

Examining the Impact of Digital Bureaucratic Competency and AI-Enabled Decision Support on Public Service Delivery and Administrative Responsiveness

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Keywords:

Administrative Responsiveness; Artificial Intelligence; Digital Bureaucratic Competency; E-Governance; Public Service Delivery.

Abstract

In today's digital age, equipping government agencies with the right technology is crucial to boost their overall performance. This paper analyzes how the digital bureaucratic competency and Artificial Intelligence (AI)-enabled decision support affect public service quality and responsiveness in Pakistan's public sector. Information was gathered from 423 staff members via a structured Google Form distributed through convenience sampling. The analytical framework grouped the study variables into four main blocks: digital know-how, AI application, service delivery results, and administrative responsiveness. Factor analysis confirmed the latent constructs, while regression tests measured the links between them. Results show that stronger digital skills and AI-assisted tools noticeably improve the speed and quality of public services, especially when demand is high and change is frequent. This research therefore urges deeper investments in training and AI infrastructure for improved governance. The findings enrich ongoing debates in public administration and provide concrete guidance for policymakers seeking to develop faster, citizen-focused public services in developing countries.

Kata kunci:

Responsivitas Administrasi; Kecerdasan Buatan; Kompetensi Birokrasi Digital; E-Governance; Pelayanan Publik.

Abstrak

Era digital menawarkan teknologi yang krusial untuk meningkatkan kinerja dari lembaga pemerintahan. Artikel ini menganalisis bagaimana kompetensi birokrasi digital dan sistem pendukung keputusan berbasis kecerdasan buatan (AI) memengaruhi kualitas layanan publik dan responsivitas di sektor publik Pakistan. Data dikumpulkan dari 423 pegawai melalui Google Form yang terstruktur dan didistribusikan melalui *convenience sampling*. Kerangka analisis mengelompokkan variabel penelitian ke dalam empat blok utama: pengetahuan digital, penerapan AI, hasil penyampaian layanan, dan responsivitas administratif. Analisis faktor mengonfirmasi konstruksi laten, sementara uji regresi mengukur hubungan di antara variabel. Hasil menunjukkan bahwa keterampilan digital dan alat bantu AI secara signifikan meningkatkan kecepatan dan kualitas layanan publik, terutama saat permintaan tinggi dan perubahan sering terjadi. Artikel ini mendorong peningkatan investasi dalam pelatihan dan infrastruktur AI agar dapat meningkatkan tata kelola pemerintahan. Temuan artikel ini memperkaya diskusi yang sedang berlangsung dalam administrasi publik dan memberikan panduan konkret bagi pembuat kebijakan yang ingin membangun layanan publik yang lebih cepat dan berorientasi pada warga di negara-negara berkembang.

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Submitted on 19 June 2025; revisions on 22 August 2025; online publication on 29 August 2025

1. Introduction

The links between the state and citizens are being redefined as governments across the world are integrating digital tools and Artificial Intelligence (AI) into their everyday routines. According to Kulal et al. (2024) and Yacoub et al. (2025), when the digital bureaucratic know-how is more agile, the pace of operation, transparency, and efficiency of the realization of its tasks by a public agency can be improved. Similarly, Plantinga (2024) underlines that civil servants currently need a high level of data-driven decision-making capabilities in order to stay effective within the environment where predictive analytics and AI are prevalent. Subih et al. (2024) and Saleh et al. (2024) also reveal that the platforms that support AI help in improving forecasting, bureaucratic streamlining, and minimizing human error, which leads to improved service delivery.

Nevertheless, Makhdam (2024) and Phuangthuean and Nuansang (2024) also stress that these benefits cannot be achieved only by adopting technologies, but they need reform-oriented, flexible, and adaptive bureaucracies. Though digital transformation has yielded some positive outcomes in the world at large, its practice in developing nations like Pakistan is not consistent. Wang et al. (2024) and Mari and Hussain (2021) emphasize that the realities of digital policy in Pakistan simply do not keep up with the ambitiousness of the ideas when it comes to their manifold and unpredictable results. It is noted that the main causes of this gap are a lack of training, rigid bureaucratic procedures, and an opposition to change, which are mentioned by Kaut and Degefa (2025). Mahmoud et al. (2025) also report on the prevalence of AI pilot projects across South Asia, with little integration of AI into the public sector's normal working operations, particularly in areas where legacy systems predominate.

