Chapter 7
DPI in the Age of Web3 and Decentralized Infrastructure

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ABSTRACT

Digital Public Infrastructure (DPI) represents a transformative paradigm for emerging economies, providing foundational systems for identity verification, payment processing, and data exchange. The convergence of DPI with Web3 technologies and decentralized infrastructure creates unprecedented opportunities for inclusive economic development. This chapter examines how blockchain, distributed ledger technologies, and decentralized protocols enhance traditional DPI frameworks, analyzing implementations across emerging markets with emphasis on India's pioneering India Stack model. Through examination of 220 million active blockchain addresses globally and DPI implementations reaching 1.3 billion citizens, this research demonstrates that Web3-enabled DPI can overcome institutional voids,

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reduce transaction costs by up to 70%, and facilitate financial inclusion for 730 million unbanked adults. The chapter analyzes technical architectures, governance models, security frameworks, and socioeconomic impacts while addressing challenges including digital divides, regulatory gaps, and sustainability concerns. Key findings reveal that DPI integrated with Web3 infrastructure contributed 0.9% to GDP in 2022, projected to reach 4.2% by 2030, with the global blockchain market valued at $31.18 billion in 2025 and forecasted to reach $393.42 billion by 2032.

1. INTRODUCTION

The digital transformation of emerging economies requires robust infrastructure that transcends traditional centralized systems. Digital Public Infrastructure (DPI) has emerged as a critical enabler for socioeconomic development, providing foundational digital systems for identity management, financial transactions, and data exchange (Das, 2024). The convergence of DPI with Web3 technologies—characterized by decentralization, blockchain protocols, and cryptographic security—represents a paradigm shift in how digital public goods are conceived, deployed, and governed.

Web3, often described as the decentralized iteration of the internet, leverages blockchain technology, smart contracts, and distributed networks to create trustless, transparent, and user-centric digital ecosystems (Chen et al., 2024). Unlike Web 2.0's centralized platforms controlled by technology giants, Web3 architectures distribute control across network participants, enabling peer-to-peer interactions without intermediary gatekeepers. This fundamental architectural difference has profound implications for DPI deployment in emerging markets, where institutional voids, limited financial infrastructure, and trust deficits constrain economic participation.

As of 2024, the global blockchain market reached $31.18 billion, with projections indicating growth to $393.42 billion by 2032 at a compound annual growth rate (CAGR) of 43.65% (Fortune Business Insights, 2025). Simultaneously, cryptocurrency adoption achieved unprecedented levels, with 220 million monthly active addresses engaging with blockchain networks in September 2024—tripling from the end of 2023 (Blaize, 2024). This explosive growth reflects not merely speculative interest but fundamental shifts in how individuals and organizations interact with digital infrastructure.

1.1 Defining Digital Public Infrastructure

Digital Public Infrastructure refers to foundational technology systems, primarily developed and governed through public-sector initiatives, that provide open, interoperable, and scalable platforms for delivering essential services (Reserve Bank