

DIGITAL GOVERNANCE AND SUSTAINABLE DEVELOPMENT: THE ROLE OF PUBLIC SERVICE EFFECTIVENESS IN LOMBOK, INDONESIA

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Abstract

Digital governance is increasingly viewed as a means of strengthening public services and advancing local sustainable development. This study investigates whether Public Service Effectiveness explains part of the association between Digital Governance and Sustainable Development Outcomes in Lombok, Indonesia. Guided by Public Value Theory, the research applies a quantitative explanatory, cross-sectional design. Data were obtained from 120 citizens in five local-government jurisdictions who had used or interacted with government public services, with respondents selected purposively. The analysis employed Partial Least Squares Structural Equation Modeling (PLS-SEM) together with bootstrap mediation testing. Digital Governance was found to positively predict Public Service Effectiveness ($\beta = 0.642$, $p < 0.001$). Public Service Effectiveness also showed a positive association with Sustainable Development Outcomes ($\beta = 0.416$, $p < 0.001$), while the direct path from Digital Governance to Sustainable Development Outcomes remained significant ($\beta = 0.246$, $p = 0.001$). The indirect effect through Public Service Effectiveness was significant as well ($\beta = 0.267$, $p < 0.001$), supporting complementary mediation. The model explains 41.2% of the variance in Public Service Effectiveness and 36.5% of the variance in Sustainable Development Outcomes. The evidence suggests that digital governance is more likely to generate sustainable public value when digital capabilities are converted into services that are effective and useful to citizens.

Keywords: Digital Governance; Public Service Effectiveness; Sustainable Development; Public Value Theory; Lombok

1. Introduction

Digital transformation is altering public-sector governance by influencing the ways governments organize information, coordinate agencies, distribute resources, and engage with citizens. The movement from conventional e-government toward digital government therefore extends beyond converting paper-based administration into electronic procedures. It also involves changes in organizational routines, interagency coordination, citizen involvement, and the delivery of public services (Gil-Garcia et al., 2018; Janowski, 2015; Mergel et al., 2019). In this broader setting, digital government is expected to strengthen access, openness, responsiveness, participation, and administrative performance, thereby producing wider public benefits (Medaglia & Misuraca, 2024; OECD, 2020). These developments have encouraged greater attention to how digital governance may contribute to sustainable development, especially where digital capabilities are used to address economic, social, community, and institutional needs.

Nevertheless, technological digitization by itself cannot be taken as evidence of sustainable development. A government may operate digital platforms while citizens still face difficulties in accessing services, obtaining timely responses, navigating fragmented systems, or receiving information that meets their needs. The public value generated by digital governance is consequently influenced by institutional capacity, governance arrangements, service quality, and the extent to which digital initiatives create benefits that citizens actually experience (Cordella & Paletti, 2019; Lubis et al., 2024; Twizeyimana & Andersson, 2019; Xue, 2024). This indicates the importance of examining not only whether digital technologies are adopted, but also how governance capabilities are converted into outcomes at the citizen level.

Public Value Theory provides a useful lens for understanding this issue because it places value creation for citizens and society at the center of public management (Bryson et al., 2014; Moore, 1995). From this standpoint, digital technology has public value when its use produces substantive improvements in public services and social outcomes, rather than simply increasing the amount of technological infrastructure. Prior research associates digital government with public value through gains in efficiency, accessibility, transparency, accountability, participation, and equity (Luna et al., 2024; Panagiotopoulos et al., 2019; Twizeyimana & Andersson, 2019). Digital governance can therefore be regarded as a public-sector capability whose contribution depends on how successfully it is converted into services that citizens can reach, understand, and use.

Public Service Effectiveness may constitute the key link in this process. When digital public services function effectively, they can lessen administrative obstacles, shorten service processes, improve reliability, strengthen communication between government and citizens, and make official information easier to understand (OECD, 2024; Welby & Tan, 2022). Improvements at the service level can then have wider implications for social inclusion, economic opportunity, community welfare, and institutional development. Recent scholarship also indicates that digital public-service quality should be considered through several dimensions, such as system performance, operational performance, and information quality, rather than by simply asking whether an online platform exists. Public Service Effectiveness consequently offers a plausible pathway through which digital governance can create public value and support sustainable development.

Although studies increasingly connect digital government with sustainable development, the mechanism linking the two remains insufficiently explained. Earlier research has considered digital government in relation to public value, service quality, institutional performance, transparency, accountability, and sustainability, yet the mediating contribution of Public Service Effectiveness has not been sufficiently established (Lubis et al., 2024; Medaglia & Misuraca, 2024). There is also a citizen-level gap because many investigations emphasize public organizations, officials, or technological systems instead of the experiences of service users. A further contextual gap concerns Indonesia, particularly local governments operating under varied socioeconomic and regional development conditions.