These obstacles point to the fact that the actual problem is not necessarily the acquisition of digital tools, but the provision of competencies and institutional flexibility to the public servants that can enable them to leverage them. The success of advanced economies shows how AI and digital talents can change governments. As an example, Aldarawsheh et. al (2024) show that the decision-support systems driven by AI make services more efficient and the entire organization respond to changes faster. On the same note, Almagharbeh (2025) establishes a direct correlation between digital know-how and service creativity.

However, according to the evidence presented by Aslam et al. (2025), Pakistani civil servants not only do not have adequate training, but they also lack proper Information Technology (IT) infrastructure, which results in uneven quality of services provided and discontent among the citizens. Awad (2024) notes that ongoing hierarchical cultures and a restricted dependence on data-driven policy-

making processes are the characteristics of South Asian bureaucracies, further limiting digital reform. In this way, although there are global examples of success, AI-Enabled Decision Support (AI-DS) is underutilized in Pakistan, and its capacity to enhance the delivery of public services and administrative responsiveness has yet to be fully tested.

This paper is a direct response to this gap, as it examines the interplay of Digital Bureaucratic Competency (DBC) and AI-DS in their influence over Public Service Delivery (PSD) and Administrative Responsiveness (AR) in the realm of the Pakistani public sector. In contrast to previous articles approaching DBC or AI-DS separately and/or exclusively of developed countries, this study offers a locally based, empirically tested framework on how the two forces interact in the context of a developing country. Focusing on the case of Pakistan, it also addresses the overall demands for evidence-based digital reforms in the field of global public administration, which is stressed in the United Nations Development Programme Digital Strategy 2022 (Awad & Alharthi, 2025).

The focus of this study is organizational level functions in the state agencies of Pakistan, not including the judiciary of Pakistan, military institutions and privately governed functions. Particularly, it examines four interlocking dimensions: (1) digital capabilities in bureaucracy, (2) AI-DS, (3) PSD, and (4) the overall responsiveness of the institutions. In order to apply the proposed framework, a quantitative research design was used. A standardized questionnaire was applied to 423 public-sector employees, representative of Pakistan as a whole and verified by exploratory and confirmatory factor analysis.

2. Literature Review

This paper uses three interconnected models, namely, the Technology Acceptance Model (TAM), the Resource-Based View (RBV) and the Institutional Theory to describe the influence of DBC and AI-DS on the provision of PSD and AR in the civil service in Pakistan. Collectively, these views depict three fundamental dimensions of digitalization: personal preparation, firm capacity and outside legitimacy pressures. TAM consists of two focal beliefs that connect technological adoption with the ease of use and usefulness perceptions, as first formulated by Davis (1989). The use of digital and AI tools in the daily work of civil servants is formed around these beliefs in the domain of public administration. According to Alsharawneh et al. (2024), the greater the digital literacy of the population, the stronger these two beliefs, and the easier the adoption of e-government will take place. By the same token, Ajayi et al. (2024) confirm that the technical capabilities and the self-assurance of bureaucrats would be determining factors in the adoption of AI. Ahmed et al. (2025) also confirm that a rational belief in the ability to remove

delays and eliminate unnecessary steps is the main reason why officials adopt AI. Dreidi et al. (2024) further state that prior exposure to the digital medium and task-technology fit mediate the levels of acceptance. Collectively, these results present the fact that DBC boosts perceived control and intention to use, leading to a faster, more accurate, and more responsive administration. In such a manner, TAM establishes the individual-level perspective on the influence of the digital set of skills on civil servants in regard to the adoption of decision-enhancing AI.

Barney (1991) put forward RBV, where resources are considered to sustain advantage when Valuable, Rare, Inimitable, and Non-Substitutable (VRIN). Under this view, the digital expertise and AI know-how should not be perceived only as technical equipment but should also be regarded as organizational assets. Hussain (2023) refers to technical skills, everyday digital literacy, and readiness for AI as rare competencies that public agencies increasingly value. Awad and Mahmoud (2024) demonstrate how AI literacy, automation routines, and data analytics enhance not only the quality but also the speed of the provided services. Ashour et al. (2024) shed light on the importance of combining staff training and smart systems in situations when highly complicated services have to be provided under pressure. According to Abdelkader et al. (2024), continued investment in digital skills can help the agencies become more anticipatory in the way of service delivery.

