
Artificial Intelligence and Digital Transformation in Public Service Delivery in Bangladesh: Prospects and Obstacles

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ABSTRACT

This article explores the implications for the principles of Digital Era Governance (DEG) and the proposed third wave of digital transformation in Bangladesh as a result of the nation's digital transformation over the past decade and the growing application of Artificial Intelligence (AI) in public services. It is a qualitative descriptive study that features a PRISMA systematic literature review of 2010–2026 peer-reviewed and selected contextual studies, thematically coding evidence across five service domains (health, education, land, finance, and e-governance) for reintegration, needs-based holism, digitization changes, and algorithmic augmentation/accountability. The review identifies strong but uneven progress on digitization; selective advances in needs-based holism; and only incipient reintegration, with AI deployments remaining a set of fragmented pilots plagued by digital divides, infrastructural gaps, inadequate data protection and cyber security regimes, skills shortages, institutional fragmentation, politicized regulation, and reliance on foreign technologies. The article adds to DEG by highlighting the legal-political safeguards, intermediary actors, and technology sovereignty as aspects of third-wave governance in the Global South. In practical terms, it suggests that inclusive public value through AI in Bangladesh can only be realized through co-sequenced investments in rural connectivity, data and identity infrastructure, capacities of civil-service and local intermediary organizations, rights-respecting data-AI governance frameworks and an independent algorithmic accountability mechanism, and provides a grounded roadmap for policymakers and a transferable framework for other lower-middle-income nations.

A. INTRODUCTION

Digital transformation is one of the most prominent governance experiments in the Global South, taking place in Bangladesh. Introduced in 2008 as the Digital Bangladesh Vision 2021, and revamped in 2023 as Smart Bangladesh 2041, the program has created a dense digital infrastructure: the Access to Information These reforms have decreased the time, cost, and number of visits to access routine government services, and played a critical role in keeping services going throughout the COVID-19 pandemic (Khatun et al., 2023a; Uddin Ahmed et al., 2022a).

But behind the jubilatory story lies underlying structural conflicts. Internet access in rural areas is still unequal, internet literacy is low, data-protection laws are still young, and the Digital Security Act

2018, which has since been repealed (and replaced with the Cyber Security Act 2023), instilled a chilling effect on digital civic engagement and journalism (Rahman & Rashid, 2020a). The issue of the sufficiency of institutional, legal, and ethical underpinnings of an AI-era state becomes urgent as the government shifts towards digitization, and implements chatbots in MyGov, testing AI triage in DGHS, and even suggesting algorithmic taxpayer risk-scoring to the National Board of Revenue (Androutsopoulou et al., 2019; Madan & Ashok, 2023a; Wirtz et al., 2019).

This paper poses three research questions that are interrelated. To begin with, to what extent has the digital transformation in Bangladesh achieved the three main themes of the Digital Era Governance (DEG) theory of reintegration, needs-based holism, and digitization changes in critical areas of the government? Second, what opportunities does AI present to take DEG into a "third wave" of public-service reform within the context of a lower-middle-income country? Third, what are the barriers (infrastructural, institutional, legal, ethical, and political) that have to be overcome to ensure that AI does not recreate or exacerbate the forms of inequity that already exist? The aims are thus to synthesize ten years of peer-reviewed evidence, to map the services of Bangladesh to the themes of DEG, and to draw grounded policy suggestions.

The article is an addition to three literatures. It applies third-wave DEG theorizing (Dunleavy & Margetts, 2025a) outside the high-income OECD contexts where it was developed, in response to Clarke (2020a), who urges putting DEG to the test in comparative contexts. It adds to the existing literature on the AI-in-public-sector, which is still predominantly focused on European and North American examples (Medaglia et al., 2023; Zuiderwijk et al., 2021a), with a South Asian focus. And it addresses ICT4D scholarship on digital-for-development paradigms (Heeks, 2020a) by asking the question of whether AI is a real leap in development or a strengthening of power imbalances.

Digital Era Governance has appeared as an alternative to New Public Management (NPM) in the mid-2000s. Dunleavy, Margetts, Bastow, and Tinkler (2005a), in their historic article, argued that NPM had reached a dead end or was now reversing its course in high-democracy nations and could not cope with service delivery falling to bits, a proliferation of agencies, and the complexity that Information and Communication Technology (ICT) was about to render tractable. Three master themes were suggested by them as the quasi-paradigm of the new age. Reintegration is a process of reversing the NPM-induced fragmentation by joining-up agencies, shared services, and whole-of-government platforms. Needs-based holism reconfigures service architectures around customer life-events, not bureaucratic silos, and the focus on one-stop access, the segmentation of user groups, and the use of interactive self-service. The concept of digitization changes is a replacement of paper-based processes with electronic processes, the creation of digital-native service designs, and open-book governance through data transparency. In this expression, DEG was a key innovation in the running of the public sector, beyond the market-mimicking logic of NPM (Dunleavy, 2005a).

Margetts and Dunleavy (2013) expanded on this framework to the second wave, whereby social media, open data, and behavioural analytics transformed the interaction between citizens and the state. They outlined a so-called quasi-paradigm where the governments would learn continuously based on the web-scale information, incorporate nudges, and be platform-based, but not bureaucratic. In a bibliometric review of references to the 2006 article, Cho (2023) reveals that DEG is now one of the most frequently cited frameworks in modern public administration, giving rise to its applications in open government (Clarke, 2020b), digital government units (Clarke, 2020b), and comparative study of reforms (Lindquist, 2022; Pollitt & Bouckaert, 2017).