Lombok offers an appropriate empirical context for examining these issues. The island comprises five local-government jurisdictions Mataram City, West Lombok Regency, Central Lombok Regency, East Lombok Regency, and North Lombok Regency that differ in socioeconomic characteristics and development conditions. At the same time, Lombok is undergoing major tourism and infrastructure expansion linked to the Mandalika Special Economic Zone in Central Lombok. Existing studies report economic, social, community, and livelihood consequences of this development, alongside concerns about equitable distribution of benefits and community participation (Hamidy et al., 2024; Widaningrum et al., 2025; Yuli et al., 2023; Zitri et al., 2025). Such circumstances make the quality of digital governance and public-service delivery relevant to the pursuit of sustainable local development. In this research, Mandalika serves only as contextual background and is not treated as an analytical variable.

On this basis, the study tests whether Digital Governance is associated with Sustainable Development Outcomes among citizens in Lombok, both through a direct relationship and through Public Service Effectiveness. Digital Governance is represented by digital accessibility, transparency, responsiveness, integration, and participation. Public Service Effectiveness is assessed through system quality, operational quality, and information quality, whereas Sustainable Development Outcomes reflect citizens' perceptions of economic development, social inclusion, sustainable communities, and institutional development. Guided by Public Value Theory, the proposed model treats Public Service Effectiveness as the mechanism through which digital governance capabilities can be converted into broader development value. By examining citizens across five local-government jurisdictions, the study seeks to clarify how digital governance can generate sustainable public value through effective service delivery.

2. Literature Review

2.1. *Digital Governance and Public Value Theory*

Digital governance can be understood as the incorporation of digital technologies, data, organizational practices, and institutional arrangements into public governance in order to improve governmental performance and relations with citizens. Its scope is broader than conventional e-government, which has often focused on placing administrative transactions online. Digital governance also concerns institutional coordination, openness, citizen participation, responsiveness, and the quality of public-service delivery (Gil-Garcia et al., 2018; Janowski, 2015; Mergel et al., 2019). The OECD

(2024) likewise highlights user orientation, coordination across institutions, openness, and purposeful application of digital technologies as characteristics of effective digital government.

For this research, Digital Governance is treated as a multidimensional governance capability comprising digital accessibility, digital transparency, digital responsiveness, digital integration, and digital participation. These dimensions capture more than the availability of online government services. They also reflect whether citizens can reach relevant information and services, receive responses from government, encounter connected public institutions, and participate through digital mechanisms.

The connection between digital governance and citizen outcomes can be interpreted through Public Value Theory. Moore's (1995) perspective emphasizes that public management should be directed toward creating value for citizens and society, rather than concentrating only on internal organizational efficiency. Applied to digital government, this view redirects attention from technology adoption itself toward the benefits citizens obtain from digital services and governance arrangements (Panagiotopoulos et al., 2019; Twizeyimana & Andersson, 2019).

Digital technologies generate public value when their application leads to substantive gains in access, efficiency, openness, accountability, participation, and fairness. Citizen-oriented research suggests that users may first experience value through improvements in individual services, which can subsequently contribute to wider social value (Luna et al., 2024). Accordingly, Digital Governance is treated here as an enabling governance capability, not as an objective in its own right. Its significance lies in the extent to which public institutions use it to improve citizens' service experiences and support wider development outcomes.

2.2. Public Service Effectiveness

Public Service Effectiveness denotes the capacity of government services to respond to citizens' needs by providing delivery that is accessible, dependable, timely, responsive, and useful. In digital government environments, effectiveness is determined not merely by whether a platform is available, but also by the platform's functionality, the quality of service processes, government responsiveness, and the information made available to users (OECD, 2024; Welby & Tan, 2022).

A citizen-centered evaluation therefore needs to consider what users actually experience when obtaining public services. An effective digital service should make administrative procedures easier, enable interaction with government agencies, support efficient processing, and communicate information accurately and clearly. These features provide the practical channel through which digital governance capabilities can become observable benefits for citizens.

Public Service Effectiveness is measured in this study through three dimensions: system quality, operational quality, and information quality. System quality concerns the functionality and ease of use of digital service systems. Operational quality captures the efficiency and performance of service procedures and government responses. Information quality refers to the accuracy, clarity, and timeliness of information communicated through digital public services. Together, these dimensions allow effectiveness to be evaluated from the user's perspective rather than only from an institutional viewpoint.

Within the proposed model, Public Service Effectiveness serves as the mediating construct. Digital Governance supplies technological, informational, and institutional capabilities, while service effectiveness represents the stage at which those capabilities become benefits that citizens can experience. This role is consistent with Public Value Theory, in which public-sector capabilities acquire broader value when they produce outcomes considered meaningful by citizens and society.

2.3. Sustainable Development Outcomes

Sustainable development in this study refers to development that combines economic and social improvement with the longer-term strengthening of communities and public institutions. At the local-government level, this idea is reflected in inclusive service provision, support for economic opportunities, improvement in community well-being, and the development of institutions that are effective and accountable. These elements correspond with the wider orientation of the Sustainable Development Goals, especially goals concerned with inclusion, sustainable communities, and effective institutions (United Nations, 2015).

Digital governance can support such outcomes by enabling local governments to communicate more effectively, circulate information, coordinate agencies, respond to public needs, and improve access to government services. Yet digital infrastructure should not be equated with sustainable development itself. What matters is whether citizens perceive changes in economic, social, community, and institutional conditions associated with public-service provision.

