

“The influence of digital transformational leadership on innovation capability through organizational agility and digital transformation”

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THE INFLUENCE OF DIGITAL TRANSFORMATIONAL LEADERSHIP ON INNOVATION CAPABILITY THROUGH ORGANIZATIONAL AGILITY AND DIGITAL TRANSFORMATION

Abstract

Public sector innovation has become increasingly critical as governments face accelerating digitalization and rising demands for efficient, transparent, and responsive public services. However, digital transformation initiatives in public organizations do not automatically generate innovation capability, particularly in bureaucratic environments that require adaptive organizational mechanisms. This study aims to examine the influence of digital transformational leadership on innovation capability through the mediating roles of organizational agility and digital transformation in public organizations. A quantitative explanatory approach was employed using survey data collected from January to May 2025 from 164 structural officials involved in digital transformation and service innovation programs in Indonesian public organizations. These respondents were selected because of their strategic roles in formulating and implementing digital initiatives and organizational change. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate both measurement and structural models. The findings indicate that digital transformational leadership significantly strengthens organizational agility and digital transformation, while organizational agility also reinforces digital transformation. However, digital transformational leadership does not directly influence innovation capability. Instead, innovation capability emerges through the mediating roles of organizational agility and digital transformation. These results highlight that innovation in public organizations is generated through the development of adaptive organizational capabilities rather than leadership alone. The study contributes by proposing an integrative model explaining how digital leadership activates dynamic capabilities that lead to innovation. Practically, the findings suggest that strengthening digital leadership, organizational agility, and integrated digital transformation strategies is essential for improving public service innovation.

Keywords

leadership, innovation capability, agility, digitalization,
public sector

JEL Classification

O31, O33, D23, H83

INTRODUCTION

Over the past decade, public sector innovation has become a global strategic agenda due to the acceleration of digitalization, rising public expectations, and pressure on governments to create greater public value. In this context, digital transformation is no longer viewed as a technological option, but rather as a strategic instrument for improving efficiency, transparency, responsiveness, and the quality of public services. Previous studies highlight that the adoption of digital technology, data integration, and cross-sector collaboration can improve the performance of public organizations and strengthen value creation for society (Adie et al., 2024; Janssen et al., 2017; Nurfadilah

& Haliah, 2024; Nuryadin et al., 2023). Thus, innovation has become a fundamental prerequisite for enhancing public value, organizational adaptability, and the long-term sustainability of public organizations in the digital era.

Despite these developments, evidence from developing countries indicates that public sector innovation still faces various structural and cultural barriers, such as resistance to change, bureaucratic rigidity, limited human resources and digital infrastructure, and disparities in innovation capacity across regions (Cinar et al., 2019; Saragih, 2024; Widyawati et al., 2024). The Indonesian case illustrates this paradox: despite having achieved a very high or extensive level of GovTech maturity (World Bank, 2025), the country's innovation index still lags behind upper middle-income countries with mature public innovation ecosystems such as China, Malaysia, and Türkiye (WIPO, 2025). This discrepancy indicates that digital transformation has not yet fully developed systemic organizational conditions that support innovation activities.

In this context, leadership is a central factor determining the direction and success of transformation. Digital transformational leadership has emerged as a form of leadership that integrates transformational vision with digital competencies to drive technology-based strategic change (AlNuaimi et al., 2022; Sugiyanto, 2025). Transformative digital leaders not only guide technology adoption but also build an innovative culture, strengthen collaboration, and foster organizational trust in change (Benitez et al., 2022; Mollah, 2025; Odai et al., 2025). Although previous studies have examined the relationships between digital transformational leadership, organizational agility, digital transformation, and innovation (AlNuaimi et al., 2022; Ly, 2023; Malik et al., 2024), three important gaps remain. First, most studies have focused on private sector organizations, while empirical evidence from public organizations remains limited. Second, prior research has predominantly examined the direct effects of digital leadership on innovation, providing limited understanding of the organizational mechanisms through which leadership influences innovation-supporting capabilities. Third, few studies have integrated organizational agility and digital transformation as complementary mediating mechanisms within a dynamic capability theory perspective. Thus, there is an urgent need to integratively examine how digital transformational leadership influences innovation capability through the mediating mechanisms of organizational agility and digital transformation in the Indonesian public sector context.

1. LITERATURE REVIEW AND HYPOTHESES

Innovation capability in public organizations refers to the dynamic capability that enables institutions to sense environmental change, seize emerging opportunities, and continuously reconfigure resources to sustain organizational performance and public value over time (Piening, 2013; Teece, 2007, 2014). Although innovation capability is often conceptualized as an organization's ability to develop and implement innovations, empirical studies in the public sector frequently operationalize this construct through organizational conditions that facilitate innovation, including managerial support, collaborative practices, resource availability, and mechanisms that encourage the generation of new ideas (Elazhary et al., 2023; Rasheed et al., 2024). Consistent with these

studies, the present research conceptualizes innovation capability as the organizational capability to establish conditions that support innovation-related activities rather than as realized innovation outputs.

