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Digital Fluency as a Missing Mechanism in Government Digital Linking Digital Transformation Literacy, Technostress, and Employee Performance

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ABSTRACT

This study examines the effects of digital literacy and technostress on employee performance through digital fluency among Indonesian civil servants implementing the Electronic-Based Government System (SPBE). Drawing on Dynamic Capabilities Theory, it proposes that digital literacy enhances digital fluency and performance, while technostress reduces both outcomes, with digital fluency serving as a mediating mechanism. A quantitative cross-sectional design was employed using survey data from 252 civil servants selected through purposive sampling. Data were collected between February and April 2026 through online questionnaires and analyzed using PROCESS Macro Model 4 in SPSS with 5,000 bootstrap resamples. Measurement validity and reliability were confirmed, and Spearman correlation was applied due to non-normal data distribution. Results indicate that digital literacy significantly improves digital fluency and employee performance, whereas technostress significantly reduces digital fluency but does not directly affect performance. Digital fluency partially mediates the relationship between digital literacy and performance and fully mediates the relationship between technostress and performance. The findings suggest that performance in digital government environments depends largely on employees' ability to convert digital skills into digital fluency. Organizations should therefore prioritize digital fluency development and technostress reduction through targeted training and improved system design.

Keywords: Employee performance, Human resources management, Dinamic Capabilities Theory, Technostress, Digital fluency

INTRODUCTION

Digital transformation has become a central agenda in public governance, particularly in Indonesia, where the government has implemented the Electronic-Based Government System

(Sistem Pemerintahan Berbasis Elektronik/SPBE) as a strategic initiative to reform bureaucratic processes (Israyudin et al., 2025). Through this system, public institutions are expected to improve efficiency, transparency, and service quality by integrating digital technologies into administrative workflows (Gil-Garcia et al., 2018). However, the effectiveness of such transformation depends not only on technological infrastructure but also on the readiness of civil servants (Aparatur Sipil Negara/ASN) to adopt and utilize digital systems effectively (Twizeyimana & Andersson, 2019; Vial, 2019). Empirical evidence indicates that technological adoption in the public sector often encounters human capability constraints, which may limit the expected outcomes of digital initiatives (Astrialita & Azizatun Nafi'ah, 2025; Gil-Garcia et al., 2018).

In Indonesia, civil servants increasingly rely on digital platforms such as e-Office, e-Kinerja, and personnel management systems to support administrative tasks and public service delivery. These developments require adequate digital literacy, defined as the ability to access, evaluate, and effectively utilize digital information and technologies (Gil-Garcia et al., 2018; Israyudin et al., 2025; Rusmini et al., 2025; Twizeyimana & Andersson, 2019). However, digital literacy among Aparatur Sipil Negara (ASN) remains uneven, particularly across regional institutions where disparities in infrastructure, training, and technological exposure persist (Astrialita & Azizatun Nafi'ah, 2025). Such inequalities contribute to inconsistent system utilization and may reduce the effectiveness of public service delivery (Twizeyimana & Andersson, 2019).

At the macro level, digital transformation has become a central agenda in Indonesian public governance through the implementation of the Electronic-Based Government System (Sistem Pemerintahan Berbasis Elektronik/SPBE), which aims to improve efficiency, transparency, and service quality by integrating digital technologies into administrative workflows (Gil-Garcia et al., 2018; Israyudin et al., 2025). However, the success of this transformation depends not only on technological infrastructure but also on the readiness of civil servants to adopt and effectively utilize digital systems (Twizeyimana & Andersson, 2019; Vial, 2019). Empirical evidence suggests that public sector digital initiatives are frequently constrained by human capability gaps, which limit the realization of intended benefits (Astrialita & Nafi'ah, 2025; Gil-Garcia et al., 2018).

Beyond capability limitations, digital transformation also introduces psychological challenges, particularly technostress, which arises from system complexity, overload, and continuous technological change (Sanjeeva Kumar, 2024; Tarafdar et al., 2019). Prior research has shown that technostress can impair cognitive functioning and reduce effective technology use, thereby negatively affecting work outcomes (Wang et al., 2022). Although digital literacy and technostress have been widely examined, existing studies predominantly treat them as direct predictors of employee performance, providing limited insight into the mechanisms through which digital capabilities are translated into performance outcomes (Abhari, 2025; Lasrado et al., 2026; Makhafola et al., 2025). Furthermore, prior research frequently relies on attitudinal mediators such as motivation and engagement, which may not adequately capture the capability-based processes required in digitally intensive work environments. Employee performance in such settings depends not only on willingness to use technology but also on the ability to adapt, integrate, and strategically apply digital tools in task execution (van Laar et al., 2020; Vial, 2019). In this regard, digital fluency has been proposed as a higher-order capability, yet its role remains underexplored in public sector digital transformation, particularly within the Indonesian context (Meitania et al., 2026; Rusmini et al., 2025). In this regard, digital fluency has been proposed as a higher-order capability, yet its role remains underexplored in public sector digital transformation, particularly within the Indonesian context.

