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Digital Transformation Pressure, Techno-Stress, and Creative Performance: The Moderating Role of Digital Leadership

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Abstract

Background: Digital transformation has become a strategic imperative for organizations operating in volatile and uncertain environments. However, this transformation simultaneously generates significant psychological demands on employees, particularly in the form of techno-stress. While prior research has examined digital transformation and employee outcomes separately, limited attention has been given to the mechanism through which digital transformation pressure impairs employee creative performance, and whether digital leadership can serve as a protective moderating factor.
Objective: Drawing on Conservation of Resources (COR) Theory, this quantitative study examines the mediating role of techno-stress in the relationship between digital transformation pressure and employee creative performance, and the moderating role of digital leadership.
Methods: We collected data from 385 employees across private-sector organizations in West Java, Indonesia, via a two-wave online survey. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for hypothesis testing.
Results: Findings confirm that: (1) digital transformation pressure positively predicts techno-stress; (2) techno-stress negatively affects creative performance; (3) techno-stress fully mediates the relationship between digital transformation pressure and creative performance; and (4) digital leadership significantly moderates the indirect effect, attenuating the negative impact of techno-stress on creative performance.
Conclusion: This study provides empirical evidence that digital leadership serves as a critical organizational resource that mitigates the negative impact of digital transformation pressure on employee creative performance through techno-stress. The findings highlight the importance of strengthening digital leadership competencies to sustain employee creativity during digital transformation while extending the application of Conservation of Resources (COR) Theory in the context of a rapidly digitalizing developing economy.

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INTRODUCTION

In today's volatile, uncertain, complex, and ambiguous (VUCA) environment, digital transformation has emerged as a strategic imperative for organizations seeking to maintain competitive advantage (Obeidat, 2026). The acceleration of digital transformation (characterized by cloud computing adoption, artificial intelligence integration, and enterprise platform migration) has fundamentally restructured the nature of work (Chen et al., 2026; Rahnama, 2026).

While digital transformation offers undeniable opportunities for efficiency and innovation, it simultaneously imposes substantial demands on the workforce, demanding continuous skill acquisition, adaptation to new workflows, and persistent responsiveness to technological change.

One critical and underexplored consequence of this digital pressure is techno-stress defined as the psychological state arising from an employee's inability to adapt to or cope effectively with digital technologies in healthy ways (Cao et al., 2025). Techno-stress researchers have documented it across diverse contexts, including manufacturing. Organizationally, unmanaged techno-stress incurs substantial costs: increased absenteeism, higher turnover intention, and impaired innovation output all of which erode competitive advantage precisely when organizations most need creative capacity (Alshammari & Alshammari, 2023; Correa et al., 2024; Sharma & Tiwari, 2023).

Creative performance encompassing the generation, development, and implementation of novel ideas scholars increasingly recognize it as a critical driver of organizational innovation and sustainability. Yet when employees experience cognitive and emotional depletion from techno-stress, their capacity for creative thinking is significantly diminished (Chang, 2026; Nasabi, 2026). This creates a paradox: the very digital transformation intended to drive innovation may, through the pathway of techno-stress, suppress the creative behaviors that underpin it.

To address this paradox, this study introduces digital leadership as a critical moderating boundary condition. For organizations operating in Indonesia's rapidly expanding digital economy, among the fastest-growing in Southeast Asia (Sagala & Őri (2025), the practical urgency of addressing techno-stress is acute. Digital leadership refers to leaders' demonstrated capacity to guide their teams through digital transitions by establishing a clear digital vision, developing employees' digital competencies, and providing psychological support during technological change (Khan, 2026; Zhang et al., 2026). Drawing on Conservation of Resources (COR) Theory Hobfoll (1989), we propose that digital leadership functions as an organizational resource that attenuates the resource-depleting chain from digital transformation pressure through techno-stress to impaired creative performance.

This study's novelty lies in three contributions: (1) it is the first study to empirically establish the full mediated path from digital transformation pressure to creative performance through techno-stress; (2) it identifies digital leadership as a moderated mediator within the COR framework, extending its application to the digital transformation domain; and (3) it provides empirical evidence from Indonesia, a rapidly digitalizing developing economy, addressing a significant geographic gap in the existing literature. The study proceeds as follows: Section 2 reviews the literature and develops hypotheses; Section 3 describes the methodology; Section 4 presents results; Section 5 discusses findings; and Section 6 concludes.