The latest is the Dunleavy and Margetts (2025b) article, Data science, artificial intelligence and the third wave of digital era governance, which states that the qualitatively new stage is undergirded by machine-learning systems, large language models, predictive analytics, and generative AI. Third-wave DEG is defined by algorithmic decision-support, automated casework, ongoing behavioural measurement, and what the authors term policy feedback using computation. Importantly, they caution that third-wave DEG can run the risk of recreating the very pathologies it is designed to address: the ability to be opaque can take the place of fragmentation; the failure to outsource properly can be recreated by vendors using algorithms; personalization based on data can lead to surveillance. Criado, Sandoval-Almazan, and Gil-Garcia (2025) place AI governance in a similar context, at micro, meso, and macro levels, pointing to further challenges of capacity, data quality, and reliance on foreign technologies that developing countries face.

It is not easy to apply DEG to a Global South scenario. Heeks (2020a) notes that a paradigm of digital-for-development in low- and middle-income states usually means paving the cow paths, i.e.,

digitization of already existing bureaucratic systems, without structural reintegration. Siddiquee (2016a) and Imran and Gregor (2010a) claim that the initial e-government initiatives in Bangladesh mostly automated front-end services without addressing the backend, which is not consistent with the concept of the DEG-type reintegration. However, recent experience with UDCs, the whole-of-government innovation platform by a2i, and MyGov service bus indicates that Bangladesh has been drifting towards holistic and needs-based designs (Faroqi et al., 2019a; Siddiquee & Faroqi, 2022a; Zafarullah & Ferdous, 2021a). The theoretical value of this article is thus to pose the question whether the three themes of DEG (an additional fourth dimension of algorithmic governance in the AI-era) can provide a sufficient prism through which to understand the path of Bangladesh, or whether a Global South-specific extension is required.

B. METHOD

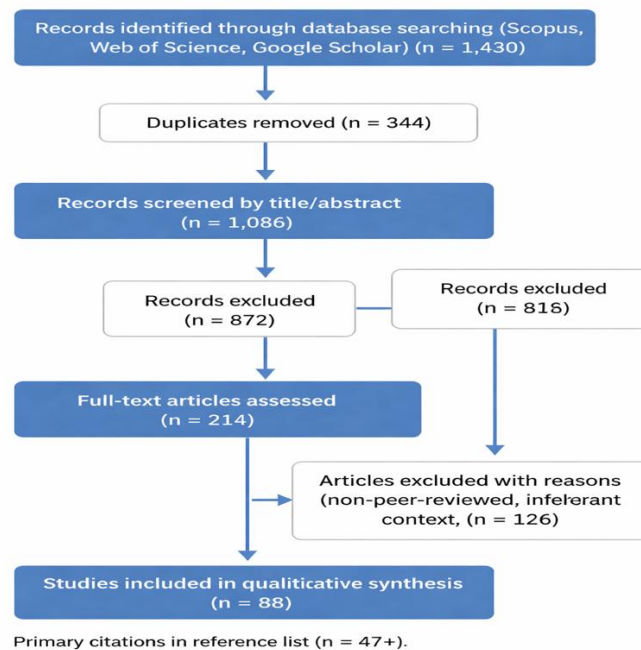
The study is based on a qualitative descriptive research design and operationalized with a systematic literature review (SLR) that follows PRISMA principles. A qualitative descriptive method is suitable when the aim is to generalize scattered empirical and theoretical data on a multi-dimensional phenomenon - here, the combination of AI, digital transformation, DEG theory, and the Bangladesh public sector.

The search took place between 2015 and 2026 in Scopus, Web of Science, and Google Scholar, as well as direct searches of high-ranking journals in the area of public administration and information systems. Search terms were a combination of the following Boolean clusters: ("artificial intelligence" OR machine learning" OR "algorithm") AND (Bangladesh" OR South Asia" OR Global South" OR developing country) and service-specific terms (a2i" OR Union Digital Centre" OR Shastho Batayon" OR e-Mutation" OR bKash" OR Nagad" OR "Muktapaath" OR "Teachers Portal" OR "Smart Bangladesh").

Only the peer-reviewed journal articles in English published between 2010 and 2026 were included due to the canonical reasons; three articles by Dunleavy et al. (2005b), Mittelstadt et al. (2016a), and Floridi et al. (2018a) were included. The research was required to deal with the public sector of Bangladesh, Global South digital governance, DEG theory, AI in the public sector, and the literature on AI-ethics. There were no non-peer-reviewed reports, opinion pieces, no full-article conference abstracts, and no studies that concentrated on AI in the private sector. In areas where the empirical Bangladesh-specific material was sparse (e.g., AI-in-taxation), a search of the grey literature was conducted only for background information and is not included in the final citation base.

The initial search resulted in about 1,430 records. There was a removal of 1,086 duplicates. Title and abstract screening narrowed it down to 214 candidate studies; full text evaluation narrowed it down to 88 studies, which qualified in terms of quality and relevance. The primary source of evidence is a 30+ peer-reviewed articles and books (see the list in the References), and it is complemented by about 20 other contextual studies used in the analysis. The PRISMA flow with numeric summaries by domain is given in Table 1 (described conceptually).