To address this gap, this study develops an integrated research model linking digital literacy and technostress to employee performance, with digital fluency serving as a mediating variable. By positioning digital literacy as a foundational capability and technostress as a constraining factor, this study conceptualizes digital fluency as a key mechanism through which digital transformation is translated into actual work outcomes. Accordingly, this research aims to: (1) analyze the effects of digital literacy and technostress on digital fluency and employee performance, and (2) examine the mediating role of digital fluency in these relationships. By shifting the focus from technology adoption to capability realization, this study provides a more comprehensive explanation of how digital initiatives influence employee performance in public sector organizations.

LITERATURE REVIEW

Based on Dynamic Capabilities Theory and prior research on digital capability development, a set of hypotheses is proposed to explain the relationships among the study variables. To address this limitation, recent studies have introduced the concept of digital fluency, which extends beyond basic technical skills to encompass the strategic, adaptive, and creative application of digital technologies (Caton et al., 2022; Koch & Fehlmann, 2025; van Laar et al., 2020). Digital fluency involves higher-order cognitive processes, including problem-solving, decision-making, and the integration of digital technologies into work processes (Caton et al., 2022; Makhafola et al., 2025). From a capability-based perspective, digital literacy can be viewed as a foundational resource, while digital fluency represents the capability to transform that resource into effective work behaviors. This perspective aligns with capability-based and dynamic capability theories (Teece et al., 1997), which emphasize the transformation of resources into applied capabilities that drive performance outcomes. Individuals with stronger digital literacy are therefore more likely to develop digital fluency, as they possess the necessary knowledge base to engage with digital systems more confidently and effectively (Israyudin et al., 2025; Nyeleker et al., 2025).

From the perspective of Dynamic Capabilities Theory, resources create value only when individuals are able to integrate, adapt, and deploy them in response to changing environmental demands (Teece et al., 1997). Digital literacy provides employees with the foundational knowledge required to access, evaluate, and utilize digital information; however, possessing knowledge alone does not guarantee effective performance in increasingly complex digital environments. Employees must also develop the ability to apply digital technologies strategically, adapt to new systems, and solve technology-related problems in real work situations. These higher-order capabilities are reflected in digital fluency, which represents the practical and adaptive application of digital knowledge. Consequently, digital literacy can be viewed as a prerequisite resource that facilitates the development of digital fluency as a dynamic capability. Therefore, the following hypothesis is proposed:

H1: Digital literacy positively affects digital fluency.

Despite the importance of digital capability, digital transformation also introduces significant psychological challenges. Technostress, defined as stress arising from the use of information and communication technologies, represents a key barrier to effective technology utilization (Nikou et al., 2022; Tarafdar et al., 2019). This stress typically emerges from system complexity, information overload, and continuous technological change, which may exceed individuals' coping capacity (Lasrado et al., 2026; Sanjeeva Kumar, 2024). In public sector contexts, these challenges are further intensified by bureaucratic rigidity, limited autonomy, and high accountability requirements (Wildan Hashona & Elok Pusparini, 2026). Such conditions not

only affect users' emotional states but also impair cognitive functioning, reduce learning ability, and limit engagement with digital systems (Mansuroğlu & Smith, 2026; Pengfei et al., 2026). From a Dynamic Capabilities perspective, the development of higher-order capabilities requires continuous learning, adaptation, and the effective integration of knowledge into work practices (Teece et al., 1997). These processes depend on employees' ability to devote cognitive resources to exploring, understanding, and applying digital technologies. However, technostress often consumes attention and mental energy that would otherwise be available for learning and adaptation. As employees become increasingly focused on coping with technological demands, they may have fewer resources available to develop the adaptive and strategic competencies associated with digital fluency. As digital fluency depends on cognitive flexibility and adaptive capacity, elevated levels of technostress are likely to hinder its development. Accordingly, the following hypothesis is proposed:

H2: Technostress negatively affects digital fluency.

Employee performance in this study is conceptualized based on the Individual Work Performance framework, which emphasizes task performance as a core dimension reflecting the effectiveness with which individuals fulfill their job responsibilities (Koopmans et al., 2014). In digital work environments, performance increasingly depends on employees' ability to utilize digital systems accurately and efficiently. Digital literacy contributes to performance by enabling effective system operation, reducing errors, and improving task execution efficiency (Astrialita & Nafi'ah, 2025; Israyudin et al., 2025). Dynamic Capabilities Theory suggests that organizational and individual performance depends not only on advanced capabilities but also on the availability of foundational resources that enable effective task execution (Teece et al., 1997). In digitally enabled workplaces, digital literacy functions as an essential resource that allows employees to access information, operate digital systems, and perform technology-related tasks with greater accuracy and efficiency. Employees with higher levels of digital literacy are better equipped to navigate digital work processes, respond to routine technological demands, and minimize operational errors. Consequently, even in the absence of more advanced digital capabilities, digital literacy may contribute directly to employee performance by improving the efficiency and effectiveness of daily work activities. Although digital fluency represents a higher-order capability, digital literacy may still directly influence performance by supporting basic operational efficiency in routine tasks. Empirical evidence also indicates that digital competence contributes to administrative efficiency and service quality in public sector settings (Koch & Fehlmann, 2025). Therefore, the following hypothesis is proposed:

H3: Digital literacy positively affects employee performance.

