

Predictive Analytics for E-Governance in Developing Economies: Applications, Readiness, and Institutional Challenges

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Abstract

Predictive analytics is the process of using past and current data to predict what might happen in the future and to help make decisions. This approach has become a part of e-governance systems all around the world. For countries that are still developing predictive analytics provides a way to skip over time-consuming ways of managing government work. It helps governments see what services people will need find cases of fraud focus help where it is needed most and use public money more wisely. This paper looks at what predictive analytics how it works in e-governance. It also checks where it is being used to improve services and make better policies. The paper also looks at the probabilities and problems that developing countries face when trying to use analytics. These include missing data systems, weak government abilities and not enough trained people. A comparison shows the differences between predictive and prescriptive analytics and how each fit into government work and how ready they are. Another comparison looks at how ready different countries are to use these tools. The paper ends by saying that predictive analytics can really help e-governance in developing countries. This only happens if there is long-term support, for better data systems, stronger government abilities and better ways to manage the data properly.

Keywords: *predictive analytics; e-governance; e-government; developing economies; big data; public policy; digital transformation*

1. Introduction

E-governance projects in countries have often been about making old ways of working digital. They take paper forms. Move them online but they don't change how choices are made. Predictive analytics is something different. Of just showing what has already happened it looks at old and new information to guess what might happen next. This helps governments get ready before problems arise. Studies about data in public policy say that when this power is used all through the process of making and carrying out rules from starting to think about problems to carrying them out and checking how they work it can change normal work into something smarter and more based on data. Experts say that for countries this is a big opportunity. Predictive analytics could help governments with not staff to see when roads will break send help where it is needed and find cheating in buying things for the public. The same studies warn that

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using e-government and AI in poor countries is still mostly just an idea, not something that is really being used. There is a difference, between what is possible and what is actually done. This paper looks at both sides of that difference.

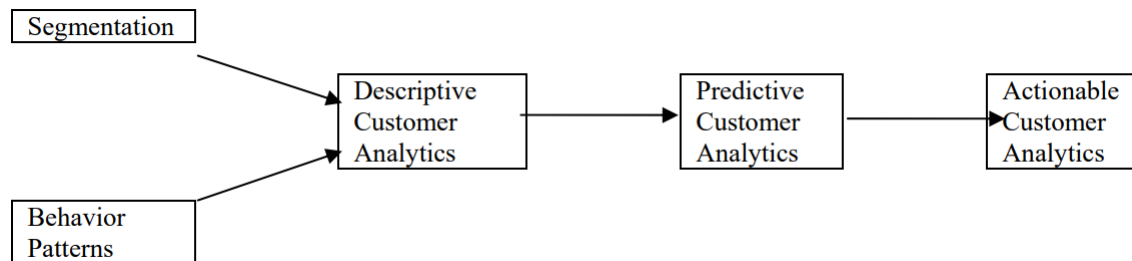


Figure1: Forecasting and Scenario Analysis

2. Predictive Analytics: Concepts and Techniques Relevant to E-Governance

Predictive analytics sits between descriptive analytics, which summarizes what has already happened, and prescriptive analytics, which recommends specific actions based on forecasted outcomes. In e-governance contexts, predictive techniques typically draw on administrative records, citizen service requests, sensor and IoT data from public infrastructure, and increasingly social media signals, to build statistical or machine learning models that forecast demand, risk, or outcomes (Chao et al., 2023). Common technique families include regression-based forecasting for budget and demand planning, classification models for risk scoring in tax or benefits fraud detection, and time-series models for infrastructure and public health forecasting. Table 1 summarizes how each analytical technique family maps onto representative e-governance functions.

Table 1. Predictive Analytics Techniques and Corresponding E-Governance Functions

Technique Family	Underlying Method	E-Governance Function
Demand forecasting	Time-series and regression models	Utility, healthcare, and public service capacity planning
Risk scoring	Classification and anomaly detection	Tax fraud, benefits fraud, and procurement risk flagging
Resource targeting	Predictive segmentation models	Social protection program eligibility and prioritization
Infrastructure prediction	Sensor-based predictive maintenance models	Water, power, and transport infrastructure failure prediction

3. Applications of Predictive Analytics in E-Governance

Across both developed and developing-economy contexts, predictive analytics has been applied to four broad e-governance functions: public service delivery, policy formulation, resource allocation, and integrity and security monitoring. In public service delivery, predictive models help agencies anticipate citizen demand for services such as healthcare appointments, unemployment benefits, or utility connections, enabling proactive capacity planning rather than reactive queue management. In policy formulation, big data-driven approaches allow policymakers to simulate the likely effects of proposed interventions before implementation, narrowing the gap between agenda-setting and evidence-based policy design (Hossin et al., 2023). In resource allocation, predictive targeting has been used to identify households most likely to benefit from social protection programs, a particularly valuable capability in

resource-constrained settings where universal coverage is not fiscally feasible. In public health specifically, predictive analytics applied to administrative and clinical data has been used to anticipate disease outbreaks and prioritize interventions, with reviews noting its applicability across the full health-policy cycle from agenda-setting through evaluation (Chao et al., 2023). Finally, on integrity and security, predictive risk-scoring models are increasingly used to flag anomalous patterns in procurement and benefits disbursement that would be difficult for human auditors to detect manually at scale.