Accordingly, Sustainable Development Outcomes are operationalized as development effects perceived or observed by citizens rather than as an objective calculation of official SDG performance. The construct covers four dimensions: economic development, social inclusion, sustainable communities, and institutional development. Economic development reflects perceived contributions of

public services to local economic activity and livelihoods. Social inclusion captures fairness of access and perceived improvements in quality of life. Sustainable communities refer to perceived improvements in community sustainability, while institutional development encompasses government effectiveness, accountability, public trust, and responsiveness to citizens' needs.

This formulation is especially pertinent in Lombok, where local development is taking place alongside extensive tourism and infrastructure investment, including the Mandalika development area. Previous studies report that this development has implications for economic activity, social conditions, communities, and livelihoods, while also raising issues of benefit distribution, participation, and livelihood sustainability (Hamidy et al., 2024; Widaningrum et al., 2025; Yuli et al., 2023; Zitri et al., 2025).

2.4. Hypotheses Development

Digital governance brings together digital tools, information resources, institutional coordination, and interaction with citizens to improve governmental processes and service delivery. Better access, transparency, responsiveness, integration, and participation can reduce procedural obstacles, make information easier to obtain, and improve governmental response. Under Public Value Theory, these capabilities become valuable when citizens experience corresponding improvements in public services (Gil-Garcia et al., 2018; Mergel et al., 2019; Moore, 1995; Twizeyimana & Andersson, 2019). Accordingly, a stronger digital-governance capability should be associated with higher Public Service Effectiveness.

H1: Digital Governance positively influences Public Service Effectiveness among citizens in Lombok, Indonesia.

Effective public services are characterized by dependable systems, efficient procedures, responsive interactions, and information that users can trust and understand. When these characteristics improve, citizens may face fewer administrative difficulties and experience more constructive interactions with government. Such service improvements can extend to economic, social, community, and institutional conditions. In line with Public Value Theory, service effectiveness represents a way of converting public-sector capabilities into benefits for citizens and society (Moore, 1995; OECD, 2024; Welby & Tan, 2022). Public Service Effectiveness is therefore expected to be positively related to Sustainable Development Outcomes.

H2: Public Service Effectiveness positively influences Sustainable Development Outcomes among citizens in Lombok, Indonesia.

Digital governance can influence sustainable development without operating exclusively through service effectiveness. Greater digital access, openness, participation, responsiveness, and coordination can strengthen the capacity of government institutions to address economic, social, community, and institutional issues (Lubis et al., 2024; OECD, 2020). A positive direct association between Digital Governance and Sustainable Development Outcomes is therefore expected.

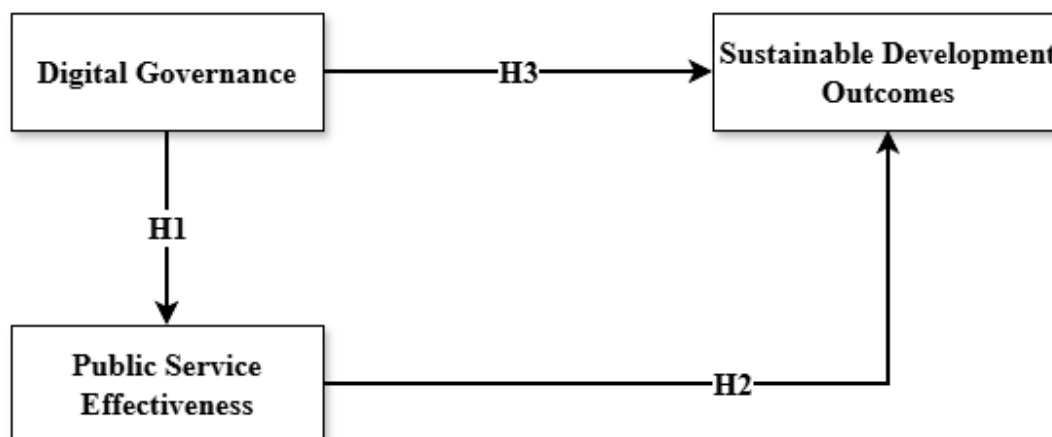
H3: Digital Governance positively influences Sustainable Development Outcomes in Lombok, Indonesia.

An indirect relationship is also expected because digital governance establishes capabilities that support government service delivery, while effective services are the means through which those capabilities can produce benefits perceived by citizens. Public Value Theory suggests that public value emerges when governmental capabilities are translated into outcomes that matter to society (Luna et al., 2024; Moore, 1995). Public Service Effectiveness is consequently proposed as the mediating pathway between Digital Governance and Sustainable Development Outcomes.

H4: Public Service Effectiveness mediates the relationship between Digital Governance and Sustainable Development Outcomes in Lombok, Indonesia.

2.5. Conceptual Framework

Drawing on Public Value Theory and the hypotheses above, the study proposes two routes from Digital Governance to Sustainable Development Outcomes. The first is a direct route, while the second operates through Public Service Effectiveness. Digital Governance is expected to strengthen the effectiveness of public services, and improved service effectiveness is in turn expected to enhance sustainable development outcomes. At the same time, digital governance may contribute directly through better access, transparency, responsiveness, institutional integration, and participation. Public Service Effectiveness therefore represents the central mechanism connecting digital governance capabilities with broader development outcomes.



