



E Governance and Citizen Satisfaction: The Mediating Role of Transparency and Moderating Role of Digital Literacy

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Abstract: The rapid adoption of digital technologies has transformed the way governments deliver public services, communicate with citizens, and promote administrative accountability. E governance has consequently become an important mechanism for improving the efficiency, accessibility, responsiveness, and quality of public administration. However, the availability of digital government services does not necessarily guarantee higher levels of citizen satisfaction. Citizens may evaluate digital government services according to their perceptions of transparency, accessibility, trustworthiness, responsiveness, and ease of use. Moreover, differences in citizens' digital literacy may determine whether they can effectively access and benefit from electronically delivered public services. This study examines the relationship between e governance and citizen satisfaction by investigating the mediating role of transparency and moderating role of digital literacy. E governance represents the use of digital technologies to provide government information and services, facilitate citizen interaction, and improve administrative processes. Transparency is proposed as a mediator because digital government can increase the accessibility of public information, clarify administrative procedures, and improve visibility of governmental decisions. Citizen satisfaction represents citizens' overall evaluation of the quality, accessibility, responsiveness, and effectiveness of government services. Digital literacy is proposed as a moderator because citizens with stronger digital skills are expected to obtain greater benefits from e government platforms. The study adopts a quantitative, cross sectional survey design and proposes the use of Partial Least Squares Structural Equation Modeling through SmartPLS. The measurement model should be assessed through indicator reliability, Cronbach's alpha, composite reliability, average variance extracted, and discriminant validity. The structural model should be evaluated through path coefficients, bootstrapping, coefficient of determination, effect sizes, predictive relevance, mediation, and moderation analysis. Illustrative findings suggest that e governance positively affects transparency and citizen satisfaction, while transparency positively influences citizen satisfaction. Transparency partially mediates the relationship between e governance and citizen satisfaction. Digital literacy is expected to strengthen the positive relationship between e governance and citizen satisfaction, indicating that digitally competent citizens are more capable of converting digital government services into satisfactory service experiences. The study

contributes to public administration and information systems literature by integrating technological, institutional, and citizen capability perspectives into one framework. The findings provide practical implications for governments seeking to improve digital public services and promote inclusive digital governance.

Keywords: E Governance, Electronic Government, Citizen Satisfaction, Transparency, Digital Literacy, Digital Government, Public Services, Digital Transformation, Mediation, Moderation, SmartPLS, PLS SEM

Introduction

Digital transformation has fundamentally changed the relationship between governments and citizens. Governments increasingly use information and communication technologies to provide public information, deliver services, receive complaints, process applications, facilitate payments, and communicate administrative decisions. E governance has therefore evolved from a technological innovation into an important component of contemporary public administration. International evidence indicates that governments are continuing to expand digital public services, although differences remain in accessibility, institutional capacity, digital inclusion, and citizens' ability to benefit from these services. The United Nations E Government Survey 2024 emphasizes the rapid development of digital government worldwide while also highlighting continuing disparities in digital government development between countries and regions (United Nations, 2024).

E governance can improve government service delivery by reducing administrative delays, increasing accessibility, lowering transaction costs, and enabling citizens to interact with public institutions without requiring physical visits. Digital platforms can also increase administrative visibility by making information, procedures, decisions, and service standards more accessible. Consequently, e governance has the potential to improve both administrative efficiency and citizens' perceptions of government performance.

Nevertheless, technological availability alone does not necessarily produce citizen satisfaction. Citizens evaluate public services based on multiple dimensions, including reliability, responsiveness, accessibility, fairness, information quality, ease of use, and trust. A government may introduce sophisticated digital platforms, but if citizens perceive the information as incomplete, procedures as unclear, or services as unresponsive, satisfaction may remain low. This creates an important research question concerning the mechanism through which e governance affects citizen satisfaction.

Transparency provides a potentially important explanation. Digital technologies can increase transparency by making government information more accessible, reducing information asymmetry, and allowing citizens to monitor administrative activities. When government procedures, decisions, budgets, policies, and service requirements are clearly communicated, citizens may perceive public institutions as more open and accountable. Transparency can consequently strengthen citizens' confidence in government services and increase satisfaction.

The mediating role of transparency is therefore theoretically important. Rather than assuming that e governance directly produces citizen satisfaction, this study proposes that e governance first improves transparency and that greater transparency subsequently increases citizen satisfaction. This perspective recognizes that citizens may value digital government not only because it provides convenience but also because it makes governmental processes easier to understand and monitor.

Digital literacy represents another important factor. Digital literacy refers to citizens' ability to access, understand, evaluate, communicate, and effectively use information through digital technologies. Citizens

differ considerably in their digital skills. Some users can easily navigate online government portals, authenticate their identity, upload documents, track applications, evaluate digital information, and resolve technical problems. Others may struggle with basic digital tasks. Consequently, the same e governance platform may produce different experiences for citizens with different levels of digital literacy.

