E-Government Adoption in West Africa: A Narrative Review of Trends, Challenges, and Policy Innovations

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ABSTRACT

E-government initiatives in West Africa have expanded over the past decade, yet adoption and implementation remain uneven across the sub-region. This structured narrative review synthesises peer-reviewed scholarship published between January 2015 and December 2025, identified through targeted searches in Scopus, Web of Science, Google Scholar, conference proceedings and authoritative grey literature, including United Nations E-Government Survey reports, World Bank datasets, and national digital strategy documents, to provide policy context. The review is organised around recurring analytical categories in the literature, including digital inclusion and infrastructure, citizen engagement, transparency and anti-corruption, cybersecurity and data protection, service delivery outcomes, and institutional capacity. Across these domains, the literature points to three consistent findings. First, access constraints and high connectivity costs continue to shape who benefits from digital public services. Second, weak institutional capacity and limited interoperability often produce fragmented implementation even where national strategies exist. Third, trust-related factors remain decisive for sustained uptake, particularly cybersecurity governance and data protection enforcement. Comparative indicators further reveal divergent trajectories within the sub-region, with Ghana performing ahead of many peers on the United Nations E-Government Development Index (EGDI), while Nigeria remains in the middle tier despite major reforms. This review consolidates dispersed regional evidence within a single analytical frame, clarifies the determinants most consistently associated with e-government adoption in West Africa, and identifies priorities for both implementation and future research.

Keywords: E-government adoption, Digital governance, West Africa, Digital divide, E-Government Development Index

INTRODUCTION

Electronic government (e-government) refers to the use of information and communication technologies (ICTs) by public institutions to improve governance processes, service delivery, and citizen engagement [1]. Effective e-government can increase efficiency, transparency, and accountability in government operations [1]. In the global context, e-government development is often measured by the United Nations E-Government Development Index (EGDI), which combines indicators of online services, telecommunications infrastructure, and human capital. Many African governments have recognised e-government as a catalyst for development and good governance, launching national ICT policies and digital transformation agendas over the past decade [2].

Despite this high-level commitment, Africa remains the least digitally connected region. The continent's average EGDI in 2022 was 0.4054, well below the global average of 0.6102, reflecting overall lower levels of online services and infrastructure [3]. Only four of 54 African countries score above the global EGDI average [3], and no African country yet ranks in the UN's "very high" EGDI tier [3]. West African nations mostly fall into the middle EGDI group, with Ghana (EGDI ≈0.58 in 2022) being a regional leader (ranked 106th globally) [3], while Nigeria (EGDI ≈0.45–0.48) remains in the middle range (ranked 144th in 2024) [1]. This indicates modest

progress; for context, Nigeria's global EGDI rank was 145th in 2003 and remains 144th two decades later [1], revealing stagnation despite investments in digital infrastructure and policy reforms. Such slow advancement underscores the complex challenges faced in implementing e-government across Africa.

While e-government research has produced robust explanatory models, including technology acceptance approaches and broader digital government perspectives, recent African scholarship shows that adoption outcomes are frequently conditioned by structural and institutional constraints that are not fully captured by individual-level acceptance variables alone. Empirical work in West Africa and comparable African settings highlights the centrality of enabling conditions such as infrastructure adequacy, organisational capability, and governance arrangements. For example, studies in Senegal and Ghana emphasise how infrastructural deficits and policy coherence shape implementation trajectories [4], [5], while research in Nigeria finds that connectivity bottlenecks and economic barriers significantly moderate digital service uptake [6], [7]. Broader comparative work across African countries shows that socio-economic and governance drivers explain variation in digital adoption even when technological platforms are available [8], [9].

At the same time, micro-level analyses in Southern Africa draw attention to user experience and service design as determinants of public service delivery outcomes, further complicating single-factor explanations [10], [11]. These diverse empirical foci indicate that the West African evidence base remains dispersed across country case studies and thematic domains, which limits consistent cross-national inference on determinants and implementation patterns. In response, this review integrates peer-reviewed scholarship on e-government adoption in West Africa to identify recurring determinants and explain uneven progress across the sub-region. The review addresses three guiding questions: (1) What structural and institutional barriers most consistently shape e-government adoption in West Africa? (2) How do implementation trajectories differ across countries within the sub-region? (3) What cross-cutting explanatory patterns emerge across infrastructure, governance capacity, and service delivery outcomes? To address these questions, the review adopts a structured narrative approach and covers literature published between January 2015 and December 2025, drawing primarily on peer-reviewed journal articles and using selected high-impact conference proceedings and authoritative policy sources for contextual evidence. The synthesis is organised around recurring analytical categories observed across the literature, including infrastructure constraints, institutional capacity, governance mechanisms, and service delivery outcomes. This organisation supports an analytical synthesis that identifies convergence and divergence across studies, highlights areas of theoretical tension, and outlines implications for refining adoption frameworks in low- and middle-income governance contexts.

Theoretical and Conceptual Foundations

E-government adoption research has been shaped by several interrelated theoretical traditions within information systems, public administration, and governance studies [12]. Early work in the field relied substantially on technology acceptance theories, particularly the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasise perceived usefulness, perceived ease of use, performance expectancy, and social influence as primary determinants of technology uptake [13], [14]. These frameworks have been widely applied to digital public service contexts and remain influential in citizen adoption research. However, subsequent scholarship has demonstrated that individual-level acceptance models alone are insufficient for explaining adoption outcomes in developing governance environments [15]. Institutional theory offers a broader explanatory lens, highlighting the role of regulatory structures, organisational capacity, policy coherence, and inter-agency coordination in shaping implementation trajectories [16]. In contexts characterised by infrastructural deficits and administrative fragmentation, structural constraints often moderate or override behavioural acceptance variables.

Recent analyses in Government Information Quarterly and related outlets have emphasised that digital government outcomes depend as much on institutional capability and governance coherence as on citizen attitudes [17], [18]. Public value theory further expands the analytical scope beyond efficiency and adoption metrics to encompass legitimacy, accountability, and trust as core dimensions of digital governance [19]. From this perspective, e-government reforms are not merely technological innovations but instruments for redefining state–citizen relations and enhancing transparency. Systematic reviews of e-government and corruption have demonstrated that digital platforms can contribute to integrity gains, although outcomes vary depending on

institutional context and enforcement mechanisms [17], [17], [18], [19]. These findings suggest that adoption must be analysed alongside governance quality and implementation integrity. In addition, digital transformation frameworks conceptualise e-government as a socio-technical reform process involving technological infrastructure, organisational redesign, data governance, and ecosystem integration. Malodia et al. [20] argue that sustainable digital government requires coordinated transformation across technological, institutional, and societal domains rather than isolated platform deployment. This perspective is particularly relevant in West Africa, where uneven infrastructure, limited interoperability, and gaps in policy implementation frequently shape reform outcomes.