In dynamic, technology-driven environments, innovation capability extends beyond adopting digital technologies and encompasses broader organizational dimensions, including leadership, organizational structures, learning capacity, collaborative networks, and adaptive governance mechanisms (Barrutia et al., 2022; Lewis et al., 2018; Miller & Ghaffarzadegan, 2025). Consequently, innovation capability has become a strategic organizational asset because it enables institutions to respond effectively to uncertainty, improve organizational resilience, and maintain long-term sustainability and competitiveness (Chen & Kim,

2023; Zhang et al., 2025). There are five indicators of innovation capability in this study, namely: the ability of an organization to encourage the creation of innovative ideas, allocate resources to support innovation, facilitate collaboration and knowledge sharing, foster an innovative organizational culture, and manage risks associated with the implementation of innovation initiatives (Elazhary et al., 2023; Rasheed et al., 2024).

The importance of innovation capability is particularly evident in the public sector, where organizations are expected to generate public value through efficient, transparent, accountable, and citizen-oriented services. Accelerating digitalization, rising citizen expectations, and increasing pressure to improve institutional performance have compelled public organizations to strengthen adaptive and innovative capacities (Adie et al., 2024; Janssen et al., 2017; Nurfadilah & Haliah, 2024).

Previous studies emphasize that innovation capability contributes to organizational change, service improvement, and public value creation by enabling institutions to continuously reallocate resources, integrate new knowledge, and develop collaborative approaches to addressing societal challenges (Azamela et al., 2022; Barrutia et al., 2022; Lewis et al., 2018). In digital governance contexts, organizational capabilities such as leadership, creativity, learning orientation, cross-functional collaboration, and digital competencies are increasingly recognized as essential drivers of public sector innovation (Atobishi et al., 2024; Gieske et al., 2018; Hoai et al., 2022). To explain this process, this study adopts dynamic capability theory (DCT) to explain how public organizations maintain relevance and performance when facing rapid change through the ability to integrate, build, and reconfigure internal and external resources (Teece et al., 2016; Teece & Pisano, 2003).

DCT emphasizes three core mechanisms – sensing, seizing, and transforming – which represent an organization's ability to detect opportunities and threats, seize opportunities through decisions and resource allocation, and continuously renew processes and structures (Teece et al., 2016; Teece, 2012, 2018). In the public sector context, this framework is relevant because digitalization forc-

es government agencies to move beyond bureaucratic routines toward faster, more valuable public services, thus requiring leadership and adaptive capabilities capable of orchestrating technology-based change (AlNuaimi et al., 2022; Ly, 2023). Based on the logic of DCT, digital transformational leadership (DTL) is positioned as a key driver, while organizational agility (OA) is a manifestation of dynamic capabilities that make organizations responsive and flexible (Atobishi et al., 2024; Teece, 2016), digital transformation (DT) as a form of digital-based resource and process reconfiguration (Ly, 2023; Mergel et al., 2019), and innovation capability (IC) as a dynamic capability output that reflects an organization's capacity to generate and enable innovation activities to occur effectively (Gullmark & Clausen, 2023; Teece, 2007).

Conceptually, DTL is a leadership style that combines transformational leadership characteristics with digital competencies to guide technology-based organizational change (AlNuaimi et al., 2022; Ly, 2023; Malik et al., 2024). DTL is not simply “installing” technology, but rather reimagining the way things work through a culture of learning, collaboration, and data-driven decision-making so that digital initiatives truly deliver value (McCarthy et al., 2021; Schiuma et al., 2021, 2024). Therefore, DTL theoretically aligns with DCT, in which leaders act as orchestrators, mobilizing resources and accelerating capability renewal to enable organizations to transform sustainably (Teece, 2016, 2017). Based on this logic, DTL is predicted to strengthen IC because digital leaders create a climate of experimentation and learning and accelerate the adoption of technologies that support innovation (Brunner et al., 2023; Sasmoko et al., 2019; Tunaboğlu & Çerasi, 2025). There are six indicators of digital transformational leadership in this study, namely: inspirational, clear vision, motivational, idealized influence, individual consideration, and intellectual stimulation (AlNuaimi et al., 2022; Ly, 2023; Rasheed et al., 2024).

OA represents an organization's ability to respond to change swiftly, flexibly, efficiently, and effectively through adjustments to strategy, processes, and resource allocation (AlNuaimi et al., 2022; ElBadawy et al., 2024; Ludviga & Kalviņa, 2023). In the public sector, OA is crucial because citizen needs and policy dynamics are changing

rapidly, while accountability demands remain high (Almazrouei et al., 2024; Atobishi et al., 2024). There are six indicators of organizational agility, namely: the ability to respond quickly to stakeholder needs, adapt flexibly to changes in processes and activities, solve problems rapidly, make responsive decisions in dynamic environments, continuously redesign organizational processes, and identify environmental changes as opportunities for organizational growth and development (AlNuaimi et al., 2022; Elazhary et al., 2023; Ly, 2023).

DTL is seen as a driver of OA because digital leaders instill an adaptive orientation through digital vision, empowerment, cross-functional collaboration, and accelerated decision-making that shape more agile organizations (AlNuaimi et al., 2022; Ly, 2023; Ramadan et al., 2023). Cross-sectoral findings consistently demonstrate a positive relationship between DTL and OA (Fachridian et al., 2024; Kludacz-Alessandri et al., 2025; Srivastava et al., 2023). OA is also expected to enhance IC because agile organizations are better able to learn quickly, capitalize on opportunities, and implement new solutions under conditions of high uncertainty (AlTaweel & Al-Hawary, 2021; Franco & Landini, 2022). Empirical evidence shows that OA strengthens innovation in products, processes, and service models; in the public sector, agility helps create public value through structures that are more responsive to citizen needs (Almazrouei et al., 2024; Fasnacht & Proba, 2024; Goncalves et al., 2020). Key mechanisms include workforce agility, a culture of experimentation, and cross-organizational collaboration, which accelerate the diffusion of innovation (Doghri et al., 2025; Goncalves et al., 2020).

