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Digital Transformation of Public Services: Institutional Barriers and Policy Implications for Smart Government

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ABSTRACT

Digital transformation has become a key strategy for improving public service delivery and advancing smart governance. However, institutional barriers often hinder its implementation. This study examines the effect of institutional barriers on digital transformation and its implications for smart governance in Indonesia. A quantitative approach was employed using survey data from 150 users of digital public services. Data were collected through a structured questionnaire and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results indicate that institutional barriers have a significant negative effect on digital transformation, while digital transformation has a significant positive effect on smart governance. In addition, digital transformation significantly mediates the relationship between institutional barriers and smart governance. These findings suggest that institutional constraints, including regulatory complexity, organizational resistance, and limited coordination, reduce the effectiveness of digital transformation initiatives. The study highlights that successful smart governance depends not only on technological advancement but also on institutional reforms that promote organizational readiness, collaboration, and leadership support. Strengthening these institutional capacities is essential for accelerating digital transformation and improving governance outcomes in Indonesia.

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A. INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed the way governments deliver public services and interact with citizens. Across the globe, governments are increasingly adopting digital platforms, artificial intelligence, big data analytics, cloud computing, and integrated information systems to improve administrative efficiency, service accessibility, transparency, and accountability (Greenstein et al., 2013; Sneller et al., 2017). This transformation has strengthened the emergence of smart governance, a governance paradigm that emphasizes the strategic use of digital technologies to develop responsive, citizen-centered, data-driven, and collaborative public administration systems. Smart governance has become an essential component of digital government initiatives as public institutions seek to enhance service quality, improve decision-making processes, and create greater public value in an increasingly digital society (Greenstein et al., 2013; Meyerhoff Nielsen & Jordanoski, 2023).

In Indonesia, digital transformation has become a national strategic priority aimed at supporting bureaucratic reform and improving public service performance. Various government initiatives, including the Electronic-Based Government System (SPBE), digital identity programs, integrated public service applications, and smart city development projects, have been implemented to modernize public administration (Muslim et al., 2024). These initiatives are expected to streamline administrative procedures, reduce bureaucratic inefficiencies, increase service accessibility, and strengthen transparency and accountability within government institutions. As citizens increasingly expect faster, more reliable, and more accessible public services, digital transformation has become a critical instrument for enhancing government responsiveness and effectiveness in the digital era.

Despite substantial investments and policy commitments, the implementation of digital transformation in Indonesian public services continues to face considerable challenges. Many government agencies experience difficulties in integrating information systems, standardizing digital procedures, and ensuring effective coordination across institutions (Oktavianti et al., 2024; Silitonga, 2023). Consequently, digital transformation efforts often remain fragmented, resulting in duplicated systems, inconsistent service standards, and limited interoperability among government entities. Furthermore, disparities in digital infrastructure and technological readiness between regions contribute to unequal levels of service quality, particularly between urban and rural areas. These conditions suggest that technological adoption alone is insufficient to achieve successful digital transformation without adequate institutional support and organizational readiness.

Among the factors influencing digital transformation, institutional barriers represent one of the most critical challenges within the public sector. Institutional barriers refer to structural, organizational, regulatory, cultural, and administrative constraints that hinder the effective implementation of technological innovations. Previous studies indicate that rigid bureaucratic structures, resistance to organizational change, fragmented governance arrangements, insufficient leadership support, regulatory inconsistencies, and limited digital competencies among public officials frequently impede digital transformation initiatives (Agus Suharsono, 2023; Cooper & Robson, 2006). Such barriers weaken the ability of government institutions to leverage digital technologies effectively and limit the achievement of desired governance outcomes. Therefore, understanding the influence of institutional barriers has become increasingly important in the context of public sector modernization.