Table 1. PRISMA-style selection summary



The selected articles were deductively coded according to the three DEG themes (reintegration, needs-based holism, digitization changes) and two themes emerging in the literature of the AI-era (algorithmic augmentation; algorithmic accountability). In the thematic areas, there were sub-codes that represented Bangladesh-specific areas of services (health, education, land, finance, e-governance writ large). Inductive codes were introduced where the empirical content was more than the deductive categories - especially on bureaucratic resistance, informal intermediaries, and political-economy dynamics of the Digital/Cyber Security Acts.

Being an SLR, as opposed to a primary empirical study, the article inherits the biases of the literature that it is based on. There is limited literature on AI studies in Bangladesh; much of the evidence base regarding AI in the public sector is extrapolated from OECD experiences. The inclusion of English-only excludes the scholarship in the Bengali language that can provide further granularity. Section 9 discusses these constraints.

C. RESEARCH FINDING AND DISCUSSION

From Digital Bangladesh 2021 to Smart Bangladesh 2041

With the 2008 electoral manifesto of the Awami League, which vowed a Digital Bangladesh by 2021, scheduled to coincide with the golden jubilee of independence, the modern arc started. It has been based on four pillars: human-resource development, connecting citizens, digital government, and ICT-enabled economy (Shareef et al., 2016a; Siddiquee, 2016b). Mobile penetration increased between 2009 and 2022, with an increase in mobile subscriptions per 100 people, reaching more than 100 per cent. Internet penetration increased to more than 40 per cent, and e-services on the National Portal expanded to more than 1,700 categories (Hoque, 2020a; Siddiquee & Faruqi, 2022b).

In April 2023, the government unveiled the successor vision of Smart Bangladesh 2041, which is organized around the four sub-pillars of smart citizen, smart government, smart society, and smart economy and entails the use of AI, the Internet of Things, cloud computing, and 5G as some of the underlying technologies (Amin, 2024a; Bhuiyan et al., 2024a; Nur Ullah & Biswas, 2024a). In one important way, Digital Bangladesh was essentially a change in digitization in the DEG meaning, but Smart Bangladesh is directly concerned with reintegration (whole-of-government architectures, a single national data exchange) and with holism (AI-enabled proactive services). It is thus the most national statement of a DEG-type procession in South Asia.

The a2i platform as an innovation intermediary

Access to Information (a2i) program, introduced in 2007 with the assistance of UNDP and USAID and institutionalized in 2023 as a National Innovation Agency, serves as the central nervous

system of the digital transformation of Bangladesh (Faroqi et al., 2019b; Zafarullah & Ferdous, 2021b). It has served as an innovation catalyst, a standards-boss, and the manager of a variety of flagship programs MyGov, D-Nothi (e-file management), Muktopaath (e-learning), e-Mutation, and EkShop. Siddiquee (2016b) and Hoque and Sorwar (2015a) attribute to a2i a role in facilitating small, but significant increases in transparency and access to services, although they warn that a2i innovations are usually pilot projects and do not entail a fundamental change in institutions.

Institutional architecture

Regulatory and institutional framework is disjointed with the ICT Division (strategy and ICT Act implementation), the Bangladesh Computer Council (BCC, infrastructure and cyber security operations), the Bangladesh Telecommunication Regulatory Commission (BTRC, spectrum and telecoms regulation), the Posts and Telecommunications Division, a2i (innovation), and sectoral agencies (DGHS, health, the Ministry of Education, education, Such multiplicity has resulted in significant capacity, and replication and inter-agency tension (Gregor et al., 2014a; Imran & Gregor, 2010b). As Farooqi, Siddiquee, and Ullah (2019b) demonstrate, even flagship programs such as UDCs rely on a complicated model of a partnership between the public, the private, and the people when the operational risk is taken by the private entrepreneurs (uddoktas), and the sustainability of the programs is not about the infrastructure itself but about the fit of governance.

Key milestones

From 2009 to 2025, landmark developments are: UDCs (2010); e-GP portal (2011); the launch of Shastho Batayon 16263 (2016); the implementation of mandatory e-Mutation (2019); the rapid expansion of bKash and Nagad taking part in COVID. These milestones follow a history of development starting with infrastructure (first wave), then moving on to web-enabled services (second wave), and finally to AI-ready architectures (third wave), although in an uneven fashion.

Prospects of AI And Digital Transformation In Public Service Delivery

This section examines five areas where AI and digital transformation are already transforming Bangladeshi public services and how it fits into DEG themes. The sub-sections triangulate the empirical results on each topic with the extension of the AI era, which is the DEG.

Health: from digitized records to AI-augmented care

The history of digital health in Bangladesh started with the Directorate General of Health Services (DGHS) Management Information System and the implementation of Shastho Batayon 16263 in April of 2016. It is registered that Shastho Batayon screened tens of thousands of influenza-like-illness cases, ranging between a handful of calls per day and up to 85,000, and had a number of interactions with citizens exceeding 10 million during the COVID-19 pandemic (Khatun et al., 2023b; Uddin Ahmed et al., 2022b). Hoque and Sorwar (2015b), in their turn, demonstrate that rural telecasters made health information available to communities that were otherwise underserved, and that Hoque (2020b) supports this finding with a capability-approach lens according to which ICT4D projects can be related to sustainable rural development.