DT is understood as a systemic reconfiguration that encompasses processes, culture, structure, people, and governance, rather than simply the digitalization of procedures (AlNuaimi et al., 2022; Ly, 2023; Mergel et al., 2019). DT success is highly dependent on leadership because digital change demands strategic alignment, resistance management, and strengthening the organization's digital competencies (Malik et al., 2024; Yusuf et al., 2023). DTL accelerates DT by formulating a digital vision and strategy, fostering a collaborative culture, and developing human capa-

bilities to execute end-to-end change (AlNuaimi et al., 2022; Sacavém et al., 2025). However, digital transformation often slows down or fails to achieve strategic impact when digital leadership is weak (AlNuaimi et al., 2022; Malik et al., 2024; Yao et al., 2023). There are five indicators of digital transformation, namely: the digitalization of business processes, the collection of large-scale data from multiple sources, the development of strong networks through digital technology, the creation of efficient customer interfaces, and the facilitation of digital information exchange within the organization (AlNuaimi et al., 2022; Ly, 2023).

DT is predicted to strengthen IC because digital technology facilitates knowledge flow, strengthens collaboration, encourages R&D investment, and enhances data-driven decisions, resulting in faster and higher-quality innovation (Chen & Kim, 2023; Z. Liu et al., 2025; Zhang et al., 2025; Zhao et al., 2024). Several studies also emphasize the role of mediators such as big data capabilities and agility, which are strengthened by DT, making organizations more adaptable to innovation (Chen, 2023; Kastelli et al., 2022; Xu et al., 2024). Although there are indications of a potential non-linear relationship when digitalization is not matched by organizational readiness (Fan et al., 2022; Li et al., 2024), the preponderance of evidence still supports DT as a catalyst for strengthening innovation capability.

Finally, this study tests two mediation pathways to explain the mechanism by which DTL influences IC. First, OA is predicted to be a mediator because DTL shapes organizational flexibility, speed, and responsiveness, which allows innovative ideas to be tested and implemented more quickly (AlNuaimi et al., 2022; Ramadan et al., 2023; Yamin & Murwaningsari, 2023). Second, DT is predicted to be a mediator because DTL fosters strategic readiness, culture, and digital competencies that accelerate end-to-end transformation, while DT provides infrastructure, data, and new ways of working that strengthen innovation capabilities (AlNuaimi et al., 2022; Ly, 2023; Malik et al., 2024; Yusuf et al., 2023). Empirical support also shows that DTL enhances DT success, and DT further strengthens IC through knowledge management and an innovative culture (Chen & Kim, 2023; T. Liu et al., 2025; Zhang et al., 2025; Zhao et al., 2024).

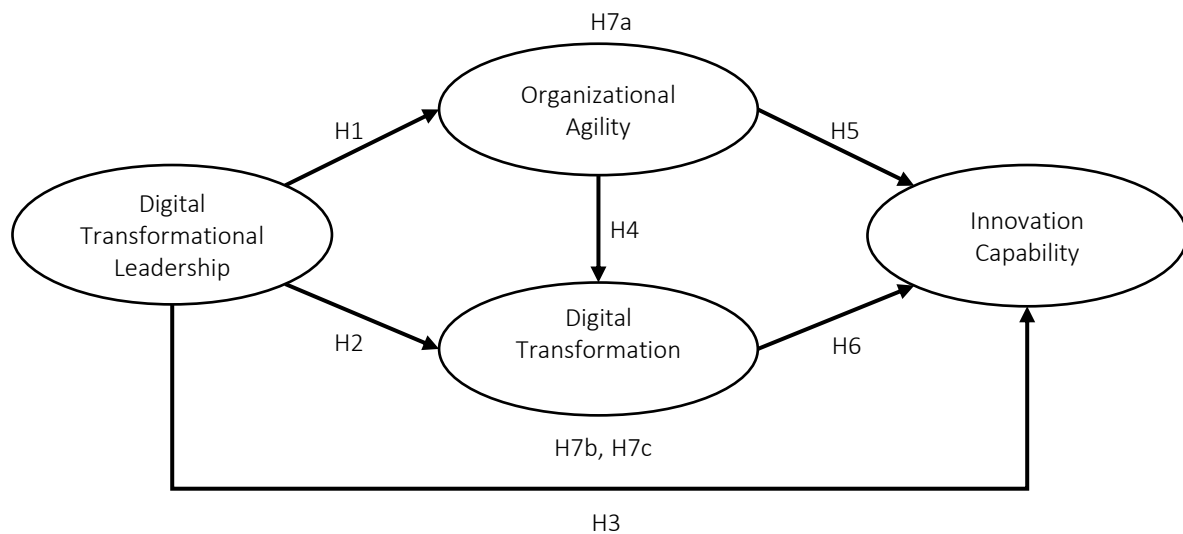


Figure 1. Conceptual model

Overall, previous studies converge in viewing innovation capability in public organizations as a bundle of dynamic capabilities rooted in leadership, learning orientation, collaboration, creativity, and digital capacity. These capabilities support organizational adaptation, improve innovation performance, and strengthen public value creation, yet they remain constrained by bureaucratic structures, capability gaps, and uneven organizational readiness (Barrutia et al., 2022; Lewis et al., 2018; Piening, 2013; Teece, 2007). Therefore, developing innovation capability in public organizations requires the coordinated strengthening of human, organizational, and technological capabilities rather than relying exclusively on digital technology adoption.

