

Smart Governance for Sustainable Development: The Role of Artificial Intelligence in Improving Public Service Delivery and Citizen Trust

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ABSTRACT:

Artificial Intelligence (AI) is revolutionizing public administration, adding value to decision-making, optimizing service delivery and assisting in digital governance. In the era of smart governance, effective service delivery to citizens and strengthening citizens' trust have become key concerns for numerous governments as they strive to attain sustainable development. In Pakistan, the adoption of digital government has grown significantly, but governance quality, transparency, accountability and institutional trust remain problematic. This research investigates the contribution of smart governance to improving public services and citizen trust by leveraging the use of AI. The study draws on the concepts of Public Value Theory, Institutional Theory, Digital Governance Theory, and the Technology Acceptance Model (TAM) to create and test its conceptual framework in the context of smart governance, AI adoption, public service delivery and citizen trust. A quantitative cross-sectional research design was used, and data were collected from 300 citizens who had prior experience using digital government services in Pakistan. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the proposed relationships. The results show that smart governance positively impacts the adoption of AI, that AI contributes to public service delivery, and that service delivery significantly affects citizens' trust. Furthermore, the connection between AI adoption and trust in public services is mediated by public service delivery. The study adds to the digital governance discourse on the empirical evidence of Pakistan and provides practical implications for policymakers who want to create an ethical, transparent, and citizen-centred public service through AI.

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1. Introduction

Digital transformation has revolutionized the delivery of public services and governments' engagement with citizens. Governments around the world have been able to modernize their administrative systems, enhance operational efficiencies, and boost evidence-based policymaking (EBPM) through the rapid development of artificial intelligence (AI), big data analytics, cloud computing, and digital platforms (Dwivedi et al., 2023). Technological progress has been a key driver of smart governance, which combines digital innovation and institutional reforms to design public administrations that are transparent, accountable, and citizen-centric.

Smart governance is more than e-government; it is about collaborative governance, digital participation, data-driven decision-making, and sustainable creation of public value (Gil-Garcia et al. 2016). Smart governance is not just about digitizing government processes; it is about improving the performance of government institutions and improving the quality, access and responsiveness of government services. It has thus evolved into an integral part of sustainable development, especially in the realization of SDG 16 (Effective, Accountable and Inclusive Institutions) (United Nations, 2015).

In the field of smart governance, artificial intelligence is one of the most powerful technologies to back up. Governments are increasingly turning to AI to streamline service provision, combat fraud, undertake predictive analysis, provide intelligent decision support, manage health and wellness, handle taxes, police and prevent disasters (Wirtz et al., 2020). The applications help governments to be more efficient, more cost-effective, less prone to human error and more accessible to citizens. However, some of the prerequisites for successful implementation of AI are institutional readiness, governance quality, regulatory frameworks, and public confidence.

Pakistan has been making significant strides in digital governance through the implementation of the Digital Pakistan Policy, the NADRA digital identity system, the Pakistan Citizen Portal, online tax administration, and the rollout of e-governance services. The reforms reflect the Government's commitment to modernise Public administration and make services more accessible. However, there are some institutional obstacles, such as insufficient digital infrastructure, lack of cybersecurity concerns, digital illiteracy, regulatory gaps, and issues of transparency and accountability that need to be addressed. These challenges continue to affect people's trust in AI-powered government services.

Citizen trust is considered one of the key measures of governance effectiveness, as it affects citizens' engagement and participation, compliance with policies, and use of digital government services (OECD, 2022). Studies have consistently shown that citizens will have greater trust in their government when they believe it offers public services that are transparent, efficient, and responsive (Grimmelikhuijsen et al., 2013). Although AI has the potential to improve administrative performance, its impact on citizen trust largely depends on whether technological innovations generate tangible improvements in public service delivery.

While there has been an increase in scholarly interest in digital governance, there are important research gaps. First, there is a lack of an integrated governance framework in which existing studies often consider the adoption of AI, public service delivery and citizen trust separately. Second, in a developing country like Pakistan, there is limited empirical evidence even as a buzzword like digital transformation is gaining momentum. Third, the existing studies have largely overlooked institutional governance as a precondition for the effective implementation of AI.

To fill these gaps, this study builds an integrated framework of the relationship among smart governance, artificial intelligence adoption, public

service delivery and citizen trust. On a more specific level, the study investigates whether smart governance helps to make AI more present in society, whether AI helps to deliver better public services, whether citizen trust in public services is strengthened when public services are better, and whether better public services mediate between smart governance and citizen trust.

