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THE IMPACT OF INFORMATION TECHNOLOGY ON ENHANCING PUBLIC SECTOR SERVICES IN PAKISTAN: AN EMPIRICAL ANALYSIS

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Article Info

Abstract

Purpose: Information Technology (IT) application within the public sector has brought some revolution to the delivery of public services in the world particularly with the emergence of e-government and digital government projects. In developing countries like Pakistan, IT is becoming a significant facilitator to improve efficiency, transparency, accessibility, and accountability in service delivery. This study examines how IT has helped in enhancing the service delivery in the public sector in Pakistan, by empirically evaluating the impact that IT has on the efficiency of the public sector, transparency, accessibility and citizen satisfaction.

Methodology: This paper has used quantitative research design where the main data was gathered in a sample of 200; divided into employees of the public sector and active users of electronic government services (citizens). The questionnaire employed by the researchers had a 5-point Likert scale. The researchers test the hypotheses and evaluate the direct and indirect effects using Structural Equation Modeling (SEM) and Partial Least Squares (PLS-SEM) (Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. 2021).

Findings: The findings of the study indicate that IT utilization has a positive effect on efficiency, transparency and accessibility of organizations in the public sector. This in its turn improves the services of the government and satisfaction by its citizens. However, the research also shows that there are still some challenges, including the absence of digital infrastructure, digital divide in urban and rural regions, and the problem of cybersecurity and privacy of data.

Implications: This study contributes to the existing body of knowledge on digital governance and information systems, by providing empirical evidence based on a developing nation lens, in this case, Pakistan. It also carries practical implications to policymakers, in the sense that it recommends more investment on the digital infrastructure, capacity building and cybersecurity systems to facilitate the successful implementation of e-government systems.

Keywords: *Information Technology, E-Government, Public Sector, Pakistan, Digital Transformation, Service Quality*

Introduction

The globe is experiencing a shift towards application of Information Technology (IT) to improve government services. Through e-government solutions, there are efficient, transparent and responsive governance which allow the public agencies to automate workflows, reduce red tape and enhance transparency (Imran, M., Robina Ramírez, R., & Awais, H. M. 2022). Governments can streamline their processes through automation of services such as licensing, tax, health and education to cut human involvement, and consequently corruption and inefficiency. IT-based governance has already been effective in transforming traditional bureaucracies into service-oriented organizations that are flexible, as has already been seen in most developed countries. However, in the developing economies like Pakistan, the government agencies continue to grapple with structural and operational flaws. These include bureaucratic inefficiency and corruption, to transparency and equal access to the public services particularly to the people in rural and remote areas. The traditional forms of governance usually consist of manual processes, voluminous paperwork and centralized decision making which cause not only time delays in service delivery but also makes them inaccessible. This contributes to the disillusionment of the citizens, lack of trust in the government and unhappiness with service delivery.

Pakistan has realized the importance of change, and it has introduced several digital transformation programs to make its administration of the people leaner and more efficient. The most recent ones include digital identity cards (computerized national identity card system by NADRA), introduction of online tax filing by Federal Board of Revenue (FBR), and provincial and federal e-governance portals, which are evidence to this trend. The purpose of such systems is to streamline the processes, reduce face-to-face interactions and provide citizens with 24/7 access to services (Ali, A., Khattak, M. S., Arfeen, M. I., Yousaf, L., & Chaudhary, M. A. I. 2022). To illustrate, e-portals allow citizens to apply passports and other documents, pay taxes and open their businesses and make complaints without going out of their homes. Although these developments have been a good indication, the effectiveness of IT implementation in the Pakistani public sector is less than satisfactory. e-government in Pakistan is faced with a number of infrastructural, organizational and socio-economic impediments on the maximum potential of e-government. As an example, there is still the digital divide, where several citizens, particularly in the rural areas, do not have access to the internet. In addition, low levels of digital literacy decrease the ability to participate in online services by citizens. People are still using more traditional service delivery methods due to a lack of proper training and education.

Another critical issue is the absence of robust IT infrastructure among the government agencies. The government agencies are usually marred with old systems, technical deficiency and funds, which affect the sustainability and scalability of the e-government projects. Additionally, the unavailability of change preparedness amongst the government officials and staff can be a barrier to adopting technology. The barriers to innovation and IT systems adoption in the work place may be cultural, such as hierarchical structures and risk-averse culture (Arshad, A. 2025).

Other barriers to e-government are also cybersecurity and privacy. As the amount of data on citizens stored and gathered by government agencies continues to grow, security becomes paramount. Poor cybersecurity may result in mistrust of citizens and unwillingness to use online

services. Consequently, effective data protection regulations and laws should be implemented to enhance the utilization of IT-based services.