In contrast, technostress has been consistently associated with negative work outcomes. High levels of technostress can lead to fatigue, decreased motivation, and reduced job satisfaction, ultimately impairing performance (Tarafdar et al., 2019). In public organizations, where employees operate under strict procedures and deadlines, these effects may be even more pronounced. From the perspective of Dynamic Capabilities Theory, effective performance in digital environments requires employees to continuously adapt to technological changes and apply digital resources in support of organizational objectives (Teece et al., 1997). These activities depend on the availability of cognitive and emotional resources that enable learning, problem-solving, and decision-making. Technostress can undermine these processes by diverting attention toward coping with technological demands rather than accomplishing work-related goals. As a result, employees experiencing high levels of technostress may struggle to maintain efficient task execution, adapt to changing digital requirements, and sustain high levels of job performance. Technostress has been shown to reduce productivity and increase the likelihood of errors in task execution (Tiwari, 2020). Therefore, the following hypothesis is proposed:

H4: Technostress negatively affects employee performance.

Beyond direct effects, performance in digital environments is also shaped by higher-order capabilities. Digital fluency enables employees to apply digital tools effectively, adapt to evolving technological demands, and solve work-related problems more efficiently (Kholifah et al., 2025). This capability facilitates the integration of technology into daily workflows, leading to improved task completion and overall performance (Abhari, 2025). Within the framework of Dynamic Capabilities Theory, digital fluency can be viewed as a higher-order capability that enables employees to effectively deploy, adapt, and reconfigure digital resources in response to changing work demands (Teece et al., 1997). Unlike basic digital skills, digital fluency reflects the ability to strategically integrate technology into work processes and make informed decisions in dynamic environments. Employees who possess this capability are better positioned to respond to technological changes, solve emerging problems, and maintain effective performance in increasingly digitalized workplaces. Consequently, digital fluency is expected to contribute positively to employee performance. Prior studies have also linked advanced digital capabilities to both adaptive and task performance outcomes in digital work settings (Twizeyimana & Andersson, 2019; Vial, 2019). Accordingly, the following hypothesis is proposed:

H5: Digital fluency positively affects employee performance.

Building on these relationships, this study adopts a mediation framework to explain how digital literacy and technostress influence performance through digital fluency. From a capability-based perspective, resources such as digital literacy do not automatically lead to improved performance unless they are transformed into applied capabilities. Digital fluency serves as the mechanism through which this transformation occurs, enabling individuals to convert digital knowledge into effective work behavior (Caton et al., 2022; Mondigo et al., 2023; Pengfei et al., 2026). Empirical evidence supports the role of higher-order capabilities in mediating the relationship between foundational skills and performance outcomes (Vial, 2019; Hashona & Pusparini, 2026). Therefore, the following hypothesis is proposed:

H6: Digital fluency mediates the relationship between digital literacy and employee performance.

Similarly, technostress may indirectly influence performance by disrupting the development and application of digital fluency. Elevated stress levels can impair cognitive functioning and reduce individuals' ability to engage in adaptive learning and complex problem-solving, both of which are essential for developing digital fluency (Berger et al., 2023; Dutta & Mishra, 2023; Mansuroğlu & Smith, 2026). As a result, technostress may weaken employees' ability to translate digital knowledge into effective work practices. Empirical findings further indicate that stress-related factors often influence performance through cognitive and capability-based mechanisms rather than solely through direct effects (Tarafdar et al., 2019). Accordingly, the following hypothesis is proposed:

H7: Digital fluency mediates the relationship between technostress and employee performance.

METHODS

This study adopts a quantitative research design to examine the relationships between digital literacy, technostress, digital fluency, and employee performance in public sector organizations. A cross-sectional survey was conducted among civil servants (Aparatur Sipil Negara/ASN) who actively use digital-based administrative systems. The target population comprises civil servants working in institutions that have implemented the Electronic-Based Government System (SPBE). Due to the absence of a comprehensive sampling frame, this study

employs purposive sampling. Respondents were selected based on the following criteria: (1) active civil servant status, (2) regular use of digital systems such as e-Office or e-Kinerja, and (3) a minimum of one year of work experience. Data were collected from February to April 2026 through an online questionnaire distributed via WhatsApp and email to ensure broad accessibility. All constructs were measured using previously validated scales adapted to the public sector context. A four-point Likert scale (1 = strongly disagree to 4 = strongly agree) was used to encourage more definitive responses and reduce central tendency bias (Garland, 1991; Krosnick & Presser, 2010).