These theoretical traditions, together, indicate that e-government adoption in West Africa cannot be adequately explained by single-factor models. Rather, it reflects the interaction of infrastructural capacity, institutional strength, governance integrity, and trust formation. By integrating insights from technology acceptance theory, institutional theory, public value theory, and digital transformation scholarship, the present review provides a structured analytical lens through which recurring patterns across the West African evidence base can be interpreted.

METHODS

Review Design

This article adopts a structured narrative review approach to synthesise and critically interpret evidence on e-government adoption in West Africa. A narrative design fits the study aim because the literature spans heterogeneous methods, contexts, and outcomes, and the objective is to integrate findings across institutional, infrastructural, and governance dimensions rather than estimate a pooled effect size [21].

Information Sources and Search Strategy

Literature searches covered January 2015 to December 2025 and targeted three primary sources: Scopus, Web of Science, and Google Scholar. Searches combined controlled and free-text terms related to e-government and the regional context. Core terms included: *e-government*, *digital government*, *e-governance*, *public sector digital transformation*, *e-service*, *e-participation*, *open government data*, *digital identity*, *cybersecurity*, *data protection*, paired with *West Africa* and country terms such as *Nigeria*, *Ghana*, and *Senegal*. Reference lists of key papers were also screened to capture additional relevant studies.

Eligibility and Source Prioritisation

The review prioritised peer-reviewed journal articles that examined e-government adoption, implementation, determinants, or outcomes in West African contexts. Empirical studies, theory-based papers, and well-grounded conceptual analyses were eligible. High-impact conference proceedings were included selectively when they provided unique methodological or regional insights not available in journals. Grey literature was used selectively for contextual evidence, limited to authoritative sources such as the United Nations E-Government Survey, World Bank datasets, and national digital strategy documents, particularly for comparative indicators and policy timelines.

Screening and Study Selection

Records were screened in two stages. Titles and abstracts were first assessed for relevance to e-government adoption or implementation in West Africa. Full texts were then reviewed to confirm substantive relevance and sufficient methodological or conceptual detail. Where multiple sources reported overlapping information, priority was given to peer-reviewed publications and the most recent or methodologically robust evidence.

Data Extraction and Synthesis

For included studies, information was extracted on country focus, study design, theoretical framing, data sources, and principal findings. Evidence was synthesised through structured thematic organisation, where recurring analytical categories observed across the literature guided section development. These categories included:

digital inclusion and infrastructure, citizen engagement, transparency and anti-corruption, cybersecurity and data protection, service delivery outcomes, and institutional capacity. The synthesis emphasised convergence, divergence, and explanatory patterns across countries and study types, and it linked thematic findings to comparative regional indicators where appropriate.

Reporting Considerations

To strengthen transparency and reporting quality for narrative synthesis, the review aligns with established guidance on narrative review rigor and clarity, including explicit aims, transparent search description, and evidence-based synthesis [22].

Table 1 summarises the characteristics of the reviewed literature. The table presents the distribution of included sources by publication type, country focus, and methodological approach. This structured overview clarifies the scope of the review and the balance between empirical, conceptual, and policy-oriented contributions within the analysed corpus.

Section	Category	n	%
A. Sources Reviewed (All Included Sources; N = 57)	Peer-Reviewed Journal Articles	42	73.7
	Conference Proceedings	1	1.8
	Books/Working Papers/Preprints	4	7
	Policy / Institutional Reports & Professional Briefs	2	3.5
	Web / Online Reports (Authoritative Sites)	8	14
	Total	**57**	**100**
B. Country Focus (Peer-Reviewed Articles Only; n = 42)	Nigeria	4	9.5
	Ghana	4	9.5
	Senegal	1	2.4
	Other African Single-Country Studies (Namibia, South Africa, Rwanda, Zambia, Kenya)	8	19
	Multi-Country African Comparative / Pan-African	9	21.4
	Global / Non-Country-Specific (Theory/Methods/General E-Gov)	16	38.1
	Total	**42**	**100**
C. Study Type (Peer-Reviewed Articles Only; n = 42)	Empirical Studies (Quantitative / Qualitative / Mixed)	28	66.7
	Evidence Syntheses (Systematic/Structured Reviews, Meta-Analysis)	6	14.3
	Conceptual / Theoretical / Framework Development	8	19
	Total	**42**	**100**

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Note: Percentages in Sections B and C are computed using peer-reviewed journal articles only (n = 42). Non-peer-reviewed sources (policy reports, institutional briefs, and web materials) were retained for contextual framing but excluded from country-focused and study-type classification.

Digital Divide and Infrastructure Challenges

One of the most prominent themes in African e-government literature is the digital divide, which refers to the gap between those with adequate access to digital technologies and those without. In Africa, this divide is evident across multiple dimensions – urban vs. rural, rich vs. poor, and between countries, and significantly affects e-government uptake. Internet penetration remains low on the continent: as of 2024, only about 38% of Africa's population had internet access, making it the world's least connected region [23]. This figure, reported by the UN, represents an improvement from approximately 28% in 2020 [24], but still lags significantly behind the global average (~66% in 2020). Rural areas are particularly underserved; adults in Sub-Saharan Africa's rural regions are 49% less likely to use mobile internet than their urban counterparts, and women are 36% less likely than men to be online [25]. Such disparities mean large segments of the population are effectively excluded from online government services, limiting the reach and impact of e-government initiatives.

A major contributor to the digital divide is the high cost of connectivity in relation to household incomes. The Alliance for Affordable Internet's research shows that data in Africa is expensive, with 1 GB costing about 5.7% of monthly income on average nearly three times the UN's affordability target of 2% [23]. This high cost is driven by factors such as limited competition and infrastructure monopolies. For example, undersea internet cables around Africa, built by large foreign tech companies, often funnel traffic through a few points and force local internet service providers to pay steep fees to connect [26]. These costs are passed to consumers, pricing out many low-income users. The result is that even in countries where basic e-services exist, many citizens cannot afford regular internet access, especially in rural and poorer communities [26]. Bridging this affordability gap is essential for inclusive e-government; otherwise, digital services risk primarily benefitting urban elites while marginalizing rural populations, as noted by case studies of connected cities like Lagos or Nairobi versus disconnected villages.