H4: Mediation effect of Public Service Effectiveness

Figure 1. Conceptual Framework of Digital Governance, Public Service Effectiveness, and Sustainable Development Outcomes

Source: Developed by the author based on Public Value Theory

Figure 1 identifies Digital Governance as the exogenous construct, Public Service Effectiveness as the mediator, and Sustainable Development Outcomes as the endogenous construct. The model contains both a direct path from Digital Governance to Sustainable Development Outcomes and an indirect path passing through Public Service Effectiveness. These proposed paths form the basis for testing H1, H2, H3, and H4 with PLS-SEM.

3. Research Methods

3.1. Research Design and Setting

A quantitative explanatory cross-sectional design was used to assess the relationships among Digital Governance, Public Service Effectiveness, and Sustainable Development Outcomes. Quantitative analysis permits the proposed associations and mediation mechanism to be tested statistically using citizens' responses, while the explanatory orientation is intended to clarify both direct and indirect relationships among the constructs.

Fieldwork covered five local-government jurisdictions in Lombok, Indonesia: Mataram City, West Lombok Regency, Central Lombok Regency, East Lombok Regency, and North Lombok Regency. Lombok was selected because of its varied socioeconomic and development characteristics, together with ongoing digital transformation and tourism-related development. The Mandalika area in Central Lombok provides a relevant contextual backdrop for considering digital governance and effective public-service provision in relation to local sustainability. It is used as context rather than as a study variable.

The unit of analysis is the individual citizen with prior experience obtaining or interacting with local-government public services, including services accessed through digital channels. This user-centered unit of analysis makes it possible to assess perceptions of digital governance and service effectiveness and to relate those perceptions to perceived sustainable development outcomes.

3.2. Population and Sample

The target population consists of citizens living in the five local-government jurisdictions of Lombok. To participate, individuals needed prior experience with local-government public services and with digital government channels.

Purposive sampling was adopted because participation depended on characteristics directly relevant to the research questions. The final dataset contains 120 valid respondents. Eligibility required respondents to be Indonesian citizens living in Lombok, aged 18 years or older, experienced in using local-government public services, and familiar with government-provided digital channels.

Before statistical analysis, all 120 questionnaires were checked for completeness and compliance with the eligibility requirements. Any response that failed to satisfy the criteria or contained incomplete information was removed from the analytical dataset.

3.3. Measurement and Instrument Development

A structured questionnaire was used to obtain measures for Digital Governance (DG), Public Service Effectiveness (PSE), and Sustainable Development Outcomes (SDO). Each construct was assessed through multiple statements using a five-point Likert response format from 1 (strongly disagree)

to 5 (strongly agree). The wording was adapted to the Lombok local-government context while retaining the intended conceptual meaning of each construct.

Digital Governance was represented by five dimensions: digital accessibility, digital transparency, digital responsiveness, digital integration, and digital participation. Public Service Effectiveness covered system quality, operational quality, and information quality. Sustainable Development Outcomes comprised economic development, social inclusion, sustainable communities, and institutional development, reflecting citizens' perceptions of development outcomes associated with selected SDG-related areas.

3.4. Data Collection Procedure

Questionnaires were distributed from September to October 2025 to citizens in all five Lombok jurisdictions Mataram City, West Lombok Regency, Central Lombok Regency, East Lombok Regency, and North Lombok Regency. Both online and offline distribution channels were used so that citizens with different levels of digital access could participate.

Before responding, participants received information about the purpose of the study, the voluntary nature of participation, confidentiality, and the academic use of the collected information. Respondents were selected according to the established purposive-sampling criteria. Completed questionnaires were subsequently screened for eligibility and completeness, producing 120 usable responses.

3.5. Data Analysis

Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied to evaluate the proposed relationships and the mediation mechanism (Hair & Alamer, 2022). The analysis proceeded through assessment of the measurement model followed by evaluation of the structural model.

For the measurement model, indicator loadings, Cronbach's alpha, composite reliability, Average Variance Extracted (AVE), and discriminant validity were considered. The structural model was examined using collinearity diagnostics, path coefficients, R^2 , and f^2 effect sizes. Bootstrapping was then used to test the significance of the direct paths associated with H1-H3 and the indirect path proposed in H4.

3.6. Ethical Considerations

Participation was entirely voluntary. Respondents were informed about the study before completing the questionnaire and could refuse or stop participating at any point without penalty.

The information collected was intended solely for academic analysis. The questionnaire did not require personally identifying information, and responses were handled confidentially and evaluated in aggregate. Data-management procedures were designed to protect respondent privacy and preserve the integrity of the research process.

3.7. Measurement Model Specification

The three principal variables are specified as multidimensional higher-order constructs. Digital Governance comprises digital accessibility, digital transparency, digital responsiveness, digital integration, and digital participation. Public Service Effectiveness consists of system quality, operational quality, and information quality. Sustainable Development Outcomes includes economic development, social inclusion, sustainable communities, and institutional development.