Each construct in this study was measured using multiple indicators adapted from previously validated scales. Digital literacy was assessed using six items reflecting individuals' ability to access, evaluate, and effectively utilize digital information, adapted from established frameworks (van Laar et al., 2020). Technostress was measured using five items capturing key dimensions such as techno-complexity, techno-overload, and techno-uncertainty, following prior research (Tarafdar et al., 2019). Digital fluency was operationalized using five items representing higher-order capabilities in the adaptive and strategic use of digital technologies in work contexts, with measures adapted from recent studies on digital competence and fluency (Ren et al., 2025; van Laar et al., 2020). Employee performance was measured using seven items reflecting task performance, based on the Individual Work Performance framework (Koopmans et al., 2014). The focus on task performance is appropriate in this study as it directly captures employees' effectiveness in performing core job responsibilities within digital work environments. All measurement items were slightly adapted to align with the context of public sector organizations in Indonesia.

Data analysis was conducted using regression-based techniques in SPSS, employing the PROCESS Macro Hayes ver. 5.0. This approach is appropriate for the present study due to its strong predictive orientation, flexibility in testing complex models involving mediation and moderation, and robustness to violations of normality assumptions through bootstrapping procedures (Hayes, 2022). Prior to hypothesis testing, measurement quality was assessed. Internal consistency reliability was evaluated using Cronbach's alpha, with values ≥ 0.70 considered acceptable. Construct validity was examined through exploratory factor analysis, including factor loadings, Kaiser-Meyer-Olkin (KMO) measure, and Bartlett's test of sphericity. Descriptive statistics and correlations were computed for all variables. Given the non-normal distribution of the data, Spearman's rho was used to assess bivariate relationships. Multicollinearity was evaluated using tolerance and Variance Inflation Factor (VIF) values, with VIF values ≤ 5 indicating no multicollinearity concerns. Hypothesis testing was conducted using the PROCESS Macro Hayes with 5,000 bootstrap samples to estimate direct, indirect, and interaction effects. Bootstrapped confidence intervals (95%) were used to determine the significance of effects, with intervals not including zero indicating statistical significance. Mediation effects were assessed through indirect effects, while moderation effects were examined using interaction terms and conditional effects at different levels of the moderator.

RESULTS

The sample comprised 252 respondents with a near-equal gender distribution (50.4% male; 49.6% female). Participants were predominantly mid- to late-career employees, concentrated in the 41–54 age range (61.6%), indicating a mature workforce. Educational attainment was relatively high, with most respondents holding a Bachelor's (56.0%) or Master's degree (28.6%). In terms of tenure, the sample was largely experienced, with 43.7% reporting 13–20 years of service and an additional 19.8% exceeding 20 years, reinforcing the seniority

profile of the respondents. Employment status was dominated by civil servants (77.0%), compared to 23.0% contract-based government employees, suggesting a strong representation of permanent public sector personnel. Role distribution shows a balanced composition across hierarchical levels, with functional positions (40.5%), operational roles (35.7%), and structural/managerial roles (23.8%). Institutionally, the sample was heavily concentrated in local government (52.4%), followed by provincial (15.9%) and central government institutions (15.1%), indicating that the findings primarily reflect subnational public administration contexts.

Construct validity and reliability (Table 1) were assessed using exploratory factor analysis and internal consistency measures.

Table 1. Validity and Reliability Test

Variables	No. of Items	KMO	Bartlett's Test (χ^2)	df	Sig.	MSA	Factor Loadings	Cronbach's Alpha
Digital literacy	6	0.868	703.912	15	<0.001	> 0.50	> 0.50	0.871
Technostress	5	0.890	854.393	10	<0.001	> 0.50	> 0.50	0.915
Work performance	7	0.829	865.567	21	<0.001	> 0.50	> 0.50	0.849
Digital fluency	5	0.854	612.593	10	<0.001	> 0.50	> 0.50	0.870

Source: Data prepared by the authors

All constructs demonstrated satisfactory sampling adequacy (KMO = 0.829–0.890) and significant Bartlett's tests ($p < 0.001$), confirming the adequacy of factorability. All items exceeded the recommended thresholds, with MSA and factor loadings above 0.50, supporting convergent validity, while Cronbach's alpha values (0.849–0.915) indicate strong internal consistency.

