceptual structure, and future trajectory of techno-stress research.

III. FINDINGS AND DISCUSSION

A. Publication Trends and Evolution of Techno-stress Research

To address RQ1, the publication trajectory of techno-stress research was examined across the study period. The results reveal a substantial increase in scholarly attention toward techno-stress over time, indicating the growing importance of technology-related stress as a workplace and organizational phenomenon. Fig. 2 illustrates the annual distribution of publications included in the review.

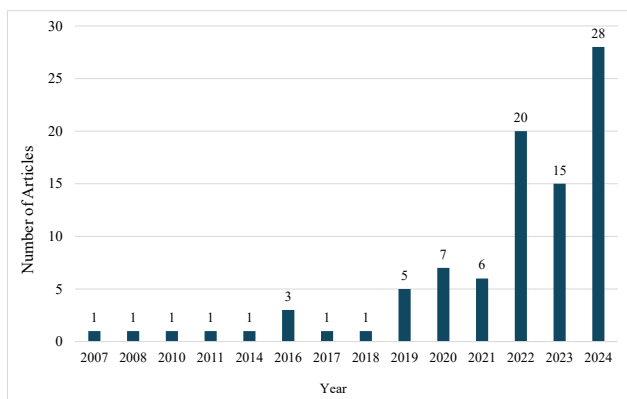


Fig. 2. Annual publication trend of 91 papers between the period 2007–2024 retrieved from Scopus.

The evolution of techno-stress research can be broadly categorized into three phases. The first phase, spanning from 2007 to approximately 2015, represents the formative stage of the field. During this period, scholarly output remained relatively limited and was primarily concerned with conceptualizing techno-stress, identifying its key dimensions, and examining its consequences for employee performance and productivity. Foundational studies conducted during this phase established the theoretical and empirical basis for subsequent investigations by introducing constructs such as techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty.

The second phase, extending from 2016 to 2019, reflects a period of gradual expansion and theoretical diversification. As organizations increasingly adopted digital technologies, researchers began investigating a broader range of outcomes including employee well-being, job satisfaction, work-life balance, organizational commitment, and coping mechanisms. During this period, techno-stress research expanded beyond the information systems discipline and attracted growing interest from scholars in organizational behaviour, human resource management, psychology, and occupational health. This interdisciplinary expansion contributed to a richer understanding of the phenomenon and its implications for both individuals and organizations.

The third phase, beginning in 2020 and continuing through 2024, represents a period of rapid growth and increasing

scholarly maturity. A substantial increase in publication output is observed during this period, coinciding with the widespread adoption of remote and hybrid work arrangements following the COVID-19 pandemic. The pandemic accelerated organizational dependence on digital technologies, virtual collaboration platforms, and technology-mediated communication, thereby intensifying concerns regarding employee well-being in digitally connected work environments. Consequently, techno-stress is a prominent research area across varied disciplines.

Recent studies increasingly examine contemporary challenges associated with digital transformation, including artificial intelligence, algorithmic management, digital surveillance, remote work fatigue, technology-enabled work intensification, and employee resilience. This shift suggests that techno-stress research has moved beyond establishing the existence of technology-related stress and is now focused on understanding its underlying mechanisms, contextual influences, and potential interventions.

The publication trend also provides evidence regarding the maturation of the field. Early research was largely exploratory and focused on identifying techno-stress creators and documenting their effects. In contrast, more recent studies demonstrate greater theoretical sophistication and methodological diversity, incorporating concepts such as digital well-being, techno-eustress, resilience, and sustainable work practices. This evolution reflects a broader transition from problem identification toward developing strategies that help individuals and organizations adapt to increasingly digital workplaces.

Overall, the publication trajectory indicates that techno-stress has evolved from a relatively niche topic within information systems research to a multidisciplinary field of growing theoretical and practical significance. The continued growth in publication output suggests that techno-stress will remain an important research domain as organizations navigate emerging technologies, artificial intelligence, and evolving forms of digital work.

B. Theoretical Lenses in Techno-stress Research

Theoretical lenses provide the conceptual foundations through which scholars explain the causes, mechanisms, and consequences of techno-stress. An examination of the 91 studies included in this review reveals that only 43 studies (47.25%) explicitly employed a theoretical framework, while more than half of the studies lacked a clearly articulated theoretical foundation. This finding suggests that although techno-stress research has experienced considerable growth, theoretical development has not progressed at the same pace as empirical investigation.

Table 1 presents the dominant theoretical frameworks identified in the literature. The Job Demands–Resources (JD-R) Theory emerged as the most frequently adopted perspective, followed by the Transactional Model of Stress and Coping, the Person–Environment (P–E) Fit Model, Conservation of Resources (COR) Theory, and the Stressor–Strain–Outcome (SSO) Framework. Collectively, these theories have shaped the intellectual evolution of techno-stress research by offering complementary explanations regarding how individuals perceive, experience, and respond to technology-related demands.

1) Dominance of resource-based perspectives

The Job Demands–Resources (JD-R) Theory [1, 4, 14] represents the most influential theoretical lens within the techno-stress literature. The theory conceptualizes workplace stress as a consequence of the interaction between job demands and available resources. In the context of techno-stress, technological demands such as techno-overload, techno-complexity, and techno-invasion are viewed as stress-inducing factors, whereas organizational support, digital competence, autonomy, and leadership support serve as resources that buffer adverse outcomes.

The popularity of JD-R Theory can be attributed to its flexibility and ability to accommodate diverse workplace contexts. Recent studies have successfully employed the framework to examine the effects of AI-driven work environments, hybrid work arrangements, and digitally intensive occupations. The theory has also enabled researchers to investigate both negative outcomes (e.g., burnout, emotional exhaustion, disengagement) and positive outcomes (e.g., resilience, work engagement, and techno-eustress).

Despite its strengths, JD-R Theory exhibits certain limitations. First, it primarily focuses on organizational factors and pays relatively limited attention to individual cognitive appraisal processes. Second, the framework was originally developed to explain general workplace stress and does not explicitly account for technology-specific characteristics such as algorithmic management, surveillance technologies, and artificial intelligence. Consequently, the theory may be insufficient to explain the increasingly complex digital environments emerging in Industry 5.0 workplaces.

2) Understanding cognitive appraisal through the transactional model

The second most frequently employed perspective is the Transactional Model of Stress and Coping [15], which conceptualizes stress as a dynamic process resulting from an individual's appraisal of environmental demands and available coping resources. Within techno-stress research, the model has been particularly useful for explaining why employees exposed to similar technological conditions often experience varying levels of stress.