Each lower-order dimension is measured through its corresponding indicators. Digital Governance, Public Service Effectiveness, and Sustainable Development Outcomes are modeled as higher-order constructs (HOCs), with their respective dimensions treated as lower-order constructs (LOCs). A two-stage PLS-SEM procedure is employed: the LOCs are evaluated first, after which the HOCs and their structural relationships are estimated. This specification follows the recommended approach for hierarchical multidimensional constructs (Sarstedt et al., 2019).

4. Results and Discussion

4.1. Research Results

4.1.1. Respondent Characteristics

The analysis uses 120 valid questionnaires from citizens representing the five local-government jurisdictions in Lombok. Variation was observed across gender, age, education, occupation, place of residence, frequency of digital-service use, and the type of digital public service most often accessed. This diversity provides a range of user experiences with digital governance and public-service delivery.

Table 1. Characteristics of Respondents

Characteristic	Category	n	%
Gender	Female	61	50.8
	Male	54	45.0
	Prefer not to say	5	4.2
Age	18-24	29	24.2
	25-34	32	26.7
	35-44	29	24.2
	45-54	21	17.5
	≥55	9	7.5
	Senior high school	31	25.8
	Diploma	12	10.0
Education	Bachelor's	51	42.5
	Master's	18	15.0
	Doctoral	6	5.0
	Other	2	1.7
	Private employee	34	28.3
Occupation	Entrepreneur	22	18.3
	Farmer-Fisher	19	15.8
	Student	19	15.8
	Government employee	17	14.2
	Professional	7	5.8
	Other	2	1.7
	Mataram City	30	25.0
Residence	East Lombok	27	22.5
	Central Lombok	22	18.3
	North Lombok	22	18.3
	West Lombok	19	15.8
	Frequently	18	15.0
Digital Service Frequency	Weekly	34	28.3
	Monthly	36	30.0
	Occasionally	22	18.3
	Rarely	10	8.3
Most-Used Digital Service	Population & civil registration	47	39.2
	Health	21	17.5
	Public information	15	12.5
	Social	11	9.2
	Licensing-administration	10	8.3
	Tax-retribution	10	8.3
	Other	6	5.0

Source: Processed primary data

The sample is reasonably balanced by gender: women account for 50.8% of respondents and men for 45.0%, while 4.2% preferred not to report gender. Respondents aged 25–34 form the largest age category at 26.7%, followed by the 18–24 and 35–44 groups, each representing 24.2%. Bachelor's degree holders constitute the largest educational category (42.5%), and private-sector employees represent the largest occupational group (28.3%). Respondents come from all five jurisdictions, with Mataram City contributing 25.0% and East Lombok 22.5%.

Use of digital government services was most commonly reported on a monthly basis (30.0%), followed by weekly use (28.3%), indicating that many participants interact with digital public services with some regularity. Population and civil-registration services were the most frequently accessed category (39.2%), followed by health services (17.5%) and public information (12.5%). Overall, the sample combines diverse demographic characteristics with practical experience of digital government services.

4.1.2. Descriptive Statistics

Descriptive statistics were calculated to portray citizens' assessments of Digital Governance, Public Service Effectiveness, and Sustainable Development Outcomes. Responses used a five-point Likert scale, where larger values indicate more favorable perceptions. Table 2 reports the mean and standard deviation for each dimension.

Table 2. Descriptive Statistics

Construct	Dimension	Mean	SD
Digital Governance	Digital Accessibility	3.231	0.667
	Digital Transparency	3.217	0.674
	Digital Responsiveness	3.242	0.672
	Digital Integration	3.242	0.688
	Digital Participation	3.253	0.696
Public Service Effectiveness	System Quality	3.250	0.683
	Operational Quality	3.253	0.676
	Information Quality	3.236	0.678
	Economic Development	3.258	0.685
Sustainable Development Outcomes	Social Inclusion	3.231	0.692
	Sustainable Communities	3.200	0.681
	Institutional Development	3.244	0.689

Source: Processed primary data

Every dimension records a mean above the neutral value of 3.00, suggesting that respondents generally view digital governance, service effectiveness, and development outcomes positively, although the assessments remain moderate. Within Digital Governance, Digital Participation has the highest mean (3.253), whereas Digital Transparency records the lowest (3.217). For Public Service Effectiveness, Operational Quality is highest (3.253), followed closely by System Quality (3.250). Among the Sustainable Development Outcomes, Economic Development obtains the highest mean (3.258), while Sustainable Communities has the lowest (3.200).

At the construct level, the average scores are 3.237 for Digital Governance, 3.246 for Public Service Effectiveness, and 3.238 for Sustainable Development Outcomes. The similarity among these values indicates broadly comparable perceptions across the three constructs. Standard deviations between 0.667 and 0.696 show a moderate degree of dispersion in respondents' evaluations.

4.1.3. Measurement Model Assessment

The measurement model was examined to establish whether the observed indicators adequately capture their intended dimensions. Attention was given to indicator reliability, internal consistency, and convergent validity. Because the three principal variables are modeled as multidimensional higher-order constructs, the lower-order dimensions were assessed first and the higher-order structure was evaluated afterward using the two-stage procedure.