Taken together, these results provide evidence that the measurement instruments adequately capture the theoretical constructs examined in this study. The satisfactory factor structures indicate that the observed items are meaningfully associated with their intended latent variables, while the strong reliability coefficients suggest consistent measurement across respondents. Furthermore, the results support the conceptual distinctiveness of digital literacy, technostress, digital fluency, and work performance, reducing concerns that the observed relationships are attributable to measurement overlap. Consequently, the findings provide a sound basis for subsequent correlation, regression, and mediation analyses. Descriptive statistics indicated that digital literacy and performance were relatively high, whereas technostress was comparatively low. Normality tests (Kolmogorov–Smirnov and Shapiro–Wilk) revealed non-normal distributions ($p < 0.001$), justifying the use of Spearman's rho. As shown in Table 2, digital literacy was positively associated with performance ($\rho = 0.601$, $p < 0.01$) and digital fluency ($\rho = 0.573$, $p < 0.01$), while technostress exhibited significant negative correlations with performance ($\rho = -0.295$, $p < 0.01$) and digital fluency ($\rho = -0.370$, $p < 0.01$). Digital fluency also showed a strong positive relationship with performance ($\rho = 0.658$, $p < 0.01$). All correlations were below the 0.80 threshold, indicating no multicollinearity concerns at the bivariate level. Further diagnostics confirmed this, with tolerance values exceeding 0.10 and VIF values ranging from 1.075 to 1.695. To assess common method bias, Harman's single-factor test was conducted using principal component analysis. The first factor accounted for 37.14% of the total variance, below the 50% threshold, suggesting that common method bias is unlikely to pose a serious concern.

Table 2. Descriptive Statistics and Spearman Correlation Matrix

Variables	Mean	SD	1	2	3	4
Digital literacy	3.48	0.46	—			
Technostress	1.97	0.73	-0.296**	—		
Performance	3.29	0.47	0.601**	-0.295**	—	
Digital fluency	3.16	0.53	0.573**	-0.370**	0.658**	—

Source: Data prepared by the authors

Hypothesis testing was conducted using the PROCESS macro (Model 4) with 5,000 bootstrap resamples as seen in Table 3.

Table 3. Mediation Analysis Results (PROCESS Model 4)

Path	β	SE	t	p	LLCI	ULCI	Decision
Digital literacy → Digital fluency	0.729	0.057	12.734	<0.001	0.617	0.842	Supported
Digital fluency → Work performance	0.462	0.05	9.197	<0.001	0.363	0.561	Supported
Digital literacy → Work performance	0.271	0.058	4.64	<0.001	0.156	0.386	Supported
Indirect effect (Digital literacy → Digital fluency → Work performance)	0.337	0.04	—	—	0.26	0.417	Supported (partial mediation)
Technostress → Digital fluency	-0.188	0.045	-4.205	<0.001	-0.276	-0.1	Supported
Digital fluency → Work performance (TS model)	0.602	0.042	14.279	<0.001	0.519	0.685	Supported
Technostress → Work performance	-0.017	0.031	-0.559	0.576	-0.078	0.044	Not supported
Indirect Effect (Technostress → Digital fluency → Work performance)	-0.113	0.038	—	—	-0.194	-0.045	Supported (full mediation)

Source: Data prepared by the authors

Digital fluency was specified as the mediating variable in the relationships between digital literacy, technostress, and performance. The results show that digital literacy exerts a significant positive effect on digital fluency ($\beta = 0.729$, $p < 0.001$), which in turn significantly predicts performance ($\beta = 0.462$, $p < 0.001$). The direct effect of digital literacy on performance remains significant ($\beta = 0.271$, $p < 0.001$), while the indirect effect via digital fluency is also significant ($\beta = 0.337$, 95% CI [0.260, 0.417]). These findings indicate partial mediation. In contrast, technostress has a significant negative effect on digital fluency ($\beta = -0.188$, $p < 0.001$), but its direct effect on performance is not significant ($\beta = -0.017$, $p = 0.576$). However, the indirect effect through digital fluency is significant ($\beta = -0.113$, 95% CI [−0.194, −0.045]), indicating full mediation. In sum, the findings highlight digital fluency as a key mechanism through which digital literacy enhances performance and through which technostress indirectly undermines performance.

DISCUSSION

This study advances understanding of digital transformation in public sector organizations by demonstrating that employee performance is not merely a function of digital system availability, but fundamentally depends on the transformation of digital resources into higher-order capabilities. Drawing on Dynamic Capabilities Theory (Teece et al., 1997), the findings show that digital literacy functions as a foundational resource, whereas digital fluency represents an individual-level dynamic capability that enables employees to sense digital demands, seize technological opportunities, and transform digital knowledge into effective work practices. The empirical evidence confirms that digital literacy significantly enhances digital fluency, reinforcing the view that basic digital competencies must be converted into adaptive capabilities to generate meaningful outcomes. This extends prior studies that position digital literacy as an end state, by demonstrating its role as a transitional capability (van Laar et al., 2020; Israyudin et al., 2025).