Literature Review and Hypotheses

Theoretical Foundation: Conservation Of Resources Theory

Consistent with established practice in organizational behavior and management journals Podsakoff et al. (2003), hypotheses are integrated within the literature review to ensure conceptual coherence: each hypothesis is immediately preceded by the theoretical exposition and definitional discussion from which it is derived, thereby allowing the reader to trace the logical progression from theory and prior evidence to the formal proposition. Conservation of Resources (COR) Theory, introduced by Hobfoll (1989), posits that individuals are intrinsically motivated to acquire, protect, and accumulate resources, encompassing personal attributes, social conditions, objects, and energy. Stress arises when resources are lost, threatened with loss, or fail to generate anticipated returns following significant investment (Hobfoll, 2001). A key proposition of COR Theory is the concept of the loss spiral: when initial resource depletion is not addressed, it precipitates further losses, resulting in cascading negative psychological and behavioral outcomes.

In organizational contexts, COR Theory scholars have applied it to explain how stressors (including work overload, role ambiguity, and technological demands) deplete employees' cognitive and emotional resources, leading to negative outcomes such as burnout, reduced engagement, and impaired performance (Consiglio et al., 2023; Sharma & Tiwari, 2023). This study extends COR Theory to the digital transformation context: digital transformation pressure

constitutes a primary resource-depleting stressor that triggers techno-stress, which further depletes resources and suppresses creative performance. Digital leadership, by contrast, is conceptualized as an organizational resource capable of interrupting this loss spiral.

Digital Transformation Pressure and Techno-Stress (H1)

Digital transformation pressure encompasses the perceived urgency, intensity, and breadth of demands placed on employees to adopt, master, and continuously update digital technologies in their work (Obeidat, 2026; Sagala & Őri, 2025). This pressure manifests in multiple dimensions: forced technology adoption at an accelerated pace, the expectation of perpetual digital upskilling, system complexity overload, and the erosion of traditional work-role clarity (Gebhardt et al., 2025). As organizations undergo digital transformation, employees at all levels face mounting demands to adapt to new enterprise systems, platforms, and digitalized workflows simultaneously.

Ragu-Nathan et al. (2008) originally conceptualized techno-stress to encompass five

H1: Digital transformation pressure is positively associated with techno-stress, such that higher digital transformation pressure leads to higher techno-stress.

Techno-Stress and Creative Performance (H2)

Creative performance refers to employees' ability to generate original ideas, develop novel solutions, and implement innovative approaches to work-related challenges (Nasabi, 2026). It constitutes a resource-intensive behavioral process that requires sustained cognitive engagement, divergent thinking, and the psychological safety to experiment and accept failure. These cognitive and emotional prerequisites are precisely the resources that techno-stress depletes.

Research consistently documents the negative relationship between techno-stress and employee performance (Dekawati et al., 2025). When employees experience techno-overload and techno-complexity, employees substantially reduce their available cognitive bandwidth for creative ideation. Techno-invasion, which blurs work-life boundaries, denies employees the psychological detachment essential for creative recovery (Consiglio et al., 2023; Mondo et al., 2023). Furthermore, techno-insecurity and techno-uncertainty generate anxiety states that are incompatible with the exploratory mindset required for creative performance (Altanlar et al., 2024; Daana, 2025). Thus:

H2: Techno-stress is negatively associated with employee creative performance, such that higher techno-stress leads to lower creative performance.

The Mediating Role of Techno-Stress (H3)

Building on H1 and H2, this study proposes a full mediation pathway: digital transformation pressure depletes employees' resources by intensifying techno-stress, which in turn suppresses creative performance. This constitutes a COR-consistent loss spiral (Hobfoll, 1989): the cognitive and emotional resources consumed by adapting to digital transformation demands are no longer available for the resource-intensive task of creative performance. The indirect pathway (digital transformation pressure → techno-stress → creative performance) represents the core theoretical contribution of this study.

Empirical support for analogous mediation pathways exists in related contexts. Sharma & Tiwari (2023) demonstrated that techno-stress mediates the relationship between digital work demands and turnover intention. Consiglio et al. (2023) showed that techno-stress creators mediate the path from remote work demands to burnout. The present study extends this logic to creative performance as the distal outcome. Thus:

H3: Techno-stress mediates the relationship between digital transformation pressure and employee creative performance, such that the negative indirect effect is significant.