Unlike JD-R Theory, which emphasizes structural workplace factors, the Transactional Model highlights the role of perception, interpretation, and coping behaviour. This perspective has contributed significantly to understanding how employees evaluate technological disruptions, adapt to digital transformations, and utilize coping mechanisms such as problem-focused and emotion-focused strategies.

However, the model's primary limitation lies in its strong emphasis on individual-level processes. Organizational structures, technological design features, and institutional influences receive comparatively less attention. Consequently, while the model effectively explains how individuals react to techno-stressors, it offers limited guidance regarding organizational interventions designed to mitigate stress.

3) Assessing compatibility through the person–environment fit perspective

The Person–Environment (P–E) Fit Model provides

another important perspective for understanding techno-stress. The model argues that stress emerges when there is a mismatch between an individual's abilities, needs, or expectations and environmental demands.

In techno-stress research, this framework has been particularly valuable in explaining adaptation challenges associated with digital transformation. Employees may experience stress when technological complexity exceeds

their competencies or when organizational expectations surpass available technological resources. The model has also facilitated investigations into cross-cultural differences, remote work adaptation, and digital skill gaps.

Nevertheless, the P–E Fit perspective tends to conceptualize technology as part of the broader environment rather than examining specific technological characteristics. Consequently, the theory may not fully capture the unique features of emerging technologies such as artificial intelligence, machine learning systems, and algorithmic decision-making platforms.

4) Resource preservation and recovery mechanisms

Conservation of Resources (COR) Theory [16] explains stress through the loss, depletion, or threatened loss of valuable resources. Within techno-stress research, the theory has been applied to understand emotional exhaustion, cognitive fatigue, and psychological strain resulting from continuous technological engagement.

The primary strength of COR Theory lies in its ability to explain why prolonged exposure to technological demands often results in burnout and reduced well-being. The theory also provides a useful framework for examining resilience-building interventions, resource recovery mechanisms, and organizational support systems.

However, the theory focuses primarily on resource dynamics and provides limited explanation regarding how individuals cognitively evaluate technological demands before experiencing resource loss. Consequently, COR Theory may be more effective when combined with appraisal-based frameworks such as the Transactional Model of Stress and Coping.

5) Explaining consequences through the stressor–strain–outcome framework

The Stressor–Strain–Outcome (SSO) Framework remains one of the most widely adopted explanatory models in information systems research [1, 4]. The framework proposes that environmental stressors generate psychological strain, which subsequently leads to behavioural and organizational outcomes.

The framework has been extensively utilized to examine relationships between techno-stress creators and outcomes such as job dissatisfaction, reduced productivity, emotional exhaustion, turnover intentions, and work disengagement. Its straightforward causal structure makes it particularly attractive for empirical testing.

However, the framework has been criticized for oversimplifying stress processes and assuming relatively linear relationships between stressors and outcomes. Contemporary digital work environments are characterized by complex interactions involving technological, organizational, and individual factors that may not be adequately captured through linear causal pathways alone.

Table 1. Theoretical lenses

S.No.	Theory	No. of Articles	%age	Citation(s)
1	Job-Demand Resources Theory	16	17.58	[17–32]
2	Transactional Model of Stress and Coping	10	10.99	[18, 33–41]
3	Person-Environment (P-E) Fit Model	5	5.49	[42–46]
4	Conservation of Resources (COR) Theory	4	4.40	[19, 39, 47, 48]
5	Stressor-Strain Outcome (SSO) Framework	3	3.30	[49–51]
6	Role Theory	2	2.20	[3, 52]
7	Sociotechnical Theory	2	2.20	[3, 52]
8	Cognitive-Affective-Conative (CAC) Framework	1	1.10	[53]
9	Complexity Theory	1	1.10	[54]
10	Computer Self-Efficacy (CSE) Theory	1	1.10	[55]
11	Coping Theory	1	1.10	[56]
12	Holistic Technostress Process Model	1	1.10	[57]
13	Affordance Theory	1	1.10	[57]
14	Appraisal Theory	1	1.10	[57]
15	Psychological Contract Theory	1	1.10	[58]
16	Push-Pull-Mooring Model	1	1.10	[59]
17	Self-Determination Theory	1	1.10	[60]
18	Self-Regulation Theory	1	1.10	[61]
19	Stimulus–Organism–Response (SOR) Theory	1	1.10	[42]
20	Human Capital Theory (HCT)	1	1.10	[42]
21	Organizational frustration model	1	1.10	[62]
22	Technology acceptance model (TAM)	1	1.10	[63]
23	Social exchange theory (SET)	1	1.10	[64]
21	No Theory Mentioned	40	43.96	[46, 51, 65–102]
	TOTAL	91	100.00	

6) Toward theoretical integration in techno-stress research

The analysis reveals that techno-stress scholarship remains theoretically fragmented. Most studies rely on a single theoretical perspective, resulting in partial explanations of a multidimensional phenomenon. While JD-R Theory effectively explains organizational demands and resources, the Transactional Model captures cognitive appraisal processes, COR Theory highlights resource depletion mechanisms, and the SSO Framework clarifies outcome pathways.

Future research would benefit from developing integrative frameworks that combine these complementary perspectives. For instance, JD-R Theory may explain the emergence of technological demands, the Transactional Model may capture employees' appraisal processes, COR Theory may explain resource depletion and recovery, and the SSO Framework may clarify resulting behavioural outcomes. Such theoretical integration would provide a more comprehensive understanding of techno-stress in increasingly complex digital workplaces characterized by artificial intelligence, algorithmic management, hybrid work arrangements, and continuous technological change.

Importantly, the review also reveals that more than half of the published studies do not explicitly employ a theoretical framework. This finding indicates a significant opportunity for future scholars to strengthen the theoretical maturity of the field by moving beyond descriptive investigations and developing richer explanatory models capable of capturing the evolving nature of techno-stress in contemporary organizations.

C. Mapping the Conceptual Landscape of Techno-stress Research

To address RQ3, bibliographic coupling analysis was conducted using VOSviewer to identify the conceptual structure of techno-stress research. Bibliographic coupling is particularly useful for mapping emerging and evolving research domains because it establishes relationships between publications based on shared references, thereby

revealing contemporary thematic concentrations within the literature [12, 103]. The analysis generated four major clusters, reflecting distinct yet interconnected streams of techno-stress scholarship (Fig. 3).

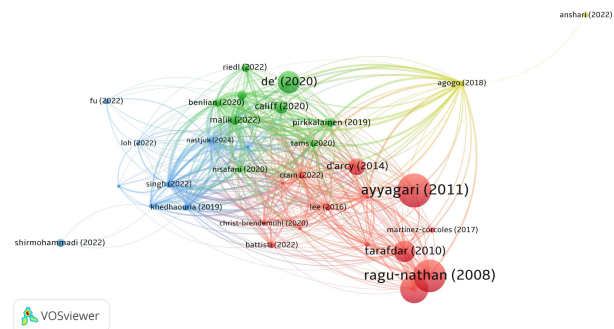


Fig. 3. Bibliographic coupling analysis (used to map the conceptual landscape).