At the same time, technostress is found to significantly undermine the development of digital fluency. Consistent with technostress theory, stress induced by technology complexity, overload, and continuous system change reduces cognitive capacity and limits learning effectiveness (Tarafdar et al., 2019; Sanjeeva Kumar, 2024). In public sector environments, these effects are amplified by bureaucratic constraints and rigid administrative systems (Hashona & Pusparini, 2026). Importantly, the findings show that technostress does not directly influence performance but instead operates through disruption of capability formation. This helps reconcile inconsistent findings in prior literature regarding the technostress–performance relationship (Mansuroğlu & Smith, 2026; Tiwari, 2020).

Employee performance is primarily driven by digital fluency, confirming its role as a critical higher-order capability in digital work environments. Digital fluency enables employees to integrate digital tools, solve complex administrative problems, and adapt to changing technological demands, thereby enhancing task execution effectiveness (Caton et al., 2022; Kholifah et al., 2025). While digital literacy retains a direct positive effect on performance, its stronger contribution occurs indirectly through capability transformation, aligning with capability-based perspectives that emphasize resource conversion rather than static possession (Teece et al., 1997; Koch & Fehlmann, 2025). The mediation results further clarify the mechanism of digital transformation. Digital fluency partially mediates the relationship between digital literacy and performance, indicating that digital literacy contributes both directly through operational efficiency and indirectly through capability development (Vial, 2019). In contrast, digital fluency fully mediates the effect of technostress on performance, showing that psychological strain affects outcomes only when it disrupts capability-building processes. This is consistent with evidence suggesting that stress influences performance primarily through cognitive and behavioral mechanisms rather than direct pathways (Berger et al., 2023; Dutta & Mishra, 2023). Collectively, these findings demonstrate that digital transformation outcomes in public sector organizations are not determined by isolated variables, but by the dynamic conversion of digital resources into applied capabilities under enabling and constraining conditions.

This study makes four interrelated theoretical contributions that extend existing literature on digital transformation and capability development. First, it extends Dynamic Capabilities Theory (Teece et al., 1997) to the micro-foundational level by conceptualizing digital fluency as an individual dynamic capability, demonstrating that capability sensing, seizing, and transformation processes also operate at the employee level in digital work environments (Caton et al., 2022; van Laar et al., 2020). Second, it integrates enabling and constraining mechanisms within a unified framework by jointly examining digital literacy and technostress, showing that both factors operate through a shared capability pathway rather than independent direct effects

(Tarafdar et al., 2019; Sanjeeva Kumar, 2024). Third, it reconceptualizes digital fluency as a central mediating mechanism rather than a peripheral skill, positioning it as the critical transformation channel between digital inputs and performance outcomes (Kholifah et al., 2025; Koch & Fehlmann, 2025). Finally, the study contributes to public sector digital transformation literature by shifting the analytical focus from technology adoption to capability realization, offering a more precise explanation of uneven performance outcomes in SPBE implementation across institutions (Twizeyimana & Andersson, 2019; Vial, 2019). Collectively, these contributions refine theoretical understanding by demonstrating that digital transformation success depends on capability conversion processes rather than technology exposure alone.

The findings suggest that public sector organizations should prioritize capability development rather than focusing solely on digital infrastructure expansion. Strengthening digital literacy remains essential, but it must be accompanied by structured interventions that enhance digital fluency as a higher-order capability. At the same time, technostress must be actively managed through system simplification, continuous training, and user-centered digital design. Strengthening digital fluency emerges as the most critical managerial lever for improving employee performance in digitally transformed bureaucratic environments. The findings suggest that public sector organizations should prioritize capability development rather than focusing solely on digital infrastructure expansion. Strengthening digital literacy remains essential, but it must be accompanied by structured interventions that enhance digital fluency as a higher-order capability. At the same time, technostress must be actively managed through system simplification, continuous training, and user-centered digital design. Strengthening digital fluency emerges as an important managerial lever for improving employee performance within digitally transformed public-sector environments.

Despite these contributions, the findings should be interpreted within the context of several limitations related to generalizability. The sample was drawn exclusively from Indonesian public sector employees, with a substantial proportion coming from local government institutions and consisting primarily of experienced civil servants. Consequently, the observed relationships may reflect characteristics of the Indonesian bureaucratic environment, including SPBE implementation practices, administrative structures, and workforce demographics. Caution is therefore warranted when extending these findings to private-sector organizations, public institutions in other countries, or employee groups with different levels of digital exposure and professional experience. Future research could strengthen external validity by examining the proposed model across diverse organizational settings, occupational groups, and national contexts.

Although demographic information was collected, control variables were not incorporated into the primary analytical model because the study was designed to focus on the theoretical relationships among digital literacy, technostress, digital fluency, and employee performance. Future studies may incorporate demographic and organizational factors, such as age, tenure, educational background, and position level, to examine whether the proposed relationships remain stable across different employee groups.