Beyond internet access, physical and technical infrastructure shortcomings pose a fundamental barrier to e-government in West Africa [9], [27]. Key issues frequently cited include: (a) Electricity and power reliability: Many areas experience frequent power outages or lack electricity, which clearly hinders access to digital government services [28]. Without reliable power, ICT infrastructure cannot function consistently, undermining both the supply (government's ability to host services) and demand sides of e-governance. (b) Broadband and network infrastructure: Fixed broadband density in Africa remains extremely low (about 2.7 subscriptions per 100 people in 2022, albeit up from 1.8 in 2020) [28]. While mobile phone penetration is high, the number of active mobile internet users is relatively low due to coverage gaps and high costs. Many rural communities still lack last-mile connectivity, meaning e-government platforms often cannot be accessed outside major urban centers [28]. (c) Digital literacy and skills: A less tangible but critical infrastructure component is human capital. Low digital literacy rates in parts of Africa mean even where internet or devices are available, citizens may not know how to use online services effectively [29]. Studies highlight education gaps and a lack of training as barriers to e-government adoption in West Africa [29]. Governments have begun addressing this by establishing digital inclusion programs and ICT training, but progress is uneven.

Read together, these infrastructure and access challenges form a vicious cycle that slows e-government progress. In Nigeria, for instance, researchers and policy analysts note that poor internet penetration in rural areas, inadequate telecom and power infrastructure, and low ICT skills have undermined the full realisation of e-government's potential [30]. Even as Nigeria is one of Africa's largest ICT markets, these internal divides keep its e-governance ranking in the middle tier. To improve, significant investment is needed: not only in hard infrastructure, such as broadband networks, electrification, and public internet access points, but also in policies to reduce costs, including fostering competition, establishing regional internet exchange points, and capacity-building for citizens [30]. Encouragingly, there are positive trends; telecom infrastructure is improving. For example, Africa saw a 48% jump in fixed broadband subscriptions 2020–2022) and mobile broadband coverage is expanding [3]. However, these improvements have not yet translated into equitable access due to persistent

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income disparities and geographic challenges [31]. Bridging the digital divide remains the foundational step upon which all other e-government innovations depend.

Citizen Engagement and E-Participation

Citizen engagement is a core objective of e-government: by opening digital channels, governments aim to involve citizens in governance processes, gather feedback, and improve service usability. In Africa, online citizen participation in decision-making and service co-design is gradually increasing but remains relatively nascent compared to global standards [32]. The UN E-Participation Index (EPI), which measures the availability of online information, consultation, and decision-making tools for citizens, shows that many African countries have room for improvement. For example, Nigeria's E-Participation was rated "High" in 2022 with an index value of 0.566 (on a 0–1 scale) [3], reflecting improvements like dedicated portals for citizen input. Yet, this is well below top global performers and indicates only basic offerings. Similarly, Ghana and Senegal score in the middle range on e-participation, suggesting that while government websites are providing more information, interactive features are not fully developed or widely used.

Several West African governments have launched online platforms to engage citizens. These include Dedicated e-participation portals, where some countries host consultation websites for discussing draft policies or budgets, although usage is often low. The social media presence of government agencies is increasingly being utilised by ministries in Nigeria, Ghana, and other countries, such as Twitter and Facebook, to disseminate information and receive complaints or queries. This has somewhat "bridged the information gap between the government and citizens" by enabling two-way communication [33]. For instance, Nigeria's government agencies now commonly maintain social media accounts and websites where citizens can submit feedback about services [6]. Nigeria's SERVICOM initiative is notable for its citizen feedback and grievance systems. It has established service charters and feedback channels for various agencies, with an online component to track service delivery performance [33]. Such tools encourage public reporting of problems (like delays or corruption in services) and hold agencies accountable for addressing complaints.

Academic case studies show that when given the opportunity, African citizens do engage online. However, awareness and trust in these channels are issues. In one Nigerian study, citizens' perceptions of using e-government to combat corruption were mixed. At the same time, many saw potential for transparency, they also expressed concerns about whether their online inputs would actually influence officials [34]. Digital literacy and civic education play a role here: people need to know that e-participation channels exist and believe that their participation is meaningful. Governments can boost engagement by actively advertising online consultations, simplifying user interfaces, and publicly responding to citizen inputs to build trust.

Given Africa's mobile-first internet usage, governments have also explored mobile-based engagement. SMS-based services and mobile apps have been utilised for various purposes, including voter information, reporting issues, election monitoring, and receiving government notifications. For instance, during the COVID-19 pandemic, many African states (Nigeria and others) created dedicated portals or mobile dashboards to share updates and allow self-reporting of health information [3]. These initiatives had the effect of familiarising more citizens with e-services and demonstrating that digital tools can facilitate the quick dissemination of information and feedback in times of crisis. Regionally, there is a growing recognition that citizen engagement is crucial for effective developmental governance. A UNDP report focusing on West Africa emphasised that a political will for greater citizen involvement exists and that e-participation "is indeed feasible," even in low-income settings, provided local solutions are employed. Examples of success include participatory budgeting in some local governments and online petition platforms in a few countries. Nonetheless, most West African e-government efforts in the last decade have initially prioritised putting basic services online over deeper participatory governance tools [28]. As these platforms mature, we see a gradual shift: from information provision to interaction and transaction. For example, by 2022, five African countries (including Nigeria, Rwanda, and South Africa) offered 20+ transactional services online, up from essentially none several years prior [3]. With increased transactional usage, such as applying for licenses and paying taxes online, governments are also paying attention to user experience and feedback, as citizen uptake determines the success of these services.

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Without a doubt, citizen engagement through e-government is growing in West Africa. However, it is still constrained by low internet access, limited awareness, and sometimes a lack of trust in government responsiveness. There are promising signs in countries that have actively pursued open government and e-participation. To fully realise e-government's democratic potential, African states will need to invest in user-centric design, promote digital civic education, and ensure that feedback collected via electronic means genuinely informs policy, thereby closing the feedback loop and strengthening public trust in e-governance.