Rather than representing isolated themes, these clusters collectively illustrate the evolution of techno-stress research from an initial focus on productivity and organizational outcomes toward more nuanced investigations of psychological experiences, contextual influences, and transformational workplace dynamics. The cluster structure also demonstrates the increasingly interdisciplinary nature of the field, drawing insights from information systems, organizational behaviour, psychology, occupational health, and human resource management.

1) Cluster 1: Contextual and behavioural impacts of techno-stress

The largest cluster centres on the contextual determinants and behavioural consequences of techno-stress. Research within this stream emphasizes that techno-stress cannot be understood independently of the organizational, occupational, and environmental contexts in which technology is embedded.

Studies within this cluster demonstrate that the nature and intensity of techno-stress vary considerably across industries, occupations, and work arrangements. For example,

public-sector employees experience stress associated with continuous digital connectivity, while service-sector employees often encounter stress resulting from technological monitoring, automation, and customer-facing digital systems. More recent contributions highlight how remote and hybrid work arrangements have intensified techno-invasion, blurred work-life boundaries, and altered employee behavioural responses.

A notable characteristic of this cluster is its emphasis on behavioural outcomes such as disengagement, cyberloafing, reduced organizational commitment, workplace deviance, and diminished employee flourishing. The prominence of these themes suggests that researchers increasingly view techno-stress not merely as an individual psychological experience but as a phenomenon with important implications for organizational effectiveness and employee conduct.

The emergence of this cluster reflects the growing recognition that techno-stress is highly context-dependent. However, despite substantial attention to behavioural outcomes, comparatively little research has examined how contextual factors interact with cultural, institutional, and socio-economic conditions across different countries. This represents an important opportunity for future investigation.

2) Cluster 2: Psychological processes and employee well-being

The second cluster focuses on the psychological mechanisms underlying techno-stress and its consequences for employee well-being. Unlike Cluster 1, which emphasizes external contextual factors, this stream concentrates on internal cognitive, emotional, and coping processes.

Research within this cluster investigates emotional exhaustion, anxiety, fatigue, stress appraisal, coping strategies, and psychological resilience. Several studies examine how employees interpret technological demands and why similar technological environments generate different stress responses among individuals. This perspective reflects the growing influence of psychological theories such as the Transactional Model of Stress and Coping and Conservation of Resources Theory.

The prominence of this cluster indicates a gradual shift in techno-stress scholarship from identifying stressors toward understanding the mechanisms through which stress develops and affects well-being. The increasing attention to Zoom fatigue, digital exhaustion, and cognitive overload following the COVID-19 pandemic further illustrates the expanding psychological orientation of the field.

Despite its substantial contribution, this cluster remains heavily reliant on self-reported survey measures. Objective assessments of cognitive strain, physiological stress responses, and neuropsychological outcomes remain relatively rare. Consequently, future studies should incorporate biometric, neuroscientific, and longitudinal approaches to provide a more comprehensive understanding of the psychological consequences of techno-stress.

3) Cluster 3: Affective and transformational dimensions of digital work

The third cluster captures the affective and transformational dimensions of techno-stress within rapidly evolving digital environments. Research in this stream

examines how employees emotionally respond to technological change and how organizations navigate digital transformation initiatives.

Unlike the previous clusters, which focus primarily on stress outcomes, this cluster acknowledges the dual nature of technology. While technological innovation can generate anxiety, frustration, and uncertainty, it can simultaneously create opportunities for learning, knowledge sharing, skill development, and organizational innovation.

The emergence of this cluster reflects broader transformations associated with Industry 4.0, Industry 5.0, artificial intelligence, and digitalization [1, 4]. Scholars increasingly recognize that technological change is not solely a source of stress but also a catalyst for adaptation and growth. Consequently, concepts such as techno-eustress, digital resilience, employee adaptability, and technology-enabled learning have begun to receive greater scholarly attention.

Nevertheless, empirical evidence examining positive responses to technological change remains relatively limited compared to studies focusing on negative outcomes. Future research should therefore investigate the conditions under which technological demands transform from stressors into developmental challenges that foster learning, engagement, and innovation.

4) Cluster 4: Techno-stress and organizational productivity

The fourth cluster represents the foundational stream of techno-stress research and focuses primarily on organizational productivity, performance, and efficiency. Many seminal studies within the domain are situated within this cluster, including investigations of techno-overload, techno-complexity, techno-insecurity, and their effects on workplace outcomes.

Research within this stream has consistently demonstrated that techno-stress adversely affects productivity through mechanisms such as role ambiguity, cognitive overload, reduced concentration, and diminished job satisfaction. However, more recent studies challenge the assumption that technology is inherently detrimental by highlighting its potential to improve efficiency when accompanied by adequate training, support systems, and technological resources.

The continued prominence of this cluster reflects the managerial origins of techno-stress research, where organizational performance concerns initially motivated scholarly inquiry. However, compared with the other clusters, this stream appears relatively mature, with established theoretical foundations and well-documented relationships between techno-stress and productivity outcomes.

Future research may benefit from moving beyond direct productivity measures and examining broader organizational outcomes such as innovation capability, digital transformation success, employee retention, and sustainable performance.

Taken together, the four clusters reveal the progressive maturation of techno-stress research. Early studies predominantly focused on productivity losses and organizational outcomes, whereas more recent investigations increasingly emphasize psychological well-being, contextual

influences, and transformational workplace dynamics.

Importantly, the clusters should not be viewed as independent streams but as interconnected dimensions of a broader techno-stress ecosystem. Contextual factors shape employees' psychological experiences; psychological responses influence behavioural outcomes; and these behavioural outcomes ultimately affect organizational productivity and digital transformation efforts. This interconnected structure suggests that techno-stress is a multi-level phenomenon requiring integrated theoretical explanations that simultaneously account for technological, organizational, and individual factors.

The cluster analysis further highlights several underexplored areas. Specifically, research remains limited regarding cross-cultural variations, physiological consequences of techno-stress, AI-enabled work environments, and positive adaptation processes such as techno-eustress and digital resilience. Addressing these gaps will be critical for advancing a more balanced and comprehensive understanding of techno-stress in the era of Industry 5.0 and artificial intelligence.

D. Prominent Authors, Journals, Articles, Countries, and Institutions

1) Prolific authors

Citation analysis identifies the scholars who have exerted the greatest influence on the development of techno-stress research. As shown in Table 2, Monideepa Tarafdar emerges as the most influential contributor, followed by Qiang Tu and Bhanu S. Ragu-Nathan. These scholars have played a foundational role in shaping the conceptual and empirical development of the field.