Through the RBV, such abilities contribute to why certain agencies perform better than others in terms of responsiveness to services. In the case of Pakistan, Alsaraireh et al. (2023) show that when the institution has better digital and AI capabilities, it responds to the needs of citizens faster. Accordingly, RBV conceptualizes DBC and AI-DS as strategic assets that are closely associated with the outcomes of PSD and AR.

The Institutional Theory of DiMaggio and Powell (1983) describes the way organizations react to coercive, normative and mimetic forces that the environment imposes on them. Efficiency is not the only goal of implementing digital reforms in many public-sector contexts: legitimacy may be an important driver of digital reforms in these sectors. In Almagharbeh (2024), it is found that digitization initiatives can amount to rule-conformance or imitation rather than innovative practices, often as reform requirements or as donor conditionality. He subsequently noted that South Asian e-government initiatives are dominated by development agendas and bureaucratic orthodoxies that tend to be top-down. Aslam et al. (2025) demonstrate that agencies in Pakistan implement digital devices primarily to soothe citizens and regain legitimacy, and Awad et al. (2025) observe that the implementation of tools is primarily passive and, as a result, leads to uneven adoption of AI and e-governance.

Caiza et al. (2025) build on this idea and state that established routines prevent change unless rigid external rules or norms common to many individuals push the matter. Institutional Theory therefore, answers why despite the existence of digital capacity, the adoption is conditioned by bureaucratic culture and pressure imposed on adopters to demonstrate external legitimacy. This discussion builds on ways in which coercive reform policies, normative professional norms, and mimetic benchmarking influence the development of AI/digital adoption in Pakistan with regard to the public sector.

This study moves to integrate this trifecta of models, creating a multi-layer explanatory model. TAM focuses on the individual level (the role digital skills play in shaping ideas about usefulness and ease of use, enhancing adoption and administrative responsiveness). RBV functions on the organization level (where digital competence and AI tools are regarded as VRIN resources that can enhance the delivery and efficiency of services). The environmental level (demonstrating how pressure of legitimacy compels agencies to embrace digital reforms even after doing so only partially) is explained in the context of Institutional Theory.

The combination of these orientations implies that digital transformation is only possible when civil servants embrace technology (TAM), agencies develop the correct sort of capabilities (RBV), and institutional pressures are all mutually supportive of constructive change (Institutional Theory). This integrative lens provides a strong basis to test the interaction of DBC and AI-DS, which is to be tested in assessing the impact on PSD and AR in Pakistan. The literature on the reviewed analysis illustrates the primacy of DBC and AI-DS in Phillip's governing enhancement. El Gareh et al. (2025), Hussain (2023) and Kulal et al. (2024) all unite around the perspective that only when acceptance, capacity and institutional alignment share a convergence, can governance gains become possible.

However, in Pakistan, according to Awad et al. (2025), the use of AI is disjointed, training is irregular, and the incentives are reformed by adherence more than by innovation. Although demonstrated around the world to bring benefits, empirical measures of how digital competence and AI decision tools interact and influence the shaping of PSD and AR remain scarce in South Asia. This study addresses a critical gap by employing a combined TAM-RBV-Institutional Theory paradigm in the Pakistani context of the public sector. It both answers the calls for more empirical results in the developing contexts, and it also gives valuable recommendations on how to reform the policy, training course, and restructure the institutions.

Digital Bureaucratic Competency and Public Service Delivery

DBC is the capacity of civil servants and their offices to use digital tools, platforms, and know-how for effective public management (Hussain, 2023). Hussain (2022) noted that higher digital literacy in government boosts the accuracy, speed, and dependability of services. Similarly, Hussain (1988) showed that skilled bureaucrats' smooth workflows and cut transaction costs, producing quicker, citizen-friendly output. Ghonim et al. (2025) confirmed that DBC gives agencies the agility to address complex citizen requests, tailoring answers in real time. In Pakistan, Awad (2024) found that better Information and Communications Technology (ICT) training for district officers noticeably improved health and licensing services. Together, these global and local studies support the idea that more digitally capable staff lead to better public outcomes.

H₁: DBC has a significant positive impact on PSD.