This study aims to investigate the influence of digital transformational leadership on innovation capability through the mediating roles of organizational agility and digital transformation in Indonesian public sector organizations. In addition, this study seeks to address gaps in the existing literature, particularly the inconsistent findings regarding the direct influence of digital transformational leadership on innovation capability, by incorporating organizational agility and digital transformation as two mediating variables. Figure 1 presents the conceptual model of this research, based on which the hypotheses are proposed:

- H1: Digital transformational leadership has a significant effect on organizational agility.*
- H2: Digital transformational leadership has a significant effect on digital transformation.*
- H3: Digital transformational leadership has a significant effect on innovation capability.*
- H4: Organizational agility has a significant effect on digital transformation.*
- H5: Organizational agility has a significant effect on innovation capability.*
- H6: Digital transformation has a significant effect on innovation capability.*
- H7a: Organizational agility mediates the relationship between digital transformational leadership and innovation capability.*
- H7b: Digital transformation mediates the relationship between digital transformational leadership and innovation capability.*
- H7c: Organizational agility and digital transformation jointly mediate the relationship between digital transformational leadership and innovation capability.*

2. METHODS

This study uses a quantitative approach with an explanatory design to examine the effect of DTL

on IC with OA and DT as mediators. The study was conducted in Indonesian public organizations implementing a digital transformation agenda, as the characteristics of public sector bureaucracy, regulations, and work culture can shape innovation patterns and transformation success (Jarvie & Stewart, 2018; Sudrajat et al., 2025). The population of this study consists of structural officials involved in service innovation and digital transformation programs, as they play strategic roles in implementing digital policies and strengthening organizational agility, making them key informants with relevant knowledge of leadership, organizational adaptation, and innovation processes (Adie et al., 2024; Nuryadin et al., 2023). Purposive quota sampling was used to ensure representation of strategic functions and regions (Sekaran & Bougie, 2016), with the minimum sample requirement calculated using the inverse square root method for the Partial Least Squares Structural Equation Modeling (PLS-SEM) with a significance level (α) of 0.05 and statistical power of 80% (Hair et al., 2021), resulting in a minimum of 155 respondents. Previous studies in public sector settings by AlNuaimi et al. (2022), Ly (2023), and Rasheed et al. (2024) reported response rates ranging from 82% to 85%. Following these studies and to minimize the risk of invalid responses while ensuring an adequate sample size, this study increased the minimum required sample size by 20%. Consequently, the target sample size was set at 186 respondents, exceeding the minimum requirement.

DTL was assessed using measurements from AlNuaimi et al. (2022), Ly (2023), and Rasheed et al. (2024), which consisted of six items. OA was assessed using measures from AlNuaimi et al. (2022), Ly (2023), and Elazhary et al. (2023), which consisted of six items. DT was assessed using measures from AlNuaimi et al. (2022) and Ly (2023), which consisted of five items. IC was assessed using measures from Elazhary et al. (2023) and Rasheed et al. (2024), which consisted of five items. Following Elazhary et al. (2023) and Rasheed et al. (2024), innovation capability was operationalized as the organizational capability to establish managerial, structural, collaborative, and resource conditions that support innovation activities. Therefore, the construct captures innovation-supporting organizational capability rather than realized innovation outputs. These measurements are presented in Appendix A.

The research instrument was a questionnaire with a five-point Likert scale, as commonly used to measure latent managerial constructs in PLS-SEM (Hair et al., 2021). Data were collected through a structured online questionnaire from January to May 2025, with guaranteed anonymity to improve response quality. Portions of the dataset have been used in related publications examining different theoretical models and research questions (e.g., Kurniyanta et al., 2026). However, the present study employs a distinct conceptual framework by focusing on the mediating roles of organizational agility and digital transformation that have not been reported in other publications. This study obtained 164 valid responses (response rate 88.17%), each representing 1 organizational unit, which exceeds the minimum requirement and is considered adequate for testing complex mediation models using PLS-SEM.

Table 1 presents the demographic profile of the respondents involved in this study. Of the 164 valid respondents, 107 were from Western Indonesia, 43 from Central Indonesia, and 14 from Eastern Indonesia. The larger proportion of respondents from Western Indonesia reflects the higher concentration of public sector offices in Java and Sumatra, which serve as the primary centers of national administrative, governmental, and economic activities. This ensures geographic representation in accordance with the purposive quota sampling method in the three main regions of Indonesia. Based on gender distribution, the majority of respondents were male (86.59%), while female respondents accounted for 13.41%. In terms of age, most respondents belonged to Generation Y or millennials (74.39%), whereas Generation X accounted for 25.61%. Regarding educational background, most respondents held a Bachelor's degree (61.59%), while 38.41% had completed a Master's degree. Overall, these characteristics indicate that the respondents were predominantly millennial public sector professionals with relatively high educational qualifications.