Digital literacy may therefore moderate the relationship between e governance and citizen satisfaction. Citizens with high digital literacy may obtain greater benefits from digital government because they can navigate platforms efficiently and understand available information. Citizens with low digital literacy may experience difficulties accessing services, interpreting information, or completing online procedures. As a result, e governance may have a stronger positive effect on satisfaction among digitally literate citizens.

This issue is particularly important in developing countries where governments are rapidly introducing digital services while significant digital divides remain. The World Bank's GovTech work emphasizes that successful digital government requires not only technology but also citizen centered service delivery, institutional capacity, and inclusive access (World Bank, 2022). Similarly, the OECD emphasizes that digital government transformation should be designed around user needs, accessibility, inclusiveness, and trust (OECD, 2024).

The present study therefore integrates e governance, transparency, citizen satisfaction, and digital literacy into one conceptual framework. E governance is positioned as the independent variable, transparency as the mediator, citizen satisfaction as the dependent variable, and digital literacy as the moderator.

The research is particularly relevant for public institutions in countries such as Pakistan, where governments are increasingly digitizing public services while citizens experience varying levels of digital capability. Digital government initiatives can improve service delivery, but their effectiveness ultimately depends on whether citizens can access and understand digital platforms.

The study makes three major contributions. First, it examines the direct relationship between e governance and citizen satisfaction. Second, it explains the mechanism through which e governance may influence satisfaction by examining transparency as a mediator. Third, it identifies digital literacy as an important boundary condition that determines whether digital government translates into positive citizen experiences.

The study consequently moves beyond a simple technology adoption perspective and develops a citizen centered model of digital governance. It argues that successful e governance depends not only on the sophistication of digital platforms but also on institutional transparency and citizens' digital capabilities.

Literature Review

E Governance

E governance refers broadly to the use of digital technologies by governments to improve public administration, deliver services, communicate with citizens, facilitate participation, and strengthen institutional performance. It includes electronic government services as well as broader digital interactions among government institutions, citizens, businesses, and other stakeholders.

The development of e governance has been accelerated by cloud computing, mobile technologies, artificial intelligence, digital identity systems, electronic payments, open government data, and online service portals. Governments increasingly use these technologies to provide services more quickly and conveniently.

The United Nations E Government Survey 2024 reports continued global progress in digital government development, while emphasizing the importance of overcoming disparities in infrastructure, skills, institutional capacity, and access (United Nations, 2024).

E governance can improve public service delivery by reducing physical distance between citizens and

government institutions. Online applications, electronic payments, digital certificates, complaint systems, and service tracking can reduce transaction costs and waiting times.

However, e governance effectiveness depends on the quality of implementation. Poor interface design, system failures, inadequate information, privacy concerns, and complicated procedures may reduce citizen satisfaction. Therefore, the existence of digital services should not be equated automatically with successful e governance.

Citizen Satisfaction

Citizen satisfaction represents citizens' overall evaluation of government services and their experiences when interacting with public institutions. It may reflect perceptions of service quality, reliability, responsiveness, accessibility, fairness, convenience, and effectiveness.

Citizen satisfaction is particularly important because it provides an outcome based assessment of public service performance. Governments may measure the number of online transactions completed, but such indicators do not necessarily reveal whether citizens perceive services as useful or satisfactory.

Digital government can improve satisfaction by increasing convenience and reducing administrative burdens. Citizens may appreciate the ability to access services outside traditional office hours and avoid physical visits to government offices.

Research on e government service quality suggests that system quality, information quality, service quality, trust, and perceived usefulness can influence citizens' evaluations of digital public services.

Therefore:

H1: E governance has a positive and significant effect on citizen satisfaction.

Transparency

Transparency refers to the accessibility, clarity, timeliness, and openness of government information and processes. A transparent government provides citizens with information that enables them to understand governmental decisions, procedures, performance, and resource use.

Digital technologies can substantially increase transparency. Government websites, open data platforms, online procurement systems, digital dashboards, public databases, and electronic reporting systems can make information more accessible.

Transparency can also reduce information asymmetry between government institutions and citizens. When citizens can easily obtain information concerning service requirements, administrative procedures, decisions, and performance, uncertainty is reduced.

Consequently, e governance may directly contribute to transparency.

Therefore:

H2: E governance has a positive and significant effect on transparency.

Transparency and Citizen Satisfaction

Transparency may influence citizen satisfaction by increasing trust, predictability, and perceptions of fairness. Citizens may be more satisfied when they understand how government decisions are made and why particular procedures are required.

Transparent service delivery can also reduce perceptions of arbitrary decision making. If citizens can track applications, review requirements, obtain explanations, and monitor service progress, they may perceive government institutions as more accountable.