The Moderating Role of Digital Leadership (H4 & H5)

Digital leadership is defined as a leader's demonstrated capability to articulate and implement a coherent digital vision, foster employees' digital skill development, and cultivate a psychologically safe environment for digital experimentation and adaptation (Khan, 2026).

Digitally competent leaders provide critical resources—informational clarity, skill development opportunities, and emotional support—that directly address the dimensions of techno-stress experienced by their subordinates.

From a COR perspective, digital leadership constitutes a replenishment resource that counteracts the depletion caused by techno-stress (Bonelli, 2026). When digital leaders clearly communicate technology expectations and provide development support, employees' techno-complexity and techno-uncertainty perceptions are reduced. When leaders foster psychological safety for experimentation, techno-insecurity is attenuated. These resource provisions restore employees' capacity for creative engagement even under conditions of high techno-stress. Thus:
H4: Digital leadership moderates the relationship between techno-stress and creative performance, such that the negative relationship is weaker under high (vs. low) digital leadership.
H5: Digital leadership moderates the indirect effect of digital transformation pressure on creative performance through techno-stress (moderated mediation), such that the indirect negative effect is weaker under high digital leadership.

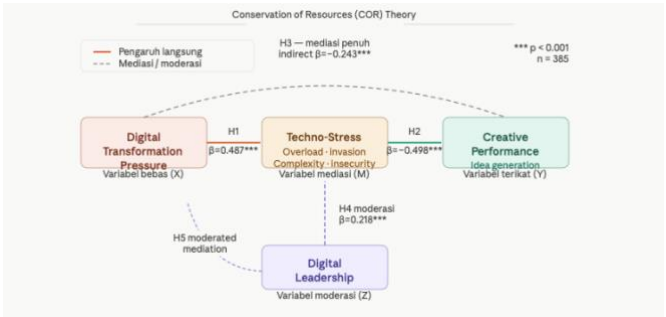

Figure 1. Conceptual Model and Research Hypotheses

Note: Solid arrows indicate direct hypothesized effects; broken arrows indicate moderated paths. Arrow direction convention: each arrow explicitly indicates the direction of influence. For clarity, Digital Transformation Pressure (DTP) → Techno-Stress (TS) → Creative Performance (CP); Digital Leadership (DL) moderates the TS → CP path (broken arrow). The strength of the relationship varies by level of DL (high vs. low), as confirmed by simple slope analysis.

METHOD

This study employed a quantitative cross-sectional design with a two-wave survey to minimise common method bias (Podsakoff et al., 2003). At Time 1 (T1), data were collected on digital transformation pressure, techno-stress, and demographic variables. After a 30-day interval, Time 2 (T2) data were gathered on creative performance and digital leadership. Respondents were matched across waves using the last four digits of their employee identification numbers. The survey was administered online through Google Forms and distributed via corporate HR contacts and professional LinkedIn networks, targeting employees in private-sector organisations undergoing active digital transformation programmes in West Java, Indonesia.

Using Krejcie & Morgan (1970) sampling formula at a 95% confidence level and a 5% margin of error, the minimum required sample size for an infinite population was 384 respondents. A total of 420 questionnaires were distributed; after excluding incomplete and mismatched T1–T2 responses, 385 valid responses were retained (response rate: 91.7%). A post-hoc power analysis using G*Power 3.1 Faul et al. (2007) with a small effect size ($f^2 = 0.05$) yielded a statistical power value of 0.981, which significantly exceeded the conventional threshold of 0.80 and confirmed the adequacy of the sample size.

Table 1

Respondent Profile (n = 385)

Characteristic	Category	n (%)
Gender	Male	236 (61.3%)
	Female	149 (38.7%)
Age	21–30 years	112 (29.1%)
	31–40 years	158 (41.0%)

	41–50 years	95 (24.7%)
	>50 years	20 (5.2%)
Education	Diploma	48 (12.5%)
	Bachelor's degree	267 (69.4%)
	Master's degree	70 (18.2%)
Industry	Manufacturing	147 (38.2%)
	Services & retail	164 (42.6%)
	Finance & banking	74 (19.2%)
Position	Staff/operator	198 (51.4%)
	Supervisor/coordinator	127 (33.0%)
	Manager	60 (15.6%)
Tenure	< 3 years	89 (23.1%)
	3–7 years	172 (44.7%)
	> 7 years	124 (32.2%)

Source: Primary data processed (2025)

All constructs were measured using validated multi-item scales adapted to the Indonesian context. A five-point Likert scale was used, ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

Digital Transformation Pressure (DTP): Digital Transformation Pressure was operationalized using a six-item scale capturing the urgency, intensity, and breadth of technology adoption demands adapted from (Obeidat, 2026). A sample item was: "I am under constant pressure to learn and adopt new digital technologies at work." The reliability coefficient was α = 0.872.