Digital Bureaucratic Competency and Administrative Responsiveness

AR refers to a government unit's ability to answer public questions, complaints, and requests quickly and in a fitting manner. Awad and Mahmoud (2024) found that public officials who are comfortable with digital tools tend to rely on up-to-the-minute data and feedback channels, such as Customer-Relations-Management (CRM) systems and mobile service apps, in order to act before problems escalate. They also noted that nations scoring high on DBC enjoyed livelier exchanges between citizens and state bodies, especially in areas where services are handed down to local offices. In a later study, Awad and Alharthi (2025) showed that training local staff in South Korea on digital platforms sliced the average time needed to answer a complaint by almost half, underscoring the link between skill and speed. Likewise, Alsaraireh and colleagues (2024) observed a strong match between the extent of internal digital training and quick responses in progressive European municipalities. Turning to Pakistan, Ahmed et al. (2025) reported that officers well-versed in database management and automation were able to clear public grievances noticeably sooner. Together, these results lend solid support to the idea that higher DBC leads to faster and more effective government reactions when citizens call for help.

H₂: DBC has a significant positive impact on AR.

AI-Enabled Decision Support and Public Service Delivery

AI-DS is the blend of smart algorithms and automated tools that help administrators sift through data and choose the best course of action (El Gareh et al., 2025). Hussain and Mari (2023) argue that embedding these AI helpers into e-

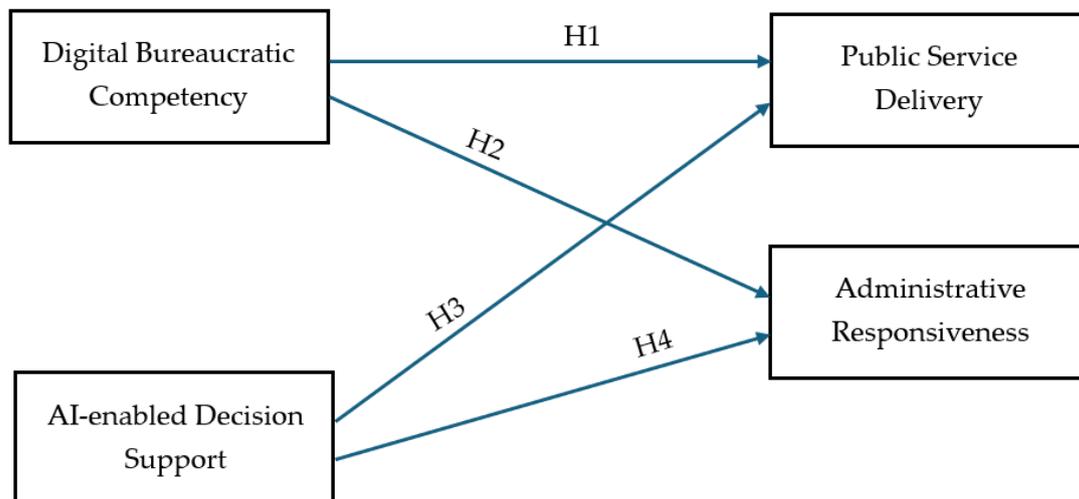
governance platforms sharpens service accuracy and trims wait times. Their study of Scandinavian public agencies showed that similar systems steered personnel and funds more wisely in both health care and education. A 2023 report on Asian digital governance by Hussain (2024) revealed that chatbots and triage apps in rural Bangladesh and India opened doors for 33 percent more citizens. Hussain (2024) noted that the United States of America federal agencies, after adding AI, better matched services to individual needs and flagged urgent issues first.

H₃: AI-DS has a significant and positive effect on PSD.

AI-Enabled Decisions Support and Administrative Responsiveness

After a thorough review of the recent literature, it is clear that AI software enhances public administration by delivering up-to-the-minute data, predicting citizen behavior, and managing routine replies. Almagharbeh et al. (2025) explain that predictive analytics models allow agencies to tackle problems, such as traffic jams, crises, and citizen inquiries, before they escalate. Aslam et al. (2025) report that Italian towns that adopted AI-based complaint systems recorded a 42 percent boost in resident satisfaction thanks to quicker responses and clearer tracking. Similarly, Al-Akash et al. (2024) found that chatbots in the United States of America agencies resolved more than 70 percent of basic questions, which in turn liberated employees for higher-priority work and trimmed wait times. Awad et al. (2025) further argue that machine learning in administrative workflows increases agility and adaptability, especially when policies shift rapidly. Evidence from South Asia supports this view, Caiza et al. (2025) show that AI portals in Pakistan's tax and passport offices cut resolution times by half. Together, these findings strongly affirm the hypothesis that smart digital tools make government operations noticeably more responsive.