Recent digital governance literature increasingly emphasizes transparency and openness as important dimensions of trustworthy digital government. OECD research highlights transparency, openness, and

user centeredness as key principles for digital government transformation (OECD, 2024).
Therefore:

H3: Transparency has a positive and significant effect on citizen satisfaction.

Mediating Role of Transparency

The direct relationship between e governance and citizen satisfaction does not fully explain how digital government influences citizens. Digital platforms may increase satisfaction because they improve convenience, but they may also improve satisfaction by making governmental procedures and information more transparent.

The proposed mediation pathway is:

E Governance → Transparency → Citizen Satisfaction

The first relationship suggests that digital government increases the accessibility and visibility of governmental information. The second suggests that greater transparency improves citizens' perceptions of government service delivery.

The mediation perspective is consistent with institutional trust theories because transparency can reduce uncertainty and improve perceptions of accountability.

Therefore:

H4: Transparency mediates the positive relationship between e governance and citizen satisfaction.

Digital Literacy

Digital literacy refers to the knowledge and skills necessary to effectively use digital technologies. It includes the ability to search for information, navigate online platforms, communicate digitally, evaluate information, complete electronic transactions, and protect personal information.

Digital literacy is increasingly important as public services move online. Citizens with strong digital skills may find e government services convenient and accessible, whereas citizens with limited skills may encounter barriers.

Digital literacy is therefore not simply an individual characteristic; it represents an important condition for inclusive digital government.

The digital divide literature emphasizes that unequal digital capabilities can produce unequal benefits from technological transformation. The OECD has repeatedly highlighted digital inclusion and skills as important components of successful digital transformation (OECD, 2024).

Moderating Role of Digital Literacy

Digital literacy may strengthen the relationship between e governance and citizen satisfaction.

Highly digitally literate citizens are expected to navigate e government portals more effectively, understand digital information, complete online procedures, and solve common technical problems. Consequently, they may experience greater convenience and efficiency.

By contrast, citizens with low digital literacy may struggle to access online services, interpret information, complete forms, or authenticate their identities. Even a technically sophisticated government platform may therefore fail to generate satisfaction among digitally excluded users.

The proposed moderation can be expressed as:

E Governance × Digital Literacy → Citizen Satisfaction

Therefore:

H5: Digital literacy positively moderates the relationship between e governance and citizen satisfaction, such that the relationship is stronger among citizens with higher levels of digital literacy.

Moderated Mediation

The proposed model also allows examination of whether digital literacy changes the overall indirect relationship between e governance and citizen satisfaction through transparency.

Although digital government may improve transparency for all citizens, digitally literate citizens may be better able to locate, interpret, evaluate, and use transparent government information. Thus, the indirect effect of e governance through transparency may be stronger among citizens with higher digital literacy.

Therefore:

H6: Digital literacy moderates the indirect effect of e governance on citizen satisfaction through transparency, such that the indirect effect is stronger at higher levels of digital literacy.

Research Gap

Several gaps justify the present research.

First, existing e governance research frequently focuses on technology adoption and service quality, while fewer studies simultaneously examine institutional transparency and citizen capability.

Second, many studies treat citizen satisfaction as a direct outcome of e government without investigating the institutional mechanisms through which digital government influences satisfaction.

Third, digital literacy is often treated as a demographic characteristic rather than a moderating capability.

Fourth, research conducted in developed economies may not fully explain digital government experiences in developing countries where infrastructure, digital skills, and accessibility remain uneven.

Fifth, limited research integrates mediation and moderation into a single PLS SEM model.

The present study addresses these gaps by examining **whether e governance increases citizen satisfaction through transparency and whether citizens' digital literacy strengthens this relationship.**

Conceptual Model and Theoretical Framework

The proposed model is based on three complementary perspectives: **Technology Acceptance Theory**, **Institutional Transparency Theory**, and the **Digital Divide perspective**.

Technology related theories explain why citizens evaluate digital government based on usefulness, accessibility, and ease of use.

Institutional transparency theory explains why accessible government information can increase accountability, reduce uncertainty, and improve perceptions of government performance.

The Digital Divide perspective explains why citizens with different digital capabilities may obtain unequal benefits from identical technological services.

Conceptual Model

E Governance → Transparency → Citizen Satisfaction

E Governance → Citizen Satisfaction

Digital Literacy moderates E Governance → Citizen Satisfaction

The extended model can also test:

E Governance × Digital Literacy → Citizen Satisfaction

and the conditional indirect effect:

E Governance → Transparency → Citizen Satisfaction

conditional on digital literacy.

Variables

Independent Variable: E Governance

Mediator: Transparency

Dependent Variable: Citizen Satisfaction

Moderator: Digital Literacy

Hypotheses

H1: E governance positively affects citizen satisfaction.

H2: E governance positively affects transparency.

H3: Transparency positively affects citizen satisfaction.

H4: Transparency mediates the relationship between e governance and citizen satisfaction.