Transparency, Accountability and Anti-Corruption

A primary driving force behind e-government adoption in Africa is the prospect of enhancing transparency and combating corruption [35]. Governments can reduce human discretion and opaqueness that often breed corruption, especially in public finance and service delivery, by digitising records and procedures [36]. Empirical research in Africa supports this: analyses have found that countries with higher e-government development tend to have lower perceived corruption, suggesting that ICTs can "diminish corruption through increased transparency [37]. In West Africa, where corruption has historically hindered development, several e-governance initiatives explicitly target financial mismanagement and bureaucratic graft.

Nigeria presents a notable example of utilising e-governance as an anti-corruption strategy. Over the past decade, the Nigerian government implemented a suite of Public Financial Management (PFM) reforms underpinned by ICT, including the Treasury Single Account (TSA), Integrated Personnel and Payroll Information System (IPPIS), Government Integrated Financial Management System (GIFMIS), and biometric banking identification (BVN) [33]. Each of these has improved transparency in specific ways. TSA is a centralised electronic treasury system consolidating all government revenue and payments [33]. It centralises funds and closes thousands of extra-budgetary accounts, thereby "mitigating revenue leakages" and ensuring oversight of all public monies [37]. Since its full adoption around 2015, the TSA in Nigeria has been credited with curbing embezzlement by making it harder to divert funds into hidden accounts [33].

These digital tools, supported by legislation and political will, collectively show how e-governance can close loopholes for corruption. According to an analysis by Nigeria's accounting and anti-corruption experts, such initiatives have "significantly reduced cases of ghost-workers and non-payment of pensions" and facilitated transparency in financial management, taxation, and licensing [33]. They also note that moving away from cash to e-payments ("cashless policy") directly reduces opportunities for petty bribery by eliminating untraceable cash transactions [33]. The positive impact in Nigeria is echoed in other countries; for example, Ghana's digital procurement system and Rwanda's e-procurement platform (Umucyo) have reportedly increased competition and reduced bid rigging in government [33].

Another facet of e-government's transparency agenda is the use of open government data (OGD) and Freedom of Information (FOI) laws. Governments can enable citizens and civil society to hold officials accountable by publishing datasets (budgets, spending, service delivery metrics, etc.) online for public scrutiny. In Africa, about 117 countries worldwide have some form of OGD initiative (as per the UN's pilot index) [3]. Many African states have introduced FOI laws (Nigeria enacted a FOI Act in 2011, Ghana in 2019, etc.). However, implementation is uneven; only about half of African countries have robust legal frameworks for access to information and even fewer actively maintain open data portals. Nigeria and Ghana both launched open data portals around the mid-2010s; Nigeria's portal (data.gov.ng) initially released datasets on government spending and services. While usage started slowly, such portals are gradually being integrated with broader e-government systems. The UN 2022 Survey notes that making open data available increases transparency and accountability, and many countries are now realising that OGD and e-participation go hand in hand [3]. For example, if budget data is transparent, citizens can participate more effectively in budget hearings with facts in hand. In West Africa, Senegal has also made strides by incorporating an open data chapter into its digital strategy, recognising that transparency is crucial for establishing trust in e-government [4].

On the macro level, early evidence suggests a correlation between e-gov and reduced corruption perceptions. An IMF working paper in 2022 found that digitalisation, such as automating tax administration, helped deter corruption in African public sectors and improved trust in institutions [38]. Nonetheless, challenges remain. Technology can curb certain types of corruption, but it may also shift corrupt behaviour into new forms, like

cyber-fraud or manipulation of digital systems [38]. Additionally, if not carefully implemented, e-government systems could lack transparency themselves or be subject to misuse. Therefore, the literature urges continued oversight and independent audits of digital systems to ensure they are indeed delivering on anti-corruption promises [39].

Without a doubt, e-government in Africa has proven to be a valuable tool for combating corruption, making government processes more transparent and traceable. Nigeria's experience with TSA, IPPIS, and related systems is often cited as a case where digital reforms led to tangible savings and greater accountability. However, success requires more than just technology: strong political will, legal reforms, and capacity building for civil servants are critical to sustain these gains. West African countries are encouraged to continue expanding their e-governance reforms and to embrace open data and civic tech innovations that empower citizens to monitor government performance. This multi-pronged approach can gradually help entrench a culture of transparency and reduce the historically high levels of corruption in the region.

Cybersecurity and Data Privacy

As governments digitise services and data, cybersecurity and data protection have become pressing concerns in Africa's e-government landscape. The rise in connectivity has, unfortunately, been accompanied by an increase in cyber threats [40]. Africa experienced the highest average number of weekly cyber attacks in 2023 compared to other regions, and cybercrime in 2021 was estimated to have caused a 10% reduction in Africa's GDP [40]. These figures underscore that African e-government systems, often with nascent security measures, are attractive targets for cybercriminals. Additionally, many African citizens are new internet users who may be vulnerable to online scams and privacy violations, making cybersecurity not only a technical imperative but also a public trust issue.

Similarly, there has been progress in establishing cybersecurity policies across the continent, but significant gaps remain. As of 2024, 39 out of 54 African countries have enacted some form of cybersecurity legislation, including cybercrime laws and laws protecting critical infrastructure. This is an improvement from a decade ago, but it means about 15 countries still lack a fundamental cyber law. Moreover, coordination and standards vary widely, with little alignment between states in cybersecurity policy [41]. For instance, only 15 countries have ratified the African Union's Malabo Convention on Cybersecurity and Data Protection (2014), which establishes a baseline for cyber norms and personal data protection [40]. Nigeria passed a Cybercrimes Act in 2015 and has a National Cybersecurity Policy. Ghana enacted a Cybersecurity Act in 2020 and established a Cybersecurity Authority. These national efforts signal recognition of the threat, but many other West African states are still drafting or debating similar frameworks. Data protection laws are similarly patchy: while a few countries like Nigeria have introduced regulations, Kenya enacted a Data Protection Act in 2019 [23]. However, many others lack comprehensive privacy laws, meaning citizens' personal data in e-government systems may not be adequately safeguarded or may only be protected by broad constitutional privacy clauses.

A core issue highlighted in policy discussions is the lack of cybersecurity capacity and resources. Africa faces a shortage of trained cybersecurity professionals, an estimated 100,000 additional professionals are needed as of 2020 to meet the demand [40]. In stark contrast, the United States has approximately 500,000 cybersecurity workers, whereas Nigeria has only around 5,000 for its 200 million people [40]. This gap in expertise means that many government IT systems are maintained by staff without specialised security training, increasing vulnerability to breaches. Furthermore, much of the software and hardware in use is outdated or unpatched, as budget constraints make regular upgrades difficult. The combination of obsolete technology and low digital literacy among users creates fertile ground for incidents such as phishing attacks, data leaks, and ransomware. Indeed, users who are not educated about cybersecurity hygiene can inadvertently compromise systems, for example, through weak passwords or falling victim to scams, illustrating how the lack of digital literacy is another significant barrier to improving cybersecurity in Africa.