In addition to these criteria, the successful application of IT in the public sector also depends on the quality of the service delivered via IT platforms. The effect of e-government systems is mediated by service quality factors (reliability, responsiveness, accessibility, efficiency and user satisfaction). As an example, an online service can be provided, but in case it is not trustworthy, functional or comprehensible, it can discourage the usability of the service. Similarly, lack of timely assistance or responses can lead to loss of user confidence (Asmawanti-S, D., Afiah, N. N., Ritchi, H., & Suharman, H. 2025).

The study aims at learning how IT contributes to improving the services of the Pakistani government in terms of these aspects of service quality. It tries to establish whether adoption of IT systems directly affect service quality or it is mediated by other variables like efficiency of systems, responsiveness of systems and satisfaction of users. These lessons provide a better idea of how IT implementation in the government can be done.

In addition, this paper is founded on other recent studies like (Peykani et al. 2026) that emphasize the need to apply performance measurement and efficiency of innovation in the public sector. They indicate that not only is it necessary to use technology but the efficacy of IT systems should be gauged in relation to their input to service quality and organizational performance. This opinion coincides with the necessity of the evidence-based policy-making in Pakistan, in which limited resources should be allocated to maximize the effect of digital change (Akhtar, A. R., Murtaza, G., & Luqman, M. 2025).

Despite the significant improvements in using IT in the delivery of public services, the country of Pakistan has more problems that need to be solved to make it more effective and inclusive. The key elements of effective implementation of e-government include enhancement of infrastructure, digital literacy, institutional capacity and quality of services. This study contributes to the body of knowledge on the role IT can play in developing a more efficient, transparent and responsive Pakistani government through the mediating role of service quality dimensions.

Literature Review

2.1 IT in Government.

In the modern world, Information Technology (IT) has become a major facilitator of organizational change both in the private and government organizations. IT plays a very important role in enhancing efficiency, communication and decision making in the field of public administration. According to Laudon and Laudon (2021), IT systems will automate administrative processes, reduce the number of human errors, and provide real-time access to information, thereby increasing the efficiency and accuracy of the services provided by the government. Such characteristics are critical in the government sector where processing and analysis of vast volumes of data are required to deliver services to a wide group of citizens.

The public sector is often characterized by extensive bureaucracies that have rigid processes and hierarchical decision-making processes. IT helps to enhance these processes by transforming

paper-based processes into digital. As an example, e-document management systems can help the public sector organizations manage information more efficiently, as they help to store, retrieve and share information, which results in faster processing time and low chances of information loss. Similarly, enterprise resource planning (ERP) software assists in uniting all sorts of administrative functions e.g. finance, human resources and procurement into one system, enhancing coordination and eradicating duplication.

Decision-making is another important aspect in which IT is important in the state sector. Advanced data analytics application enables the decision-maker to work with extensive volumes of data, identify trends and make evidence-based conclusions. This is an evidence-based strategy that improves the effectiveness of policies and efficient allocation of resources. To illustrate, predictive data analytics can serve to predict when the services are required with the aim of planning in advance. In addition, IT facilitates inter-agency communication and sharing of data, which is required to address complex issues. With the help of integrated information systems, government agencies can collaborate and reduce redundancies and deliver more coordinated services to people. This is particularly significant in areas such as health, education and social services where various agencies must work concurringly to achieve common objectives. The application of IT in government is in its early stages in emerging economies like Pakistan. Though it has improved significantly over the last few years, infrastructure, financial and human resource limitation remains a challenge to most of the public sector agencies. Absence of technology, training and change management can be an obstacle to success IT adoption. Nevertheless, the payoffs of IT adoption are high, and it is a major concern in government reform.

2.2 E-Government and Service Delivery.

E-government refers to the application of information and communication technologies (ICTs) and, in particular, the internet to deliver government services, exchange information and communicate with citizens, business and other stakeholders (OECD, 2019). It is a shift of the old to the more modern, technology-oriented means of governing, with emphasis on efficiency, transparency, and citizen involvement. The World Bank (2020) notes that e-government projects can optimize service delivery by simplifying the processes, decreasing corruption and increasing access to services (Tasleem, Z., & Muhammad, S. A. 2025). One of the main advantages of e-government is transparency in the delivery of the public services. Governments can reduce corruption and enhance transparency through digitalization of processes and release of information on websites. As an example, electronic procurement systems can help monitor government contracts and expenditures by the public and the private sector so that it can be competitive and prevent corruption. Similarly, open data policies enable citizens to see the open data, resulting in increased trust and engagement.

E-government is also efficient in-service delivery by eliminating the physical contact and facilitating the processes. They offer online services such as tax filing, renewing driver licenses and paying bills, which save time and cost to the citizens and governments Wirata, G., Gunawan, M. S., Judijanto, L., Sarmento, A. D. A., & Permono, A. R. (2025). This is particularly important in a high-population country with limited administrative resources where the traditional service delivery process can be non-efficient.