Indicator reliability was examined from the outer loadings. Internal consistency was assessed through Cronbach's alpha and composite reliability, while convergent validity was evaluated using AVE. In line with commonly used PLS-SEM benchmarks, loadings around 0.70 or higher, reliability coefficients exceeding 0.70, and AVE above 0.50 are treated as evidence of acceptable measurement quality.

Table 3. Measurement Model Assessment of Lower-Order Constructs

Construct	Dimension	Indicator	Loading	Cronbach's α	Composite Reliability	AVE
Digital Governance	Digital Accessibility	DG1	0.798	0.833	0.864	0.680
		DG2	0.833			
		DG3	0.841			
	Digital Transparency	DG4	0.804	0.830	0.862	0.676
		DG5	0.830			
		DG6	0.831			
	Digital Responsiveness	DG7	0.769	0.805	0.833	0.624
		DG8	0.805			
		DG9	0.796			
	Digital Integration	DG10	0.838	0.855	0.882	0.713
		DG11	0.855			
		DG12	0.840			
	Digital Participation	DG13	0.817	0.797	0.839	0.636
		DG14	0.797			

Public Service Effectiveness	System Quality	DG15	0.778			
		PSE1	0.808	0.801	0.854	0.661
		PSE2	0.801			
		PSE3	0.831			
	Operational Quality	PSE4	0.817	0.821	0.855	0.662
		PSE5	0.821			
		PSE6	0.803			
	Information Quality	PSE7	0.751	0.845	0.852	0.659
		PSE8	0.845			
		PSE9	0.836			
Sustainable Development Outcomes	Economic Development	SDO1	0.844	0.832	0.844	0.712
		SDO2	0.844			
	Social Inclusion	SDO3	0.749	0.807	0.831	0.621
		SDO4	0.807			
		SDO5	0.807			
	Sustainable Communities	SDO6	1.000	-	-	-
		SDO7	0.801	0.783	0.841	0.639
	Institutional Development	SDO8	0.812			
		SDO9	0.710			

Source: Processed primary data

Table 3 shows that the lower-order measurement results meet the required quality criteria. All indicator loadings exceed 0.70, ranging from 0.710 to 0.855. SDO9 has the smallest loading at 0.710, but it remains above the specified threshold and is therefore retained.

For the multi-item dimensions, Cronbach's alpha ranges from 0.783 to 0.855 and composite reliability ranges from 0.831 to 0.882. These coefficients indicate satisfactory internal consistency. AVE values fall between 0.621 and 0.713, all above 0.50, which supports convergent validity.

Sustainable Communities is measured with one indicator, SDO6. Because it is a single-item dimension, Cronbach's alpha, composite reliability, and AVE are not reported under the conventional multi-item calculation. The indicator is retained because the dimension is part of the theoretically specified Sustainable Development Outcomes construct.

Taken together, the lower-order measurement results provide acceptable evidence of indicator reliability, internal consistency, and convergent validity. The indicators and dimensions were therefore retained for the subsequent higher-order construct assessment.

4.1.4. Higher-Order Construct Assessment

After the lower-order dimensions had been evaluated, the higher-order constructs were assessed using the two-stage procedure. Latent-variable scores for the lower-order dimensions were first generated from their measurement models. These dimension scores were then used in the second stage to estimate the relationships between each lower-order component and its corresponding higher-order construct.

Digital Governance comprises Digital Accessibility, Digital Transparency, Digital Responsiveness, Digital Integration, and Digital Participation. Public Service Effectiveness contains System Quality, Operational Quality, and Information Quality. Sustainable Development Outcomes is formed by Economic Development, Social Inclusion, Sustainable Communities, and Institutional Development.

Table 4. Higher-Order Construct Assessment

Higher-Order Construct	Lower-Order Construct	Loading	Composite Reliability	AVE
Digital Governance	Digital Accessibility	0.884	0.947	0.781
	Digital Transparency	0.891		
	Digital Responsiveness	0.876		
	Digital Integration	0.894		
	Digital Participation	0.875		
Public Service Effectiveness	System Quality	0.916	0.939	0.836
	Operational Quality	0.912		
	Information Quality	0.915		
	Economic Development	0.868		
Sustainable Development Outcomes	Social Inclusion	0.895	0.916	0.732
	Sustainable Communities	0.782		
	Institutional Development	0.873		

Source: Processed primary data

The higher-order assessment indicates strong representation of each principal construct by its lower-order dimensions. For Digital Governance, loadings range from 0.875 to 0.894. Digital Integration has the largest loading (0.894), followed by Digital Transparency (0.891), whereas Digital Participation is the smallest (0.875). Even the lowest value indicates a strong contribution to the higher-order construct.

The three dimensions of Public Service Effectiveness also load strongly on the higher-order construct, with values between 0.912 and 0.916. System Quality records the highest loading (0.916), followed by Information Quality (0.915) and Operational Quality (0.912). Their close values indicate a stable and consistent multidimensional representation.