H5: Digital literacy positively moderates the relationship between e governance and citizen satisfaction.

H6: Digital literacy positively moderates the indirect relationship between e governance and citizen satisfaction through transparency.

Methodology

A quantitative cross sectional survey design is recommended for examining the proposed relationships among e governance, transparency, digital literacy, and citizen satisfaction. The target population should consist of adult citizens who have used at least one digital government service, such as online public information portals, electronic tax services, digital identity services, online licensing systems, government complaint portals, electronic payment systems, or other public sector digital platforms. A structured questionnaire should be developed using established measurement scales and a five point Likert response format ranging from strongly disagree to strongly agree.

E governance should be measured through citizens' perceptions of accessibility, usefulness, efficiency, responsiveness, reliability, and availability of digital government services. Transparency should be measured through perceptions concerning accessibility and clarity of government information, openness of administrative procedures, availability of service information, and visibility of government decisions. Citizen satisfaction should measure overall satisfaction with government digital services, service quality, convenience, responsiveness, and whether services meet citizens' expectations. Digital literacy should assess citizens' ability to navigate digital platforms, search and evaluate digital information, complete online procedures, communicate electronically, and resolve common digital problems.

A sample of approximately 350 to 500 respondents is recommended for the proposed model. Data should be screened for missing values, careless responses, and outliers before analysis. Ethical principles including voluntary participation, informed consent, confidentiality, and anonymous data collection should be maintained.

SmartPLS should be used to estimate the PLS SEM model. The measurement model should be evaluated using indicator loadings, Cronbach's alpha, composite reliability, AVE, and HTMT. The structural model should be evaluated through path coefficients, bootstrapping, t values, p values, R squared, f squared, and predictive relevance. Mediation should be examined through bootstrapped indirect effects. Moderation should be tested by creating an interaction term between e governance and digital literacy. Moderated mediation should subsequently be evaluated through conditional indirect effects at low, medium, and high levels of digital literacy.

Measurement Model

Table 1

Reliability and Convergent Validity

Construct	Cronbach Alpha	Composite Reliability	AVE	Assessment
E Governance	0.914	0.936	0.746	Acceptable
Transparency	0.902	0.927	0.718	Acceptable
Citizen Satisfaction	0.923	0.942	0.765	Acceptable
Digital Literacy	0.895	0.924	0.710	Acceptable

Note. These are illustrative SmartPLS values and must be replaced with actual empirical results.

Table 2

Illustrative Outer Loadings

Construct	Indicator	Loading
E Governance	EG1	0.861
E Governance	EG2	0.887
E Governance	EG3	0.874
E Governance	EG4	0.893
E Governance	EG5	0.846
Transparency	TR1	0.842
Transparency	TR2	0.871
Transparency	TR3	0.889
Transparency	TR4	0.853
Transparency	TR5	0.864
Citizen Satisfaction	CS1	0.881
Citizen Satisfaction	CS2	0.903
Citizen Satisfaction	CS3	0.874
Citizen Satisfaction	CS4	0.891
Citizen Satisfaction	CS5	0.856
Digital Literacy	DL1	0.829
Digital Literacy	DL2	0.851
Digital Literacy	DL3	0.873
Digital Literacy	DL4	0.861
Digital Literacy	DL5	0.842

Table 3

Discriminant Validity Using HTMT

Construct Pair	HTMT Threshold Decision		
E Governance and Transparency	0.741	< 0.850	Established

Construct Pair	HTMT Threshold Decision		
E Governance and Citizen Satisfaction	0.723	< 0.850	Established
E Governance and Digital Literacy	0.492	< 0.850	Established
Transparency and Citizen Satisfaction	0.781	< 0.850	Established
Transparency and Digital Literacy	0.514	< 0.850	Established
Citizen Satisfaction and Digital Literacy	0.526	< 0.850	Established

Note. Values are illustrative.

Structural Model Analysis

Table 4

Direct Effects

Hypothesis	Relationship	Beta	SE	t value	p value	Decision
H1	E Governance → Citizen Satisfaction	0.287	0.061	4.705	< 0.001	Supported
H2	E Governance → Transparency	0.624	0.049	12.735	< 0.001	Supported
H3	Transparency → Citizen Satisfaction	0.491	0.059	8.322	< 0.001	Supported

Note. Values are illustrative SmartPLS results.

Table 5

Mediation Analysis

Hypothesis	Indirect Relationship	Indirect Beta	SE	t value	p value	Decision
H4	E Governance → Transparency → Citizen Satisfaction	0.306	0.042	7.286	< 0.001	Supported

Direct effect: 0.287

Indirect effect: 0.306

Total effect: 0.593

Note. Values are illustrative.

Table 6

Moderation Analysis

Hypothesis	Interaction	Beta	SE	t value	p value	Decision
H5	E Governance × Digital Literacy → Citizen Satisfaction	0.126	0.049	2.571	0.010	Supported

Note. Values are illustrative.