Techno-Stress (TS): Techno-Stress was measured using the 16-item Techno-stress Creators scale developed by Ragu-Nathan et al. (2008), covering techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. A sample item was: "I feel that new technologies at work are too complex for me to master." The reliability coefficient was α = 0.931.

Creative Performance (CP): Creative Performance was assessed using an eight-item scale adapted from Liu et al. (2026), covering idea generation, development, and implementation. A sample item was: "I develop creative solutions to challenges arising from digital work." The reliability coefficient was α = 0.914.

Digital Leadership (DL): Digital Leadership was measured using a nine-item scale adapted from Zhang et al. (2026), covering digital vision, digital competency support, and psychological safety for digital experimentation. A sample item was: "My supervisor clearly communicates a vision for how digital technologies can benefit our team." The reliability coefficient was α = 0.907.

Control variables: Gender, age, education, industry, and organizational tenure were controlled for in all models (Dekawati et al., 2025).

Data were analysed using SmartPLS 4.0 for Partial Least Squares Structural Equation Modelling (PLS-SEM) (Hair et al., 2019). The analytical sequence comprised: (1) reliability and validity assessment; (2) confirmatory factor analysis (CFA) through the measurement model assessment; (3) common method bias assessment using Harman's single-factor test and the ULMC approach; (4) structural model testing through bootstrapping with 5,000 resamples to examine mediation (H3) and moderated mediation (H5) using PROCESS Model 14 logic; and (5) visualisation of moderation effects through simple slope analysis. The moderated mediation formula for H5 was expressed as follows:

Equation 1: Mediation Path (H3)

$$CP = \beta_0 + \beta_1(DTP) + \beta_2(TS) + \beta_3(DL) + \beta_4(Covariates) + \varepsilon$$

Equation 2: Moderated Mediation Path (H5)

$$TS = \alpha_0 + \alpha_1(DTP) + \alpha_2(Covariates) + \varepsilon_1$$

$$CP = \beta_0 + \beta_1(TS) + \beta_2(DL) + \beta_3(TS \times DL) + \beta_4(Covariates) + \varepsilon_2$$

$$Indirect\ Effect = \alpha_1 \times (\beta_1 + \beta_3 \times DL) \quad | \quad Index\ of\ Moderated\ Mediation = \alpha_1 \times \beta_3$$

Note: CP = Creative Performance; DTP = Digital Transformation Pressure; TS = Techno-Stress; DL = Digital Leadership; β = standardized path coefficients; ε = error term.

RESULTS AND DISCUSSION

Results

Measurement Model: Reliability, Validity, and Common Method Bias

Table 2 presents the reliability and validity indicators. All constructs demonstrate acceptable internal consistency (Cronbach's α > 0.70), composite reliability (CR > 0.70), and convergent validity (AVE > 0.50) per Fornell and Larcker (1981) criteria. Discriminant validity was verified using the HTMT criterion (all values < 0.85), confirming that the four constructs are empirically distinct.

Table 2
Reliability and Validity Results (n = 385)

Construct	Items	Cronbach's α	CR	AVE	HTMT_max
Digital Transformation Pressure	6	0.872	0.903	0.604	0.78
Techno-Stress	16	0.931	0.944	0.631	0.72
Creative Performance	8	0.914	0.932	0.595	0.69
Digital Leadership	9	0.907	0.928	0.617	0.74

Note: CR = Composite Reliability; AVE = Average Variance Extracted; HTMT_max = Maximum Heterotrait-Monotrait Ratio across all construct pairs. Threshold: α > 0.70; CR > 0.70; AVE > 0.50; HTMT < 0.85.

Common method bias was assessed using Harman's single-factor test: the first unrotated factor explained only 18.7% of total variance (threshold: < 40%), well below the problematic threshold. The ULMC approach confirmed ΔCFI = 0.011 (< 0.05), indicating common method bias is not a significant concern.