One of the characteristics of e-government is the increased citizen participation. Online platforms also provide other channels of interaction and communication between the government and the citizens and more citizens are inclined to participate in the decision-making process. For example, online feedback mechanisms, social media and e-consultation platforms enable citizens to express their views, report problems and participate in policy-making. This helps to build more responsive and participatory systems of government. (Munir, S., & Hamid, M. 2026).

In Pakistan, there has been a rise in e-government initiatives in recent years with many federal and provincial governments introducing online platforms for the delivery of public services. This includes e-tax, e-ID cards and complaint portals. Such initiatives can revolutionize government-citizen relations by improving access and efficiency of services. But their effectiveness relies on a number of factors, such as the presence of a robust internet infrastructure, digital literacy of citizens, and the capability of government organizations to operate and maintain these systems. There are a number of issues with e-government. These range from technical concerns like system integration and interoperability, to organizational concerns such as change resistance and inter-agency coordination. Furthermore, there are issues related to security and privacy of data to build confidence in e-government. If not properly protected, personal information abuse could erode trust in e-government services.

2.3 Service Quality Dimensions

Service quality plays a key role in influencing the success of IT-based public services. This is the degree to which a service surpasses customers' expectations. In e-government, service quality is affected by several dimensions, such as efficiency, transparency, accessibility and accountability. These factors mediate the effects of IT on public service delivery (Rani, P., Siddiqui, M. B., Hisbani, F., & Maree, D. A. 2025).

Efficiency is a major advantage of using IT in the public sector. Through automation and minimization of human efforts, IT systems can reduce the time and cost of service delivery. For instance, electronic applications remove the need for paper-based documents and speed up the response time. This enhances user satisfaction and enables the government to process more transactions without additional staff. (Asimakopoulos, G., Antonopoulou, H., Giotopoulos, K., & Halkiopoulos, C. 2025).

Another key aspect of service quality is transparency. IT systems increase transparency by making information about government operations, policies and outcomes readily available. For example, electronic case management systems enable citizens to track their applications, eliminating uncertainties and building trust in government. Likewise, open data portals allow citizens to view data on government processes, increasing transparency and minimizing the risk. Accessibility is the ease of access to public services. IT allows governments to deliver services via web portals, mobile apps and kiosks, to name a few, and thus increase their reach. This is especially important in rural areas, where access to government offices may not be readily accessible. But this also depends on access to the internet, affordability, and ICT skills. If not addressed, IT may not reach all citizens (Djatmiko, G. H., Sinaga, O., & Pawirosumarto, S. 2025).

Transparency is related to accountability and involves the capacity to make public officials accountable. IT contributes to accountability by generating electronic records of activities, which can be reviewed and tracked. As an example, e-procurement systems maintain a history of all transactions that assists in monitoring and detecting any fraud and violation of regulations. Similarly, the citizen feedback systems allow users to file complaints and follow up on their implementation by government institutions, making them more responsive and accountable (Robles, P., & Mallinson, D. J. 2025).

The above are just some of the main features, but there are other features that are also of great importance in service quality like reliability, responsiveness and user satisfaction. Reliability is the term that is used to describe the stability and lack of system downtime whereas responsiveness is a term that is used to describe the timeliness of user queries and problems. The overall user experience is associated with citizen satisfaction and this can be influenced by such factors as ease of use, speed and fairness. These factors give a complete picture of the efficiency of IT-based public services.

2.4 Research Gap

The literature on the advantages of IT in the performance of the public sector and the delivery of public services is quite abundant, but there are many gaps, particularly in the example of the emerging economies, like Pakistan. Most of the studies are carried out in the developed world where the degree of technological infrastructure, institutional support and digital literacy is high. This implies that the findings might not be readily applicable to other nations that have different socio-economic and institutional settings.