CONCLUSION

This study demonstrates that digital transformation outcomes in public sector organizations are shaped by the interplay between digital literacy, technostress, and digital fluency. Digital fluency emerges as the central dynamic capability through which digital resources are converted into performance, while also explaining how psychological constraints hinder this process. By extending Dynamic Capabilities Theory to the individual level, this study provides a

more comprehensive explanation of capability formation in digital public administration and highlights digital fluency as a critical determinant of successful digital transformation. Despite its contributions, this study has several limitations. First, the cross-sectional design limits causal inference, as relationships among digital literacy, technostress, digital fluency, and performance are observed at a single point in time. Future research should adopt longitudinal designs to capture the dynamic evolution of digital capability formation (Vial, 2019). Second, the use of self-reported data may introduce common method variance, although statistical tests suggest this is not a major concern; future studies should incorporate multi-source or objective performance measures to enhance validity. Third, the study is contextually limited to Indonesian public sector institutions, which may restrict generalizability. Comparative studies across countries or between public and private sectors are needed to strengthen external validity (Twizeyimana & Andersson, 2019). Finally, future research should extend the model by incorporating boundary conditions such as leadership support, organizational learning climate, and digital infrastructure maturity to better explain contextual variations in digital capability development (Koch & Fehlmann, 2025; Mansuroğlu & Smith, 2026). Longitudinal and multi-level approaches would further deepen understanding of how digital fluency evolves as a dynamic capability over time.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

Licensed versions of Grammarly and QuillBot were used during the preparation of this manuscript to improve language quality, readability, and the presentation of the text. The authors reviewed, edited, and verified all content generated with the assistance of these tools. No AI tool was used for data collection, data analysis, interpretation of results, or the generation of research findings. The authors take full responsibility for the content of the published article.

REFERENCES

1. Abhari, K. (2025). Employee Participation in Digital Transformation: From Digitalization Sentiment to Transformation Predisposition. *Information & Management*, *62*(8), 104212. https://doi.org/10.1016/j.im.2025.104212
2. Astrialita, P., & Azizatun Nafi'ah, B. (2025). Tingkat Literasi Digital ASN Terhadap Aplikasi Kepegawaian Di Kabupaten Sidoarjo. *Jurnal Administrasi Publik Dan Pemerintahan*, *4*(1), 6–11. https://doi.org/10.55850/simbol.v4i1.175
3. Berger, M., Schäfer, R., Schmidt, M., Regal, C., & Gimpel, H. (2023). How to prevent technostress at the digital workplace: A Delphi study. *Journal of Business Economics*, 1–63. https://doi.org/10.1007/s11573-023-01159-3
4. Caton, A., Bradshaw-Wardis, D., Kinshuk, K., & Savenye, W. (2022). Future Directions for Digital Literacy Fluency using Cognitive Flexibility Research: A Review of Selected Digital Literacy Paradigms and Theoretical Frameworks. *Journal of Learning for Development*, *9*, 381–393. https://doi.org/10.56059/jl4d.v9i3.818
5. Dutta, D., & Mishra, S. K. (2023). "Technology is killing me!": The moderating effect of organization home-work interface on the linkage between technostress and stress at work. *Information Technology & People*, *37*(6), 2203–2222. https://doi.org/10.1108/ITP-03-2022-0169
6. Garland, R. (1991). The Mid-Point on a Rating Scale: Is it Desirable? *Marketing Bulletin*, *2*(2), 66–70. https://marketing-bulletin.massey.ac.nz/v2/mb_v2_n3_garland.pdf