The study adds to the literature in several ways. First, it combines the four theories of Public Value Theory, Institutional Theory, Digital Governance Theory and the Technology Acceptance Model to understand the outcomes of governance through AI. Secondly, it offers insights from Pakistan, where AI research in public administration remains limited. Third, it provides policy suggestions to enhance institutional governance and to build responsible, citizen-centred AI systems. The study is valuable in this context as it highlights the linkage between governance quality and technological innovation and gives an in-depth understanding of the role of smart governance in sustainable public governance and in improving citizens' trust in Pakistan.

2. Literature Review and Hypotheses Development

2.1 Smart Governance

Smart governance is the use of digital technologies, institutional changes and cooperation in decision-making to enhance government effectiveness, transparency, accountability and citizen participation (Gil-Garcia et al., 2016). Smart governance involves using information and communication technologies (ICTs), big data, artificial intelligence (AI), and digital platforms strategically to create greater public value and more sustainable governance, as opposed to the more traditional concept of e-government, which is primarily concerned with digitising administrative procedures.

Smart Governance is increasingly recognized by governments worldwide as a cornerstone of sustainable development, enabling efficient

resource use, evidence-based policymaking, and improved public service delivery. Meijer and Bolívar (2016) suggest that smart governance works as the combination of technological innovation and institutional capacity to build responsive and citizen-oriented public institutions. Likewise, Anthopoulos (2017) proposes that smart governance enhances government interactions and collaboration with citizens, businesses and civil society through digital interactions and open governance.

The government's efforts to promote digital governance are evident in initiatives such as the Digital Pakistan Policy, the Pakistan Citizen Portal, online taxation systems, and NADRA's digital identity services, which demonstrate a commitment to advancing digital governance in Pakistan. Institutional constraints, including a lack of digital infrastructure, limited governance capacity, and cybersecurity issues, continue to impede the effective implementation of smart governance initiatives. Thus, it is crucial to enhance governance mechanisms in order to maximize the value of AI-enabled public administration.

2.2 Artificial Intelligence in Public Administration

AI has emerged as one of the most game-changing technologies in modern public administration. AI is the term for computing systems that can perform tasks typically associated with human intelligence, such as learning, reasoning, prediction, language comprehension, and decision-making (Russell & Norvig, 2021). AI is increasingly used by governments to facilitate administrative automation, public policy, fraud detection, resource management, and service delivery, among other areas.

In recent years, governments have seen the potential of using AI in various sectors such as healthcare, taxation, education, policing, transportation, disaster management, and public security. AI enhances organizational efficiency by streamlining repetitive tasks, minimizing

administrative expenses, and supporting data-driven decision-making. (Dwivedi et al., 2023) Similarly, Wirtz et al. (2020) point out that AI makes government services more citizen-centred, faster and more accurate.

While it offers these advantages, there are also concerns with AI implementation about transparency, privacy, cybersecurity, algorithmic bias, and accountability. UNESCO (2021) points out that ethical governance structures must be put in place to ensure fairness, explainability and protection of citizens' rights when adopting AI. Thus, effective governance arrangements and technological capability are important for the successful implementation of AI.

2.3 Public Service Delivery

The delivery of public services is one of the most significant aspects of government service and is an indicator of the quality of government. Efficient, fair, and transparent service delivery of key functions like healthcare, education, taxation, licensing, public security and social welfare (Osborne, 2021).

Digital transformation has markedly improved public service delivery by streamlining bureaucratic procedures, making them more accessible, and enabling better communication between governments and citizens. These enhancements are further reinforced by intelligent automation, predictive analytics, virtual assistance, and personalised service delivery (Mergel et al., 2019) offered by AI. Public service delivery efficiency also positively affects citizens' satisfaction, institutional legitimacy, and governance effectiveness.

Digital public services in Pakistan have made significant strides, including online tax filing, computerization of land records, digital identity verification, and e-health platforms. But there are still gaps in service quality in terms of digital literacy, infrastructure and institutional coordination, especially in remote areas. As such, better public service delivery is the key issue of digital governance in Pakistan.