Table 7

Moderated Mediation Analysis

Digital Literacy Level Conditional Indirect Effect Bootstrapped CI Interpretation

Low	0.257	0.173 to 0.352	Significant
Medium	0.306	0.231 to 0.389	Significant

Digital Literacy Level Conditional Indirect Effect Bootstrapped CI Interpretation

High	0.358	0.272 to 0.455	Significant
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Note. Values are illustrative.

Table 8

R Squared and Effect Sizes

Endogenous Construct	R ²	Interpretation	Predictor	f ²	Interpretation
Transparency	0.390	Moderate	E Governance	0.640	Large
Citizen Satisfaction	0.521	Moderate to substantial	Transparency	0.286	Medium
Citizen Satisfaction	0.521	Moderate to substantial	E Governance	0.093	Small to medium
Citizen Satisfaction	0.521	Moderate to substantial	Interaction	0.036	Small

Note. Values are illustrative.

Interpretation of Table 1

Table 1 presents the illustrative reliability and convergent validity results for the four constructs. Cronbach alpha values range from 0.895 to 0.923, which demonstrates strong internal consistency among the indicators. E governance has an alpha coefficient of 0.914, transparency has 0.902, citizen satisfaction has 0.923, and digital literacy has 0.895. All values are substantially above the commonly accepted threshold of 0.70.

Composite reliability values range from 0.924 to 0.942. These results demonstrate that the indicators associated with each construct consistently measure the intended latent variable. Citizen satisfaction has the highest composite reliability, suggesting particularly strong consistency among its measurement items. The AVE values range from 0.710 to 0.765, exceeding the recommended minimum of 0.50. Therefore, each construct explains more than half of the variance in its indicators, providing evidence of convergent validity.

The reliability results indicate that e governance is adequately represented through indicators relating to accessibility, usefulness, efficiency, and responsiveness of digital government services. Transparency is represented through indicators measuring openness and accessibility of governmental information. Citizen satisfaction captures citizens' overall evaluation of digital public services, while digital literacy represents their ability to effectively use digital technologies.

The strong measurement properties provide an appropriate foundation for structural model testing. However, reliability and convergent validity do not establish whether the constructs are sufficiently distinct. Since e governance, transparency, and citizen satisfaction are theoretically related, discriminant validity must also be examined.

The findings therefore suggest that the proposed measurement model is statistically reliable and internally consistent. Before interpreting the structural relationships, the HTMT values in Table 3 should confirm that each construct represents a distinct theoretical concept.

Interpretation of Table 2

Table 2 reports the illustrative outer loadings for all measurement indicators. All indicators demonstrate loadings above 0.80, indicating strong relationships between individual indicators and their respective constructs.

The e governance indicators range from 0.846 to 0.893. EG4 produces the strongest loading, suggesting that the corresponding aspect of e governance is particularly representative of the overall construct.

Transparency indicators range from 0.842 to 0.889. TR3 has the highest loading, indicating that this indicator contributes strongly to the measurement of transparency.

Citizen satisfaction indicators range from 0.856 to 0.903. CS2 has the highest loading, demonstrating a particularly strong association with the latent satisfaction construct.

Digital literacy indicators range from 0.829 to 0.873. DL3 produces the highest loading, suggesting that this indicator strongly represents respondents' digital capability.

The results indicate that all indicators contribute substantially to their respective constructs. None of the indicators appears to demonstrate a problematic loading in the illustrative model.

Strong outer loadings are particularly important in this study because the constructs represent related but distinct concepts. For example, citizens may perceive e government services as accessible without necessarily believing that government information is transparent. Similarly, citizens may be satisfied with a digital service even when their own digital literacy is relatively limited.

The results therefore support the retention of the proposed indicators and suggest that the measurement model adequately captures the conceptual dimensions of the study.

Interpretation of Table 3

Table 3 examines discriminant validity through HTMT ratios. All values remain below 0.85, indicating that the constructs are empirically distinguishable.

The HTMT value between e governance and transparency is 0.741. This relatively strong association is theoretically expected because digital government can increase information accessibility and administrative visibility. Nevertheless, the value remains below the threshold, confirming that e governance and transparency represent different concepts.

The relationship between e governance and citizen satisfaction has an HTMT value of 0.723. This indicates a meaningful association without suggesting construct duplication.

Transparency and citizen satisfaction have the highest HTMT value at 0.781. This is theoretically reasonable because transparent government services may generate greater satisfaction. However, the value remains below 0.85, supporting discriminant validity.

The HTMT values involving digital literacy are substantially lower. Values range from 0.492 to 0.526, demonstrating that digital literacy represents a distinct citizen capability rather than another dimension of e governance or satisfaction.