Although detailed public reporting is limited, there have been instances of cyberattacks on African government systems [42]. These incidents have prompted governments to take cybersecurity more seriously, often with international support [42]. Multilateral efforts, such as the Cybersecurity East Africa and West Africa initiatives, and support from organisations like the World Bank and the ITU, are helping to establish Computer Emergency

Response Teams (CERTs) and train staff in many countries. Regional bodies, such as ECOWAS, have also developed regional cybersecurity frameworks and encouraged information sharing among the cybersecurity agencies of member states [43].

A significant discussion in literature concerns the balance between the push for open, accessible e-government and the need for security and privacy. For instance, publishing open data and providing APIs for e-services can spur transparency and innovation, but it can also expose sensitive information if not properly vetted. Similarly, digital ID systems significantly enhance service delivery and inclusion, but also become high-value targets for hackers and raise privacy concerns when data governance is weak. The Global Voices report (2025) highlights concerns about data exploitation by foreign tech firms in Africa and the absence of robust data protection in many countries, warning that Africa's data could be extracted and monetised by foreign corporations without benefit to locals [23]. It commends Nigeria's NDPR and similar laws as significant steps, but notes that they are exceptions rather than the norm [23]. Indeed, enforcement is a significant gap, even where laws exist, lack of regulatory capacity means companies or government agencies may not fully comply with data protection standards.

Cybersecurity and privacy are the Achilles' heel of Africa's e-government growth. There is clear evidence that more secure digital environments are needed. When citizens fear for their data privacy or the integrity of online services, they will hesitate to use e-services, undermining adoption. Thus, strengthening cybersecurity is not only about preventing attacks but also about building trust in e-government. Policy recommendations from experts include accelerating the adoption of continental frameworks, such as the AU's conventions; investing in cybersecurity training; updating legal frameworks to criminalise cyber offences and protect users; and incorporating security-by-design into all new e-government systems. Interestingly, initiatives such as the newly formed African Network of Cybersecurity Authorities (ANCA) under Smart Africa are creating platforms for collaboration and capacity building. As Africa's digital transformation continues, ensuring secure connections, not just connections, is vital, meaning that cybersecurity must be seen as an integral part of the digital government infrastructure, not an afterthought.

Public Service Delivery and Digital Service Uptake

At its core, e-government is designed to enhance public service delivery, making it more efficient, accessible, and user-friendly [20], [44]. In Africa, the impact of e-government on service delivery presents a mixed but generally positive picture, with clear examples of benefits alongside ongoing challenges in service uptake and quality [31].

Over the past five to ten years, African governments have significantly increased the number of services available online. The 2022 UN E-Government Survey noted a "remarkable improvement" in online service provision globally, with Africa being part of this trend [3]. By 2022, even some lower-income African countries had launched transactional e-services, such as online business registration, e-tax filing, passport applications, where previously there were none [3]. Notably, Nigeria, for the first time, offered 20+ online public services across various **sectors** including business licensing and government payments [3]. Similarly, countries such as Rwanda, Angola, Egypt, and South Africa have also crossed the 20-service threshold, which the UN described as a noteworthy milestone for the continent. In West Africa, Ghana has developed approximately 26 e-government platforms, according to recent counts, covering services ranging from driver's license renewals to healthcare appointments [45]. It has been recognised for its relatively well-developed G2C basics [45]. Smaller countries like Cape Verde have also digitised many services/. This expansion demonstrates a clear commitment to leveraging technology for service delivery.

The shift to digital platforms, as documented in various studies, has reduced processing times and increased convenience for citizens. For example, the process of registering a new business in many West African countries used to involve numerous in-person visits and bureaucratic hurdles; now, with online one-stop-shop portals, like Nigeria's Corporate Affairs Commission e-registration or Ghana's eRegistrar, the time and cost to start a business have dropped significantly [3]. Online tax filing systems have made it easier for citizens and businesses to comply with tax obligations, boosting revenue collection while minimising face-to-face interactions that could facilitate bribery. A Brookings study (2020) on Ghana's digital public services noted improvements in government responsiveness and some cost savings thanks to these digital platforms [46]. Furthermore, digital

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delivery proved crucial during the COVID-19 pandemic, governments that had digital portals could continue offering services even when physical offices closed, thereby enhancing their resilience.

However, despite availability, a recurring challenge is the low uptake of certain e-services [47]. Multiple sources note that having a service online does not guarantee that citizens will use it, especially if they are accustomed to paper-based processes or distrust the online system. For instance, even with online portals, many Nigerians still initially preferred to obtain certain documents in person due to concerns about online payment security or simply a lack of awareness of the digital option [1]. Over time, this is changing as digital literacy improves and success stories spread. Still, governments have had to invest in public awareness campaigns and support to drive usage. Another issue is that some e-services launched have been incomplete or faced technical hitches, which can discourage users. A study on e-governance implementation in Nigeria's public sector found that resistance to change within public institutions and occasional technical failures meant some officials and citizens revert to old manual ways, hindering full adoption [1].

African e-government has begun to enhance public service delivery tangibly, but the benefits are unevenly distributed. Countries like Ghana and Nigeria now offer a broad array of digital services. Yet, they still face the challenge of onboarding all citizens to these platforms and ensuring consistent service quality. The literature calls for the regular evaluation of e-governance initiatives' impact on outcomes such as efficiency, transparency, and citizen satisfaction, a task that currently presents a considerable knowledge gap in Nigeria and similarly in other African countries. As we advance, it will be important for governments not just to roll out e-services but also to monitor their performance, gather user feedback, and iterate on design. Additionally, maintaining a human touch and addressing the broader socio-economic barriers to access will determine how universally beneficial Africa's e-government revolution can be.

Policy Frameworks and National Strategies

The development of e-government in Africa has been guided by various policy frameworks, strategies, and institutional setups at both national and regional levels [31]. These frameworks outline goals for digital governance and often address the cross-cutting issues needed for e-government to flourish [31]. However, the effectiveness of these strategies varies, and policy gaps remain where implementation has not caught up with ambition.