These reforms in DEG terms are the instantiations of the needs-based holism in that the citizens can bypass the bureaucratic silos through the single number and digitization transforms by substituting paper referrals with integrated CRM records. Reintegration is, nonetheless, incomplete: Synesis IT, a private provider, runs the platform on a contract basis, and the integration of referrals to the public hospitals with the DGHS databases is not complete. The potential future AI layer - symptom-triage chatbots, image-based diabetic-retinopathy screening, and maternal-risk prediction models - may advance the system to the third-wave DEG by transforming Shastho Batayon into an ongoing-learning decision-support system. In their seminal work on the use of AI in the healthcare system, Sun and Medaglia (2019) cautiously note that such leaps do not need much more technical capacity: they need data governance, clinical-AI validation, and consent architectures that are still in their infancy in Bangladesh.

Education: platforms, personalized learning, and AI tutoring

There are over 600,000 registered teachers in the Teachers Portal, which is a peer-learning platform; more than 500 free online courses are offered by Muktopaath; and teacher-created content is supported by the Shikhhok Batayon network (Amin, 2024b; Nur Ullah & Biswas, 2024b). The Sangsad TV educational broadcast served millions of out-of-school children throughout COVID-19, and the Department of Secondary and Higher Education rolled out digital classrooms. These are sample texts of DEG-style digitization transformations and evidence of the first steps towards holism by integrating professional development of teachers and curriculum materials.

The potential AI extension - adaptive learning platforms, automated essay grading in Bengali, and AI tutors of rural schools - is young but possible. However, Amin (2024b) and Bhuiyan et al. (2024b) report that merely 23 percent of primary schools have operational computer laboratories and just 17 percent of educators have undergone some formal training in digital pedagogy. Devoid of these foundations, AI tutoring would contribute to urban-rural divides instead of urban-rural bridges (Van Deursen & Van Dijk, 2019a). Bangladeshi EdTech ecosystem thus exemplifies the DEG paradox: great platform accessibility on the surface, shallow capability of reintegration and algorithmic expansion on the back-end.

Land administration: e-Mutation, e-Porcha, and the quiet revolution

The corruption-prone public service in Bangladesh has always been land administration, and most civil litigation has been driven by disputes. The e-Mutation rollout by the Ministry of Land (since 2019) and e-Porcha (digital record-of-rights) and the Digital Record Room is the most ambitious effort to re-integrate radically fragmented registries at the Ministry of Land, the Directorate of Land Records and Survey, sub-registry offices, and at the Upazila level land administration. Begum (2023) and Ali et al. (2024) report significant decreases in the processing time (months to weeks), the number of visits by citizens (5+ to 2), and petty corruption in the Upazila land office.

e-Mutation (in DEG terms) is the most obvious Bangladeshi example of reintegration: it will knit together databases that have been fractured into a workflow where an update will be automatic. However, Brooks and Alam (2015) caution that the digitization of what is not yet reconciled with parallel paper records might just open up new rent-seeking opportunities to middlemen, and action-research by the Anti-Corruption Evidence consortium confirms that e-Mutation does not necessarily reduce, but sometimes compounds corruption. AI-ready extensions, such as satellite-imagery fraud detection or natural-language-processing contract verification or block chain-anchored title chains, are possible but require data-quality underpinnings that are yet to be built.

Finance and banking: the MFS revolution and digital taxation

Mobile Financial Services (MFS) is now the most popular topic of discussion of digital success in Bangladesh. With bKash, which was launched in 2011, and state-supported Nagad, which was launched in 2019, over 100 million accounts are now served; financial inclusion increased to more than 65% in 2022, up from less than 50% in 2017. In a cross-country m-government analysis, Shareef et al. (2016b) demonstrate that the influences on adoption in Bangladesh are trust, perceived quality of the services, and intermediary support, which have a significantly higher impact on adoption than in the developed markets. Faroqi et al. (2019c) discovered that UDC entrepreneurs are trust-brokers, who combine bKash cash-in/out with government service payments - a distinctly Bangladeshi manifestation of needs-based holism.

The e-Return, e-Payment, and e-fiscal-device rollouts of the National Board of Revenue are the first step towards digitization in digital taxation; the future overlay is a taxpayer risk-scoring and return-verification AI. In their empirically documented study, Ahmed et al. (2025) discuss how the e-GP platform of the Bangladesh Public Procurement Authority, which was introduced in 2011, has decreased the lead times of the procurement process, improved competition among bidders, and delivered tangible efficiency benefits, which, however, Transparency International Bangladesh (2023) notes, have not yet significantly combined, these areas demonstrate that MFS and e-GP progress the digitization changes and reintegration themes associated with DEG most, as well as reveal the ease with which digital rails can transport the same rent-seeking behaviours.

E-governance broadly: UDCs, MyGov, and the National Portal

Union Digital Centres are at the centre of the service-delivery architecture of Bangladesh. They run almost in all Union Parishads, and offer more than forty services: birth registration, passport applications, overseas-employment registration, utility payments, agricultural information, and e-commerce, which is offered by local entrepreneurs. Ovi et al. (2024) come to three empirically strong conclusions: UDCs have a significant negative transaction cost effect on rural citizens; the quality of their services is

MyGov is an a2i-launched platform, which provides a single entry to over 1,700 services through a shared service bus. In their article in the European Journal of Information Systems about the change strategy of the so-called sweet spot e-government in Bangladesh, Gregor et al. (2014b) pinpointed the deficiency in knowledge among senior officials as the bottleneck - a diagnosis that is also relevant. New AI features and extensions are MyGov chatbot ("Sohoj"), voice-based Bengali services, and document-classification models. When done right, they would open the door to third-wave DEG by transforming the portal into an intelligent mediator; otherwise, they will recreate the issue of opacities reported by Busuioc (2021a) and Wirtz et al. (2020a).