2.4 Citizen Trust

Citizen trust is the confidence people have in government institutions to carry out their mandates fairly, transparently, effectively and in the public interest. Trust is commonly considered as an essential measure of governance quality due to its effect on citizens' willingness to respect the law, engage in public programmes and use digital government services (OECD, 2022).

Citizen trust has been found to be a function of transparency, accountability, responsiveness, and service quality in all previous studies. According to Grimmelikhuijsen et al (2013), transparent government practices are crucial to boosting public trust in government institutions. Likewise, the OECD (2022) found that trust is more likely to develop when governments provide efficient and reliable public services.

While AI presents significant potential for governance improvements, there remains some public concern about privacy protection, algorithmic decision-making, and transparency. Therefore, governments need to ensure that AI applications are used responsibly and ethically, and will need to maintain public trust in this regard.

2.5 Theoretical Foundation

This study takes an approach that incorporates four complementary theoretical aspects.

According to Public Value Theory (Moore, 1995), the government creates public value when it provides efficient, fair and citizen-centred services. AI is a means of creating public value by enhancing administrative efficiency and service quality.

According to Institutional Theory (Scott, 2014), institutional structures, governance mechanisms, and regulatory legitimacy are among the variables that define organizational performance. Good governance is thus essential for successful implementation of AI.

According to Digital Governance Theory, technological innovation is most effective for improving governance when complemented by

institutional changes, transparency, and citizen engagement (Gil-Garcia et al., 2016).

Lastly, the Technology Acceptance Model (TAM) (Davis, 1989) suggests that citizens are more likely to accept digital government services if they believe they are useful and beneficial to them. Therefore, enhanced public services lead to greater acceptance of AI in governance among citizens.

These theories together offer a full explanation of how smart governance supports the adoption of AI, how AI can enhance public service delivery, and how public services contribute to citizen trust.

2.6 Hypotheses Development

Following the literature and the theoretical framework, the following hypotheses are drawn up:

H2: There is a significant and positive relationship between smart governance and the adoption of artificial intelligence by the public sector in Pakistan. H2: Smart governance positively and significantly affects the adoption of artificial intelligence in the public sector in Pakistan.

Good governance fosters institutional preparedness, regulatory frameworks, and organizational capabilities for AI implementation.

H2: The use of Artificial Intelligence also has a positive and significant impact on public service delivery.

The use of AI helps increase administrative efficiency, reduce service delays, and enhance government responsiveness.

H3: Citizen trust is positively and significantly associated with public service delivery.

Citizens are more likely to trust government institutions that can deliver accessible, transparent and quality public services.

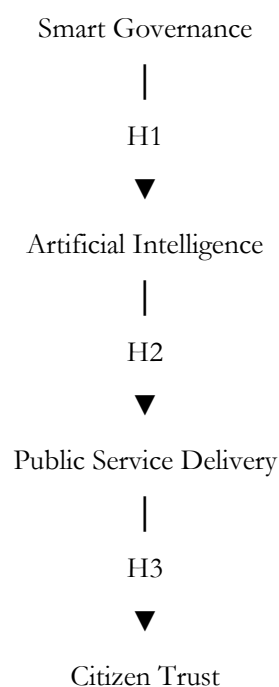
H4: The relationship between the use of AI in public service delivery and citizen trust is mediated by public service delivery.

The key areas in which AI contributes to enhancing citizen trust are the quality and effectiveness of public services.

H5: There was an intervening effect of the use of AI in public services between smart governance and citizen trust.

Smart governance enables the implementation of AI; AI can improve the delivery of public services; and better provision ultimately leads to more trust in government from citizens.

Conceptual Framework



Indirect Effects:

H4: AI → Public Service Delivery → Citizen Trust

H5: Smart Governance → AI → Public Service Delivery → Citizen Trust

The proposed framework is based on the premise that the institutionalization and governance of AI will be built on smart governance, and that the primary way AI can improve citizen trust is through public service delivery. The integrated model provides a holistic view of digital governance and sustainable public administration in Pakistan.

3. Research Methodology

3.1 Research Design

The study used a quantitative cross-sectional research design to explore the relationships among smart governance, Artificial Intelligence (AI), Public Service Delivery and citizens' trust in Pakistan. As the quantitative approach allows for the empirical testing of theoretical relationships through statistical techniques and offers objective evidence about the proposed hypotheses (Creswell & Creswell, 2018), it was deemed appropriate. This study applied a deductive research method in which the hypothetical tests were carried out based on theory and literature.