For Sustainable Development Outcomes, the higher-order loadings extend from 0.782 to 0.895. Social Inclusion has the strongest loading (0.895), followed by Institutional Development (0.873) and Economic Development (0.868). Sustainable Communities has the lowest loading (0.782), but this remains within an acceptable range and the dimension is retained.

Composite reliability is 0.947 for Digital Governance, 0.939 for Public Service Effectiveness, and 0.916 for Sustainable Development Outcomes. Their corresponding AVE values are 0.781, 0.836, and 0.732. These statistics indicate adequate reliability and convergent validity for the higher-order constructs.

The evidence supports the proposed multidimensional structure of all three constructs and allows the analysis to proceed to the structural model. The lower-order dimensions specified in the conceptual framework can be maintained as components of their respective higher-order constructs.

4.1.5. Structural Model Assessment

Once the measurement properties of the lower- and higher-order models had been established, the structural model was assessed to determine explanatory power and to examine the proposed relationships. The evaluation considered R^2 , path coefficients, collinearity, and f^2 effect sizes.

In the structural specification, Digital Governance is the exogenous construct, Public Service Effectiveness is the mediator, and Sustainable Development Outcomes is the endogenous outcome. The model therefore estimates the influence of Digital Governance on Public Service Effectiveness and the subsequent contributions of both Digital Governance and Public Service Effectiveness to Sustainable Development Outcomes.

The structural relationships are represented as follows:

$$PSE = \beta_1 DG + \zeta_1$$

$$SDO = \beta_2 DG + \beta_3 PSE + \zeta_2$$

Where DG represents Digital Governance, PSE represents Public Service Effectiveness, SDO represents Sustainable Development Outcomes, and ζ represents unexplained variance.

Table 5. Structural Model Assessment

Endogenous Construct	Predictor	Path Coefficient (β)	R^2	VIF	f^2
Public Service Effectiveness	Digital Governance	0.642	0.412	1.000	0.700
Sustainable Development Outcomes	Digital Governance	0.246	0.365	1.700	0.062
Sustainable Development Outcomes	Public Service Effectiveness	0.416	0.365	1.700	0.159

Source: Processed primary data

Digital Governance shows a strong positive path to Public Service Effectiveness, with $\beta = 0.642$. Its R^2 of 0.412 means that approximately 41.2% of the variance in Public Service Effectiveness is accounted for by Digital Governance.

For Sustainable Development Outcomes, the model yields $R^2 = 0.365$. Thus, Digital Governance together with Public Service Effectiveness explains about 36.5% of the variance in the outcome construct. Both estimated paths are positive: Digital Governance has $\beta = 0.246$, while Public Service Effectiveness has $\beta = 0.416$.

The VIF of 1.700 for the two predictors of Sustainable Development Outcomes indicates that multicollinearity is not a material problem. Regarding effect size, Digital Governance has a comparatively large effect on Public Service Effectiveness ($f^2 = 0.700$). Its effect on Sustainable Development Outcomes is smaller ($f^2 = 0.062$), while the effect of Public Service Effectiveness is $f^2 = 0.159$.

Overall, the structural estimates are consistent with the proposed model: Digital Governance is related to Sustainable Development Outcomes directly and is also linked to the outcome through Public Service Effectiveness. The statistical significance of these paths is considered further through the bootstrapping results used for hypothesis testing.

4.1.6. Hypothesis Testing

The direct hypotheses were evaluated by testing whether the estimated structural paths differed significantly from zero. Bootstrapping with 5,000 resamples was used to derive the standard errors and significance statistics for the proposed relationships.

Table 6. Hypothesis Testing of Direct Effects

Hypothesis	Relationship	β	t-statistic	p-value	Decision
H1	Digital Governance $\rightarrow$ Public Service Effectiveness	0.642	11.304	<0.001	Supported
H2	Public Service Effectiveness $\rightarrow$ Sustainable Development Outcomes	0.416	5.440	<0.001	Supported
H3	Digital Governance $\rightarrow$ Sustainable Development Outcomes	0.246	3.221	0.001	Supported

Source: Processed primary data

All three direct hypotheses receive empirical support. H1 shows that Digital Governance has a positive and statistically significant association with Public Service Effectiveness ($\beta = 0.642$, $t = 11.304$, $p < 0.001$). This is the largest path in the model, suggesting that stronger digital-governance capabilities are closely associated with more effective public-service delivery.

H2 is supported because Public Service Effectiveness positively and significantly predicts Sustainable Development Outcomes ($\beta = 0.416$, $t = 5.440$, $p < 0.001$). The result implies that better system performance, service processes, responsiveness, and information quality are accompanied by more favorable perceptions of sustainable development.

H3 is likewise supported. Digital Governance has a significant positive direct relationship with Sustainable Development Outcomes ($\beta = 0.246$, $t = 3.221$, $p = 0.001$). Although this coefficient is lower than those for H1 and H2, the significant path indicates that digital governance contributes to development outcomes in addition to its influence through service effectiveness.

The direct-effect tests therefore provide statistical support for the relationships proposed in the conceptual framework. Digital Governance functions both as an antecedent of Public Service Effectiveness and as a direct contributor to Sustainable Development Outcomes.