Table 2 (conceptually described) correlates every area of service to the three DEG themes and the AI-era expansion with a strong, moderate, or nascent score. The conceptual framework (described conceptually) in Figure 1 connects third-wave DEG theory with AI-enabled public services in Bangladesh, which places the concepts of reintegration, holism, digitization, and algorithmic augmentation in opposition to the enabling conditions (infrastructure, legal framework, institutional capacity) and contextual constraints (digital divide, political economy).

Table 2: Mapping of Bangladesh Digital Services to DEG Themes and AI-era Extension

	Reintegration	Needs-Based Holism	Digitisation Changes	AI-Era Algorithmic Augmentation
Health <i>(Shastho Batayon / DGHS)</i>	Strong Telemedicine services for rural reintegration	Moderate Basic health info; limited holistic care	Strong E-health records & online consultations	Moderate AI diagnostics support
Education <i>(Teachers Portal / Muktopaath)</i>	Moderate Teacher training for reintegration	Strong E-learning & skill development	Strong Digital courses & resources	Nascent Emerging AI tutoring tools
Land <i>(e-Mutation / e-Porcha)</i>	Nascent Initial e-mutation services	Moderate Basic land records; limited services	Strong Online land records systems	Moderate AI for land records & mapping
Finance <i>(bKash / Nagad / e-GP / NBR)</i>	Strong Mobile banking for reintegration	Moderate Financial inclusion services	Strong Digital payments & tax systems	Strong AI fraud detection & credit scoring
E-Governance <i>(UDCs / MyGov / National Portal)</i>	Strong UDCs supporting reintegration	Moderate Basic e-services; limited integration	Strong E-government portals & services	Nascent Early AI chatbots for services

Strong

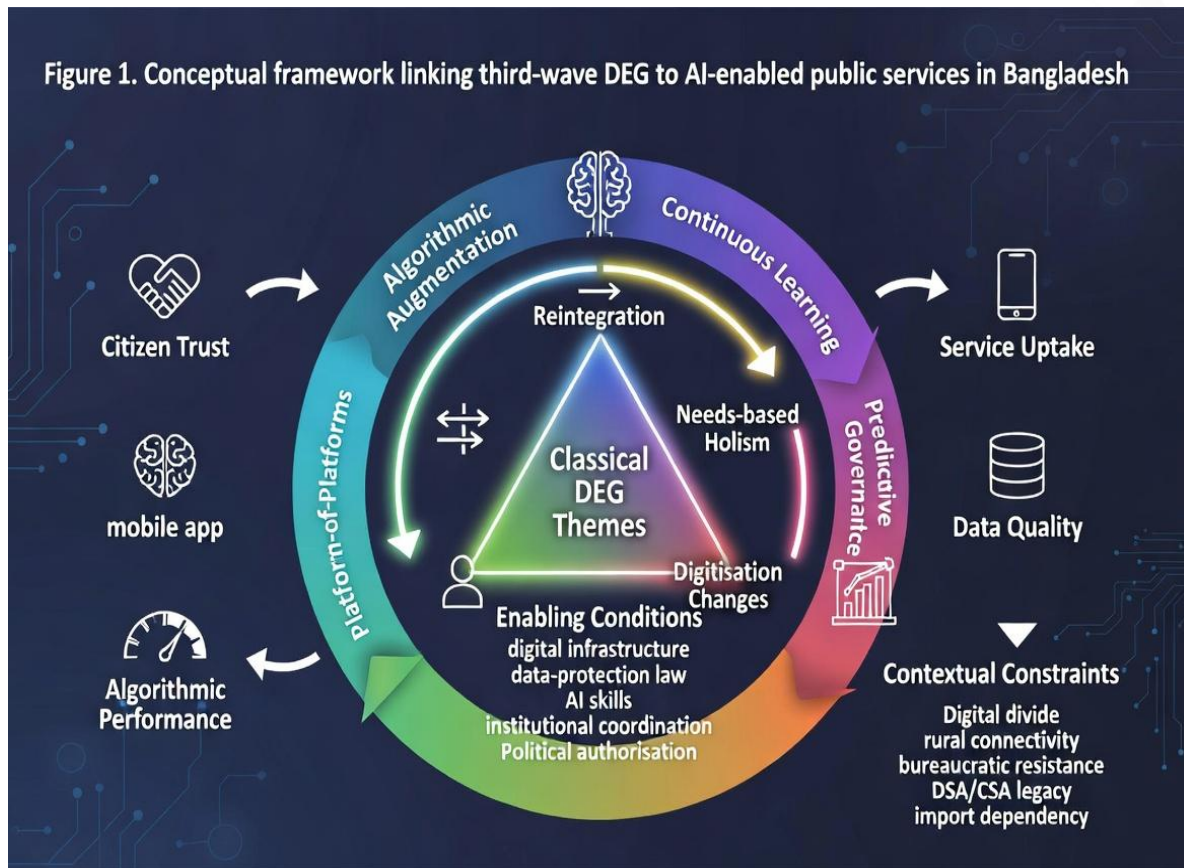
Moderate

Nascent

Strong

Absent

Figure 1. Conceptual framework linking third-wave DEG to AI-enabled public services in Bangladesh



Obstacles And Challenges

The persistent digital divide

In their article, Van Deursen and van Dijk (2019b) claim that digital divides have already progressed beyond the first level (physical access) to the second level (skills and usage) to the third level (outcomes and benefits). Bangladesh is a place where there is a combination of all three. As mobile subscriptions surpass population figures, meaningful broadband coverage is still limited to urban populations; a 2023 a2i survey found that just one out of five rural homes could access uninterrupted internet access that would support video-based telemedicine. Hoque (2020c) demonstrates that despite the presence of UDCs, women, people with disabilities, and ethnic minorities do not have the literacy and confidence to conduct transactions independently, which mediates access to services using uddoktas. Heeks (2020b) puts this as the trend whereby digital-for-development recreates and heightens the already present competitive logics instead of even levelling the playing field.