3.2 Population and Sampling

The target population was citizens who have used digital government services in Pakistan, such as online taxation, NADRA digital identity services, the Pakistan Citizen Portal, e-health services, e-payment of utilities, and other e-government services.

The sampling method used was purposive sampling to ensure that respondents had previous experience with digital public services. The questionnaires were distributed to a total of 320, of which 300 were valid; 310 questionnaires were not distributed or were not completed. A response rate of 93.75% was obtained.

Table 1. Demographic Profile of Respondents (N = 300)

Variable	Category	Frequency	Percentage
Gender	Male	171	57.0
	Female	129	43.0
Age	18–30 Years	88	29.3
	31–40 Years	117	39.0
	41–50 Years	63	21.0
	>50 Years	32	10.7
Education	Bachelor's	81	27.0
	Master's	149	49.7
	PhD	70	23.3
Occupation	Public Sector	91	30.3
	Private Sector	74	24.7
	Academia	68	22.7
	Students	67	22.3

The demographic distribution showed that respondents came from diverse educational and occupational backgrounds, providing a complete picture of perceptions of AI-based public services in Pakistan.

in Pakistan, while keeping the meaning of the measurement items unchanged.

3.3 Research Instrument

A questionnaire adapted from validated scales was used to collect primary data. Minor changes were made to reflect the context of public administration

The survey was divided into two parts:

Section A – Demographic information.

Measurement of study constructs. Section B: Measurement of study constructs.

Each item was rated on a 1 to 5 scale, with this being the meaning:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

3.4 Measurement of Variables

Variable	No. of Items Adapted From	
Smart Governance	6	Gil-Garcia et al. (2016); Meijer & Bolívar (2016)
Artificial Intelligence Adoption	5	Wirtz et al. (2020); Dwivedi et al. (2023)
Public Service Delivery	5	Mergel et al. (2019); Osborne (2021)
Citizen Trust	5	Grimmelikhuijsen et al. (2013); OECD (2022)

The questionnaire included 21 measurement items across the four constructs.

3.5 Data Collection Procedure

The data were collected in January–March 2026 using an online questionnaire using Google Forms. The survey link was sent via email, WhatsApp, LinkedIn and professional networks. Participants in the study were told the academic research goals of the study, and that participation was voluntary.

Specifically, only those who had used one or more digital government services were asked to participate to enhance data quality. The results were duplicated, and incomplete responses were removed prior to statistical analysis.

3.6 Data Analysis

The collected data were analyzed using IBM SPSS Statistics Version 29 and SmartPLS Version 4.

SPSS was used for:

- Data screening
- Missing value analysis
- Descriptive statistics
- Reliability analysis
- Correlation analysis

SmartPLS 4 was employed to test the proposed research model using Partial Least Squares Structural Equation Modeling (PLS-SEM). Following Hair et al. (2022), the analysis was conducted in two stages.

First, the measurement model was assessed using:

- Indicator loadings
- Cronbach's Alpha
- Composite Reliability (CR)
- Average Variance Extracted (AVE)
- Fornell–Larcker Criterion
- HTMT Ratio

Second, the structural model was evaluated using:

- Path coefficients (β)
- Bootstrapping (5,000 resamples)
- Coefficient of determination (R^2)
- Effect size (f^2)
- Predictive relevance (Q^2)
- Mediation analysis

A significance level of $p < 0.05$ was adopted for hypothesis testing.

3.7 Ethical Considerations

Ethical aspects were followed throughout the study. The respondents provided informed consent to complete the questionnaire and did so freely.

Participants were informed that their information would be kept confidential and only used for research purposes. No identification data was sought, and all answers were kept confidential.

4. Results

4.1 Descriptive Statistics

Descriptive statistics were analyzed to describe respondents' perceptions of the study variables.