4. Predictive Analytics for Developing Economies: Opportunities and Constraints

Developing economies face a distinctive combination of opportunity and constraint when adopting predictive analytics for governance. On the opportunity side, many developing-economy governments are building digital infrastructure and civil registries from a relatively low base, which creates an opening to design predictive capability directly into new systems rather than retrofitting it onto legacy infrastructure, as many developed economies must do. Systematic reviews of e-government in sustainable development contexts note that digital government tools, including analytics capabilities, can support progress toward multiple development goals when adoption is paired with adequate institutional support (Pougel, Bonnel, & Beier, 2018). On the constraint side, research on e-government and state capacity in developing countries finds that the environmental and social benefits of digital government tools are conditional on the underlying administrative capacity of the state, meaning predictive analytics deployed atop weak institutions is unlikely to deliver its theorized benefits (Banda & Du Plessis, 2024). Persistent barriers include fragmented or incomplete administrative data, a shortage of data science and analytics talent within public agencies, unreliable connectivity outside major urban centers, and, in some cases, low public trust in how predictive systems use citizen data. Reviews of e-government impacts more broadly caution that the empirical evidence for public value gains from these technologies is still fragmented and context-dependent, reinforcing the need for careful, locally grounded evaluation rather than the direct transplantation of developed-economy analytics models (MacLean & Titah, 2022).

Table 2. Comparative Analysis of Descriptive, Predictive, and Prescriptive Analytics in Government

Analytics Type	Core Question Answered	Representative Government Use	Maturity Required
Descriptive	What has happened?	Dashboards on service usage, budget execution reports	Low
Predictive	What is likely to happen?	Demand forecasting, fraud risk scoring, outbreak prediction	Moderate
Prescriptive	What action should be taken?	Automated resource allocation, optimized service routing	High

5. Comparative Analysis: Analytical Readiness in Developed versus Developing Economies

A comparison of analytical readiness across developed and developing-economy governments clarifies why predictive analytics adoption has proceeded unevenly. Developed economies generally benefit from integrated administrative databases, established data governance frameworks, and a larger pool of public-sector data science talent, all of which lower the barrier to moving beyond descriptive dashboards toward genuine predictive capability. Developing economies, by contrast, often possess valuable but fragmented data sources, mobile payment records, census surveys, and donor-funded program data, that have not yet been integrated into interoperable systems capable of supporting reliable prediction. Table 3 compares the two contexts across four dimensions central to predictive analytics adoption.

Table 3. Comparative Analysis of Predictive Analytics Readiness: Developed versus Developing Economies

Readiness Dimension	Developed Economies	Developing Economies
Data infrastructure	Integrated, interoperable administrative databases	Fragmented data across ministries and donor programs
Institutional capacity	Established data governance and analytics units	Limited in-house data science capacity
Connectivity	Near-universal broadband and device access	Uneven rural-urban connectivity gaps
Regulatory environment	Mature data protection and AI governance frameworks	Emerging or partially enforced data protection rules

6. Challenges and Risks

Beyond infrastructure and capacity gaps, predictive analytics in e-governance carries risks that developing-economy governments must actively manage. Algorithmic bias is a central concern: predictive models trained on incomplete or unrepresentative administrative data risk systematically under-serving populations who are least represented in digital records, often the rural poor or informal-sector workers who are precisely the groups social programs intend to reach. Data privacy is another significant risk, particularly where data protection legislation lags behind the analytics capability itself, exposing citizens to potential misuse of predictive profiles built from health, financial, or welfare records. Reviews of big data governance in public administration also highlight the risk of over-reliance on predictive outputs without adequate human oversight, a concern amplified in developing-economy contexts where independent audit and oversight institutions may themselves be under-resourced. Finally, there is a talent and sustainability risk: predictive analytics systems built with donor or vendor support can become unsustainable once external funding ends if local capacity to maintain and interpret the models has not been built in parallel.

7. Conclusion

Predictive analytics offers developing economies a genuine opportunity to strengthen e-governance by shifting public administration from reactive record-keeping toward proactive, forecast-informed decision-making in service delivery, policy formulation, and resource allocation. The comparative analysis presented here shows that the technology's benefits are not automatic: they are conditional on data infrastructure, institutional capacity, and governance safeguards that many developing economies are still building. Governments that sequence adoption deliberately, starting with well-scoped, lower-risk predictive applications while investing in the underlying data and human capacity, are best positioned to convert predictive analytics from a theoretical promise into a durable improvement in public administration.

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