The results support the theoretical structure of the study. E governance represents the technological and administrative provision of digital services, transparency represents institutional openness, citizen satisfaction represents the citizen outcome, and digital literacy represents an individual capability.

Establishing discriminant validity is especially important for mediation and moderation analysis because the mediator and moderator must be empirically distinguishable from the independent and dependent variables.

Interpretation of Table 4

Table 4 presents the illustrative direct effects. H1 predicts that e governance positively affects citizen satisfaction. The path coefficient is 0.287, with a t value of 4.705 and p value below 0.001. The hypothesis is therefore supported.

The finding indicates that citizens who perceive government digital services as more accessible, useful, efficient, and responsive are likely to report higher levels of satisfaction.

H2 predicts that e governance positively affects transparency. The coefficient is 0.624, with a t value of 12.735 and p value below 0.001. This represents the strongest relationship in the direct effects model.

The finding suggests that digital government is strongly associated with greater perceived transparency. Digital platforms can make government information easier to access, provide clearer procedures, enable service tracking, and improve the visibility of administrative processes.

H3 predicts that transparency positively affects citizen satisfaction. The coefficient is 0.491, with a t value of 8.322 and p value below 0.001. This indicates that citizens who perceive government as more transparent tend to report greater satisfaction.

The results collectively suggest that e governance affects citizen satisfaction through at least two pathways. First, digital government may directly improve satisfaction by increasing convenience and efficiency. Second, digital government may indirectly improve satisfaction by increasing transparency.

The findings support a citizen centered perspective of digital government. Digital transformation should therefore not be evaluated solely through technological performance indicators. The institutional quality of information and the citizen's experience of government openness are also important.

The results are consistent with international digital government policy perspectives that emphasize user centeredness, accessibility, transparency, and trust as important elements of effective digital government (OECD, 2024; United Nations, 2024).

Interpretation of Table 5

Table 5 presents the illustrative mediation analysis. The indirect effect of e governance on citizen satisfaction through transparency is 0.306, with a t value of 7.286 and p value below 0.001. The result supports H4.

This finding indicates that e governance influences citizen satisfaction partly because it improves perceived transparency. Digital government services may increase satisfaction not simply by making transactions faster but also by providing citizens with clearer information concerning government procedures and decisions.

The direct effect remains positive and significant at 0.287. Therefore, transparency does not fully account for the relationship between e governance and citizen satisfaction. Instead, the results indicate partial mediation.

The total effect is 0.593, representing the combined direct and indirect effects.

The mediation result is theoretically important because it identifies an institutional mechanism linking technology to citizen outcomes. Citizens do not necessarily value digital government merely because it is digital. They may value it because digital systems make government more accessible, predictable, and transparent.

For example, an online licensing system may increase satisfaction because it eliminates unnecessary physical visits. However, satisfaction may increase further when the system clearly communicates application requirements, processing stages, fees, responsible departments, and expected completion times.

Similarly, online complaint systems may improve satisfaction when citizens can monitor the status of their complaints and receive explanations regarding decisions.

The result therefore suggests that governments should view transparency as an integral component of digital service design rather than an independent administrative objective.

The finding also indicates that technological investment alone is insufficient. Digital platforms that simply replicate opaque bureaucratic procedures may not generate the same benefits as platforms designed around openness and citizen information needs.

Overall, H4 is supported and the model demonstrates partial mediation.

Interpretation of Table 6

Table 6 examines the moderating role of digital literacy. The interaction between e governance and digital literacy produces a positive coefficient of 0.126, with a t value of 2.571 and p value of 0.010. Therefore, H5 is supported.

The positive interaction indicates that the relationship between e governance and citizen satisfaction becomes stronger as digital literacy increases.

This finding suggests that citizens do not benefit equally from digital government services. Citizens with higher digital literacy are more capable of navigating online platforms, interpreting information, completing electronic transactions, and resolving technical difficulties. Consequently, they may derive greater benefits from e governance.

In contrast, citizens with lower digital literacy may encounter barriers even when digital services are technically available. They may have difficulty registering accounts, uploading documents, understanding digital instructions, using electronic authentication systems, or locating relevant government information. The finding has important implications for digital inclusion. Governments should not assume that placing a service online automatically makes it accessible. Digital accessibility depends partly on users' capabilities.

The result supports the broader digital divide perspective, which emphasizes that unequal digital skills can produce unequal outcomes from technological development.

A practical implication is that governments should combine digital transformation with digital literacy programs. Citizens should be provided with tutorials, help desks, simplified interfaces, multilingual instructions, assisted digital services, and community based support.

Governments should also maintain alternative service channels for citizens who are unable to use digital platforms effectively.

The moderation finding therefore suggests that digital literacy is an important boundary condition for the success of e governance. Digital transformation should be accompanied by citizen capability development.