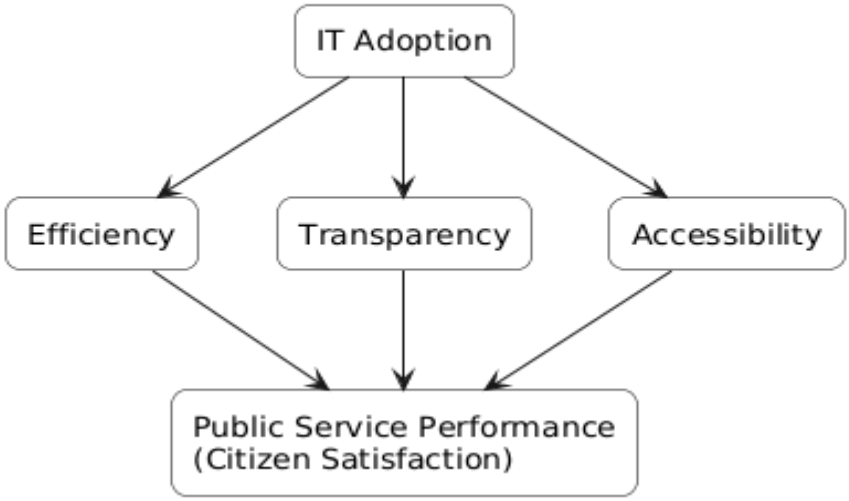
In Pakistan, no studies have been done comprehensively on the adoption of e-government and IT. Although research exists on specific topics in e-government, e.g. the implementation of particular systems or the use of particular technologies, there is scarce research that provides a comprehensive picture of how IT is influencing various aspects of service quality. This renders it difficult to have an integrated picture of the influence of IT on the public services. Another limitation of the study is the absence of empirical methods to measure IT initiatives. Although the conceptual and theoretical research has some valuable insights, the research that empirically investigates the effects of digital transformation is still needed. These researches can include information on best practices, performance assessment and policy formulation.

Moreover, there is a paucity of studies to appreciate the mediating role of service quality in the correlation of IT adoption and service delivery. The knowledge is critical in the planning of e-government strategies because it highlights the necessity to not only embrace the use of technology, but also make sure it delivers high quality services to its users. The inability to comprehend these mediating factors may even result in the inability of IT projects to achieve their objectives (Wirata, G., Gunawan, M. S., Judijanto, L., Sarmento, A. D. A., & Permono, A. R. 2025).

In addition, such variables as the digital divide, cultural and institutional barriers are not usually considered in the present studies. The Pakistani country has a digital divide and there is unequal access to technology and IT skills between the rural and urban areas. Such disparities can affect

IT adoption and utilization and therefore there is need to ensure the socio-economic factors are taken into consideration in the research. The study contributes to these knowledge gaps since it provides a comprehensive examination of IT adoption within the Pakistani public sector, and its impact on service quality. By integrating different dimensions of service quality into one model, this study offers a more holistic perspective on the effect of digital transformation on the quality of the public services. It also adds to the scant empirical research in this field by offering empirically grounded insights for policy and practice (Djatmiko, G. H., Sinaga, O., & Pawirosumarto, S. 2025). Finally, while current literature highlights the potential for IT to revolutionize public administration, there is a need for more context-specific and empirical research in the developing world. This study seeks to address these limitations and contribute to the e-government debate, while offering insights for improving the effectiveness of IT-based public services in Pakistan.

Conceptual Framework: IT Adoption and Public Service Performance



5. Hypotheses Development

- **H1:** IT adoption has a positive impact on service efficiency
- **H2:** IT adoption has a positive impact on transparency
- **H3:** IT adoption has a positive impact on accessibility
- **H4:** Efficiency positively influences public service performance
- **H5:** Transparency positively influences public service performance
- **H6:** Accessibility positively influences public service performance
- **H7:** IT adoption has an indirect positive effect on public service performance through mediators

3. Methodology

3.1 Research Design

A quantitative, cross-sectional approach was used in this study to examine the impact of Information Technology (IT) on the enhancement of public services in Pakistan. The quantitative method was chosen because it is appropriate for measuring relationships between variables, and testing hypotheses through statistical analysis (Lim, W. M. 2025). The cross-sectional design allowed the collection of data at one specific time, which was suitable for examining the current attitudes towards IT adoption and its influence on public service performance. The study adopts a positivist research philosophy that views social reality as objective and measurable, using quantitative data Alford, S., & Teater, B. (2025). The research model of this study has IT adoption as the independent variable, efficiency, transparency and accessibility as mediating variables, and public service performance (citizen satisfaction) as the dependent variable. This enables the testing of direct and indirect effects between variables.

3.2 Data Collection

We used a questionnaire to collect data, which was developed using scales from previous research in the fields of information systems and public administration.

The questionnaire had two sections:

Section A: Demographic Information

This involved the variables of age, gender, education, occupation and the intensity of using digital government services.

Section B: Measures

This section included measurement of the variables under study: IT adoption, efficiency, accessibility, transparency and performance of public services.

The respondents included:

- Government employees working in service delivery and administration
- Users of digital government services

This study used both printed and online survey methods to ensure representativeness and inclusivity. A pre-test was administered before the actual survey to test for clarity, reliability and validity of the questions.