Infrastructure gaps

The last mile is weak despite the impressive growth in the fibre-optic backbone. Rural power is almost universal in extent, but unreliable; load shedding in the hottest summer months is a regular occurrence, and interferes with the UDC. The locations of data centres are highly concentrated in Dhaka, posing latency and resiliency threats. Power interruptions are listed as one of the top-three constraints by UDC entrepreneurs by Faroqi et al. (2019d) and Siddiquee and Faroqi (2022c); Gregor et al. (2014c) list infrastructure in the middle of the list of issues that have to be overcome before higher-order governance benefits can be collected.

Data governance and privacy vacuum

Bangladesh does not have an in-depth data-protection law. Since 2022, a Draft Personal Data Protection Act has been circulating, which has been criticized due to extensive exemptions for state agencies. In their canonical mapping of algorithmic ethics, Mittelstadt et al. (2016b) have found the following pillars of responsible data use: consent, accountability, and traceability; all three are under-institutionalized in Bangladesh. In the absence of a DPA that has significant independence, the speed

with which data on citizens is concentrated in a2i, DGHS, NBR, and MFS platforms would result in the so-called AI governance gaps, according to Chen et al. (2023) and Zuiderwijk et al. (2021b), which are still conditions where the technical capacity outpaces oversight.

Cyber security exposure

The level of cyber security is behind the pace of digitalization. The 2016 Bangladesh Bank heist, where the US\$81 million was diverted in the SWIFT system, is used as a point of reference; more recent events in 2023 to 2025 of citizen-data leaks of government portals highlight the persistence of vulnerability. Mikhaylov et al. (2018) and Wirtz et al. (2020b) caution that the dark side aspects of AI, such as data poisoning, adversarial attacks, and model theft, are only going to increase the surfaces of cyber risk unless security is designed into it. The e-Government Computer Incident Response Team (BGD e-GOV CIRT) of the BCC has limited resources compared to the amount of attack surface that it is tasked with protecting.

AI readiness and skills gap

The systematic review of AI adoption in public administration by Madan and Ashok (2023b) finds the skills of the workforce as one of the top five determinants. The AI preparedness in Bangladesh is not high by regional standards: the Oxford Insights Government AI Readiness Index 2023 ranks the country far lower than India and Sri Lanka. The same binding constraint on e-government shown fifteen years ago by Imran and Gregor (2010c) and Gregor et al. (2014c) is the knowledge deficits among older civil servants; the same constraint is now the knowledge deficit with AI. Data-scientist pipes are slender, and the vast majority of AI pilots in the public sector are based on the capacity by vendors - an aspect that reproduces the risks of algorithmic procurement that Kuziemski and Misuraca (2020) note.

Institutional fragmentation and bureaucratic resistance

According to Siddiquee (2016c) and Imran and Gregor (2010c), the deep-rooted bureaucratic resistance is recorded: the top officials view digital changes as a threat to discretion and informational asymmetry, as well as informal power. Champion et al. (2022) demonstrate that the use of AI increases problems of collaborative governance since algorithms cross-cut agency boundaries in a way that NPM-era silos did not need to support. The absence of a truly empowered Chief Digital Officer in any of the government bodies of Bangladesh results in every ministry re-creating data pipelines, which generates the same fragmentation that DEG was designed to avert.

Legal-regulatory vacuum and the Digital Security Act legacy

Probably, the most influential barrier is political-legal. In 2018, over the protests of the Editors' Council and press-freedom groups, the Digital Security Act 2018 (DSA) criminalized speech acts on digital platforms broadly defined; Rahman and Rashid (2020b) and Azad (2021) report the impact of the chilling effect of the Digital Security Act on investigative journalism. In 2023, the Act was officially repealed and replaced by the Cyber Security Act 2023; however, a review of civil-society analysis and the review of the 2025 Cyber Security Ordinance (Clooney Foundation for Justice, 2025, reviewed contextually) demonstrates that many of the vaguely worded offences continued to exist. This is critical to AI governance in three respects. First, it thwarts civic and university questioning of government algorithms. Second, it undermines trust, which is the most crucial factor of digital-service adoption (Shareef et al., 2016c). Third, it is an indicator of a political-economic preference towards surveillance-enabled over accountability-enabled digital infrastructures, which is the opposite of what third-wave DEG demands.