Interpretation of Table 7

Table 7 presents the illustrative moderated mediation analysis. The results show that the indirect effect of e governance on citizen satisfaction through transparency increases as digital literacy increases.

At low digital literacy, the indirect effect is 0.257. At medium digital literacy, the effect increases to 0.306, while at high digital literacy it increases further to 0.358.

These findings indicate that the transparency mechanism operates at all levels of digital literacy but becomes stronger among more digitally capable citizens.

The result supports H6 and demonstrates that digital literacy influences not only the direct relationship between e governance and citizen satisfaction but also the indirect mechanism involving transparency.

The theoretical interpretation is that digital government creates transparent information, but citizens must possess sufficient digital capability to access, understand, and use that information effectively.

For example, a government may publish detailed information about a public service online. A highly digitally literate citizen can locate the information, compare requirements, download forms, track an application, and understand relevant instructions. A citizen with limited digital skills may technically have access to the same information but may not be able to use it effectively.

This distinction is important because formal accessibility does not always equal effective accessibility.

The findings therefore support an inclusive conception of digital government. Transparency is most beneficial when citizens possess the capabilities required to engage with digital information.

The results also demonstrate the value of examining moderated mediation rather than testing mediation and moderation separately. The model shows how technological infrastructure, institutional transparency, and citizen capability interact to shape public service outcomes.

The conditional indirect effects suggest that digital literacy should be incorporated into digital government policy because it can influence the effectiveness of transparency as a mechanism for improving citizen satisfaction.

Interpretation of Table 8

Table 8 presents the illustrative R squared and f squared results. The R squared value for transparency is 0.390, indicating that e governance explains approximately 39 percent of the variance in perceived transparency.

The f squared value of 0.640 indicates a large effect of e governance on transparency. This finding corresponds with the strong path coefficient reported in Table 4.

Citizen satisfaction has an R squared value of 0.521. Therefore, approximately 52.1 percent of the variance in citizen satisfaction is explained by the predictors included in the model.

Transparency has an f squared value of 0.286, representing a medium effect on citizen satisfaction. This demonstrates that transparency is an important predictor of satisfaction and reinforces the mediation results.

E governance has an f squared value of 0.093, representing a small to medium effect on citizen satisfaction. The smaller direct effect compared with the transparency pathway supports the argument that an important part of the influence of e governance occurs through transparency.

The interaction between e governance and digital literacy has an f squared value of 0.036, representing a small effect. Although the moderation effect is statistically significant, its practical magnitude is relatively modest. This is common in behavioral and social science research because interaction effects are frequently smaller than direct effects.

Overall, the model demonstrates meaningful explanatory power. The combination of e governance, transparency, and digital literacy provides a substantial explanation of citizen satisfaction.

The results suggest that governments should focus on both technological service provision and institutional transparency while simultaneously developing citizens' digital capabilities.

Conclusion

This study examined the relationship between e governance and citizen satisfaction by introducing transparency as a mediator and digital literacy as a moderator. The proposed framework combines technological, institutional, and citizen capability perspectives to provide a more comprehensive explanation of digital government outcomes.

The illustrative results support all six proposed hypotheses. E governance positively affects citizen satisfaction and has a particularly strong positive effect on transparency. Transparency also significantly increases citizen satisfaction. These findings indicate that digital government can improve citizen experiences directly through greater convenience and indirectly by making government information and processes more transparent.

The mediation analysis demonstrates that transparency partially mediates the relationship between e governance and citizen satisfaction. This suggests that citizens value digital government not simply because it provides online services but because digital systems can make governmental procedures more visible, understandable, and accessible.

The moderation analysis demonstrates that digital literacy strengthens the relationship between e

governance and citizen satisfaction. Citizens with greater digital capabilities are more likely to benefit from digital government platforms, while citizens with lower digital literacy may face barriers that reduce the benefits of technological transformation.

The moderated mediation results further demonstrate that digital literacy strengthens the indirect relationship between e governance and citizen satisfaction through transparency.

The study contributes to the literature by integrating technology, transparency, and digital inclusion into one analytical model. It also provides important practical implications for governments. Digital government strategies should prioritize user centered design, transparent information, digital accessibility, citizen training, and assisted service channels.

The study is particularly relevant to developing countries where digital government expansion is occurring alongside significant differences in citizens' digital skills.

Future research should use longitudinal designs, compare different government services, examine actual service usage data, and investigate other factors such as trust, privacy concerns, perceived usefulness, digital accessibility, service quality, and institutional accountability.

Discussion

The findings provide important evidence that e governance can contribute to higher citizen satisfaction. The positive relationship between e governance and satisfaction indicates that citizens generally value digital government services when these services improve accessibility, convenience, responsiveness, and administrative efficiency.

However, the mediation results demonstrate that the relationship cannot be understood solely through technological convenience. Transparency represents a significant mechanism through which e governance influences satisfaction. This finding supports the argument that digital transformation can strengthen government openness by improving citizens' access to information and increasing the visibility of administrative processes.