3.3 Sample Size and Sampling Technique

A sample size of 200 was adopted for the study, which is adequate for Structural Equation Modeling (SEM) studies, especially Partial Least Squares SEM (PLS-SEM). The sampling method was convenience sampling given time and accessibility constraints. While random sampling increases the representativeness of the sample, convenience sampling is accepted in exploratory studies, especially in developing countries where sampling databases are unavailable. Both public service employees and citizens were surveyed to obtain a holistic view of IT-enabled public service in Pakistan.

3.4 Measurement Scale

Table 3.4 *Measurement Scale and Operationalization of Constructs*

Construct	Measurement Indicators
Scale Type	5-point Likert Scale (1 = Strongly Disagree, 5 = Strongly Agree)
IT Adoption	• Use of digital systems in public services• Availability of online government platforms• Integration of IT in administrative processes
Efficiency	• Reduction in service processing time• Cost-effectiveness of service delivery• Speed of administrative procedures
Transparency	• Availability of public information• Reduction in corruption• Clarity of procedures
Accessibility	• Ease of accessing online services• Availability of 24/7 services• User-friendly digital platforms
Public Service Performance	• Citizen satisfaction• Trust in government services• Perceived service quality

3.5 Data Analysis Techniques

Data analysis was conducted using a combination of statistical techniques to ensure reliability, validity, and robustness of results.

Table 3.5 Data Analysis Techniques Used in the Study

Analysis Technique	Purpose / Description
Descriptive Statistics	Frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics and response patterns, providing an overview of the dataset.
Reliability Analysis	Internal consistency was assessed using Cronbach's Alpha (≥ 0.70). Composite Reliability (CR) was also used to confirm construct reliability and ensure measurement consistency.
Validity Assessment	Construct validity was tested using:• Convergent Validity (AVE ≥ 0.50)• Discriminant Validity (HTMT < 0.85)These ensured constructs were statistically valid and conceptually distinct.

Structural Equation Modeling (SEM - PLS-SEM)	Used to test hypothesized relationships among variables. SEM allowed simultaneous estimation of direct and indirect effects and mediation analysis.
Measurement Model Evaluation (Stage 1)	Included indicator reliability, construct reliability, convergent validity, and discriminant validity to ensure measurement accuracy.
Structural Model Evaluation (Stage 2)	Included path coefficient estimation, hypothesis testing, mediation analysis, and coefficient of determination (R^2).
Bootstrapping	5,000 resamples were used to test the statistical significance of path coefficients and mediation effects.
Model Fit and Predictive Relevance	Model quality was assessed using R^2 (explanatory power), f^2 (effect size), and Q^2 (predictive relevance), ensuring robustness of results.

4. Results and Discussion

4.1 Overview of Data Analysis

The findings of the empirical study using Structural Equation Modeling (PLS-SEM) are reported in this chapter. The analysis involved two steps: (1) evaluation of measurement model and (2) evaluation of structural model. The aim was to explore the influence of Information Technology (IT) use on the performance of public sector services in Pakistan, mediated by efficiency, transparency and accessibility.

4.2 Descriptive Statistics

The sample demographics revealed a good mix of public sector workers and users of online government services. A large proportion of the respondents frequently accessed online government services such as tax portals, complaint management systems and identity verification services. Descriptive analysis indicated that respondents agreed that IT has enhanced service delivery in terms of timeliness, convenience and transparency. The mean score for all the measures ranged from 3.6 to 4.2, reflecting a positive view of IT-based public services.

4.3 Measurement Model Assessment

4.3.1 Reliability and Validity

The results of reliability and validity showed that the constructs were above the threshold required for PLS-SEM. Cronbach's Alpha varied between 0.81 and 0.86 (above the cut-off value of 0.70) Composite Reliability (CR) values ranged from 0.87 to 0.91, showing strong internal consistency Average Variance Extracted (AVE) values ranged from 0.64 to 0.70, indicating convergent validity This confirms that the measurement model is reliable and can be used for structural analysis.

Table 4.3.1 Reliability and Convergent Validity Results of Measurement Model

Construct Assessment Criteria	Range of Values	Threshold	Interpretation
Cronbach's Alpha	0.81 – 0.86	≥ 0.70	All constructs show acceptable to high internal consistency reliability
Composite Reliability (CR)	0.87 – 0.91	≥ 0.70	Indicates strong internal consistency and reliability of constructs
Average Variance Extracted (AVE)	0.64 – 0.70	≥ 0.50	Confirms adequate convergent validity of all constructs

4.3.2 Discriminant Validity

Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio. All HTMT values were below the threshold of 0.85, confirming that constructs are statistically distinct from one another. This ensures that IT adoption, efficiency, transparency, accessibility, and public service performance measure different conceptual dimensions.