Construct validity and reliability were evaluated using PLS-SEM following guidelines for assessing measurement and structural models (Hair et al., 2021). Prior to the main survey, pretesting for content validity was conducted through expert and potential respondent assessments to en-

Table 1. Demographic profile of the respondents (n = 164)

Profile	Information	Percent
Region	Western Indonesia	65.24
	Central Indonesia	26.22
	Eastern Indonesia	8.54
Gender	Male	86.59
	Female	13.41
Age	Generation X (45-60)	25.61
	Generation Y / millennials (29-44)	74.39
Education	Bachelor	61.59
	Master	38.41

sure item clarity, relevance, and readability within the Indonesian bureaucratic context (Sekaran & Bougie, 2016). Subsequently, pilot testing with 30 respondents was conducted to assess the items' empirical validity and internal consistency, and to ensure the instrument's suitability for use in the main data collection. The research procedures also adhered to ethical principles of surveys (e.g., anonymity, confidentiality, and voluntary participation) to minimize response bias and enhance data integrity. Additionally, the study protocol was reviewed and approved by the Research Ethics Committee of the Faculty of Medicine, Brawijaya University, Indonesia, with approval letter No. 01/EC/KEPK-S3/01/2025, dated January 2, 2025.

3. RESULTS

In this study, data were analyzed using the PLS-SEM method with SmartPLS 4.0 software, starting with an evaluation of the measurement model followed by an assessment of the structural model as outlined by Hair et al. (2021). This stage aims to ensure that each construct in the model has adequate validity and reliability before proceeding to structural model testing. The measurement model evaluation procedure involved testing outer loadings, Cronbach's Alpha, composite reliability (CR), average variance extracted (AVE), Fornell-Larcker criterion, and Heterotrait-Monotrait ratio (HTMT) (Hair et al., 2021; Sarstedt et al., 2021).

The evaluation of the measurement model, as presented in Table 2, began with a convergent validity test by examining the outer loading of each indicator on its respective construct ≥ 0.708 (Hair et al., 2021). However, indicators with loadings between 0.40 and 0.70 were retained, as their re-

moval did not significantly increase CR or AVE, and they were theoretically relevant to the construct (Hair et al., 2021). Convergent validity was also assessed using an AVE value of ≥ 0.50 , indicating that the construct explains more than 50% of the variance in its indicators (Hair et al., 2021). To ensure internal reliability, this study evaluated Cronbach's Alpha and CR, with acceptable values ranging between 0.70 and 0.95 (Hair et al., 2021). Furthermore, Table 3 shows discriminant validity using the HTMT ratio < 0.90 and the Fornell-Larcker criterion, which requires that the square root of the AVE of each construct exceeds its correlation with other constructs (Hair et al., 2021). The results of the measurement model evaluation showed that all constructs (DTL, OA, DT, and IC) met all validity and reliability criteria.

Furthermore, structural model evaluation using the PLS-SEM approach was conducted to assess the strength of the relationships between latent constructs and the model's ability to explain the phenomena under study. The evaluation process, following the guidelines of Hair et al. (2021) and Sarstedt et al. (2020), included several main stages: collinearity testing, path coefficient analysis, R^2 , f^2 , and Q^2 measurements, and significance testing through bootstrapping. Additionally, a mediation test was conducted to assess the role of OA and DT as intermediary variables in the relationship between DTL and IC.

The results of the hypotheses testing in Table 4 indicate that most of the structural relationships in this research model are statistically significant. First, DTL was shown to have a positive and significant influence on OA ($\beta = 0.548$; $p = 0.000$). This finding indicates that transformational digital leadership can improve an organization's

Table 2. Reliability and convergent validity assessment

Construct	Items	Factor loadings	Cronbach's Alpha	CR	AVE
DTL	DTL1	0.883	0.944	0.945	0.781
	DTL2	0.875			
	DTL3	0.908			
	DTL4	0.920			
	DTL5	0.843			
	DTL6	0.871			
OA	OA1	0.854	0.924	0.930	0.731
	OA2	0.897			
	OA3	0.900			
	OA4	0.909			
	OA5	0.684			
	OA6	0.864			
DT	DT1	0.768	0.893	0.900	0.703
	DT2	0.772			
	DT3	0.892			
	DT4	0.900			
	DT5	0.850			
IC	IC1	0.883	0.899	0.911	0.717
	IC2	0.674			
	IC3	0.890			
	IC4	0.906			
	IC5	0.859			

Table 3. Discriminant validity assessment

Construct	Fornell-Larcker Criterion ¹				HTMT Criterion			
	DT	DTL	IC	OA	DT	DTL	IC	OA
DT	0.838							
DTL	0.632	0.884			0.682			
IC	0.767	0.616	0.847		0.850	0.662		
OA	0.670	0.548	0.772	0.855	0.733	0.583	0.844	

Note: 1 The square root of AVE is on the diagonal and is italicized.

ability to respond to change quickly and flexibly. Furthermore, DTL was also shown to have a significant influence on DT ($\beta = 0.378$; $p = 0.000$). This indicates that digitally oriented leadership contributes significantly to driving the strategic implementation of digital transformation in public organizations.