4.1.7. Mediation Analysis

The mediation test was performed to determine whether Public Service Effectiveness carries part of the effect of Digital Governance to Sustainable Development Outcomes. In other words, the analysis evaluates whether stronger digital governance is associated with better development outcomes partly because it improves the effectiveness of public services.

The indirect pathway tested was:

$$DG \rightarrow PSE \rightarrow SDO$$

The indirect effect was calculated from the product of the Digital Governance $\rightarrow$ Public Service Effectiveness coefficient and the Public Service Effectiveness $\rightarrow$ Sustainable Development Outcomes coefficient. Its significance was evaluated through 5,000 bootstrap resamples.

Table 7. Mediation Effect of Public Service Effectiveness

Hypothesis	Indirect Relationship	Indirect Effect (β)	t-statistic	p-value	Decision
H4	DG $\rightarrow$ PSE $\rightarrow$ SDO	0.267	4.106	<0.001	Supported

Source: Processed primary data

The analysis identifies a positive and statistically significant indirect effect of Digital Governance on Sustainable Development Outcomes through Public Service Effectiveness ($\beta = 0.267$, $t = 4.106$, $p < 0.001$). H4 is therefore supported. The result indicates that stronger digital governance is associated with better sustainable development outcomes partly through improvements in public-service effectiveness.

The indirect effect should be considered alongside the direct effect reported for H3. Since the direct path from Digital Governance to Sustainable Development Outcomes remains positive and significant while the mediated path is also significant, Public Service Effectiveness operates as a complementary mediator. The findings consequently indicate two routes of influence: one direct and another transmitted through effective public services.

The mediation evidence strengthens the study's central argument that digital governance should not be interpreted merely as a technological infrastructure or administrative reform. Its broader contribution becomes more meaningful when digital capabilities improve services that citizens can actually access, use, and evaluate. Public Service Effectiveness thus represents an important conversion mechanism through which digital-governance capabilities can produce development benefits at the citizen level.

4.2. Discussion

The empirical results indicate that Digital Governance is associated with Sustainable Development Outcomes through both a direct route and an indirect route. The strongest structural relationship is between Digital Governance and Public Service Effectiveness ($\beta = 0.642$), suggesting that accessibility, transparency, responsiveness, integration, and participation are important capabilities for improving citizens' experiences with public services. This result is in line with research emphasizing digital government's potential to strengthen access, coordination, responsiveness, and public value (Gil-Garcia et al., 2018; Mergel et al., 2019; Twizeyimana & Andersson, 2019).

Public Service Effectiveness is also positively associated with Sustainable Development Outcomes ($\beta = 0.416$). The result indicates that dependable systems, efficient service processes, responsive government interactions, and high-quality information can be connected with wider economic, social, community, and institutional benefits. This interpretation is compatible with Moore's (1995) Public Value Theory, which emphasizes that public-sector capabilities become valuable when they generate benefits that citizens and society consider meaningful.

The direct Digital Governance $\rightarrow$ Sustainable Development Outcomes path is significant at $\beta = 0.246$, showing that the contribution of digital governance is not exhausted by service delivery. At the same time, the indirect coefficient through Public Service Effectiveness is $\beta = 0.267$, confirming complementary mediation. Thus, the evidence points away from a technology-adoption-only explanation and toward the importance of how digital capabilities reshape the delivery and experience of public services.

For Lombok, the findings imply that digital transformation should be pursued together with improvements in service quality rather than through platform expansion alone. Attention to system reliability, operational performance, information quality, responsiveness, and citizen participation can strengthen the connection between digital governance and development objectives. This consideration is especially relevant within Lombok's broader development trajectory, including the Mandalika context, where inclusive and effective public governance is important for maintaining local economic and social benefits.

Overall, the study offers a citizen-centered account of the digital governance–sustainable development relationship. Digital Governance provides the enabling capability, Public Service Effectiveness converts that capability into service-level value, and Sustainable Development Outcomes represent the broader benefits perceived by citizens.

5. Conclusion

The evidence from Lombok indicates that Digital Governance is relevant to sustainable development and is strongly associated with Public Service Effectiveness. In turn, Public Service Effectiveness shows a positive relationship with Sustainable Development Outcomes, while Digital Governance also retains a significant direct association with the development outcome. The mediation analysis further shows that Public Service Effectiveness serves as a complementary mechanism connecting Digital Governance with Sustainable Development. This result is consistent with Public Value Theory because it demonstrates that technological and institutional capabilities acquire wider public value when they are translated into effective services and benefits that citizens can experience. For local governments, the implication is that digital transformation should be accompanied by improvements in service reliability, operational efficiency, information quality, responsiveness, and opportunities for citizen participation. Several limitations should be considered when interpreting the

findings. The cross-sectional design, purposive sampling procedure, and sample of 120 respondents constrain the extent to which the results can be generalized. In addition, Sustainable Development Outcomes are based on citizens' perceptions rather than objective regional or SDG indicators. Future studies could strengthen the evidence by using larger and more representative samples, longitudinal designs, and objective SDG-related measures to further examine the links among digital governance, public-service effectiveness, and sustainable development.

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