At the same time, smart governance has attracted growing attention in public administration literature as governments seek to maximize the benefits of digital transformation. Smart governance extends beyond the digitization of public services by emphasizing technology-enabled decision-making, transparency, citizen participation, inter-organizational collaboration, and public value creation. However, although prior studies have examined digital government, e-government adoption, smart city development, and public sector innovation, several research gaps remain. First, many studies focus predominantly on

technological determinants while paying limited attention to institutional barriers. Second, digital transformation and smart governance are often investigated as separate constructs rather than as interconnected processes. Third, empirical evidence from developing countries, particularly Indonesia, remains limited despite the distinctive institutional challenges faced by emerging economies. Furthermore, studies incorporating citizens' perceptions as an evaluative perspective remain insufficient, even though public trust and acceptance are essential indicators of successful governance transformation.

To address these gaps, this study investigates the influence of institutional barriers on digital transformation and examines the implications of digital transformation for smart governance in Indonesia. Unlike previous studies that primarily emphasize technological readiness or organizational innovation, this research highlights the institutional dimension of digital transformation and explores how institutional constraints shape governance outcomes through the transformation process. The novelty of this study lies in the integration of institutional barriers, digital transformation, and smart governance within a single analytical framework in the context of Indonesian public services. Moreover, by incorporating citizens' perceptions as the basis of analysis, this study offers a citizen-centered perspective on the effectiveness of digital government initiatives. Accordingly, this study aims to analyze the effect of institutional barriers on digital transformation, examine the impact of digital transformation on smart governance, and investigate the mediating role of digital transformation in the relationship between institutional barriers and smart governance. The findings are expected to contribute to the advancement of digital governance and public administration literature while providing practical recommendations for strengthening institutional capacity and accelerating digital transformation initiatives in Indonesia.

B. LITERATURE REVIEW

Institutional Barriers

Institutional barriers are structural, regulatory, organizational, and cultural constraints that hinder the adoption of digital technologies within public institutions. These barriers commonly manifest through regulatory complexity, bureaucratic rigidity, fragmented governance structures, resistance to change, limited digital competencies, and weak leadership support, all of which reduce the effectiveness of digital transformation initiatives. Institutional theory suggests that organizational behavior and innovation capacity are shaped by formal rules, norms, and administrative structures (Nguyen et al., 2023; Robinson, 2006). Previous studies have shown that organizational resistance, insufficient managerial commitment, governance fragmentation, regulatory inconsistencies, and limited human resource capabilities significantly impede digital transformation in the public sector (Davies et al., 2019; Iskandar et al., 2022; Robinson, 2006). Therefore, institutional readiness is considered a critical prerequisite for successful digital transformation and the advancement of public sector governance.

Digital Transformation

Digital transformation refers to the integration of digital technologies into organizational processes and public service delivery to improve efficiency, effectiveness, and public value creation. In the public sector, this transformation involves the adoption of technologies such as digital platforms, artificial intelligence, big data, cloud computing, and integrated information systems to modernize governance and enhance service quality. (Madyo, 2022; Sawir et al., 2023) describes digital transformation as a process through which organizations improve performance by leveraging digital technologies to create substantial organizational change. In public administration, digital transformation contributes to more efficient procedures, greater service accessibility, and stronger citizen engagement, while its successful implementation requires not only technological investment but also organizational adaptation and leadership commitment (Krasnykov et al., 2024; Rahman et al., 2021). Therefore, digital transformation is

increasingly recognized as a strategic instrument for improving governance performance and public service outcomes.

Smart Governance

Smart governance is a governance approach that utilizes digital technologies to enhance transparency, accountability, citizen participation, responsiveness, and collaborative decision-making. As an evolution of traditional e-government, smart governance integrates information and communication technologies to support data-driven policies and citizen-centered public services (Browne, 2021; Nica, 2019). It is characterized by openness, collaboration, and evidence-based decision-making, enabling governments to improve service quality, administrative efficiency, and public trust (Ghobakhloo, 2020; Zhou et al., 2023). Consequently, smart governance has become an important framework for evaluating the effectiveness of digital transformation and public sector modernization.

Conceptual Framework and Hypotheses Development

Based on institutional theory and the existing literature, institutional barriers are expected to negatively affect digital transformation because regulatory and organizational constraints reduce the capacity of public institutions to adopt and utilize digital technologies effectively. Furthermore, digital transformation is expected to positively influence smart governance by improving transparency, accountability, citizen participation, responsiveness, and public service quality (Browne, 2021; Zhou et al., 2023). Finally, digital transformation is expected to mediate the relationship between institutional barriers and smart governance, as institutional constraints influence governance outcomes through their impact on the effectiveness of digital transformation initiatives.