Interestingly, the results showed that DTL did not have a significant direct influence on IC ($\beta = 0.128$; $p = 0.057$). This finding indicates that digital leadership does not automatically generate innovation in public organizations without supporting organizational mechanisms. In a complex, hierarchical public bureaucracy, innovation often requires a process of organizational transformation and increased agility before producing innovative output. Conversely, this study found that OA ($\beta = 0.441$; $p = 0.000$) and DT ($\beta = 0.391$; $p = 0.000$) had

a significant influence on IC, indicating that agile organizations that successfully implement digital transformation have a greater capability readiness to support and facilitate innovation activities within the organization.

Finally, a mediation test was conducted to assess the role of OA and DT as mediators. The mediation analysis showed that OA and DT played significant mediating roles in the relationship between DTL and IC. Mediation through OA ($\beta = 0.241$; $p = 0.000$), through DT ($\beta = 0.148$; $p = 0.000$), and chain mediation through OA and DT ($\beta = 0.099$; $p = 0.002$) all proved significant. These results indicate that the influence of digital leadership on innovation-supporting capability occurs through the process of building dynamic capabilities, namely through increased organizational agility and digital transforma-

tion. Thus, digital leadership acts as a primary driver that activates organizational capabilities, while innovation emerges as a result of the organization's systemic transformation and adaptation processes.

In addition to testing the significance of the structural relationships, this study evaluated the effect size (f^2) to determine the contribution of each exogenous construct to the explained variance of the corresponding endogenous construct. According to Hair et al. (2021), f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effect sizes, respectively. As shown in Table 4, DTL has a large effect on organizational agility (OA) ($f^2 = 0.429$), indicating that leadership is a major determinant of organizational agility. Organizational agility also demonstrates a large effect on innovation capability (IC) ($f^2 = 0.363$), while its effect on DT is close to the threshold for a large effect ($f^2 = 0.331$), suggesting a substantial contribution to digital transformation. Furthermore, digital transformational leadership has a medium effect on digital transformation ($f^2 = 0.222$), and digital transformation shows a medium effect on innovation capability ($f^2 = 0.245$). In contrast, the direct effect of digital transformational leadership on innovation capability is small ($f^2 = 0.033$), indicating that although the relationship is weak and statistically insignificant, digital transformational leadership contributes to innovation capability primarily through the mediating roles

of organizational agility and digital transformation rather than through a direct effect.

Table 5 presents the explanatory power (R^2) and predictive relevance (Q^2) of the structural model. The R^2 values indicate that the model explains 30.0% of the variance in OA, 54.9% of the variance in DT, and 71.9% of the variance in IC. Based on the criteria proposed by Hair et al. (2021), the explanatory power of the model is weak for OA, moderate for DT, and moderate, approaching the substantial threshold, for IC. These results suggest that the proposed model provides a meaningful explanation of the endogenous constructs, particularly for digital transformation and innovation capability. Furthermore, the Q^2 values obtained through the blindfolding procedure are 0.217 for OA, 0.377 for DT, and 0.503 for IC. Since all Q^2 values are greater than zero, the model demonstrates predictive relevance for all endogenous constructs. Moreover, following the guidelines of (Hair et al., 2021), the predictive relevance is medium for OA and large for both DT and IC, indicating that the model possesses satisfactory predictive capability, particularly in explaining digital transformation and innovation capability in Indonesian public sector organizations. Overall, the results of the structural model evaluation indicated that the developed model has good structural validity, strong predictive relevance, and supports the theoretical assumption that DTL influences IC through OA and DT.

Table 4. Structural model assessment and hypothesis testing

	Hypothesis	Path coefficient	t-values	p-values	Decision	VIF	f^2
H1	DTL → OA	0.548	8.354	0.000***	Supported	1.000	0.429
H2	DTL → DT	0.378	4.916	0.000***	Supported	1.429	0.222
H3	DTL → IC	0.128	1.903	0.057 ^{ns}	Not Supported	1.746	0.033
H4	OA → DT	0.462	6.625	0.000***	Supported	1.429	0.331
H5	OA → IC	0.441	6.127	0.000***	Supported	1.903	0.363
H6	DT → IC	0.391	5.350	0.000***	Supported	2.215	0.245
H7a	DTL → OA → IC	0.241	5.617	0.000***	Supported	—	—
H7b	DTL → DT → IC	0.148	3.878	0.000***	Supported	—	—
H7c	DTL → OA → DT → IC	0.099	3.154	0.002**	Supported	—	—

Note: *** indicates significance at $p < 0.001$; ** indicates significance at $p < 0.01$; * indicates significance at $p < 0.05$; ns indicates not significant.

Table 5. Evaluation of explanatory power and predictive power

No	Construct	R Square (R^2)	Description	Q Square (Q^2)	Description
1	OA	0.300	Weak	0.217	Medium
2	DT	0.549	Moderate	0.377	Large
3	IC	0.719	Moderate	0.503	Large

4. DISCUSSION

Throughout this discussion, innovation capability is interpreted as the organizational capability to establish managerial, structural, and resource conditions that support innovation activities, consistent with the operationalization adopted from Elazhary et al. (2023) and Rasheed et al. (2024), rather than as realized innovation outputs. The findings of the study indicate that most of the relationships in the research model are empirically supported and consistent with the literature on digital transformational leadership and innovation-supporting capability. First, DTL has been shown to have a positive influence on OA. The results suggest that leaders who have a digital vision, encourage cross-functional collaboration, and utilize technology in decision-making processes can improve an organization's ability to respond to change quickly and flexibly. In the context of Indonesian public organizations facing the pressures of digitalization and increasingly dynamic service demands, digital leadership acts as a catalyst that accelerates the organization's ability to adapt to environmental changes. This result is consistent with prior studies that confirm that DTL serves as an important driver in increasing OA and strengthening the organization's adaptive capacity in facing the dynamics of digital transformation (AlNuaimi et al., 2022; Fachridian et al., 2024; Ly, 2023; Ramadan et al., 2023).