Most African countries have recognised the need for clear e-government strategies and have laid out plans; however, implementation gaps are evident in the varying outcomes. Countries that paired strategy with sustained investment and reform (like Ghana) have pulled ahead in e-gov rankings [3]. Others have excellent plans on paper but slower realisation (like Nigeria, which, despite a comprehensive master plan, still struggles with infrastructure and institutional bottlenecks [1]. The literature suggests that aligning policy with realistic resource allocation, setting measurable targets, and monitoring progress is key. International benchmarks like the UN EGDI are useful to track progress, and indeed Nigeria's recent strategies reference improving its EGDI score as an objective [1]. From now on, adapting policy frameworks to address emerging issues, such AI in government, digital sovereignty concerns, and the environmental impact of digital infrastructure, will also be necessary as part of future-proofing Africa's e-government agendas.

In addition to infrastructure and institutional capacity, a new set of governance questions is beginning to shape the future of digital government in West Africa. As public agencies adopt artificial intelligence tools, practical concerns arise around accountability for algorithm-driven decisions, the detection and mitigation of bias, and transparency in automated processes that affect citizens. At the same time, questions of digital sovereignty are becoming more pronounced. Many government platforms depend on foreign cloud services and external technology providers, raising issues about data localisation, control over national data assets, and long-term strategic autonomy. Cross-border data flows within ECOWAS further complicate matters, particularly where cybersecurity and data protection standards differ across countries. To address these issues, deliberate regional coordination are required to ensure that digital transformation proceeds in a manner that safeguards accountability, national interests, and citizens' rights.

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Regional Comparisons and West African Cases

To understand e-government adoption in West Africa, it is instructive to compare national trajectories, as they illustrate how different contexts and strategies yield different outcomes. Table 1 compiles comparative indicators from the United Nations E-Government Survey 2022, supplemented with information from national digital strategies and peer-reviewed analyses to contextualise implementation trajectories across selected West African countries.

Table 1. E-Government Development in Selected West African Countries

Country	UN EGDI 2022 (value)	EGDI Rank 2022	E-Participation Index 2022	Notable E-Gov Initiatives and Strategy
Ghana	0.5824 (High)	106	0.5342 (Medium)	National Digital Strategy; Online portals for taxes, business registration, passport, etc. Widely implemented mobile money integration for services.
Cabo Verde	0.5660 (High)	110	0.4143 (Medium)	E-Governance Strategic Plan focusing on connectivity across islands; high internet penetration relative to region; strong political support for ICT in public services.
Nigeria	0.4525 (Middle)	144	0.5662 (High)	National e-Gov Masterplan; Integrated Financial Systems (TSA, IPPIS, etc.) for transparency; various online portals (e.g., for government services, open data) but uneven uptake; significant infrastructure deficits in rural areas.
Senegal	0.4479 (Middle)	143	0.5268 (High)	"Digital Senegal 2016–25" strategy; strong e-ID (biometric ID card) program; developing online platforms for key services (e.g., e-tax, e-health); relatively good mobile broadband coverage in urban areas.
Côte d'Ivoire	0.5467 (High)	120	0.3681 (Medium)	Moved up to High EGDI in 2022[88]; national digital plan emphasizing e-services and e-commerce; improvements in telecom infrastructure recently (e.g., backbone network).

Sources: UN E-Government Survey 2022; UN E-Participation Index 2022; country reports. (E-Participation values for some countries from UN data not explicitly given above; South Africa added for context).

Table 1 highlights that cross-country variation in e-government development within West Africa cannot be explained by policy presence or economic size alone. Ghana records a higher EGDI than Nigeria, even though Nigeria has pursued multiple flagship digital reforms. This divergence is consistent with evidence that adoption and sustained use depend on the coherence of implementation arrangements and the extent to which services are integrated into routine administrative workflows, rather than on the mere availability of portals or platforms [5], [7]. In adoption terms, this suggests that "facilitating conditions" operate at a systemic level in West Africa, where institutional and infrastructural constraints can limit the translation of behavioural intention into actual use [7].

Cabo Verde's relatively strong EGDI positioning reinforces the importance of governance coherence and service integration. Although smaller in scale, Cabo Verde's performance is consistent with comparative African evidence showing that countries with relatively stronger online service maturity and more coordinated service provision tend to achieve higher composite performance indicators, even when structural constraints persist [8].

The implication here is not that smaller countries face fewer constraints, but that a narrower service scope can sometimes enable more consistent end-to-end implementation, thereby improving measured digital government performance.

Nigeria's profile is analytically instructive because it suggests a possible mismatch between institutional ambition and implementation depth. While Nigeria's digital reforms include financial management and accountability-oriented systems, empirical studies indicate that uptake remains uneven and strongly conditioned by access constraints and institutional bottlenecks [7]. Related work on Nigeria's electronic identity adoption also points to the importance of credibility and trust-proximal factors in shaping participation in core digital governance infrastructure [6]. These findings provide a plausible explanation for why visible reform activity may not translate into proportionate improvements in EGDI performance: backend integration, service reliability, and trust-enabling safeguards shape whether reforms become routinely used public services.

Senegal and Côte d'Ivoire represent intermediate trajectories characterised by measurable progress alongside uneven consolidation. Senegal's emphasis on foundational systems such as digital identity and service platforms provides the institutional basis for scaling, but adoption outcomes are still likely to depend on how reliably such systems function across sectors and population groups. Côte d'Ivoire's movement into the "high EGDI" category in 2022 aligns with evidence that improvements in telecommunications infrastructure and service expansion can lift measured performance, yet the durability of such gains depends on the extent to which systems are trusted and safeguarded [48]. Evidence from large-scale synthesis work on trust, risk, privacy, and security in e-government use further supports the interpretation that trust mechanisms affect not only citizen willingness to adopt services but also the legitimacy and continuity of digital public service systems [48].

Without a doubt, the comparative pattern suggests that higher EGDI positioning in West Africa is more consistently associated with implementation coherence, service integration, and trust-enabling governance than with strategy articulation alone.

While infrastructural investment is consistently identified as foundational to digital government development, the reviewed evidence does not demonstrate a uniformly linear relationship between infrastructure expansion and adoption outcomes. Nigeria, for example, has implemented significant financial management and digital service reforms, yet improvements in composite performance indicators and sustained citizen uptake remain moderate [7]. Comparative African evidence further indicates that infrastructure upgrades, when not accompanied by administrative integration and trust-enhancing safeguards, may increase service availability without generating routine usage [9]. These divergent findings suggest that infrastructure constitutes a necessary but insufficient condition for adoption, and that institutional coherence and governance credibility determine whether structural investments translate into measurable outcomes.