Accordingly, the following hypotheses are proposed:

H1: Institutional Barriers significantly affect Digital Transformation.

H2: Digital Transformation positively and significantly affects Smart Governance.

H3: Digital Transformation mediates the relationship between Institutional Barriers and Smart Governance.

C. RESEARCH METHOD

Research Design

This study employs a quantitative research approach to examine the relationships among Institutional Barriers, Digital Transformation, and Smart Governance in the context of public service delivery in Indonesia. A quantitative approach was selected because it enables the systematic measurement of latent variables and the statistical testing of hypothesized relationships among constructs. The study adopts an explanatory research design to investigate the causal relationships between institutional barriers and smart governance, as well as the mediating role of digital transformation. Furthermore, a cross-sectional survey design was utilized, whereby data were collected at a single point in time from citizens who have experience using digital public services provided by government institutions in Indonesia. This survey-based approach is considered appropriate because it allows the study to capture public perceptions regarding the effectiveness of digital transformation initiatives and their implications for governance outcomes.

Population and Sample

The population of this study consists of Indonesian citizens who have accessed or utilized digital public services provided by government agencies, including online administrative systems, digital licensing platforms, electronic identity services, tax administration systems, public complaint applications, health service portals, and other government-operated digital platforms. Due to the absence of a comprehensive sampling frame covering all users of digital public services in Indonesia, this study employs a non-

probability sampling approach using purposive sampling techniques. Respondents were selected based on several criteria, namely being Indonesian citizens aged 18 years or older, having used at least one government digital service within the last twelve months, possessing sufficient understanding of digital public service platforms, and being willing to participate voluntarily in the survey. A total of 150 respondents participated in this study. According to Hair et al. (2022), a sample size ranging from 100 to 200 respondents is generally adequate for Structural Equation Modeling using Partial Least Squares (SEM-PLS), particularly for models with moderate complexity. Therefore, the sample size of 150 respondents meets the minimum requirements for conducting SEM-PLS analysis.

Data Collection Procedure

Primary data were collected through a structured online questionnaire distributed using digital survey platforms to facilitate broader geographic coverage and accessibility across different regions of Indonesia. Prior to the main survey, a pilot test was conducted with a small group of respondents to ensure clarity, readability, and content validity, and the feedback obtained was used to refine the questionnaire. Participation was voluntary, and respondents were informed about the study's objectives, the confidentiality of their responses, and the anonymous nature of data collection. The survey was conducted over a period of approximately two months.

Measurement of Variables

This study examines three latent variables, namely Institutional Barriers (IB), Digital Transformation (DT), and Smart Governance (SG), which were operationalized using multiple indicators adapted from previous studies in digital governance, public administration, and digital transformation literature. All responses were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Institutional Barriers were assessed through five indicators related to regulatory complexity, organizational resistance to change, inter-agency coordination, digital competencies, and leadership support. Digital Transformation was measured using five indicators reflecting digital infrastructure availability, digital service delivery, service efficiency, system integration, and citizen-oriented digital services. Meanwhile, Smart Governance was evaluated through five indicators covering transparency, accountability, citizen participation, government responsiveness, and improvements in public service quality resulting from digital initiatives.

Data Analysis Technique

Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS 3), which is appropriate for predictive and exploratory research involving complex relationships among latent constructs and relatively small sample sizes (Hair et al., 2022). The analysis consisted of two stages: evaluation of the measurement model (outer model) and structural model (inner model). The measurement model was assessed through convergent validity using outer loading (≥ 0.70) and Average Variance Extracted (AVE ≥ 0.50), reliability using Cronbach's Alpha and Composite Reliability (≥ 0.70), and discriminant validity using the Fornell-Larcker Criterion and HTMT (< 0.90). The structural model was evaluated using the coefficient of determination (R^2), predictive relevance (Q^2), and effect size (f^2). Hypothesis testing was conducted through bootstrapping with 5,000 subsamples, applying a significance threshold of t-statistic > 1.96 and p-value < 0.05. Based on the conceptual framework, three hypotheses were formulated: H1, Institutional Barriers significantly affect Digital Transformation; H2, Digital Transformation positively and significantly affects Smart Governance; and H3, Digital Transformation mediates the relationship between Institutional Barriers and Smart Governance.