H₄: AI-DS has a significant positive impact on AR.

Figure 1. Conceptual Model

Source: Author(s)

3. Methods

The consistency software used to analyze the data of this study was IBM SPSS. Before carrying out parametric tests, the research team analyzed distribution of the data by considering skewness and kurtosis statistics. All skewness values were within -2 to +2, and kurtosis values within -3 and +3 ranges, hence proving that the variables were within the levels of their assumptions of normality as recommended by Kline (2011). The descriptive statistics were initially performed to provide the demographic characteristics of the respondents in terms of their age, gender and character traits on their jobs.

In the attempt to prove the measurement model, the paper utilized EFA and CFA. These actions helped to make sure that the constructs under study were captured faithfully in the data. Since the main interest of the study was to examine cause-and-effect relationships, the baseline analysis model was multiple linear regression. This model was used to test the predictive capacity of DBC and AI-DS on two outcome variables: PSD and AR. With regression analysis, the researchers were able to calculate the magnitude of these effects, as well as the direction (positive or negative), giving strong support to the resultant relationship expected.

The sampling frame comprised all the employees of the sectors which were directly related to the service delivery side of the Pakistan government council. Since time and resources were limited, the researchers needed to use a convenience sampling approach that facilitated a short and not very expensive data collection process, with the limitation of available participants. The convenience sampling was justified by the fact that the study had enough participants to minimize statistical issues at the required sample size level stated by Morgan (1970).

Insufficient access to bureaucrats is a typical reason to use convenience sampling in exploratory research in the area of public administration, where the reliability of heading above set minimums is justified.

Despite the fact that convenience sampling can be associated with limitations in terms of generalizability, the resulting sample size of 423 valid responses surpassed the requisite 384 respondents that Morgan (1970) recommended as the adequate number of reactions to be used in populations of 500,000 and 1,000,000, and hence the statistical sufficiency and reliability of the collected information. The data was collected in February-May 2025 with a structured online questionnaire with the help of Google Forms. The official channels and professional networks provided a link to the survey. The study was voluntary, where the respondents were offered an introduction and informed consent to the study before responding to the questionnaire.

The survey tool was categorized into five parts: (1) DBC, which questions based on the articles from Mari and Hussain (2021) and Kaut and Degefa (2025); (2) AI-DS, adapted from Plantinga (2024) and Saleh et al. (2024); (3) PSD objects according to Yacoub, et al. (2025); (4) AR, based on Wang et al. (2024) and Phuangthuean and Nuansang (2024), and (5) Demographic data factors, such as gender, age, job role, and experience. All the construct items were gauged using a five-point Likert scale of 1= Strongly Disagree to 5 = Strongly Agree. This outcome was a design that provided standardization and comparability of variables.

4. Results and Discussion

A brief descriptive analysis laid out the basic demographic profile of the respondents. For each categorical item: age, gender, education, and department, simple counts and percentages were calculated. Of the respondents, roughly 68% identified as male and 32% as female. In terms of age, nearly half (about 52%) were in the 31–40 group, with a further 27% in the 41–50 range, pointing to a predominantly mid-level cohort. Education levels were notably high, suggesting a particularly well-qualified public workforce. Respondents were drawn from departments such as education, health, municipal services, interior affairs, and planning and development, most of whom worked in frontline service roles. Taken together, these characteristics indicate a sample of mid-career, well-educated officials who are already familiar with digital tools and AI, thereby strengthening the value of the study's insights into technology-assisted decision-making in government.