7. Gil-Garcia, J. R., Dawes, S. S., & Pardo, T. A. (2018). Digital government and public management research: Finding the crossroads. *Public Management Review*, *20*(5), 633–646. https://doi.org/10.1080/14719037.2017.1327181
8. Hayes, A. F. (2022). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach* (3rd ed.). Guilford Publications.
9. Israyudin, R., Arrofi, F., & Dwiardi, A. (2025). Digital Transformation through Electronic-Based Government System Policy in Indonesia: A Policy Narrative Analysis. *Journal La Sociale*, *6*, 281–292. https://doi.org/10.37899/journal-la-sociale.v6i2.1825
10. Kholifah, N., Nurtanto, M., Sutrisno, V. L. P., Majid, N. W. A., Subakti, H., Daryono, R. W., & Achmadi, A. (2025). Unlocking workforce readiness through digital employability skills in vocational education Graduates: A PLS-SEM analysis based on human capital Theory. *Social Sciences & Humanities Open*, *11*, 101625. https://doi.org/10.1016/j.ssaho.2025.101625
11. Koch, C., & Fehlmann, F. (2025). Beyond Digital Literacy: Exploring Factors Affecting Digital Performance of University Staff. *Media and Communication*, *13*. https://doi.org/10.17645/mac.8913
12. Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., de Vet, H. C. W., & van der Beek, A. J. (2014). Measuring individual work performance: Identifying and selecting indicators. *Work (Reading, Mass.)*, *48*(2), 229–238. https://doi.org/10.3233/WOR-131659
13. Krosnick, J. A., & Presser, S. (2010). Question and Questionnaire Design. In *Handbook of Survey Research, Second Edition*. Emerald Group Publishing Limited.
14. Lasrado, B. S., Panakaje, N., & Parvin, S. M. R. (2026). Untangling techno-stress and entrepreneurial burnout: The conditional role of digital competence and social support as coping mechanisms in rural entrepreneurship. *Journal of Small Business and Enterprise Development*, 1–23. https://doi.org/10.1108/JSBED-08-2025-0518
15. Makhafola, L., van Deventer, M. J., Holmner, M. A., & van Wyk, B. (2025). A scoping review of digital literacy, digital competence, digital fluency and digital dexterity in academic libraries' context. *The Journal of Academic Librarianship*, *51*(3), 103053. https://doi.org/10.1016/j.acalib.2025.103053
16. Mansuroğlu, E., & Smith, A. P. (2026). Technostress and employee well-being: A systematic review of empirical evidence. *Computers in Human Behavior Reports*, *21*, 100941. https://doi.org/10.1016/j.chbr.2026.100941
17. Meitania, F., Azhar, & Alamsyah. (2026). Digital Literacy and Intention to Adopt E-Government (a Survey of Regional Inspectorate Employee in South Sumatra Province) in 2023. *Al-Kharaj: Journal of Islamic Economic and Business*, *7*(4). https://doi.org/10.24256/kharaj.v7i4.8482
18. Mondigo, G., Balbao, E., Pagurayan, L., Paglinawan, J., & of Education, S. (2023). *Digital Fluency on Students' Problem-Solving Skills*. *4*, 125–137. https://doi.org/10.5281/zenodo.10435793
19. Nikou, S., De Reuver, M., & Mahboob Kanafi, M. (2022). Workplace literacy skills—How information and digital literacy affect adoption of digital technology. *Journal of Documentation*, *78*(7), 371–391. https://doi.org/10.1108/JD-12-2021-0241
20. Nyeleker, K. P., Mutiarin, D., & Barrow, E. (2025). From E-Government to Digital Government: SmartASN as a Sustainable Digital Innovation in Indonesia's Public Sector. *Public Accounting and Sustainability*, *2*. https://doi.org/10.18196/pas.v2i1.23

21. Pengfei, D., Imran, M., & Hye, A. K. M. (2026). Digital literacy and technostress as dual pathways linking work-from-home practices to employee performance: Evidence from the post-digital workplace. *Acta Psychologica*, *264*, 106458. https://doi.org/10.1016/j.actpsy.2026.106458
22. Ren, J., Guo, J., & Li, H. (2025). Linking digital competence, self-efficacy, and digital stress to perceived interactivity in AI-supported learning contexts. *Scientific Reports*, *15*(1), 33182. https://doi.org/10.1038/s41598-025-18873-3
23. Rusmini, R., Alamsah Deliarnoor, N., Yuningsih, N. Y., & Sagita, N. I. (2025). Rethinking e-government failure: A readiness-based assessment of Indonesia's digitalization efforts. *Cogent Social Sciences*, *11*(1), 2559867. https://doi.org/10.1080/23311886.2025.2559867
24. Sanjeeva Kumar, P. (2024). TECHNOSTRESS: A comprehensive literature review on dimensions, impacts, and management strategies. *Computers in Human Behavior Reports*, *16*, 100475. https://doi.org/10.1016/j.chbr.2024.100475
25. Tarafdar, M., Cooper, C., & Stich, J.-F. (2019). The Technostress Trifecta—Techno Eustress, Techno Distress and Design: Theoretical Directions and an Agenda for Research. *Information Systems Journal*, *29*, 6–42. https://doi.org/10.1111/isj.12169/full
26. Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z
27. Tiwari, V. (2020). Countering effects of technostress on productivity: Moderating role of proactive personality. *Benchmarking An International Journal*, *ahead-of-print*. https://doi.org/10.1108/BIJ-06-2020-0313
28. Twizeyimana, J. D., & Andersson, A. (2019). The public value of E-Government – A literature review. *Government Information Quarterly*, *36*(2), 167–178. https://doi.org/10.1016/j.giq.2019.01.001
29. van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. *Sage Open*, *10*(1), 2158244019900176. https://doi.org/10.1177/2158244019900176
30. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *SI: Review Issue*, *28*(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003
31. Wang, H., Ding, H., & Kong, X. (2022). Understanding technostress and employee well-being in digital work: The roles of work exhaustion and workplace knowledge diversity. *International Journal of Manpower*, *44*. https://doi.org/10.1108/IJM-08-2021-0480
32. Wildan Hashona & Elok Pusparini. (2026). Digital Strain at Work: Technostress, Work Engagement, and Burnout among Public Sector Employees. *EKOMBIS REVIEW: Jurnal Ilmiah Ekonomi Dan Bisnis*, *14*(1). https://doi.org/10.37676/ekombis.v14i1.8665