The prominence of Tarafdar and her collaborators reflects their pioneering contributions to the conceptualization and measurement of techno-stress. Their work introduced several core constructs that continue to underpin contemporary research, including techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. These dimensions have subsequently become the dominant framework through which technology-related stress is examined across organizational settings.

The influence of Qiang Tu and Bhanu S. Ragu-Nathan further illustrates the field's strong roots in information systems research. Their contributions have focused on understanding the organizational consequences of technology-induced stress and developing theoretical explanations linking technological demands with employee outcomes. Together, these authors established many of the foundational assumptions that continue to guide techno-stress scholarship.

An interesting pattern emerging from the citation analysis is the concentration of influence among a relatively small group of scholars. This finding suggests that the field remains heavily anchored around a limited number of seminal contributions. While such concentration has facilitated theoretical coherence and construct development, it may also limit conceptual diversity. Future research would benefit from greater engagement with perspectives originating from psychology, occupational health, human resource management, and emerging digital work studies.

The analysis also reveals a gradual shift from foundational conceptualization toward more specialized investigations of coping mechanisms, resilience, remote work, artificial intelligence, and employee well-being. This evolution indicates that techno-stress research is moving beyond construct validation and increasingly addressing contemporary organizational challenges associated with digital transformation.

Table 2. Prolific authors as per the citation count

Rank	Author Name	Citations	Documents
1	Monideepa Tarafdar	3123	7
2	Qiang Tu	2835	3
3	Bhanu S. Ragu-Nathan	2209	2
4	Varun Grover	1417	2
5	Christopher B. Califf	276	3
6	Alexander benlian	196	2
7	Christian Maier	185	4
8	Tim Weitzel	185	4
9	Sven Laumer	178	2
10	Jakob Wirth	178	2
11	Mina Beigi	143	2
12	Melika Shirmohammadi	143	2
13	Anis Khedhaouria	92	2

2) Landmark journals

The citation analysis of journals provides insights into the disciplinary foundations and intellectual diffusion of techno-stress research. As shown in Table 3, the Journal of Management Information Systems, MIS Quarterly, and Information Systems Research account for a substantial proportion of the highly cited literature within the field.

The dominance of these journals demonstrates that techno-stress research originated primarily within the information systems discipline. Early studies focused on understanding the organizational consequences of technology adoption and the unintended stress associated with information and communication technologies. Consequently, information systems journals served as the primary outlet for theoretical and empirical developments within the domain.

However, the journal distribution also highlights the increasing interdisciplinary nature of techno-stress research. Beyond information systems outlets, influential contributions now appear in journals related to organizational behaviour, psychology, management, occupational health, human resource management, and digital transformation. This diversification suggests that techno-stress is increasingly recognized as a multifaceted phenomenon extending beyond technology adoption issues and encompassing broader questions of employee well-being, workplace design, and organizational sustainability.

The strong presence of A* and A-ranked journals further indicates the growing academic legitimacy and relevance of techno-stress research. As organizations continue to accelerate digital transformation initiatives, the field is likely to attract increasing attention from scholars across multiple disciplines.

The journal analysis also reveals opportunities for future expansion. While information systems journals continue to dominate publication output and citations, greater engagement with public health, behavioural science, and interdisciplinary management journals may enrich theoretical perspectives and facilitate broader understanding of technology-related stress in contemporary workplaces.

Table 3. Landmark journals as per the citation count

Rank	Journal Name	Citations	Documents	Publisher	ABDC Rank	H-index	Cite Score/ Impact Factor	Year Inception	ISSN	ISSN Online
1	Journal of Management Information Systems	2263	6	Taylor & Francis Online	A	170	10.2/10.3	1984	0742-1222	1557-928X
2	MIS Quarterly: Management Information Systems	1709	4	University of Minnesota Press	A*	271	-/7.0	1977	0276-7783	2162-9730
3	Information Systems Research	1269	2	The Institute for Operations Research and the Management Science	A*	185	-/7.8	1990	1047-7047	1526-5536
4	International Journal of Information Management	676	2	Elsevier	A*	177	53.1/20/1	1980	0268-4012	1873-4707
5	Journal of Business Research	344	6	Elsevier	A	265	20.3 / 10.5	1973	1048-2963	1973-7978
6	European Journal of Information Systems	270	4	Taylor & Francis Online	A*	128	23.1/9.5	1991	0960-085X	1476-9344
7	International Journal of Manpower	215	5	Emerald Group Publishing	A	73	8.8/4/4	1980	0143-7720	1758-6577
8	International Journal of Hospitality Management	95	2	Elsevier	A*	169	21.2/10.0	1974	0278-4319	1873-4693
9	VINE Journal of Information and Knowledge Management Systems	93	3	Emerald Group Publishing	B	39	9.0/2.9	1971	2059-5891	-
10	Journal of Decision Systems	90	2	Taylor & Francis Online	B	33	6.3/2.7	1992	1246-0125	2116-7052

3) Most cited articles

The analysis of highly cited publications provides valuable insights into the intellectual foundations and evolution of techno-stress research. As presented in Table 4, the most

influential articles primarily focus on identifying techno-stress antecedents, examining employee outcomes, and developing theoretical explanations for technology-induced stress.

Table 4. Top 10 articles as per the citation count

Rank	Article Name	Author	Year	Journal	Citations	Methodology
1	Technostress: Technological antecedents and implications	Ayyagari R.; Grover V.; Purvis R.	2011	MIS Quarterly: Management Information Systems	1335	Empirical
2	The consequences of technostress for end users in organisations: Conceptual development and validation	Ragu-Nathan T.S.; Tarafdar M.; Ragu-Nathan B.S.; Tu Q.	2008	Information Systems Research	1243	Empirical
3	The impact of technostress on role stress and productivity	Tarafdar M.; Tu Q.; Ragu-Nathan B.S.; Ragu-Nathan T.S.	2007	Journal of Management Information Systems	966	Empirical
4	Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice	De' R.; Pandey N.; Pal A.	2020	International Journal of Information Management	666	Conceptual
5	Impact of technostress on end-user satisfaction and performance	Tarafdar M.; Tu Q.; Ragu-Nathan T.	2010	Journal of Management Information Systems	626	Empirical
6	Understanding Employee Responses to Stressful Information Security Requirements: A Coping Perspective	D'Arcy J.; Herath T.; Shoss M.K.	2014	Journal of Management Information Systems	412	Empirical
7	The bright and dark sides of technostress: A mixed-methods study involving healthcare IT	Califf C.B.; Sarker S.; Sarker S.	2020	MIS Quarterly: Management Information Systems	256	Empirical
8	Impact of artificial intelligence on employees working in industry 4.0 led organizations	Malik N.; Tripathi S.N.; Kar A.K.; Gupta S.	2022	International Journal of Manpower	166	Qualitative
9	Technostress and the hierarchical levels of personality: a two-wave study with multiple data samples	Maier C.; Laumer S.; Wirth J.; Weitzel T.	2019	European Journal of Information Systems	152	Empirical
10	Deliberate or Instinctive? Proactive and Reactive Coping for Technostress	Pirkkalainen H.; Salo M.; Tarafdar M.; Makkonen M.	2019	Journal of Management Information Systems	142	Empirical