Table 1. Demographic Profile of Respondents (N=423)

Variables	Category	f	%
Gender	Male	288	68.1
	Female	135	31.9
Age	21-30 years	47	11.1
	31-40 years	220	52.0
	41-50 years	115	27.2
	Above 50 years	41	9.7
Educational background	Bachelors	55	13.0
	Masters	253	59.8
	PhD	115	27.2
Department Affiliation	Education	102	24.1
	Health	89	21.0
	Municipal/Local Services	76	18.0
	Planning & Development	67	15.8
	Interior/ Administrative services	89	21.0
Years of experience	Less than 5 years	58	13.7
	5-10 years	167	39.5
	11-15 years	124	29.3
	Above 15 years	74	17.5

Source: Author(s)

Table 2. Factor Analysis Results

Factors	Item loadings	KMO	Bartlett's test (Sig.)	Inference Method	Rotation Method	Eigen value	Variance Explained (%)
DBC	0.748	0.861	0.000	Principal Component Method	Varimax	2.987	77.624
AI-DS	0.861						
PSD	0.876						
AR	0.896						

Source: Author(s)

To test how many unique dimensions underlie the study concepts, an EFA was run via PCA with Varimax rotation. Before extracting, sampling adequacy and pattern strength were checked with the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity. A KMO score of 0.839 shows strong sampling quality, meaning the dataset is fit for factor work. Bartlett's test was also significant ($p < 0.001$), confirming that the correlation matrix is not just random noise. The analysis uncovered four key factors: DBC, AI-DS, PSD and AR. Each item loaded above the 0.70 mark, providing solid evidence of convergent validity. Together, the factors explain 77.62% of the total variance, reflecting a high proportion of the variance accounted for and a good model fit. The first eigenvalue (2.987) sits above Kaiser's rule (exceeding 1), underscoring the prominence of the lead factor. Overall, these

outcomes support both construct validity and internal consistency, echoing recent research on digital governance (Mounkoro et al., 2024; Trajkoviki, 2024).

Table 3. Correlation Matrix

Variables	Mean	Std.Dev	Skewness	Kurto sis	DBC	AI- DS	PSD	AR
DBC	3.97	0.69	-0.09	-0.63	1			
AI-DS	3.76	0.61	-0.58	0.35	0.59**	1		
PSD	3.88	0.64	-0.44	-0.18	0.56**	0.78**	1	
AR	4.12	0.51	-0.98	-0.14	0.57**	0.81**	0.85**	1

Note: All correlations are significant at the 0.01 level (2-tailed)

Source: Author(s)

The correlation study reveals consistent, statistically robust patterns among the four variables under review. DBC shows a moderate relationship with AI-DS ($r = 0.59$), PSD ($r = 0.56$), and AR ($r = 0.57$). These figures suggest that stronger digital skills in the civil service directly enhance both service delivery and the speed of administrative replies. AI-DS, meanwhile, relates more strongly to PSD ($r = 0.78$) and AR ($r = 0.81$), underscoring the value of evidence-based tools for boosting efficiency and agility. The tightest link appears between PSD and AR ($r = 0.85$), suggesting that improvements in on-the-ground services almost always trigger quicker, more flexible administrative actions. Together, these results extend earlier studies (Hussain, 2023; Saleh et al., 2024) and underline that blending human digital know-how with AI can substantially fortify public administration, especially in emerging economies such as Pakistan.

Table 4. Results of Linear Regression Analysis Between Variables

Effect Path	F	R	R ²	β	T	P
DBC → PSD	24.87	0.61	0.37	0.61	15.92	0.000**
DBC → AR	19.04	0.54	0.29	0.54	12.67	0.000**
AI-DS → PSD	88.15	0.83	0.68	0.75	29.78	0.000**
AI-DS → AR	93.42	0.86	0.74	0.77	33.49	0.000**

Note: All relationships are statistically significant at the 0.01 level (2-tailed)

Source: Author(s)

The updated Table 4 lays out the fresh regression findings, and they clearly show that DBC and AI-DS both boost PSD and make government offices more responsive. The DBC-PSD link is strong, with a standardized beta of 0.61 and an R-squared of 0.37, which tells us that digital know-how in the ranks explains nearly four-tenths of the variations in how well services reach the public solid, if not overwhelming, effect on day-to-day performance. Meanwhile, DBCs link to AR gives a beta of 0.54 and an R-squared of 0.29, confirming that tech-savvy officials

drive faster replies, clearer processes, and smoother problem-solving. The shot-in-the-arm from AI-support tools is even clearer. AI-DS-PSD records a beta of 0.75 and an R-squared of 0.68, meaning the smart apps and algorithms running backstage account for two-thirds of the gains citizens actually notice. The tightest bond shows up in the AI-DS-AR pathway, where beta hits 0.77 and R-squared soars to 0.74, underlining how predictive models, automated routines, and live dashboards give front-line staff the edge they need to respond faster and with higher accuracy. These results echo the work of Wang et al. (2024) and Phuangthuean and Nuansang (2024), strengthening the idea that combining digital skills with a solid AI backbone makes government agencies quicker, more efficient, and ultimately better at serving citizens.