Analytical Synthesis and Conceptual Implications

A cross-study synthesis of the reviewed literature reveals three recurrent explanatory mechanisms shaping e-government adoption in West Africa. First, infrastructural adequacy operates as a foundational structural condition. Empirical evidence from Nigeria demonstrates that citizen engagement with digital monitoring and public service platforms remains strongly influenced by facilitating conditions, including connectivity reliability and technological access, even where attitudinal support for digital tools is present [7]. This finding suggests that technology acceptance constructs such as perceived usefulness and ease of use, while important, are insufficient explanatory variables in contexts where infrastructural constraints remain binding. Adoption outcomes in West Africa therefore require theoretical interpretation that embeds individual-level acceptance variables within broader infrastructural realities.

Second, institutional capacity mediates implementation outcomes. Comparative African evidence indicates that variation in e-government performance correlates closely with governance quality, regulatory coherence, and administrative capability [9]. Where coordination mechanisms are fragmented and enforcement institutions are weak, policy ambition does not consistently translate into functional service delivery. This pattern supports institutional theory perspectives, which emphasise that digital reforms are conditioned by organisational alignment and regulatory legitimacy rather than technological deployment alone. Evidence from Senegal's

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digital transition further illustrates that strategic frameworks require complementary institutional capacity to generate sustained implementation effects [4].

Third, trust and cybersecurity governance function as reinforcing determinants of sustained adoption. Recent research on trust, privacy, and security in digital government environments demonstrates that perceived data protection, system integrity, and cybersecurity assurance significantly influence continued usage intentions [48], [48]. Similarly, analyses of data protection enforcement in African contexts indicate that legal frameworks without effective compliance mechanisms fail to produce durable trust in digital platforms [49], [50]. These findings extend public value theory by showing that trust is not merely an outcome of digitalisation but an enabling condition for its consolidation.

Viewed as a whole, the evidence supports a layered explanatory model of e-government adoption in West Africa. Infrastructural readiness constitutes the enabling foundation. Institutional capacity acts as a mediating mechanism translating policy into interoperable and functional services. Trust-based governance, supported by credible enforcement of cybersecurity and data protection, reinforces sustained uptake and legitimacy. Divergent national trajectories within the sub-region can therefore be interpreted not simply as differences in policy ambition or strategy formulation, but as variations in the interaction between structural conditions, institutional coherence, and trust-generating governance mechanisms.

Conceptual Model of E-Government Adoption in West Africa

Synthesising the preceding analysis, the review supports a layered conceptual structure for explaining e-government adoption in West Africa (Figure 1). At the foundational level lies the structural layer, comprising infrastructural readiness variables such as broadband connectivity, electricity reliability, and system interoperability. These conditions determine the feasibility of digital service deployment and access. The second level represents the institutional layer, which encompasses regulatory coherence, administrative capacity, policy alignment, and inter-agency coordination. This layer mediates the translation of digital strategies into functional and integrated public services. The third level constitutes the trust layer, including cybersecurity governance, data protection enforcement, transparency mechanisms, and perceived system integrity.

This layer reinforces sustained citizen engagement and long-term legitimacy of digital platforms. These layers interact cumulatively rather than independently. Structural deficiencies constrain institutional effectiveness, while weaknesses in trust-based governance undermine continued use even where infrastructure and administrative capacity exist. The proposed model refines prevailing adoption frameworks by situating technology acceptance within broader governance and institutional conditions characteristic of West African states.

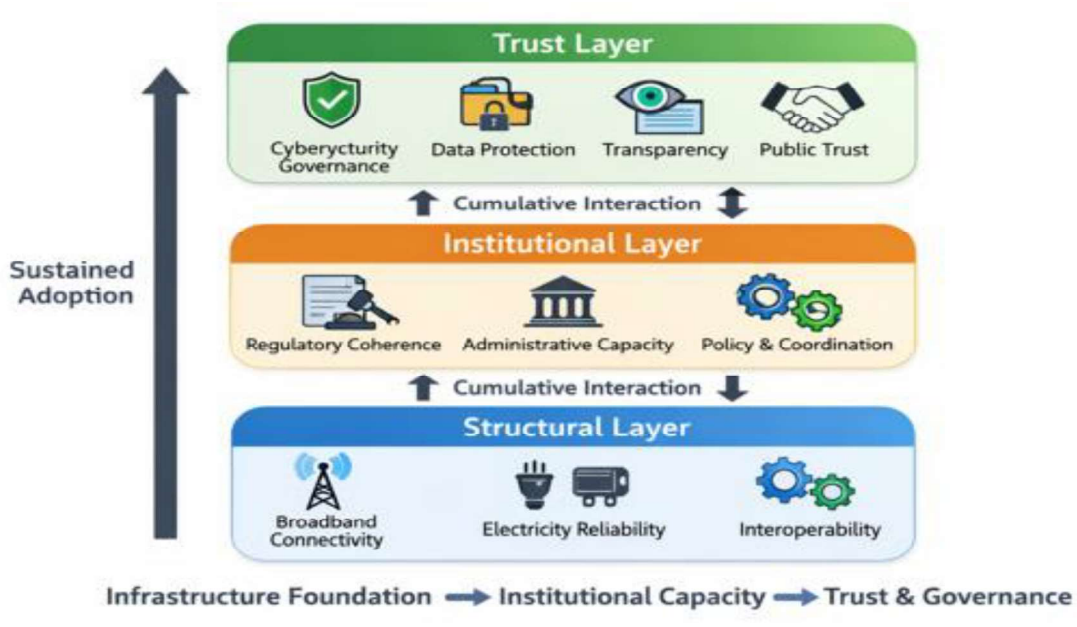

Figure 1. Conceptual Model of E-Government Adoption in West Africa.

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The figure illustrates a layered explanatory framework in which infrastructural readiness forms the structural foundation, institutional capacity mediates implementation effectiveness, and trust-based governance reinforces sustained adoption. The model depicts cumulative interaction across layers, highlighting how structural constraints, institutional coherence, and trust mechanisms jointly shape e-government trajectories within West African contexts.