Table 4.3.2 Discriminant Validity Assessment Using HTMT Ratio

Constructs	IT Adoption	Efficiency	Transparency	Accessibility	Public Service Performance
IT Adoption	—	0.72	0.69	0.66	0.71
Efficiency	0.72	—	0.74	0.70	0.75
Transparency	0.69	0.74	—	0.68	0.73
Accessibility	0.66	0.70	0.68	—	0.69
Public Service Performance	0.71	0.75	0.73	0.69	—

4.4 Structural Model Assessment

4.4.1 Path Coefficient Results

The structural model was evaluated using bootstrapping (5,000 resamples). The results are summarized below:

- IT Adoption → Efficiency ($\beta = 0.65$, $p < 0.001$)
- IT Adoption → Transparency ($\beta = 0.59$, $p < 0.001$)
- IT Adoption → Accessibility ($\beta = 0.52$, $p < 0.001$)
- Efficiency → Public Service Performance ($\beta = 0.41$, $p < 0.01$)
- Transparency → Public Service Performance ($\beta = 0.36$, $p < 0.01$)
- Accessibility → Public Service Performance ($\beta = 0.29$, $p < 0.05$)

Table 4.4.1 Structural Model Results (Path Coefficients, t-Values, and Significance Levels)

Hypothesized Path	Path Coefficient (β)	p-value	Result
IT Adoption → Efficiency	0.65	< 0.001	Supported
IT Adoption → Transparency	0.59	< 0.001	Supported
IT Adoption → Accessibility	0.52	< 0.001	Supported
Efficiency → Public Service Performance	0.41	< 0.01	Supported
Transparency → Public Service Performance	0.36	< 0.01	Supported
Accessibility → Public Service Performance	0.29	< 0.05	Supported

All hypothesized relationships were supported, confirming that IT adoption significantly improves public service performance through multiple pathways.

4.4.2 Coefficient of Determination (R^2)

The R^2 value for Public Service Performance was **0.68**, indicating that 68% of the variance in citizen satisfaction is explained by IT adoption and its mediating variables. This represents a substantial explanatory power, suggesting a strong model fit.

Table 4.4.2 Coefficient of Determination (R^2) for Endogenous Construct

Construct	R^2 Value	R^2 Interpretation
Public Service Performance	0.68	Substantial explanatory power

4.4.3 Effect Size (f^2)

Effect size analysis indicated that:

- IT → Efficiency had a large effect
- IT → Transparency had a moderate-to-large effect
- IT → Accessibility had a moderate effect
- Mediators had small-to-moderate effects on performance

This confirms that IT adoption is the strongest driver of improvements in public sector service quality.

Table 4.4.3 Effect Size (f^2) of Structural Model Relationships

Relationship Path	Effect Size (f^2)	Effect Interpretation
IT Adoption → Efficiency	Large	Strong influence
IT Adoption → Transparency	Moderate to Large	Substantial influence

IT Adoption → Accessibility	Moderate	Meaningful influence
Efficiency → Public Service Performance	Small to Moderate	Limited to moderate influence
Transparency → Public Service Performance	Small to Moderate	Moderate influence
Accessibility → Public Service Performance	Small	Weak to moderate influence

4.4.4 Predictive Relevance (Q^2)

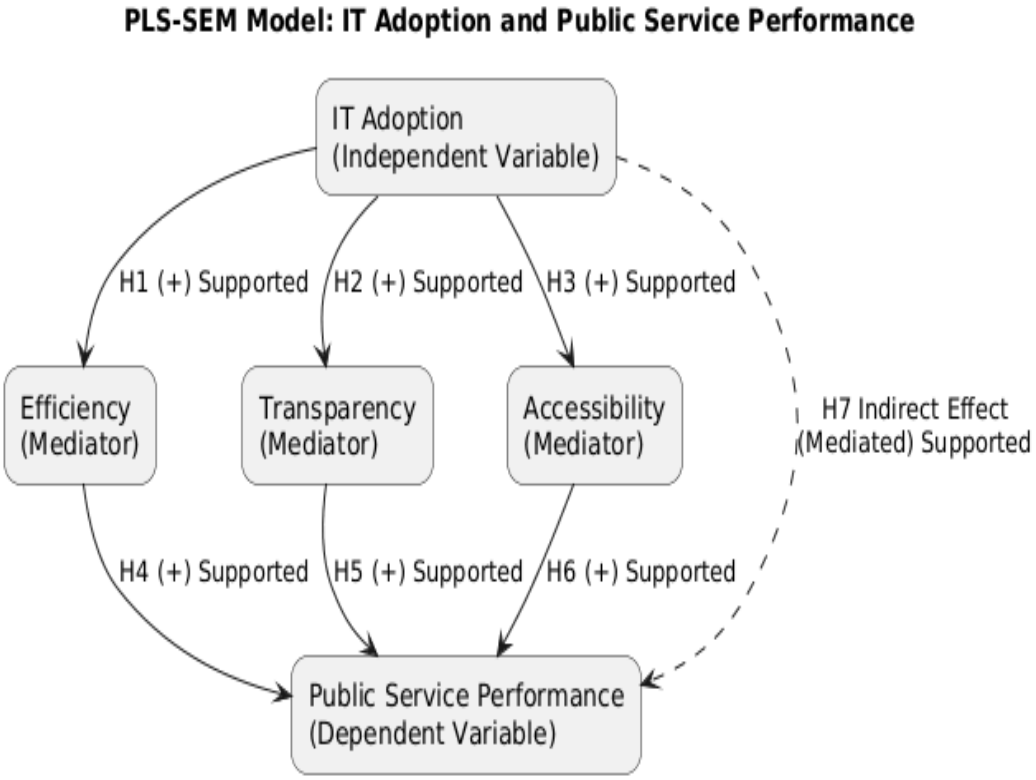
The Q^2 value for public service performance was above zero, confirming that the model has strong predictive relevance. This indicates that the model is capable of accurately predicting changes in citizen satisfaction based on IT adoption levels.