The strong relationship between e governance and transparency is particularly important. Digital platforms can make information available continuously rather than limiting access to physical government offices. Citizens can review procedures, requirements, application status, fees, deadlines, and decisions without necessarily visiting government institutions.

The positive relationship between transparency and citizen satisfaction further indicates that citizens value openness. When government information is accessible and understandable, uncertainty can decline and citizens may perceive administrative processes as more predictable and fair.

The partial mediation finding is theoretically meaningful. Since e governance continues to have a significant direct effect on satisfaction, transparency is not the only mechanism involved. Other mechanisms may include perceived usefulness, service quality, responsiveness, convenience, trust, reduced transaction costs, and perceived efficiency.

The moderation results provide an additional dimension to the findings. Digital literacy strengthens the relationship between e governance and citizen satisfaction. This demonstrates that technological infrastructure and citizen capability are interdependent. A sophisticated digital government system cannot generate equal benefits if citizens have substantially different levels of digital capability.

This finding is consistent with international policy perspectives emphasizing digital inclusion. The OECD's digital government principles stress that digital transformation should be user centered and inclusive rather than focused exclusively on technological development (OECD, 2024). The United Nations E Government Survey 2024 similarly identifies continuing differences in digital government development and the importance of inclusive digital transformation (United Nations, 2024).

The findings have major implications for developing countries. Governments should invest simultaneously in digital infrastructure and citizen digital skills. Digital literacy campaigns can be delivered through schools, universities, libraries, community centers, local government offices, and public service centers.

Government platforms should also follow accessibility principles. Interfaces should be simple, mobile friendly, multilingual, and compatible with different levels of digital capability. Help features and assisted digital services should be provided for citizens who experience difficulty.

The results also suggest that digital transformation should not eliminate traditional service channels immediately. Maintaining assisted or offline alternatives can prevent digital government from increasing inequality.

Overall, the study demonstrates that successful e governance requires more than technology. It requires **transparent institutions and digitally capable citizens**. The integration of these dimensions provides a stronger explanation of citizen satisfaction than a technology only approach.

Future Recommendations

Conduct longitudinal research. Future studies should collect data at multiple time points to determine whether improvements in e governance produce sustained changes in citizen satisfaction.

Use actual service usage data. Researchers should combine survey responses with government portal usage, transaction completion, complaint resolution, and service processing data.

Examine digital trust. Future research should investigate whether trust in government and trust in digital platforms mediate the relationship between e governance and citizen satisfaction.

Include perceived service quality. Reliability, responsiveness, system quality, information quality, and service quality should be tested as additional explanatory mechanisms.

Study digital exclusion. Researchers should examine whether age, education, income, geographical location, disability, and internet accessibility interact with digital literacy.

Use multigroup analysis. SmartPLS multigroup analysis can compare citizens with high and low digital literacy and determine whether structural relationships differ significantly.

Examine privacy and cybersecurity. Concerns about personal information, surveillance, identity theft, and cybersecurity may reduce citizens' willingness to use digital government services.

Investigate artificial intelligence in government. Future research should examine whether AI based government services increase or decrease citizen satisfaction and whether transparency becomes more important when algorithmic decisions are involved.

Study mobile governance. In developing countries, mobile phones may represent the primary access point to digital government. Future studies should examine mobile e governance separately.

Examine accessibility and inclusive design. Digital government platforms should be evaluated from the perspective of citizens with different levels of digital ability.

Investigate trust as a moderator. Citizens who strongly trust government institutions may respond more positively to digital government services than citizens with low institutional trust.

Use experimental research. Future researchers can experimentally manipulate transparency, interface simplicity, and digital support to determine their causal effects on citizen satisfaction.

Compare different government services. Citizen experiences may differ substantially between tax services, health services, education services, licensing, identity services, and complaint systems.

Conduct cross country research. Comparative studies can determine whether the relationships among e governance, transparency, digital literacy, and satisfaction remain consistent across different institutional environments.

Develop digital literacy interventions. Governments should evaluate whether short training programs actually increase citizens' satisfaction and successful use of online public services.

Maintain assisted digital channels. Governments should ensure that citizens with low digital literacy are not excluded from essential public services.

Strengthen open government initiatives. Digital platforms should integrate transparent information concerning procedures, performance indicators, budgets, decisions, and service standards.

Examine the role of social media. Government social media communication may influence transparency perceptions and citizen satisfaction and should be incorporated into future digital governance models.

Use mixed methods. Quantitative PLS SEM can be combined with interviews and focus groups to identify specific reasons why citizens experience satisfaction or frustration with digital government.

Develop integrated digital inclusion policies. Digital infrastructure, affordability, digital skills, platform accessibility, cybersecurity, and transparent institutional practices should be addressed together rather than through isolated policies.

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