For empirical validation, the proposed layered model may be operationalised using measurable constructs aligned with each analytical layer. Infrastructural readiness may be assessed using indicators such as broadband penetration rates, electricity reliability indices, and system interoperability measures drawn from ITU and World Bank datasets. Institutional capacity may be examined through variables including regulatory coherence, digital strategy implementation monitoring, inter-agency integration, and administrative ICT training levels. Trust-based governance may be measured using the presence and enforcement of cybersecurity legislation, operational data protection authorities, and survey-based trust indices. Such operationalisation enables future multi-level quantitative testing of the model across West African contexts.

Research and Practice Implications

A critical reading of the reviewed evidence indicates that the constraints discussed above have implications that extend beyond policy design to the way e-government adoption is conceptualised, measured, and implemented in West Africa. Accordingly, the following implications therefore distinguish between priorities for academic inquiry and considerations for practice, based on the reviewed evidence.

Academic Implications

1. Digital Inclusion as a Structural Boundary Condition

Empirical evidence across African contexts indicates that infrastructural readiness and facilitating conditions significantly shape e-government adoption outcomes. In Nigeria, facilitating conditions and access constraints were found to moderate adoption intentions even where perceived usefulness was high [7]. Similarly, cross-country African evidence demonstrates that infrastructural support and governance effectiveness jointly explain variation in digital government performance [9]. These findings suggest that technology acceptance models require contextual extension when applied in low-infrastructure environments.

2. Institutional Capacity as an Explanatory Mechanism

Comparative research in Sub-Saharan Africa indicates that institutional coherence and administrative effectiveness are strongly associated with e-governance maturity [9]. In Ghana, business adoption of digital government services was influenced not only by technological readiness but also by institutional credibility and service integration [51], [52]. This supports a shift from strategy description toward modelling institutional capacity as a mediating variable in adoption studies.

3. Trust, Risk, and Security as Determinants of Sustained Use

Meta-analytic structural modelling evidence shows that perceived trust, privacy, and security significantly influence behavioural intention and continued usage of e-government platforms [53]. In the African context, electronic identity adoption studies further demonstrate that credibility and system integrity affect citizen participation in core digital governance systems [54], [55]. These findings reinforce the need to integrate trust constructs more systematically into West African adoption research.

4. Interoperability And Enterprise Architecture As Under-Theorised Variables

Enterprise architecture scholarship highlights that fragmentation and lack of interoperability constrain digital transformation in developing public sectors [56]. Yet, interoperability is often treated descriptively rather than analytically in African e-government literature. Incorporating architecture maturity and cross-agency integration metrics could strengthen explanatory models of uneven implementation outcomes.

Practitioner Implications

1. Prioritising Implementation Coherence Over Strategy Volume

Cross-national African evidence indicates that governance effectiveness is more predictive of digital government outcomes than the mere existence of digital strategies [9]. This suggests that implementation arrangements, enforcement capacity, and administrative coordination require prioritisation over additional policy formulation.

2. Embedding Trust and Security in System Design

Given the established influence of trust, privacy, and security on usage intentions [48], [48], cybersecurity governance and data protection enforcement should be embedded into implementation design rather than treated as post-deployment safeguards.

3. Addressing Inclusion Through Access and Usability

Studies in Ghana and Nigeria show that inclusion barriers, including affordability and service usability, influence digital uptake [56], [57]. Addressing these constraints is therefore essential for translating digital reform into measurable service usage.

4. Strengthening Physical and Technical Infrastructure Foundations

Beyond Internet penetration alone, recent evidence underscores that electricity reliability, broadband stability, and interoperable ICT architectures remain structural determinants of sustained digital public service performance in African contexts [9], [27]. Practitioners should therefore align digital reforms with broader infrastructure investments, ensuring that platform expansion does not outpace foundational system capacity.

Limitations

This review has certain limitations. Although structured search procedures were applied, the narrative design does not provide the statistical exhaustiveness of a systematic meta-analysis. The distribution of empirical evidence is also uneven, with Nigeria and Ghana more frequently represented than smaller West African states. In addition, reliance on composite indicators such as the EGDI may mask subnational and sector-specific variations in adoption outcomes. These constraints should be considered when interpreting the findings.

CONCLUSION

E-government adoption in West Africa has transitioned from isolated digitisation efforts to an increasingly institutionalised component of governance reform. This review addressed three guiding questions: the structural and institutional barriers shaping adoption, the variation in national implementation trajectories, and the cross-cutting explanatory patterns emerging across infrastructure, governance capacity, and service delivery domains. The synthesis demonstrates that uneven progress across the sub-region is not merely a function of policy intent, but reflects layered constraints in infrastructural readiness, institutional coordination, and trust-related governance mechanisms. The findings show that infrastructural deficits condition the feasibility of digital service deployment; institutional capacity mediates implementation effectiveness; and cybersecurity governance and data protection reinforce sustained usage and legitimacy. Comparative evidence from Ghana, Nigeria, Senegal, Cabo Verde, and Côte d'Ivoire illustrates that countries demonstrating regulatory coherence, coordinated digital strategies, and stronger administrative alignment achieve more consistent adoption outcomes, even where economic resources are limited.

Theoretically, this review contributes by refining prevailing e-government adoption frameworks through a layered explanatory model tailored to low- and middle-income governance contexts. While models such as TAM, UTAUT, and public value theory explain individual-level acceptance, the evidence from West Africa indicates that these models require contextual embedding within structural and institutional conditions. Accordingly, this study advances a three-tier conceptual structure in which infrastructural readiness forms the foundational layer, institutional capacity operates as a mediating mechanism, and trust-based governance

functions as a reinforcing determinant of sustained adoption. Practically, the review clarifies that execution, coordination, and regulatory enforcement are more decisive than the mere existence of digital strategies. The analysis suggests that governments must prioritise interoperability, administrative capability, and enforceable cybersecurity frameworks if digital transformation is to translate into measurable service outcomes.

Future research should extend comparative cross-country analyses beyond dominant cases such as Nigeria and Ghana, incorporate longitudinal designs to examine policy durability across political cycles, and empirically test the proposed layered model using multi-level analytical approaches. Greater integration of institutional theory and adoption models will be necessary to explain how structural constraints interact with behavioural determinants in African contexts.

E-government in West Africa represents not only a technological reform but also a broader socio-institutional transformation. Progress is evident, yet sustained advancement depends on alignment between infrastructure, governance coherence, and trust mechanisms within an integrated framework. This review consolidates fragmented regional evidence and presents a context-sensitive adoption model, which strengthens theoretical understanding and offers practical insights for both research and implementation.

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