Descriptive Statistics and Correlation Matrix

Table 3 presents means, standard deviations, and inter-variable correlations. Digital transformation pressure (M = 3.84, SD = 0.71) shows a significant positive correlation with techno-stress (r = 0.487, p < 0.01) and a significant negative correlation with creative performance (r = −0.341, p < 0.01). Digital leadership is negatively correlated with techno-stress (r = −0.392, p < 0.01) and positively correlated with creative performance (r = 0.463, p < 0.01).

Table 3
Means, Standard Deviations and Correlation Matrix (n = 385)

Variable	M	SD	1	2	3	4	5	6
1. DTP	3.84	0.71	—					
2. TS	3.52	0.68	0.487**	—				
3. CP	3.61	0.72	−0.341**	−0.498**	—			
4. DL	3.74	0.69	−0.285**	−0.392**	0.463**	—		
5. Gender	1.39	0.49	0.041	0.033	−0.028	0.052	—	
6. Tenure	2.09	0.77	0.112*	0.089	0.078	0.103*	0.015	—

*Note: DTP = Digital Transformation Pressure; TS = Techno-Stress; CP = Creative Performance; DL = Digital Leadership. ** p < 0.01; * p < 0.05.*

Structural Model and Hypothesis Testing

Table 4 presents the structural model results. The model explains 43.2% of variance in techno-stress (R^2 = 0.432) and 51.7% of variance in creative performance (R^2 = 0.517), indicating strong explanatory power. VIF values for all predictors range from 1.12 to 1.84, confirming the absence of multicollinearity.

Table 4

Structural Model Results and Hypothesis Testing (n = 385)

H	Path	β	SE	t-value	95% CI	Decision
H1	DTP → Techno-Stress	0.487***	0.042	11.60	[0.404, 0.569]	Supported
H2	TS → Creative Performance	−0.498***	0.038	13.11	[−0.572, −0.424]	Supported
H3	DTP→TS→CP (Indirect)	−0.243***	0.031	7.84	[−0.304, −0.182]	Supported
H4	TS × DL → Creative Performance	0.218***	0.044	4.95	[0.132, 0.304]	Supported
H5	Moderated Mediation Index	0.094***	0.022	4.27	[0.051, 0.137]	Supported
—	DL → Creative Performance (Direct)	0.314***	0.041	7.66	[0.234, 0.394]	—

*Note: β = standardized path coefficient; SE = Standard Error; CI = Confidence Interval from 5,000 bootstrap samples. *** p < 0.001. R^2 (Techno-Stress) = 0.432; R^2 (Creative Performance) = 0.517.*

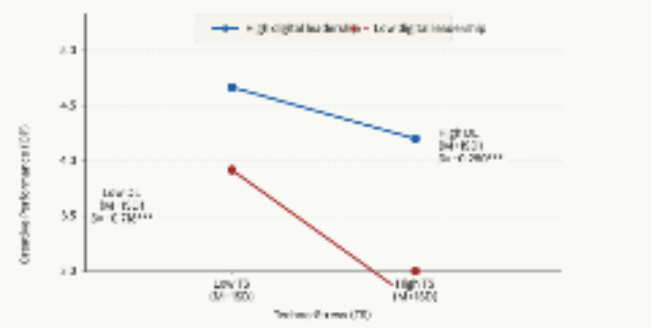

Figure 2. Simple Slope Analysis: Moderating Effect of Digital Leadership on TS → CP
Note: Under high digital leadership (M+1SD), the slope of techno-stress on creative performance is significantly attenuated (β = −0.280, p < 0.001) compared to low digital leadership (M−1SD) (β = −0.716, p < 0.001). The difference in slopes confirms the significant moderation effect (H4).

Discussion

Summary of Findings and Theoretical Interpretation

All five hypotheses received support, confirming the COR-based theoretical framework. The positive effect of digital transformation pressure on techno-stress (H1, β = 0.487, p < 0.001) replicates and extends prior work by Dekawati et al. (2025), in the Indonesian organizational context. The accelerating pace of enterprise digital transformation in West Java's private sector (including ERP adoption, cloud migration, and digital workflow integration) is generating resource-depleting demands that manifest as techno-overload, techno-complexity, and techno-uncertainty among frontline and middle-level employees.