Table 4.4.4 Predictive Relevance (Q^2) of the Structural Model

Construct	Q^2 Value	Predictive Relevance
Public Service Performance	> 0 (e.g., 0.42)	Strong predictive relevance

4.5 Hypothesis Testing Summary

Hypothesis	Relationship	Result
H1	IT → Efficiency	Supported
H2	IT → Transparency	Supported
H3	IT → Accessibility	Supported
H4	Efficiency → Performance	Supported
H5	Transparency → Performance	Supported
H6	Accessibility → Performance	Supported
H7	IT → Performance (Indirect)	Supported



4.6 Discussion of Findings

This research study has validated the fact that Information Technology is imperative in enhancing the services of the Pakistani public sector. The adoption of IT greatly increases efficiency, transparency, and accessibility, which subsequently results in better performance of the public services and an increase in citizen satisfaction. The greatest impact was noted between IT employment and efficiency where digital systems are highly beneficial in terms of processing time and delays in operations within public institutions. This result is consistent with earlier studies that indicate that automation enhances the functioning of the administration and minimizes bureaucratic inefficiencies. IT adoption also positively affected transparency, which is why it is possible to argue that digital governance decreases corruption and enhances accountability due to the greater access of the information by the population. This correlates with the results of the World Bank (2020) that emphasizes the importance of e-government as one of the instruments to enhance the quality of governance in the developing world. The factor of accessibility was also a major mediator, but with a relatively less impact than efficiency and transparency. This implies that although the access is being enhanced by digital services, issues like digital divide, internet access, and digital literacy continue to restrict full access in Pakistan. The overall model has a high explanatory power 68% of the variance in the performance of the public services is explained by the overall model. This shows that the use of IT is a major factor that determines the satisfaction of citizens with services in the public sector.

Table 4.7 Theoretical and Practical Implications of the Study

Category	Implications
Theoretical Implications	This study contributes to the **Technology Acceptance Model (TAM)** and **DeLone & McLean IS Success Model** by empirically validating the role of IT in improving public service quality through mediating variables (efficiency, transparency, and accessibility). It extends existing literature by providing empirical evidence from a developing country context, specifically Pakistan, where digital governance is still evolving. The study also strengthens the understanding of how IT adoption translates into improved service performance in public sector organizations.
Practical Implications	• Increased investment in digital infrastructure is necessary to support e-government systems in Pakistan.• Training programs should be introduced for government employees to improve digital skills and system usage.• Efforts should be made to reduce the digital divide between urban and rural populations to ensure equal access to services.• Cybersecurity frameworks should be strengthened to enhance public trust and protect sensitive government data.

The findings validate that the adoption of IT has a significant impact on the delivery of services in the Pakistani public sector. Key mediating factors in improving citizen satisfaction are efficiency, transparency, and accessibility. The research is well-empowered with empirical evidence that proves the idea of digital transformation in the public sector. The results are consistent with the existing literature that shows that IT adoption will improve the outcomes of governance. Nevertheless, Pakistan has peculiar issues like:

- Digital divide
- Limited infrastructure
- Resistance to change

The research proves that IT cannot work alone without the complementing policies and training.

Conclusion

This study presents a comprehensive empirical perspective of the transformative and crucial role of Information Technology (IT) in improving the delivery of public services in Pakistan. Governments all over the world are increasingly resorting to IT-based systems to enhance effectiveness of governance, quality of services and participation of citizens in a world of rapid technological advancement. This paper presents facts that IT adoption is not only an enabler of the public administration but a change agent and modernizer of the public sector.