D. RESULTS AND DISCUSSION

Respondent Profile

A total of 150 valid questionnaires were collected and analyzed. The respondents consisted of citizens who had experience using digital public services in Indonesia, including online licensing systems, digital identity services, tax platforms, public complaint applications, and health service portals.

Table 1. Demographic Characteristics of Respondents

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	82	54.7
	Female	68	45.3
Age	18–25 Years	35	23.3
	26–35 Years	56	37.3
	36–45 Years	38	25.3
	>45 Years	21	14.0
Education	High School	29	19.3
	Diploma	24	16.0
	Bachelor	76	50.7
	Postgraduate	21	14.0
Frequency of Using Digital Public Services	1–2 Times/Month	31	20.7
	3–5 Times/Month	58	38.7
	More than 5 Times/Month	61	40.6

Based on Table 1, the majority of respondents were male, accounting for 82 individuals (54.7%), while female respondents totaled 68 individuals (45.3%). In terms of age, most respondents were between 26–35 years old (37.3%), followed by those aged 36–45 years (25.3%), 18–25 years (23.3%), and over 45 years (14.0%). Regarding educational background, respondents were predominantly bachelor's degree holders, representing 76 individuals (50.7%), followed by high school graduates (19.3%), diploma holders (16.0%), and postgraduate degree holders (14.0%). Concerning the frequency of digital public service utilization, the largest proportion of respondents reported using digital public services more than five times per month (40.6%), followed by those using such services 3–5 times per month (38.7%) and 1–2 times per month (20.7%). These findings indicate that the respondents generally possess substantial experience in using digital public services, making them suitable sources of information for evaluating digital transformation and smart governance initiatives in Indonesia.

Measurement Model Evaluation (Outer Model)

Convergent Validity

Convergent validity was assessed through outer loading values and Average Variance Extracted (AVE). All indicators exceeded the recommended threshold of 0.70.

Table 2. Outer Loading Values

Construct	Indicator	Loading
Institutional Barriers	IB1	0.814
	IB2	0.846
	IB3	0.829
	IB4	0.871
	IB5	0.793

Digital Transformation	DT1	0.832
	DT2	0.856
	DT3	0.884
	DT4	0.817
	DT5	0.845
Smart Governance	SG1	0.846
	SG2	0.878
	SG3	0.821
	SG4	0.891
	SG5	0.854

Based on Table 2, all indicators exhibit outer loading values above the recommended threshold of 0.70, ranging from 0.793 to 0.891. For the Institutional Barriers construct, loading values range between 0.793 and 0.871, indicating that all indicators adequately represent the construct. Similarly, the Digital Transformation construct demonstrates strong indicator reliability, with loading values ranging from 0.817 to 0.884. The Smart Governance construct also shows satisfactory results, with outer loading values between 0.821 and 0.891. These findings confirm that all indicators possess good convergent validity and are appropriate for measuring their respective latent constructs within the SEM-PLS model.

Reliability Analysis

Table 3. Reliability and Validity Assessment

Construct	Cronbach's Alpha	Composite Reliability	AVE
Institutional Barriers	0.885	0.916	0.687
Digital Transformation	0.899	0.925	0.712
Smart Governance	0.907	0.931	0.730

Based on Table 3, all constructs demonstrate satisfactory levels of reliability and convergent validity. The Cronbach's Alpha values range from 0.885 to 0.907, while Composite Reliability values range from 0.916 to 0.931, exceeding the recommended threshold of 0.70 and indicating strong internal consistency. Furthermore, the Average Variance Extracted (AVE) values for Institutional Barriers (0.687), Digital Transformation (0.712), and Smart Governance (0.730) are all above the minimum criterion of 0.50, confirming adequate convergent validity. These results indicate that the measurement model is reliable and that each construct is capable of explaining a substantial proportion of the variance of its indicators.