Seminal contributions such as Tarafdar *et al.* [3], Ragu-Nathan *et al.* [104], and Ayyagari *et al.* [105] occupy central positions within the literature because they established the conceptual foundations of the field. These studies introduced key techno-stress constructs, developed measurement frameworks, and empirically demonstrated the negative effects of technology-related stress on employee attitudes and performance. Their continued influence suggests that contemporary techno-stress scholarship remains strongly grounded in these foundational conceptualizations.

The citation patterns also reveal the evolution of research priorities over time. Earlier studies primarily focused on identifying techno-stress creators and documenting their adverse consequences [106]. In contrast, more recent highly cited publications increasingly examine coping mechanisms, resilience, digital well-being, remote work environments, and

the dual nature of technology as both a stressor and an enabler of performance [107–111]. This transition reflects the maturation of the field from problem identification toward understanding adaptation and intervention strategies.

Another notable observation is the strong representation of studies examining organizational and managerial implications. Highly cited articles frequently investigate outcomes such as job satisfaction, productivity, burnout, employee engagement, and organizational performance, highlighting the practical significance of techno-stress beyond purely theoretical concerns.

Collectively, the most cited articles demonstrate that the field has evolved from establishing the existence and dimensions of techno-stress to exploring more complex questions concerning coping, resilience, technological change, and digital transformation. Nevertheless, relatively few highly cited studies examine emerging issues such as

artificial intelligence, algorithmic management, and intelligent

4) Highest contributing countries

The geographical distribution of techno-stress research reveals significant disparities in scholarly contributions across countries and regions. As presented in Table 5 and Fig. 4, the United States emerges as the most influential

contributor, accounting for 5708 citations across 36 publications. Other prominent contributors include India, Germany, the United Kingdom, France, and China. Collectively, these countries have played a central role in shaping the intellectual development of the techno-stress domain.

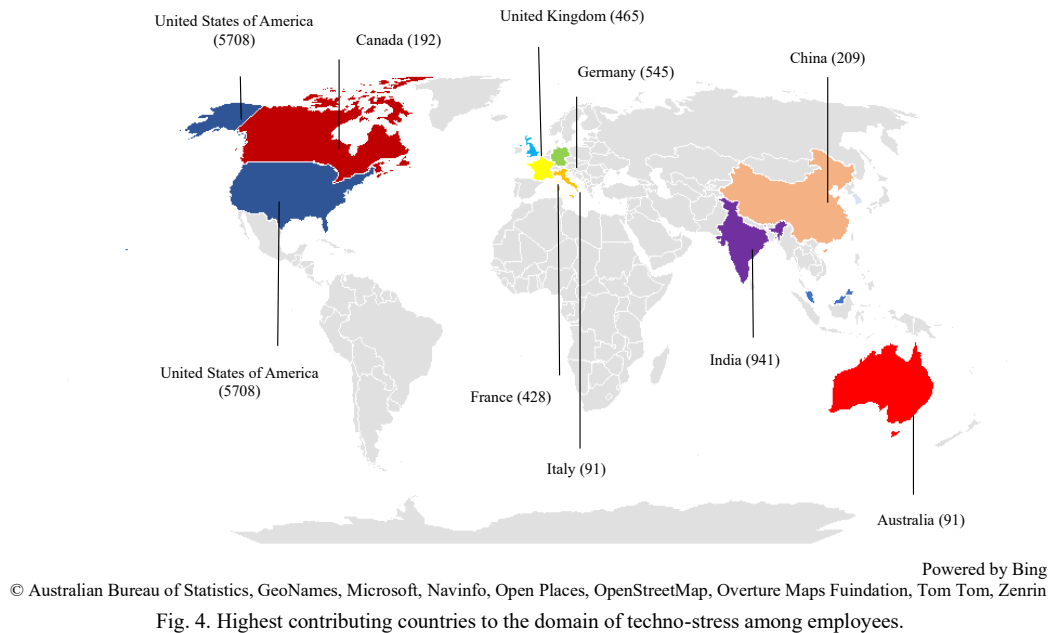


Fig. 4. Highest contributing countries to the domain of techno-stress among employees.

Table 5. Top 10 countries as per the citation count

Rank	Country	Citations	Documents
1	United States	5708	36
2	India	941	22
3	Germany	545	15
4	United Kingdom	465	15
5	France	428	11
6	Malaysia	224	6
7	China	209	9
8	Canada	192	8
9	South Korea	127	7
10	Australia	91	5
11	Italy	91	4

The dominance of the United States is not surprising given its long-standing leadership in information systems research, technological innovation, and digital workplace transformation. Many foundational techno-stress studies originated from U.S.-based scholars and institutions, contributing to the development of key constructs such as techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. Furthermore, the strong presence of leading information systems journals and research centres within the United States has facilitated sustained scholarly engagement with technology-induced workplace stress.

A particularly noteworthy finding is India's position as the second most influential contributor despite producing substantially fewer publications than the United States. This pattern suggests that techno-stress research originating from India has achieved considerable academic visibility and impact. Several factors may explain this phenomenon. First, India hosts one of the world's largest information technology and business process outsourcing industries, exposing

employees to intensive technology use and rapid digital transformation. Second, the widespread adoption of remote and hybrid work arrangements following the COVID-19 pandemic has increased scholarly interest in technology-related workplace challenges. Third, national initiatives promoting digitalization and technological modernization have accelerated research attention toward employee well-being in technology-intensive environments.

Beyond publication volume, the findings reveal important thematic distinctions between developed and developing economies. Research emerging from developed countries such as the United States, Germany, the United Kingdom, and France tends to focus on organizational interventions, digital leadership, technology governance, employee well-being, and advanced workplace technologies. These studies frequently investigate how organizations can design supportive environments to mitigate the negative consequences of techno-stress while maximizing the benefits of digital transformation.