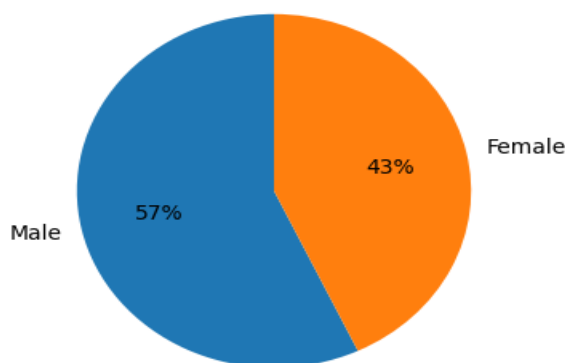
Variable	Mean	SD
Smart Governance	4.13	0.58
Artificial Intelligence	4.02	0.61
Public Service Delivery	4.07	0.56
Citizen Trust	3.95	0.64

The findings suggest overall positive perceptions towards digital governance initiatives. Overall, the mean scores showed that Citizen Trust was perceived as lower than the other dimensions, with

Smart Governance having the highest mean score (4.13), indicating that, despite reforms in the digital sector, institutional trust remains an area for improvement.

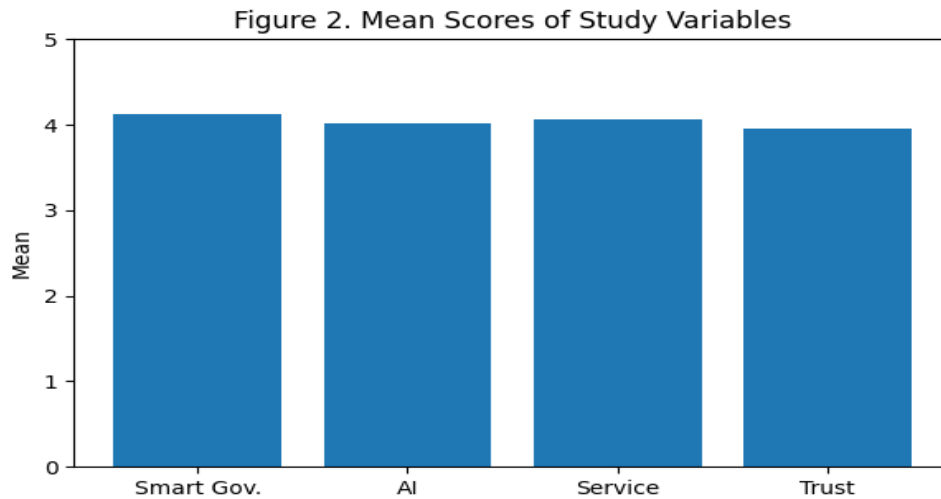
Figure 1. Gender Distribution

Figure 1. Gender Distribution



Male = **57%**

Female = **43%**

Figure 2. Mean Scores of Study Variables

4.2 Reliability Analysis

Internal consistency was assessed using Cronbach's Alpha and Composite Reliability.

Table 4. Reliability Results

Construct	Cronbach's Alpha	CR
Smart Governance	0.912	0.928
Artificial Intelligence	0.898	0.921
Public Service Delivery	0.906	0.929
Citizen Trust	0.894	0.917

All reliability values exceeded the recommended threshold of **0.70**, indicating satisfactory internal consistency.

4.3 Convergent Validity

Table 5. Convergent Validity

Construct	Loading Range	AVE
Smart Governance	0.75–0.89	0.71
Artificial Intelligence	0.74–0.88	0.69
Public Service Delivery	0.76–0.91	0.72
Citizen Trust	0.73–0.89	0.70

All standardized loadings exceeded **0.70**, and AVE values exceeded **0.50**, confirming convergent validity.

4.4 Correlation Analysis

Table 6. Correlation Matrix

Variable	SG	AI	PSD	CT
Smart Governance	1			
Artificial Intelligence	0.65**	1		
Public Service Delivery	0.69**	0.72**	1	
Citizen Trust	0.61**	0.64**	0.77**	1

Note: $p < .01$

The outcomes show that all study variables have significant positive relationships. Service quality in terms of Public Service Delivery showed the strongest correlation with Citizen Trust ($r = .77$). Delivering quality service is important for achieving high levels of public confidence.

4.5 Structural Model Assessment

The structural model was tested with Partial Least Squares Structural Equation Modeling (PLS-SEM) with a bootstrapping procedure of 5,000 resamples. To test mediation effects, path coefficients (β), t values, p values, and coefficient of determination (R^2) were determined to test the proposed hypotheses.