Discriminant Validity

Table 4. Fornell-Larcker Criterion

Construct	IB	DT	SG
Institutional Barriers	0.829		
Digital Transformation	0.654	0.844	
Smart Governance	0.541	0.738	0.854

Based on Table 4, the Fornell–Larcker criterion confirms satisfactory discriminant validity among the constructs. The square root of the AVE for Institutional Barriers (0.829), Digital Transformation (0.844), and Smart Governance (0.854) is greater than their respective correlations with other constructs. Specifically, the correlation between Institutional Barriers and Digital Transformation is 0.654, between Institutional Barriers and Smart Governance is 0.541, and between Digital Transformation and Smart Governance is 0.738, all of which are lower than the corresponding square root AVE values. These results indicate that each construct is empirically distinct and captures a unique concept within the research model.

Structural Model Evaluation (Inner Model)

Coefficient of Determination (R^2)

The coefficient of determination (R^2) results indicate that the model possesses moderate explanatory power. The R^2 value of 0.428 for Digital Transformation suggests that Institutional Barriers explain 42.8% of the variance in Digital Transformation, while the remaining 57.2% is influenced by factors not included in the model. Furthermore, the R^2 value of 0.545 for Smart Governance indicates that Digital Transformation explains 54.5% of the variance in Smart Governance, with the remaining 45.5% attributable to other variables outside the scope of this study. These findings demonstrate that the proposed model has a moderate capacity to explain variations in both Digital Transformation and Smart Governance.

Predictive Relevance (Q^2)

The predictive relevance assessment shows that the Q^2 value for Digital Transformation is 0.392 and for Smart Governance is 0.511. Since both Q^2 values are greater than zero, the model demonstrates satisfactory predictive relevance, indicating that the exogenous constructs have adequate capability to predict the endogenous constructs. These results confirm that the proposed model possesses strong predictive accuracy and is capable of explaining and forecasting the relationships among Institutional Barriers, Digital Transformation, and Smart Governance.

Effect Size (f^2)

Table 5. Effect Size Assessment

Relationship	f^2	Interpretation
Institutional Barriers → Digital Transformation	0.748	Large
Digital Transformation → Smart Governance	1.195	Large

Based on Table 5, the effect size (f^2) results indicate that both relationships in the model have substantial effects. The relationship between Institutional Barriers and Digital Transformation has an f^2 value of 0.748, while the relationship between Digital Transformation and Smart Governance has an f^2 value of 1.195. Both values exceed the threshold of 0.35, indicating large effect sizes according to Hair et al. (2022). These findings suggest that Institutional Barriers make a significant contribution to explaining variations in Digital Transformation, and Digital Transformation plays a highly influential role in explaining Smart Governance within the proposed research model.

Hypothesis Testing

Table 6. Direct Effects

Hypothesis	Relationship	Path Coefficient (β)	T-Statistic	P-Value	Decision
H1	Institutional Barriers → Digital Transformation	-0.654	11.283	0.000	Supported
H2	Digital Transformation → Smart Governance	0.738	14.762	0.000	Supported

Based on Table 6, the direct effect analysis indicates that all hypothesized relationships are statistically significant. Institutional Barriers have a significant negative effect on Digital Transformation ($\beta = -0.654$, $T = 11.283$, $p = 0.000$), supporting H1 and indicating that higher institutional barriers tend to hinder the implementation of digital transformation within public services. Meanwhile, Digital Transformation has a significant positive effect on Smart Governance ($\beta = 0.738$, $T = 14.762$, $p = 0.000$), supporting H2 and demonstrating that greater levels of digital transformation contribute to the

development of more effective smart governance practices. These findings confirm the important role of institutional conditions in shaping digital transformation outcomes and highlight the contribution of digital transformation to improving governance quality.