This research paper looked at the impact of DBC and AI-DS on PSD and AR using quantitative surveys that were administered to 423 units working in the public sector in Pakistan. Observations indicate positive and significant relationships of all predictors with the outcomes that support the aforementioned hypotheses and reflect trends observed in the wider body of literature. To begin with, DBC has 37 percent of the variance in PSD explained (heave = 0.61; R2 = 0.37), which is not a negligible connection, as the other authors (Hussain, 2023; Kulal et al., 2024) write that improvement in digital skills contributes to faster and more precise services. Similarly, Hussain (2024) observes that when digital literacy is high, it facilitates work processes and citizen-worker interactions, particularly in departments that receive high traffic of people seeking services. At the domestic level, Saad et al. (2025) indicate the same improvements when public officials were provided with digital training, which resulted in prominent leaps of efficiency in daily state operations. Together, these trends validate the notion that sound digital expertise is a crucial resource to improve the service quality in the present-day bureaucracies.

Second, the study demonstrates that AR ($\beta = 0.54$, R2 = 0.29) is significantly enhanced by DBC, which is also indicated by the works of Phuangthuean and Nuansang (2024) and Makh dum (2024). Those reports showed that when frontline employees in Korea and Latin America were given digital skills, they reduced response times and settled complaints with more accuracy. Similarly, according to Mari and Hussain (2021), Pakistani civil servants with access to dashboards and mobile applications solved issues of citizens more rapidly. Taken together, these results support the perception that digital competence provides an essential propeller to responsive government. Third, the analysis will reveal a strong effect of the AI-DS on PSD (0.75, R2 = 0.68), similar to Saad et al. (2025) who claimed that using AI tools transformed e-government interactions into more personalized and reliable. Yacoub et al. (2025) have mentioned in the same line that AI systems

assisted European agencies in sifting and prioritize complex cases with high efficiency. A similar high degree of explanatory power of AI was traced by Subih et al. (2024) in South Asia, where the Pakistan Ehsaas program used AI-based analytics to help it target its aid more efficiently and transparently.

Finally, the interaction between AI-DS and AR was the most significant of all liaisons studied (0.77, $R^2 = 0.74$), as Subih et al. (2024) and Yacoub et al. (2025) found that AI-based assistance desks and demand predictions cut average response rates in half and allowed evidence-based responses to citizen queries. The same findings were observed by Mounkoro et al. (2024) and Tariq (2025) in Italy and Pakistan, respectively, as both the AI-based chatbots and intelligent case routing increased the feelings of timeliness and the general satisfaction of the users. The conclusions made together enrich and expand the literature by demonstrating that human-centric digital capabilities and machine-enhanced decision-support tools are most effective when interlocked to deliver higher service experiences and management fluidity. Since the observed pattern exists not only in various national environments and with varying degrees of public management, it is safe to expect that its effects can be extended on a wider scale than a single dataset.

Theoretical Implications

The paper contributes to a growing literature on digital governance and public sector innovation and the administrative science more generally. To begin with, by simultaneously experimenting DBC and AI-DS, it demonstrates the performance of these two functions in harmony with one another in defining the quality of public administration. In contrast to the previous works where each factor is considered independently, the current paper integrates them into one model that may give a more comprehensive set of items to researchers interested in evaluating the performance of digital governments.

Second, the study supports three prominent theories, such as socio-technical systems, New Public Service and the TAM, by demonstrating that the success of digital literacy enhancement can rely not just on the competency of the employees (digital literacy of the civil servants) but also on strong technological infrastructures (AI-based decision aids). Collectively, these factors shed light on service efficiency and responsiveness to a far better level than those models that isolate their contribution. Third, the research advances the discussion of AR through the operationalization of AI-based decision-making as a measurable variable and its direct connection to fast, situationally adapted service delivery in real conditions. The theory is further advanced and developed by this work through highlighting agile, self-adapting types of digital governance as the main highlight of this work,

as opposed to the previous models that focused primarily on traditional ICT or permanently fixed e-government services.