Algorithmic bias and ethical AI concerns

The warning of Bender-and-colleagues-style about the large language models trained on unrepresentative corpora is acute in Bangladesh, with the limited data on training the language to be used in the training of Bengali, and the failure of machine-translation services to default to English-centric models. Mittelstadt et al. (2016b), Floridi et al. (2018b), Janssen and Kuk (2016), and Busuic (2021b) demonstrate that algorithmic bias and lack of explain ability are putting the values of due process, equal treatment, and contestability of public law under pressure already, in the context of the Bangladesh administrative state. Algorithms in which the taxpayer-risk score or welfare score is

encoded invisibly with no explain ability requirements would allow caste, class, or gender bias to be encoded.

Dependence on imported technology

The AI and cloud stack in Bangladesh is highly dependent on external suppliers (Microsoft Azure, Google Cloud, Amazon Web Services, Chinese hyperscalers). This generates typical ICT4D dependency relationships (Heeks, 2020b): rents are exported to foreign countries; data-sovereignty anxieties build up; and locally based model-development in the Bengali language faces capital difficulties. Bangladesh has not yet built sovereign digital public infrastructure at scale, unlike the IndiaStack of India (Aadhaar, UPI, DigiLocker), which is the direction the a2i program seems to be moving towards, with its recent membership of the UN Advisory Body on AI and the DPI Safeguards Working Group.

Rural connectivity and electricity reliability

Lastly, and most fundamentally, rural access and power are still a limitation. The three-generation digital infrastructure framework by Heeks (2020b) will be a reminder that AI-era (third-generation) infrastructure assumes second-generation broadband, and in turn, second-generation broadband assumes first-generation connectivity. Bangladesh has yet to do the second-generation rollout, and the political discourse has already shifted to third-generation AI applications, a sequencing risk that will result in showcase pilot projects instead of systemic change.

Synthesizing Bangladesh through the third-wave DEG lens

A subtle verdict by reading is the process of digital transformation of Bangladesh by DEG. The nation has achieved a lot concerning digitisation transformations: paper has been substituted more in the health (Shastho Batayon), land (e-Mutation), education (Muktopaath), finance (bKash/Nagad), and procurement (e-GP) sectors. In needs-based holism, there exists real, but asymmetric progress: UDCs and MyGov offer a real one-stop experience, but life-event-based designs (birth, marriage, death) are not the organizing logic of service architecture. Bangladesh is the slowest to move through on the reintegration: inter-agencies exchange of data remains only an infrequent event, master data management remains ineffective, and the existence of a national data-exchange layer comparable to X-Road (Estonia) or DEPA (India) is yet to be operationalized.

The third wave of AI, as used by Dunleavy and Margetts (2025c), is much more of a hypothetical one. Discrete pilots exist (chatbots, diagnostic-imaging support, and taxpayer-risk models), but the institutional scaffolding, such as data-protection law, evaluations of the impact of algorithms, the need to explain, and independent oversight, is missing at the moment. This is a structural threat in which Bangladesh will bring in the third-wave AI technology, and the third-wave DEG governance will be absent, and the pathologies that Wirtz, Weyerer, and Sturm (2021) described will be revived.

Comparative perspective: India, Pakistan, and Sri Lanka

A more integrated implementation of the reintegration theme of DEG is IndiaStack, the India biometric identity, the Unified Payments Interface, and the emerging Digital Public Infrastructure (DPI) architecture in India. The direct benefit transfer system based on Aadhaar has transferred billions of dollars with quantifiable leakage, and UPI has now made over 70 percent of the online payments in India. Nevertheless, critical reviews (e.g., peer-reviewed articles about consent, accountability, and data sovereignty in Aadhaar/UPI, 2024-2025) reveal that there are high costs: authentication failures have barred vulnerable groups from welfare; the 2023 Digital Personal Data Protection Act broadly exempts state agencies; and algorithmic control of welfare inclusion has generated reported harms.

The journey of digital government in Pakistan via the NADRA (National Database and Registration Authority) and e-Pakistan has been unsteady due to the complexity of civil-military governance. The once regional pioneer ICTA-led e-government program of Sri Lanka had stuttered since 2015 and had been hit even harder by the 2022 economic crisis. Bangladesh contrasts these: it is coherent enough, but not centralized enough, dynamic enough, than post-crisis Sri Lanka. The lesson of comparison is that DEG-style integration is a political-economic accomplishment, rather than a technical accomplishment. The a2i of Bangladesh possesses the organizational DNA to effect such integration, but needs political approval, which has fluctuated.

Implications for DEG theory

The experience of Bangladesh proposes that three amendments should be made to DEG theory when applied to the Global South. To begin with, legal-political pillars (data protection, algorithmic responsibility, speech protections) should be part of DEG and not external facilitators - the Digital Security Act legacy demonstrates how illiberal law-making can gut the DEG promise. Second, the reintegration functions OECD DEG models attribute to bureaucracies are played by intermediary actors (UDC entrepreneurs, MFS agents, NGO digital-literacy trainers): they are reintegration functions, but not transitional ones. Third, reliance on foreign technology is transforming reintegration: with core AI models not owned by the state, data flows and algorithmic decisions are not fully controlled by the state. This direction is indicated by scholars like Heeks (2020c), Criado and Gil-Garcia (2019), and Madan and Ashok (2023c); this article builds on their arguments, demonstrating how each of these amendments translates into reality in five areas of Bangladeshi services.

Policy implications

The policy has important implications. Using AI, Bangladesh will not be able to directly transition to the third wave of DEG that expands upon the half-baked premises of the first and second waves. Instead, it needs to seek co-located digitization transformations (reliable rural connectivity, universal identity, electronic file management), reintegration (a national data-exchange layer, shared service bus maturation), and holism (life-event orchestration of services) - and construct the legal and institutional framework that the adoption of AI assumes.