Mediation Analysis

Table 7. Indirect Effect Analysis

Hypothesis	Indirect Relationship	β	T-Statistic	P-Value	Decision
H3	Institutional Barriers → Digital Transformation → Smart Governance	-0.483	8.916	0.000	Supported

Based on Table 7, the indirect effect analysis reveals that Digital Transformation significantly mediates the relationship between Institutional Barriers and Smart Governance (β = -0.483, T = 8.916, p = 0.000), thereby supporting H3. The negative coefficient indicates that higher institutional barriers indirectly reduce the level of Smart Governance by hindering the implementation of Digital Transformation. This finding suggests that Digital Transformation serves as an important mechanism through which institutional constraints influence governance outcomes, emphasizing the need for public institutions to minimize organizational, regulatory, and administrative barriers in order to maximize the benefits of digital transformation and strengthen smart governance practices.

Discussion

The findings indicate that institutional barriers remain a fundamental challenge in advancing digital transformation within Indonesian public services. Regulatory complexity, organizational resistance to change, weak inter-agency coordination, limited digital competencies, and insufficient leadership support continue to constrain the effective adoption of digital technologies. These results reinforce the argument of institutional theory that organizational structures, rules, and administrative arrangements play a crucial role in shaping innovation processes within public institutions (Madyo, 2022; Pasenko et al., 2023). The findings are also consistent with previous studies that identified institutional constraints as key impediments to successful public sector digital transformation (Li et al., 2022; Sukare & Abdullahi, 2025). This suggests that technological modernization cannot be fully realized when institutional environments remain rigid and fragmented.

The study further demonstrates that digital transformation serves as an important driver of smart governance development. The integration of digital technologies into public service processes enhances government transparency, accountability, responsiveness, citizen participation, and overall service quality. These findings support the smart governance perspective proposed by (Li et al., 2022; Sukare & Abdullahi, 2025), which emphasizes that technological innovation is a strategic enabler of governance modernization. As digital systems become more integrated and citizen-oriented, governments are better positioned to deliver services efficiently while fostering greater public trust and engagement. Consequently, digital transformation should be viewed not merely as a technological initiative but as a governance reform instrument that reshapes the relationship between governments and citizens.

Another important finding is the role of digital transformation as a mechanism linking institutional conditions to governance outcomes. The results suggest that institutional weaknesses influence smart governance primarily through their impact on the effectiveness of digital transformation initiatives. In other words, even substantial investments in digital infrastructure and technology may not generate meaningful governance improvements when institutional barriers remain unresolved. This finding highlights the importance of aligning technological innovation with supportive institutional arrangements, including adaptive regulations, collaborative governance structures, leadership commitment, and continuous capacity

development. Such alignment is essential to ensure that digital transformation initiatives can achieve their intended objectives and contribute to sustainable governance improvements.

From a theoretical perspective, this study contributes to the digital governance literature by integrating institutional barriers, digital transformation, and smart governance within a single analytical framework. While previous studies have often examined these concepts separately, the present findings demonstrate that governance outcomes are shaped by the interaction between institutional capacity and technological transformation. From a practical standpoint, the results suggest that policymakers should prioritize institutional reform alongside digital modernization efforts. Strengthening regulatory coherence, enhancing inter-agency collaboration, improving digital competencies among public employees, and fostering leadership commitment to innovation will be critical for accelerating digital transformation and achieving more effective, transparent, and citizen-centered governance in Indonesia.

E. CONCLUSION

This study examined the relationship between institutional barriers, digital transformation, and smart governance in the context of public service delivery in Indonesia. The findings indicate that institutional barriers, including regulatory complexity, organizational resistance to change, weak inter-agency coordination, limited digital competencies, and insufficient leadership support, hinder the successful implementation of digital transformation initiatives, highlighting the importance of institutional readiness in supporting public sector modernization. The study also demonstrates that digital transformation plays a crucial role in advancing smart governance by improving transparency, accountability, responsiveness, citizen participation, and service quality, thereby contributing to more efficient, citizen-centered, and data-driven governance systems. Furthermore, digital transformation was found to mediate the relationship between institutional barriers and smart governance, suggesting that institutional constraints indirectly influence governance outcomes through their impact on the effectiveness of digital transformation efforts. These findings imply that achieving smart governance requires not only technological investment but also comprehensive institutional reforms, including regulatory improvement, organizational adaptability, capacity building, and stronger collaborative governance practices to support sustainable public service innovation in Indonesia.

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