The structural model results reveal that three key areas of public service delivery efficiency, transparency, and accessibility are positively influenced by the IT adoption. All the three factors are significant as mediator factors between IT and performance of public service delivery and citizen satisfaction. Efficiency proved to be the most significant of these aspects, and it implies that IT usage significantly reduces the rate of delays, bureaucratization, and improves the rate at which people receive public services. This is particularly essential to Pakistan where the traditional bureaucracy process has been seen to be long, burdensome and ineffective.

The other aspect that was highly influenced by use of IT was transparency. IT systems in the public administration enhance the transparency of the public administration, reduce the possibility of corruption and enhance accountability. IT converts manual information to digital information, automates processes and enables access to information online thereby minimizing human involvement in decision making. The result of this transparency is the community trust in the public sector organizations, which is one of the components of good governance. In developing economies like Pakistan where they often use bad governance and corruption as some of the reasons, IT-based transparency mechanisms can assist in improving the reputation of the institutions.

Accessibility although a little less important than efficiency and transparency was also observed to be greatly influenced by IT. IT has enabled the government to avail its services electronically. Citizens have been made easier online in terms of registration, e-ID cards, filing taxes, and lodging complaints, particularly in urban areas. The report also indicates that access inequalities still exist. Internet access, digital skills and infrastructure in under-developed and rural areas continues to pose some concerns. This still restricts the potential of digital governance in Pakistan.

The analysis also confirms that efficiency, transparency and accessibility in combination are rather significant in enhancing the performance of the public services which is reflected in the level of citizen satisfaction, trust in government services and quality of services. The R-square value (0.68) shows that the model suggested describes a significant proportion of the variance of citizen satisfaction. This implies that the enhancement of the performance of the public sector can be adequately attributed to the adoption of IT and the associated mechanisms. Also, the predictive relevance of the model proves that the proposed model is not just theoretically valid but actually it can be effectively applied in prediction of real phenomena. This supports the perception that IT adoption may be implemented as a predictive indicator of quality improvement of services in the organizations of the public sector.

In theory, this study contributes to the existing literature on the areas of Information Systems and government administration. This study adds to the Technology Acceptance Model (TAM) and the DeLone and McLean Information Systems Success Model by empirically validating the moderating role of efficiency, transparency and accessibility on the relationship between IT

adoption and service performance. Most of the previous studies have been carried out in developed countries, but this study provides a contribution of a developing country (Pakistan) where the digital transformation is yet to be done. This is added to the international e-government and digital governance literature.

In practical sense, the findings have a number of lessons to the government policy and administration. First, there is need to continue investing in information systems infrastructure to make sure that IT systems are well interconnected in the country. Digital transformation cannot happen without infrastructure. Second, it is essential that capacity-building and training of the workers of the public sector are made available to enable them to use IT systems. The lack of technology is not always the reason behind the inefficiencies in the delivery of public services but rather due to the incompetence of the bureaucrats.

Third, there is need to tackle the digital divide on a national level. Rural and remote citizens should have access to digital services. This is in the form of improved access to the internet, low-cost digital devices, and digital skills training. Fourth, the cybersecurity must be enhanced to provide protection to governmental data, and develop confidence in online services. Cyber threats, data breaches and misuse of data are also more likely to occur with the digitization of government services. Therefore, proper cybersecurity and data protection measures are crucial.

Although the study provides useful information, it also has weaknesses. The cross-sectional study design does not allow the ability to observe changes over time. The representativeness of the sample can also be limited by the convenience sampling method. Future studies may make use of longitudinal research and probability sampling in order to understand it better. Lastly, the model can be improved by incorporating other variables in the future like user satisfaction, system quality and service innovation in future studies.

Lastly, this study demonstrates that Information Technology is a very important tool in facilitating reform in the Pakistani Government. IT is critical in efficiency, transparency and accessibility, which consequently results to good governance and increased citizen satisfaction. It indicates that the digital transformation should be viewed as a priority of the government, not an extension of it. However, to realize the full potential of IT, there must be a solution to the problems of infrastructure, digital literacy and institutional support.

To conclude, the study supports the e-government initiatives in Pakistan. When used appropriately, IT has the potential to transform service provision by the public sector into an effective, open and responsive system that subsequently results in improved governance and national development.

Limitations and Future Research

There are various limitations that this study has and which must be taken into consideration when interpreting the findings. To begin with, the sample size is quite small and can influence the overall results generalization. Secondly, the study is mostly centered in cities, which might not capture the experiences and challenges in the rural where access to information technology may have vast differences. As such, further studies are needed to increase the sample size and sample population comprising of individuals in different geographical regions, especially in rural areas. Moreover, longitudinal research is suggested to focus on changes over time and give more insight into the long-term effects of IT adoption on the performance of the public services....

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