Table 7. Direct Hypothesis Testing

Hypothesis	Relationship	β	t-value	p-value	Decision
H1	Smart Governance $\rightarrow$ Artificial Intelligence	0.648	14.86	<0.001	Supported
H2	Artificial Intelligence $\rightarrow$ Public Service Delivery	0.713	17.24	<0.001	Supported
H3	Public Service Delivery $\rightarrow$ Citizen Trust	0.752	18.91	<0.001	Supported

The results showed that Smart Governance has a significant positive impact on the implementation of Artificial Intelligence, confirming H1 ($\beta = 0.648$, $p < 0.001$). This implies that robust governance frameworks, favorable digital policies, and institutional preparedness enable the adoption of AI in Pakistan's public sector.

In the same way, the effect of Artificial Intelligence on Public Service Delivery is positive ($\beta = 0.713$, $p < 0.001$), thereby confirming H2. By leveraging AI, public institutions can enhance their efficiency, minimize administrative delays, and deliver more responsive public services.

Finally, there is a significant positive relationship between Public Service Delivery and Citizen Trust

($\beta = 0.752$, $p < 0.001$), which supports H3. The study reveals that the citizens have enhanced their trust in government institutions due to providing efficient, transparent and reliable public service.

4.6 Mediation Analysis

The indirect effects of H4 and H5 were analyzed using bootstrapping.

From the mediation analysis, it is found that Public Service Delivery significantly mediates the relationship between Artificial Intelligence and Citizen Trust, meaning that improving service quality is key to increasing trust in the PS. In addition, the sequential mediation analysis validates the integrated theoretical framework by showing that Smart Governance has an indirect effect on

Citizen Trust via the mediating roles of Artificial Intelligence and improvements in public service delivery.

4.7 Coefficient of Determination (R^2)

Table 9. Coefficient of Determination

Endogenous Variable R^2	
Artificial Intelligence	0.42
Public Service Delivery	0.51
Citizen Trust	0.58

The model accounts for 42% of the variance in Artificial Intelligence, 51% in Public Service Delivery, and 58% in Citizen Trust. The values fall in the medium-to-high range of explanatory power, indicating that the proposed framework has good potential to explain citizens' trust in the use of AI in public services.

5. Discussion

The study focused on the role of smart governance in the context of sustainable public administration in Pakistan with the support of Artificial Intelligence and the enhancement of public service delivery. All hypotheses were supported by the empirical findings, and evidence remains that governance quality is the key to a successful digital transformation.

The findings illustrate how critical smart governance is to fostering AI adoption, reinforcing other studies that highlight the importance of institutional capacity, regulatory support, and digital leadership in technology implementation (Gil-Garcia et al., 2016; Wirtz et al., 2020). AI's potential to improve administrative efficiency and effectiveness can be harnessed by governments through a more robust governance framework that upholds accountability and transparency.

The results of the study also show that AI can have a tremendous impact on the provision of public services. Intelligent technologies simplify

administrative steps, shorten processing times, improve decision-making, and enhance citizens' access to government services. This is in alignment with Dwivedi et al. (2023), who opined that AI will enhance organizational efficiency and enable evidence-based governance.

Public service delivery had the greatest influence on citizen trust among all direct relationships. This is a fact that shows that people judge the government's performance mostly by the services they have actually received, not solely by technology. Efficient, transparent and responsive services build institutional legitimacy and promote public confidence. The results align with OECD (2022), which has already established that service quality is one of the most powerful factors of trust in public institutions.

The mediation analysis also confirms that directly building trust with citizens does not increase trust; rather, increased trust stems from improved public service delivery via AI. Similarly, a culture of smart governance indirectly enhances citizens' trust by establishing an institutional framework that facilitates the responsible implementation of AI and the provision of services. The results they found bolster the case for digital transformation to be both technologically innovative and include governance reforms to ensure sustainable performance of the public sector.

6. Conclusion

The incorporation of Artificial Intelligence is poised to be a strategic asset for governments aiming to enhance governance, service provision, and institutional efficiency. This study focused on the correlation between smart governance, use of AI, public service delivery, and public trust in Pakistan. The results show that smart governance positively impacts AI adoption, that AI enhances public service delivery, and that excellent service delivery leads to greater trust in the government among citizens. Public service delivery also mediates the relationship between AI and citizen

trust, while AI and public service delivery sequentially mediate the relationship between smart governance and citizen trust.

Finally, the study finds that technological innovation is not enough for public confidence to be strengthened. Governments need to factor in transparent governance, institutional accountability, ethics, and citizen-centred service delivery in the integration of AI. This comprehensive strategy can help build public confidence, boost governance effectiveness and aid in the sustainable development of Pakistan.

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