Chapter 5
Hybrid AI and Blockchain Systems for Digital Identity in Developing Countries:
Predictive Governance for Public Inclusion and Efficiency

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ABSTRACT

The digital transformation of public administration demands innovative solutions that balance operational efficiency with inclusive governance. This chapter proposes a hybrid framework using predictive AI and blockchain to address a key barrier in developing countries: the lack of formal digital identities. By applying AI-driven predictive analytics to biometric verification and leveraging blockchain for data integrity and decentralization,it is demonstrated that integrated systems can support secure, scalable identity infrastructures. These systems expand access to public services and generate real-time data that help governments forecast needs, reduce exclusion and allocate resources strategically. Drawing on empirical studies and case examples, the chapter explores opportunities, implementation challenges and policy implications, focusing on algorithmic transparency, ethical data governance,

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and institutional readiness, while showing how AI-powered predictive technologies can transform public administration through inclusive, data-informed and accountable digital identity systems.

INTRODUCTION

Even in 2025, tens of millions of people, most of them in the Global South, still walk through life with no official proof of who they are. No card, no digital token, nothing that lets them open a bank account, enroll a child in school or cast a vote. The result is a cascade of closed doors: clinics turn them away, social-protection schemes can't find them, and basic civil rights remain out of reach. Without a secure way to say, "this is me", inequality hardens rather than shrinks, and public institutions lose the data they need to target help where it matters most.

The irony is that digital government is racing ahead at full speed. Smartphones, mobile-money platforms and one-stop e-government portals promise friction-free services, yet they rely on an identity layer that many countries simply do not have. Legacy systems are often patch-work, vulnerable to leaks and too expensive to scale beyond major cities. Where infrastructure is thin and public administrations are stretched, the identity gap widens just when digital inclusion is meant to close it.

New hybrid solutions that blend blockchain's tamper-proof ledgers with AI's pattern-recognition muscle are starting to look like a way out of the stalemate. On the AI side, transfer-learning models have already boosted diagnostic accuracy in medical imaging, brain-tumor detection, for example, now crosses the 95% threshold in some trials. Comparative work on machine-learning classifiers in clinical settings confirms the same reliability gains. Those advances can be repurposed for biometric authentication, making face- or fingerprint-matching both faster and harder to spoof. Blockchain then locks the verified credential into an auditable chain that no single actor, whether a government agency or a mobile operator, can quietly rewrite. Together, the two technologies could give individuals a portable, privacy-preserving ID that works on- and offline, while giving public agencies the trust lawyer they need to deliver services fairly and efficiently.

Of course, technology is only half the battle; governance, regulation and user trust will decide whether these systems take root. But the tools are now on the table, and for millions still invisible to the state, that could be the first real step into modern economic and civic life.

Complementing AI, the blockchain provides a tamper-proof infrastructure for decentralized data management. Its role in cybersecurity defense, particularly at the edge, underscores its value in safeguarding sensitive identity data from unauthorized access and systemic breaches.