In contrast, studies originating from developing economies, particularly India and several Asian countries, often emphasize technology adaptation challenges, digital skill gaps, work-life boundary management, job insecurity, and employee coping mechanisms. These themes reflect the unique socio-economic and organizational conditions associated with rapid technological adoption in emerging economies. Consequently, techno-stress manifests differently across national contexts, highlighting the importance of considering cultural, institutional, and developmental factors when interpreting research findings.

The geographical distribution of publications also reveals a

notable concentration of knowledge production within a limited number of countries. Contributions from Africa, Latin America, the Middle East, and several parts of Southeast Asia remain comparatively scarce despite increasing levels of digitalization in these regions. This imbalance raises concerns regarding the generalizability of existing techno-stress theories and findings. Most dominant theoretical frameworks have been developed and tested within Western or technologically advanced contexts, potentially limiting their applicability to diverse socio-cultural environments.

These observations suggest that the future development of techno-stress scholarship requires greater geographical diversification. Comparative cross-national studies, multi-country datasets, and culturally sensitive theoretical frameworks are needed to capture how technological demands, organizational practices, and employee experiences vary across different institutional contexts. Such efforts would contribute to a more globally representative understanding of techno-stress and strengthen the external validity of the field's theoretical foundations.

5) Top contributing institutions

Institutional citation analysis provides valuable insights into the organizational centres that have shaped the development of techno-stress research. As shown in Table 6, the College of Business and Economics at Western Washington University, United States, emerges as the most influential institution, recording the highest citation count among the institutions included in the analysis. Other highly cited institutions are similarly affiliated with disciplines such as information systems, business management, organizational behaviour, and technology management.

The institutional distribution highlights the interdisciplinary nature of techno-stress research. While the field initially emerged within information systems and technology management domains, its growth has increasingly attracted contributions from business schools, management departments, psychology faculties, and organizational research centres. This disciplinary diversification reflects the recognition that techno-stress is

not solely a technological issue but also a behavioural, organizational, and well-being concern.

Another notable observation is the concentration of influential institutions within technologically advanced economies, particularly the United States and parts of Europe. Many of these institutions have established research strengths in digital transformation, workplace technologies, information systems, and employee well-being, enabling them to play a central role in advancing techno-stress scholarship. Their contributions have been instrumental in developing foundational constructs, measurement scales, and theoretical frameworks that continue to guide contemporary research.

The institutional analysis also reveals the growing internationalization of the field. Although North American and European universities continue to dominate citation rankings, institutions from emerging economies, particularly in Asia, have increasingly contributed to techno-stress research in recent years. This trend mirrors the broader geographical expansion observed in the country-level analysis and reflects the increasing relevance of digital transformation challenges across diverse economic and organizational contexts.

Despite this progress, the concentration of highly cited institutions within a relatively small number of regions suggests that knowledge production remains uneven. Limited representation from Africa, Latin America, and several developing economies may restrict the contextual diversity of existing findings and theoretical perspectives. Future research would therefore benefit from greater collaboration among institutions across different regions, enabling the development of more globally representative and context-sensitive understandings of techno-stress.

Overall, the institutional landscape demonstrates that techno-stress research has evolved from a niche area within information systems scholarship into a multidisciplinary and internationally relevant field. The continued expansion of institutional participation is likely to enhance theoretical diversity, methodological innovation, and contextual understanding as the field continues to mature.

Table 6. Topmost Institutions as per the citation count

Rank	Institution	Location	Citations
1	College of Business and Economics, Western Washington University	United States of America	265
2	Isenberg School of Management, University of Massachusetts, Amherst	United States of America	162
3	Human Development and Computer Sciences, University of Houston	United States of America	143
4	Southampton Business School, Southampton	United Kingdom	143
5	Faculty of Business and Finance, University Tunku Abdul Rahman	Malaysia	49
6	Middle Tennessee State University	United Kingdom	29
7	Department of Marketing Management, Indian Institute of Management, Vishakhapatnam	India	24
8	Department of Management, Sahrood Branch, Islamic Azaad University	Iran	16
9	University of Bamberg	Germany	14

IV. FUTURE RESEARCH AGENDA

The bibliometric findings reveal that techno-stress research has experienced substantial growth over the past decade, particularly following the widespread digitalization of work and the emergence of remote and hybrid work arrangements. However, the review also uncovers several conceptual, theoretical, methodological, and contextual gaps that continue to constrain the advancement of the field. Building upon the identified publication trends, theoretical

foundations, conceptual clusters, and geographical patterns, this section proposes a future research agenda to guide the next generation of techno-stress scholarship.

A. Advancing Theoretical Development

One of the most notable findings of the review is the limited theoretical maturity of the field. Less than half of the reviewed studies explicitly employed a theoretical framework, while those that did primarily relied on established theories such as the Job Demands–Resources (JD-R) Theory, Transactional Model of Stress and Coping,

Person–Environment Fit Model, Conservation of Resources Theory, and the Stressor–Strain–Outcome Framework.

Although these theories have significantly contributed to understanding techno-stress, they were largely developed before the emergence of artificial intelligence, algorithmic management, intelligent automation, and Industry 5.0 work environments. Consequently, their explanatory power may be constrained when applied to increasingly complex digital ecosystems.

Future research should move beyond single-theory applications and develop integrative frameworks capable of capturing technological, organizational, and individual-level influences simultaneously. For example, JD-R Theory may explain technological demands and organizational resources, the Transactional Model may capture cognitive appraisal processes, COR Theory may explain resource depletion and recovery, while the SSO Framework may clarify behavioural outcomes. Such integration would provide a more holistic understanding of techno-stress mechanisms.

Additionally, emerging perspectives such as Digital Resilience Theory, Boundary Management Theory, Self-Determination Theory, Privacy Calculus Theory, and Sociotechnical Systems Theory offer promising avenues for explaining employee adaptation to AI-enabled workplaces, continuous connectivity, digital surveillance, and technology-mediated work arrangements.

B. Understanding Techno-stress in AI-driven Work Environments

A second important finding concerns the evolving technological context of techno-stress research. While traditional techno-stressors such as techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty continue to dominate the literature [112], relatively little attention has been devoted to stressors arising from artificial intelligence, machine learning systems, algorithmic management, generative AI, and intelligent workplace technologies.

As organizations increasingly deploy AI-enabled systems for performance monitoring, decision-making, scheduling, recruitment, and customer interaction, employees are likely to experience new forms of stress associated with transparency, autonomy, accountability, and trust. Existing techno-stress frameworks may therefore require modification to capture these emerging challenges.

Future studies should investigate AI-specific techno-stressors, including algorithmic opacity, digital surveillance, perceived loss of control, automation anxiety, and AI-related job insecurity. Research should also examine the conditions under which AI functions as a resource that enhances productivity and well-being rather than a stressor that undermines employee performance.