Practical Implications

The findings of the study provide the evident practical advice that could play the guiding role of the leaders in the public sector, policymakers, civil servants, and digital-change planners in developing countries like Pakistan. To begin with, since DBC is a leading force in promoting both PSD and AR, an appropriate training program that is specific decentralization should be initiated by the responsible authorities. Such lessons should include both the lower and higher levels of skill, including data analytics, automatization of work-related processes, and professional online communication techniques. Second, the stark advantage of AI-DS demonstrates that agencies can enhance the quality of their services by fitting the available AI solutions, such as predictive dashboards, triage automation, and chatbots. These systems reduce the burden of the workers, accelerate internal decision-making and ensure 24/7 support to the citizens.

Third, the presented interconnected framework is a kind of transparent scale that would measure the digital maturity of an organization. Its two pillars, DBC and AI-DS, give leaders an opportunity to identify where they are weak and develop a custom-fit action to strengthen the front-line services as well as the internal responsiveness. The findings establish unequivocally that digital transformation should no longer be regarded merely as a tech refresh; rather, it needs to be regarded as a strategic competence, which requires a real commitment to the entire organization and responsible use of AI, as well as an inclusive digital policy practice in providing equitable, open, and efficient governance at each level of administration. Theoretically, the research empowers the study of digital governance through its integration of TAM, RBV, and Institutional Theory in a developing country where individual readiness, the ability of the organization to adapt to various influences, and pressures on legitimacy are interrelated to determine the outcome. Practically, the findings stress the need to combine targeted bureaucratic training with AI-enabling decision-making instruments in order to enhance service delivery and responsiveness within the Pakistani civil service. Combined, the two contributions imply that this development will increase not only scholarly knowledge but also governmental powers to achieve effective and citizen-based digital transformation.

Limitations and Future Research Directions

This investigation sheds light on how digital skills and AI tools intersect within public administration, yet several limitations remain that future scholars

need to address. First, the research used a cross-sectional design, which cannot firmly establish a cause-and-effect chain among digital capacity, AI adoption, and administrative outcomes. Although the links proved statistically significant, a longitudinal approach is needed to trace how these variables evolve and influence one another over time. Second, data were gathered through convenience sampling from 423 public-sector employees in Pakistan, which may limit how far the results can be applied elsewhere. Although the findings offer rich detail about the country's bureaucracy, public administrations differ widely around the world in digital maturity, governance models, and institutional norms. Researchers should therefore test the same framework in varied settings, both advanced and emerging, to broaden external validity and generate comparative policy insights.

Third, because core constructs such as DBC and AI-DS relied on self-report surveys, answers may reflect social desirability or personal interpretation rather than objective performance. Future investigations should draw on multiple data sources-system logs, performance audits, and on-the-ground observations that converging evidence can boost the reliability of results. Fourth, because the present project relied mainly on numerical data, it barely scratched the surface of the institutional, behavioral, and political dynamics that shape AI adoption. To fill that gap, later work could mix methods or turn purely qualitative, gathering interviews with decision-makers, running ethnographies of implementation, and assessing how front-line users interact with new systems.

Fifth, this study sidestepped potential moderators-organizational culture, political resolve, cybersecurity maturity, and citizens' own digital skills-whose presence or absence might alter the observed relationships. Adding those variables to future models could clarify the conditions under which digital tools actually yield better service outcomes. Lastly, as AI technology keeps advancing at breakneck speed, researchers must turn their attention to ethics and governance issues like algorithmic accountability, fairness, transparency, and trust in order to secure public confidence in AI-driven services. These questions will guide the design of digital governance that is inclusive, equitable, and sensitive to every local context over the next decade.

5. Conclusion

This study set out to explore how two interrelated factors, DBC and AI-DS, affect PSD and AR in Pakistan's government agencies. Results show that personal digital skills and system-level AI tools both matter, boosting the speed, quality, and responsiveness of public administration. Digital competence alone strengthens service delivery and makes agencies quicker to react, underscoring that trained staff remain the backbone of any successful digital shift. At the same time, AI decision

support emerged as a leading driver of improved outcomes, proving that smart technology can streamline choices, allocate resources wisely, and involve citizens more fully. Together, these findings argue for a blended approach that pairs capable people with intelligent automation to build truly effective e-government. The lessons contribute to scholarly debate and provide practical insights for policymakers, IT planners, and public leaders who want to create nimble, citizen-focused institutions during an era of rapid digital change.

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