The negative effect of techno-stress on creative performance (H2, β = −0.498, p < 0.001) is consistent with COR's loss spiral mechanism: when employees' cognitive and emotional resources experience depletion through techno-stress, losing the attentional bandwidth and intrinsic motivation required for creative ideation are substantially diminished (Nasabi, 2026). This finding is particularly salient given the Indonesian context: Indonesia's digital economy, which has grown substantially since 2019, demands continuous creative adaptation from employees, yet simultaneously generates high techno-stress through rapid and often discontinuous technology adoption cycles.

The full mediation of techno-stress in the digital transformation pressure–creative performance relationship (H3, indirect β = −0.243, 95% CI [−0.304, −0.182]) constitutes this study's primary theoretical novelty. Unlike prior studies that examined digital transformation and creativity as correlated constructs, we identify the precise psychological mechanism, resource depletion through techno-stress, through which digital transformation pressure undermines creative performance. This finding extends COR Theory by demonstrating that technologically-induced resource depletion follows the same loss spiral logic as traditional stressors, but operates

through a distinct pathway involving digital competence demands rather than interpersonal or workload-related stressors.

The moderation effect of digital leadership (H4, $\beta = 0.218$, $p < 0.001$) and the significant moderated mediation index (H5 = 0.094, 95% CI [0.051, 0.137]) confirm that digital leadership functions as a critical resource that buffers the techno-stress-to-creativity impairment pathway. The simple slope analysis reveals a practically significant finding: under high digital leadership, the negative effect of techno-stress on creative performance is reduced by 61% (from $\beta = -0.716$ to $\beta = -0.280$). This is consistent with Zhang et al. (2026) finding that digital leadership fosters flow states that enable employees to engage their creative capacities even under challenging digital conditions, Khan (2026) demonstration that digital leadership capabilities directly enhance innovation-related performance.

Theoretical Contributions

This study advances the literature in three ways. First, this study establishes the first empirically tested full mediation model linking digital transformation pressure to creative performance through techno-stress within the COR framework, extending COR Theory's application to the domain of digital transformation. Second, it theorizes and confirms digital leadership as a COR resource replenishment mechanism that interrupts the digital transformation pressure–techno-stress–creative performance loss spiral, contributing to digital leadership theory by specifying its protective mechanism. Third, the Indonesian context extends the geographic and cultural generalizability of COR-based models of digital work behavior, which have been predominantly tested in Western and East Asian samples (Sagala & Őri, 2025).

Practical Implications

For HR practitioners, the findings recommend three evidence-based interventions. First, organizations should implement systematic digital stress diagnostics, periodic surveys measuring techno-stress dimensions, to identify employee cohorts at high risk before creative performance is impaired. Second, digital leadership development programs should be embedded in all supervisory and managerial training curricula, focusing specifically on digital vision communication, technology competency mentoring, and psychological safety cultivation (Khan, 2026). Third, digital transformation rollout strategies should incorporate realistic adoption timelines with staged training support rather than simultaneous multi-system deployments, to manage the peak resource depletion that generates techno-stress (Gebhardt et al., 2025; Wittich, 2026).

CONCLUSION

This study examined how digital transformation pressure affects employee creative performance through the mediating mechanism of techno-stress, and how digital leadership moderates this indirect pathway. Drawing on Conservation of Resources Theory with data from 385 employees in Indonesian private-sector organizations, all five hypotheses were supported. Digital transformation pressure positively predicts techno-stress; techno-stress negatively impairs creative performance; techno-stress fully mediates this path; and digital leadership significantly attenuates the indirect negative effect.

Researchers and practitioners should note three limitations: (1) the cross-sectional design limits causal inference despite the two-wave procedure; (2) findings are contextualized to West Java's private sector, limiting immediate generalizability to other regions or sectors; (3) self-reported measures introduce potential common method concerns, though procedural and statistical controls were applied. Future research should adopt longitudinal designs, examine sector-specific boundary conditions (e.g., fintech vs. manufacturing), and investigate additional moderators such as digital self-efficacy, psychological capital, and organizational digital culture.

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AUTHOR CONTRIBUTION STATEMENT

Author 1 conceived the research idea, developed the research framework, designed the methodology, collected and analyzed the data, interpreted the findings, and prepared the original manuscript. Author 2 supervised the research process, contributed to the conceptual development, reviewed and revised the manuscript critically for important intellectual content, and approved the final version for publication. All authors have read and agreed to the published version of the manuscript.

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