C. Moving beyond Negative Outcomes

The conceptual landscape analysis reveals that techno-stress research remains heavily oriented toward negative outcomes such as burnout, exhaustion, fatigue, disengagement, reduced productivity, and diminished well-being [1, 5]. While these outcomes remain important, this dominant focus may provide an incomplete understanding of employee experiences in digitally intensive workplaces [4].

Recent studies have begun exploring concepts such as techno-eustress, digital resilience, employee adaptability, and technology-enabled learning. These emerging perspectives suggest that technology can simultaneously function as a source of challenge, growth, and innovation.

Future research should therefore adopt a more balanced perspective by examining both the detrimental and beneficial consequences of technological engagement. Specifically, scholars should investigate the mechanisms through which employees transform technological demands into opportunities for learning, competence development, creativity, and innovation. Such work would contribute to a more nuanced understanding of technology's dual role in contemporary organizations.

D. Addressing Contextual and Cross-cultural Variations

The geographical analysis highlights a substantial concentration of techno-stress research within a limited number of countries, particularly the United States, India, Germany, and the United Kingdom. Although these studies have significantly advanced the field, they may not adequately reflect the diverse socio-cultural and institutional realities of other regions.

The manifestation of techno-stress is likely to vary across cultures, industries, and economic contexts. Factors such as digital infrastructure, organizational culture, national regulations, technological readiness, and societal attitudes toward technology may influence how employees perceive and respond to techno-stressors.

Future research should prioritize comparative cross-national studies that examine similarities and differences across developed and developing economies. Such investigations would contribute to the development of more context-sensitive theories and improve the global applicability of techno-stress frameworks.

Particular attention should be directed toward underrepresented regions including Africa, Latin America, the Middle East, and Southeast Asia, where rapid digitalization is occurring but scholarly contributions remain relatively limited.

E. Strengthening Methodological Rigor

The review indicates that the majority of techno-stress studies rely on cross-sectional survey designs and self-reported measures. While these approaches have generated valuable insights, they restrict causal inference and may introduce common method bias.

Future research should adopt longitudinal, experimental, and mixed-method approaches to capture the dynamic nature of techno-stress. Longitudinal designs are particularly important because techno-stress is not a static phenomenon; employees' responses to technology often evolve as they gain experience, develop coping strategies, and adapt to organizational changes.

Furthermore, researchers should incorporate objective indicators of stress, including physiological, behavioural, and digital trace data. Advances in wearable technologies, biometric monitoring, eye-tracking systems, and AI-based sentiment analysis create new opportunities for measuring stress more accurately and in real time.

The integration of qualitative approaches may also provide richer insights into employees' lived experiences, coping

mechanisms, and adaptation processes that are difficult to capture through standardized surveys alone.

F. Toward Sustainable Digital Well-being

Finally, the review suggests that techno-stress research should move beyond identifying stressors toward developing evidence-based solutions that promote sustainable digital well-being. As organizations continue to accelerate digital transformation, understanding how to create healthy and productive technology-enabled workplaces becomes increasingly important.

Future studies should evaluate the effectiveness of organizational interventions such as digital well-being programs, resilience-building initiatives, right-to-disconnect policies, AI-assisted workload management systems, and technology training programs. Research should also investigate how leadership practices, organizational culture, and human-centred technology design influence employee well-being in digitally intensive environments.

By shifting attention from problem identification to solution development, future techno-stress research can contribute not only to theoretical advancement but also to the design of healthier and more sustainable workplaces in the digital era.

V. IMPLICATIONS

A. Theoretical Implications

This review contributes to the theoretical advancement of techno-stress research in several important ways. First, the findings reveal that the field remains theoretically fragmented despite its rapid growth. Although techno-stress research has expanded considerably over the past decade, fewer than half of the reviewed studies explicitly employed a theoretical framework. This indicates that the empirical development of the field has outpaced its theoretical maturation, resulting in a fragmented body of knowledge characterized by isolated explanations rather than cumulative theory building.

Second, the review demonstrates the dominance of resource-oriented and stress appraisal perspectives, particularly the Job Demands–Resources (JD-R) Theory, Transactional Model of Stress and Coping, Conservation of Resources (COR) Theory, Person–Environment Fit Model, and Stressor–Strain–Outcome (SSO) Framework. While these theories have significantly advanced understanding of technology-induced stress, the analysis suggests that each perspective explains only a specific dimension of the phenomenon. JD-R Theory primarily focuses on organizational demands and resources, the Transactional Model emphasizes cognitive appraisal processes, COR Theory explains resource depletion and recovery, and the SSO Framework clarifies the progression from stressors to behavioural outcomes. Consequently, existing scholarship remains characterized by partial rather than holistic explanations of techno-stress.

Third, the conceptual landscape analysis reveals that techno-stress should be viewed as a multi-level phenomenon operating simultaneously at technological, individual, organizational, and contextual levels. The identified clusters demonstrate that contextual influences shape psychological experiences, psychological responses affect employee

behaviours, and these behaviours ultimately influence organizational outcomes. This interconnected structure challenges the tendency of prior studies to examine techno-stress through a single disciplinary lens and highlights the need for integrated theoretical frameworks capable of explaining interactions across multiple levels of analysis.

Fourth, the review highlights an important theoretical imbalance within the literature. Existing studies overwhelmingly focus on the negative consequences of technology use, including burnout, fatigue, anxiety, emotional exhaustion, and reduced productivity. Comparatively little attention has been devoted to positive adaptation processes such as techno-eustress, digital resilience, technology-enabled learning, and employee growth. As organizations increasingly operate in digitally intensive environments, theoretical models must move beyond deficit-oriented perspectives and incorporate mechanisms that explain both adverse and beneficial outcomes of technological engagement.

Fifth, the findings suggest that many dominant theoretical frameworks may require refinement in response to emerging workplace technologies. Most foundational theories underpinning techno-stress research were developed prior to the widespread adoption of artificial intelligence, algorithmic management, intelligent automation, and advanced digital surveillance systems. Consequently, these theories may not fully capture contemporary stressors associated with algorithmic decision-making, automation anxiety, digital monitoring, and perceived loss of autonomy. This highlights the need for theoretical extensions and new conceptual models capable of explaining employee experiences in AI-enabled work environments.

Finally, the review exposes a significant contextual limitation within the current body of knowledge. The concentration of research within a small number of countries raises questions regarding the universal applicability of existing techno-stress theories. The findings suggest that socio-cultural, institutional, and economic conditions may influence how employees perceive, experience, and cope with technology-related stress. Therefore, future theoretical development should adopt a more context-sensitive perspective and examine whether dominant techno-stress frameworks operate similarly across developed and developing economies.