Policy Recommendations

There are eight recommendations on the basis of the analysis. Bangladesh ought to first create an all-encompassing framework of AI policies that transcends the existing draft National AI Strategy to a legally binding document that contains an algorithmic-impact-assessment clause for high-risk applications in the public sector, explainability requirements, and a register of public-sector AI systems. The international templates are provided by Busuioc (2021c), Desouza et al. (2020), Young et al. (2019), and Wirtz et al. (2020c).

Second, the government needs to enact an honest, independent Personal Data Protection Act, with restrictive state exemptions, an independent Data Protection Authority, and significant enforcement capabilities. The third-wave DEG promise cannot be achieved structurally without it. Third, the Cyber Security Act 2023 must be radically amended, as opposed to being renamed, to eliminate the poorly-defined speech offences that escaped the DSA repeal. The trust that supports AI adoption will require a regulatory environment that is friendly to civic questioning (Shareef et al., 2016d).

Fourth, there should be an ongoing AI and digital skills capacity-building initiative in the civil service (with a priority on senior officials) (responding to the Imran and Gregor knowledge-deficit diagnosis) in data scientists in departmental ministries and front-line UDC entrepreneurs. Fifth, Bangladesh ought to develop a national data-exchange layer, identity stack, consent manager, and a whole-of-government digital architecture, loosely modelled after Estonia X-Road or India DEPA, to fit the institutional realities of Bangladesh. This can be the tangible route towards DEG reintegration.

Sixth, the idea of citizen-centric design must be implemented as a requirement in all ministries with life-event-oriented service orchestration instead of digitization based on forms. The UDC model is a domestic evidence-of-concept of human-in-the-loop service bundling. Seventh, collaboration between the government and private and people-centred partnerships needs to be institutionalized by means of joint risk-reward frameworks with a specific focus on developing AI models in the Bengali language, sovereign cloud capacity, and the involvement of local MSMEs, to reduce the dependency nature Heeks (2020d) describes.

Eighth, procurement standards, pilot-to-scale transitions, and audit regimes should incorporate ethical AI guardrails that are based on the principles of beneficence, non-maleficence, autonomy, justice, and explicability of AI4People (Floridi et al., 2018c) and on epistemic and normative AI scrutiny (Mittelstadt et al., 2016c). These guardrails would be operationalized by an independent algorithmic accountability unit, which would be located outside the executive.

Limitations and Future Research

This paper has a number of shortcomings. As an SLR, it can only project its findings up to the extent of the literature on the topic of the use of AI in peer-reviewed research, which is sparse when it comes to the use of AI in Bangladesh; most of the discussion is based on inferences about a similar environment. Bengali-language scholarship is not allowed in English-language scholarship. The study period (2010-2026) also has an AI takeoff preceding the period of complete spread of generative AI, with the services of the population. The 2024-2025 politics of the interim government, the 2026 elections, and resultant policy resets are situated contextually instead of being a key piece of evidence. The priority of future research is to focus on direct empirical research on particular AI pilots in DGHS, NBR, and MyGov; to highlight the qualitative fieldwork in comparison across South Asian digital-public-infrastructure trajectories; and to conduct participatory analyses that focus on marginalized users (women, persons with disabilities, ethnic minorities, and climate-displaced populations) whose experience of AI-enabled government will be defined. Algorithms and the political economy of procurement, the lock-in of vendors, and data sovereignty are also concerns that scholars need to challenge.

D. CONCLUSION AND RECOMMENDATION

Bangladesh is at a crossroads. One of the most ambitious transformations of public service ever undertaken in a lower-middle-income country is the digital underpinning between 2009 and 2024, which includes a2i, UDCs, MyGov, Shastho Batayon, e-Mutation, bKash/Nagad, e-GP, Muktopaath. Against the backdrop of classical themes in DEG, Bangladesh has achieved significant progress on digitization transformations, significant but partial progress on needs-based holism, and initial progress on reintegration. This foundation is now suggested to be overlaid with AI and 4IR technologies as planned in the Smart Bangladesh 2041 agenda.

This leap is precarious and possible, and that is the main argument of the article. Potentially, since the a2i model of innovation-midair, the citizen access to the UDC network, and the manifestation of platform effects that the MFS revolution demonstrates, give the ingredients of a unique Global South variant of the third-wave DEG. Unstable, as the legal-institutional scaffolding, which third-wave DEG demands, such as data protection, algorithmic responsibility, free civic discourse, autonomous oversight, and sovereign digital infrastructure, is still tentatively constructed, and in certain aspects has actually degraded under the DSA-Cyber Security Act legacy.

The new understanding that comes out of this is that AI is not going to bail out Bangladeshi public administration out of first- and second-wave deficits that have not been addressed yet; it will only exacerbate them. The lack of clean backend records at the national level to create an e-Mutation system will produce scale rent-seeking algorithms. The bias will be automated by training a taxpayer-risk model using biased enforcement data. An English-trained foundation model with a Bengali chatbot placed on it will leave out the citizens that the chatbot is supposed to serve. However, when actions in accordance with these recommendations are taken - legal foundations, skills, whole-of-government architecture, citizen-centric design, ethical guardrails - then it is plausible that Bangladesh can be among the first lower-middle-income countries to operationalize third-wave DEG, and provide a model to be replicated by the Global South.

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