The results further reveal that DTL plays a crucial role in driving DT implementation. Digital leaders not only facilitate technology adoption but also build an organizational culture that supports innovation, collaboration, and data use in strategic decision-making. This reinforces the view that DT success depends heavily on leaders' ability to formulate a digital vision and systematically manage organizational change (Alakaş, 2024; AlNuaimi et al., 2022; Ly, 2023; Ramadan et al., 2023).

This study also demonstrates that OA acts as a key enabler in strengthening DT. Organizations with high levels of agility tend to be better able to integrate digital technology into work processes, adapt their organizational structures, and accelerate decision-making in response to environmental changes. OA enables organizations to respond to technological opportunities more quickly and flexibly, thereby accelerating the effective implementation of DT.

This finding aligns with various studies showing that organizational agility is a key factor driving the success of DT, as agile organizations have a better ability to adapt to technological changes and environmental dynamics (AlNuaimi et al., 2022; Ly, 2023; Xu et al., 2024). Interestingly, the analysis showed that DTL did not have a significant direct effect on IC. These findings suggest that digital leadership does not automatically generate innovation in Indonesian public organizations without supporting organizational mechanisms.

In public bureaucratic environments, often characterized by hierarchical structures and complex administrative procedures, innovation tends to emerge through a process of organizational transformation and the development of adaptive capabilities before producing innovative output. In other words, digital leadership serves as a trigger for strategic change, but innovation-supporting capability can only develop when the organization successfully builds adaptive capabilities and effectively utilizes digital technologies. This finding aligns with a number of studies showing that the influence of leadership on innovation is often indirect and mediated by organizational capabilities such as agility, digital capability, digital governance, or digital transformation (Abdurrahman et al., 2024; Benitez et al., 2022; Kurniyanta et al., 2026; Pandey et al., 2023). Leadership functions more as a driving force than as a direct determinant of innovation capability.

Conversely, this study shows that OA and DT have a positive effect on IC, indicating that organizations with high levels of agility tend to establish stronger organizational conditions that support innovation activities and facilitate the adoption of new ideas. This can be explained because OA enables faster learning processes, flexibility in resource allocation, and the ability to utilize digital technology to create innovative solutions (Sarwar et al., 2023; Zhang et al., 2025; Zhao et al., 2024). Furthermore, the analysis results show that OA and DT play an important mediating role in the relationship between DTL and IC. This finding confirms that the influence of digital leadership on innovation-supporting capability occurs through the process of building organizational capabilities that enable organizations to adapt and transform their resources effectively. Thus, digital leadership does not directly produce

innovation capability, but first strengthens the organization's ability to respond to change and implement digital transformation, which ultimately drives innovation.

In addition to the direct and indirect relationships identified in the structural model, the explanatory and predictive power of the model further support the robustness of the findings. The R^2 values indicate that DTL substantially explains OA and DT, while OA and DT jointly explain a considerable proportion of the variance in IC. These findings suggest that the proposed model has adequate explanatory power in understanding how public organizations develop IC through adaptive organizational mechanisms. Furthermore, the Q^2 values demonstrate that the model possesses satisfactory predictive relevance, indicating that the relationships among DTL, OA, DT, and IC are not only statistically significant but also meaningful in predicting organizational outcomes in the public sector context.

The effect size (f^2) analysis also provides additional evidence regarding the relative contribution of each construct within the model. The findings indicate that DTL exerts a substantial effect on OA, but a moderate effect on DT. OA demonstrates an important contribution to both DT and IC. In contrast, the direct effect of DTL on IC is relatively weak, further reinforcing the conclusion that leadership influences innovation primarily through the development of adaptive organizational capabilities rather than through direct intervention alone. Collectively, these results strengthen the argument that OA and DT function as critical dynamic capabilities that translate leadership orientation into organizational capabilities and support mechanisms that facilitate innovation activities in public organizations.

Theoretically, this finding supports the DCT, which states that innovation-supporting capabil-

ity results from an organization's ability to sense opportunities, seize them, and transform resources through a continuous process of organizational change (Teece, 2012; Teece et al., 1997). In the context of this study, DTL acts as the primary driver that triggers the sensing process and provides strategic direction for the organization, while OA and DT function as dynamic capabilities that enable the organization to carry out the seizing and transforming processes, which ultimately result in IC as a strategic outcome of the organization (Abdurrahman et al., 2024; Sarwar et al., 2023; Xu et al., 2024; Zhang et al., 2025). Thus, innovation in public organizations depends not only on leadership alone, but also on the organization's ability to develop adaptive capabilities and utilize digital transformation strategically.