Collectively, these insights advance techno-stress scholarship by moving beyond isolated theoretical applications and highlighting the need for integrated, multi-level, and contextually grounded explanations capable of capturing the evolving realities of digital work. The review therefore contributes not only by synthesizing existing knowledge but also by identifying the theoretical boundaries that must be addressed to advance the next generation of techno-stress research.

B. Practical Implications

The findings of this review offer several practical insights for organizations, managers, policymakers, and technology designers seeking to address the growing challenge of techno-stress in digitally intensive workplaces.

First, the dominance of Job Demands–Resources (JD-R) Theory across the reviewed literature suggests that techno-stress should not be viewed solely as a consequence

of technology use but rather as the result of an imbalance between technological demands and available resources. Organizations should therefore move beyond simply introducing new technologies and simultaneously invest in supportive resources such as employee training, technical assistance, digital literacy initiatives, and managerial support systems. Such interventions can help employees cope more effectively with technological complexity, information overload, and continuous technological change.

Second, the conceptual landscape analysis demonstrates that psychological outcomes represent one of the most prominent themes within the techno-stress literature. Emotional exhaustion, anxiety, fatigue, and cognitive overload consistently emerge as important consequences of technology-related stress. Managers should therefore recognize techno-stress as a workplace well-being issue rather than merely a technology adoption challenge. Integrating employee well-being initiatives into digital transformation strategies can help organizations reduce the negative psychological effects associated with technology-intensive work environments.

Third, the contextual and behavioural cluster highlights the influence of organizational environments on employee responses to technology. The findings indicate that techno-stress frequently manifests through behaviours such as disengagement, reduced commitment, lower productivity, and workplace deviance. Consequently, organizations should carefully evaluate how technological systems are implemented and managed. Employee participation in technology implementation processes, clear communication regarding technological change, and realistic performance expectations may reduce resistance and improve adaptation outcomes.

Fourth, the review reveals that research on techno-stress has increasingly shifted toward remote, hybrid, and digitally connected work environments. This trend suggests that organizations should reconsider traditional assumptions regarding employee availability and digital connectivity. Continuous connectivity may improve responsiveness but can also contribute to work-life boundary erosion and sustained psychological strain. Managers should therefore establish clear expectations regarding digital communication, workload distribution, and after-hours technology use to support healthier work practices.

Fifth, the growing attention to artificial intelligence, automation, and advanced digital technologies indicates that organizations must proactively prepare employees for future technological transitions. Rather than focusing exclusively on technological efficiency, managers should consider the human implications of digital transformation initiatives. Investments in reskilling, upskilling, and technology adaptation programs can enhance employee confidence and reduce uncertainty associated with emerging technologies.

The review also provides important implications for technology developers and system designers. Many studies identify techno-complexity, techno-overload, and techno-invasion as persistent sources of stress. These findings suggest that user-centred design principles should play a central role in technology development. Systems that are intuitive, transparent, and aligned with employee workflows are likely to reduce cognitive burden and facilitate

smoother technology adoption.

Finally, the geographical analysis highlights the concentration of techno-stress research within a relatively small number of countries. Policymakers and organizational leaders should therefore exercise caution when directly transferring interventions across different cultural and institutional contexts. Strategies that prove effective in technologically mature economies may require adaptation before implementation in emerging markets. Developing context-sensitive approaches to digital well-being will become increasingly important as digital transformation expands across diverse industries and regions.

Overall, the findings suggest that effective management of techno-stress requires a balanced approach that simultaneously addresses technological demands, employee capabilities, organizational support mechanisms, and contextual influences. Organizations that successfully achieve this balance are likely to experience not only lower levels of employee stress but also more sustainable digital transformation outcomes.

VI. CONCLUSION

The rapid digitalization of workplaces, accelerated by advances in artificial intelligence, automation, remote work technologies, and Industry 5.0 initiatives, has intensified scholarly interest in understanding the causes and consequences of techno-stress. In response to this growing body of literature, the present study systematically reviewed and mapped the intellectual structure of techno-stress research using the SPAR-4-SLR protocol and bibliometric techniques.

The findings reveal a substantial increase in scholarly attention toward techno-stress, particularly following the widespread adoption of digital technologies in organizational settings. The analysis identifies the dominant theoretical foundations underpinning the field, with Job Demands–Resources Theory, the Transactional Model of Stress and Coping, Conservation of Resources Theory, the Person–Environment Fit Model, and the Stressor–Strain–Outcome Framework emerging as the most frequently employed perspectives. However, the review also demonstrates that techno-stress research remains theoretically fragmented, with many studies relying on isolated theoretical explanations and limited integration across perspectives.

The bibliographic coupling analysis further reveals four major thematic streams shaping the domain: contextual and behavioural impacts of techno-stress, psychological outcomes and employee well-being, affective and transformational dimensions of digital work, and techno-stress and organizational productivity. Collectively, these clusters illustrate the evolution of the field from an initial focus on productivity-related concerns toward broader investigations of employee well-being, adaptation, and digital transformation. At the same time, the findings indicate that research continues to emphasize negative outcomes such as burnout, fatigue, and emotional exhaustion, while comparatively less attention has been devoted to positive adaptation processes including digital resilience, techno-eustress, and technology-enabled growth.

The review also highlights significant geographical

imbalances within the literature. Although the United States remains the dominant contributor, countries such as India have emerged as influential sources of techno-stress research, reflecting the growing importance of digital transformation in emerging economies. Nevertheless, contributions from many regions remain limited, raising concerns regarding the generalizability of existing theoretical frameworks and emphasizing the need for more context-sensitive and cross-cultural investigations.

Several opportunities for future research emerge from the analysis. In particular, the growing presence of artificial intelligence, algorithmic management systems, intelligent automation, and digitally connected work environments requires the development of more contemporary theoretical explanations capable of capturing the unique stressors associated with emerging technologies. Furthermore, greater methodological diversity, increased use of longitudinal and mixed-method designs, and broader geographical representation will be essential for advancing a more comprehensive understanding of techno-stress in the future.

Overall, this review contributes by synthesizing the fragmented techno-stress literature, identifying its dominant intellectual foundations, mapping its conceptual structure, and highlighting key opportunities for future inquiry. Rather than offering a definitive account of the field, the study provides an evidence-based assessment of its current state and suggests directions through which future scholarship can develop more integrated, contextually grounded, and theoretically robust explanations of techno-stress in an increasingly digital world.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Mehak Mahajan: Conceptualization, methodology, data collection, formal analysis, bibliometric analysis, interpretation of findings, writing—original draft preparation, and manuscript revision. Mehmood Ahmad: Conceptualization, supervision, validation, critical review and editing, interpretation of findings, and final approval of the manuscript. Both authors reviewed, revised, and approved the final version of the manuscript.

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