From a practical perspective, the findings of this study provide strategic implications for Indonesian public organization leaders in designing and implementing innovation-oriented digital transformation. The results indicate that enhancing public organizations' innovation capabilities is not sufficient through strengthening digital leadership alone but also requires building organizational agility and an integrated digital transformation process. Therefore, Indonesian public organizations need to develop digital leadership capable of building an adaptive culture, accelerating decision-making processes, and encouraging the use of digital technology in organizational work processes. Furthermore, government agencies need to strengthen the digital competency of their human resources, increase the flexibility of their organizational structures, and build a data-driven collaboration ecosystem to support innovation within public sector organizations (AlNuaimi et al., 2022; Ly, 2023; Sarwar et al., 2023). Thus, strengthening digital leadership, agility, and digital transformation are strategic elements in driving sustainable public sector innovation in the digital era.

CONCLUSION

This study examined the role of digital transformational leadership in enhancing innovation capability in public sector organizations through the mediating roles of organizational agility and digital transformation. The findings reveal that digital transformational leadership strengthens organizational adaptability by enhancing agility and supporting digital transformation initiatives. The results further suggest that innovation-supporting capabilities in public organizations are shaped by the alignment

of leadership orientation, organizational adaptability, and digital transformation efforts. Collectively, these findings extend the application of dynamic capability theory by demonstrating the importance of adaptive organizational mechanisms in supporting innovation-related activities in the public sector.

This study offers academic and practical implications. Academically, it addresses a gap in public sector research by explaining how digital transformational leadership influences innovation capability through organizational agility and digital transformation. The findings support dynamic capability theory by showing that leadership promotes innovation indirectly by developing adaptive organizational capabilities. They also clarify the mediating roles of organizational agility and digital transformation, which remain underexplored in the public sector. Practically, the findings suggest that Indonesian public organizations should integrate leadership development, organizational agility, and digital transformation into their innovation strategies. Public sector leaders should foster adaptive cultures, strengthen digital competencies, accelerate data-driven decision-making, and leverage digital technologies to improve organizational processes and public service delivery.

This study has several limitations. First, its focus on Indonesian public sector organizations limits the generalizability of the findings to countries with different governance systems and levels of digital maturity. Second, the distinctive bureaucratic characteristics of the public sector warrant further cross-sector comparisons. Third, the cross-sectional design cannot capture changes in digital transformation and innovation capability over time; therefore, longitudinal or mixed-method studies are recommended. Fourth, innovation capability was measured through organizational conditions supporting innovation rather than realized innovation outcomes. Future studies should incorporate outcome-based measures and examine additional factors, including digital culture, digital capabilities, and cross-sector collaboration.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Table A1. Operationalization of constructs and measurement Items

Constructs and references	Item	Item description
Digital transformational leadership (DTL) – AlNuaimi et al. (2022), Ly (2023), and Rasheed et al. (2024)	DTL-01	My Head of Service Office inspires all members with a digital transformation plan.
	DTL-02	My Head of Service Office provides a clear vision of digital transformation to the members of the organization.
	DTL-03	My Head of Service Office motivates team members to work together towards the same digital transformation goal.
	DTL-04	My Head of Service Office influences all members to achieve the digital transformation goals for the organization.
	DTL-05	My Head of Service Office maintains collaboration, trust, and participation of all members.
	DTL-06	My Head of the Service Office stimulates all members to understand the latest digital technology in order to realize digital transformation ideas.
Organizational Agility (OA) – AlNuaimi et al. (2022), Ly (2023), and Elazhary et al. (2023)	OA-01	In my organization, the Service Office is able to quickly respond to stakeholder needs.
	OA-02	In my organization, the Service Office can quickly adjust service processes and activities to meet fluctuating user demand.
	OA-03	In my organization, the Service Office can quickly address partner issues.
	OA-04	In my organization, the Service Office can quickly implement decisions to respond to environmental and government changes.
	OA-05	In my organization, the Service Office continuously seeks ways to reinvent or redesign the organization.
	OA-06	In my organization, the Service Office views environmental and government changes as opportunities to advance services rapidly.
Digital transformation (DT) – AlNuaimi et al. (2022) and Ly (2023)	DT-01	My organization involves implementing electronic-based business processes towards digitalization, including digitizing everything that can be digitized.
	DT-02	My organization collects large amounts of data from various sources using new digital technologies, such as big data, cloud computing, artificial intelligence, and the Internet of Things (IoT), to increase efficiency and effectiveness.
	DT-03	My organization builds stronger networks between business processes using digital technology.
	DT-04	My organization uses new digital technologies to improve processes and activities in the service.
	DT-05	My organization strives to share experiences using new digital technologies to exchange information with stakeholders.
Innovation capability (IC) – Elazhary et al. (2023) and Rasheed et al. (2024).	IC-01	In my organization, there are clear mechanisms in place to encourage employees to propose new, valuable, and innovative ideas.
	IC-02	In my organization, there is a budget available to allocate to the development of new technologies in an effort to actively seek innovative ideas.
	IC-03	IT program/project management in my organization, there is collaboration between IT personnel and management personnel who are equal in using digital technology to be effective and can share knowledge, thus facilitating innovation.
	IC-04	In my organization, management encourages and supports employees to continue to innovate in creating an innovative environmental culture by providing appreciation to employees who create new, valuable, and innovative ideas.
	IC-05	My organization considers measurable risks and the impacts that arise when implementing innovative ideas.