

Digital Public Infrastructure and Economic Growth: A Case Study of UPI and DBT in India

Dr. Udayakumara M

Associate Professor, Department of Economics, Government Arts, Commerce & P G Collage,
(Autonomous), HASSAN -573201, KARNATAKA, INDIA.

Abstract

Digital Public Infrastructure (DPI) has emerged as a critical framework for promoting inclusive economic development by creating interoperable, scalable, and secures digital platforms that facilitate identity authentication, financial transactions, information exchange, and public service delivery. In recent years, India has developed one of the world's most extensive DPI ecosystems through the India Stack, which integrates digital identity, digital payments, and technology-enabled governance mechanisms. Among its most significant components, the Unified Payments Interface (UPI) and Direct Benefit Transfer (DBT) have played a transformative role in reshaping India's digital economy and governance architecture.

This study examines the contribution of UPI and DBT as key pillars of India's Digital Public Infrastructure and evaluates their role in promoting economic growth, financial inclusion, governance efficiency, and institutional transformation. The study argues that the combined impact of UPI and DBT demonstrates the potential of DPI to function as an economic enabler by reducing transaction costs, strengthening financial inclusion, supporting economic formalization, and improving state capacity. However, sustainable DPI development requires addressing challenges related to digital inequality, cyber security, data privacy, and digital literacy. The Indian experience provides valuable policy lessons for developing economies seeking to build inclusive, secure, and sustainable digital ecosystems for long-term economic development.

Keywords: Digital Public Infrastructure, Unified Payments Interface, Direct Benefit Transfer, Financial Inclusion, Digital Economy, Economic Growth, Digital Governance

Introduction

The rapid advancement of digital technologies has fundamentally transformed the functioning of modern economies. Governments worldwide are increasingly investing in digital infrastructure to improve governance, strengthen public service delivery, and promote inclusive economic development. Among the various digital transformation strategies adopted globally, the concept of Digital Public Infrastructure (DPI) has gained considerable importance. DPI refers to interoperable digital systems that provide foundational public services, including digital identity, payment systems, and secure data exchange, enabling governments, businesses, and citizens to participate effectively in the digital economy.

India has emerged as one of the world's most prominent examples of successful implementation of Digital Public Infrastructure.

Two of the most influential components of India's DPI are the Unified Payments Interface (UPI) and the Direct Benefit Transfer (DBT) programme. Introduced in 2016 by the National Payments Corporation of India (NPCI), UPI has revolutionized digital payments by enabling instant, interoperable, low-cost transactions across banks through mobile applications. Its open architecture has encouraged innovation, expanded digital commerce, and facilitated the participation of fintech companies in the financial ecosystem. The rapid increase in UPI transactions demonstrates the growing acceptance of digital payments among consumers, merchants, and businesses across urban and rural India.

This study seeks to examine how UPI and DBT have contributed to India's economic transformation by strengthening financial inclusion, improving public sector efficiency, facilitating digital innovation, and supporting inclusive economic growth. Through a qualitative case study based on secondary data and policy analysis, the paper evaluates the role of these flagship initiatives in creating a resilient and inclusive digital economy. The findings are expected to contribute to the growing literature on digital governance, financial technology, and public policy while offering policy insights for emerging economies seeking to develop their own digital public infrastructure frameworks.

Background of the Study

Digital Public Infrastructure has become a central pillar of digital transformation strategies worldwide. Unlike conventional digital systems that operate independently, DPI consists of interoperable digital platforms that function as public goods and enable governments, businesses, and citizens to interact efficiently. The Organisation for Economic Co-operation and Development (OECD), World Bank, and G20 have increasingly emphasized DPI as a foundation for inclusive growth, innovation, and resilient governance.

The Unified Payments Interface has become one of the world's largest real-time payment systems, enabling billions of low-cost transactions each month. Its interoperability, open architecture, and ease of use have significantly expanded digital payment adoption across households, businesses, and government institutions. At the same time, the Direct Benefit Transfer programme has transformed welfare administration by directly transferring benefits to eligible recipients, reducing leakages, duplication, and delays.

Their combined success has positioned India as a leading example of how DPI can support sustainable and inclusive economic growth, making it an important case study for policymakers and researchers across the world.

Literature Review

Digital Public Infrastructure (DPI) has emerged as a foundational framework for enabling inclusive digital economies through interoperable systems for identity, payments, and data exchange. Recent scholarship argues that DPI functions as a public good by reducing transaction costs, improving service delivery, and supporting innovation across the public and private sectors. India's experience with the India Stack has become a prominent example internationally because it combines digital identity, digital payments, and public service delivery at national scale.

Within India's DPI ecosystem, the Unified Payments Interface (UPI) has transformed retail digital payments by providing an interoperable, low-cost, real-time payment infrastructure. Studies report that UPI has accelerated digital payment adoption, encouraged fintech innovation, expanded merchant acceptance, and strengthened financial inclusion by lowering barriers to participation in the formal

financial system. The rapid growth of UPI has also supported entrepreneurship, e-commerce, and MSME development through reduced transaction costs and improved payment efficiency.

The Direct Benefit Transfer (DBT) programme represents another major pillar of India's DPI. Built on the Jan Dhan–Aadhaar–Mobile (JAM) architecture, DBT has improved the efficiency of welfare delivery by transferring subsidies directly into beneficiaries' bank accounts. Research suggests that DBT has reduced leakages, improved targeting, enhanced transparency, and strengthened public trust in welfare programmes, contributing to better governance outcomes.

Research Gap

Existing research has extensively examined UPI, financial inclusion, and DBT separately. However, comparatively few studies analyze UPI and DBT together as complementary pillars of India's Digital Public Infrastructure and evaluate their combined contribution to economic growth, governance efficiency, and inclusive development. This study addresses that gap through an integrated case study.

Objectives

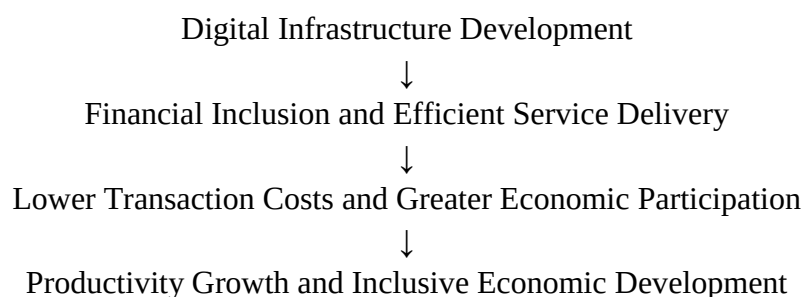
1. To examine the evolution of India's Digital Public Infrastructure.
2. To analyze the contribution of UPI to digital payment adoption and financial inclusion.
3. To evaluate the effectiveness of DBT in improving welfare delivery and governance.
4. To identify policy recommendations for strengthening India's Digital Public Infrastructure ecosystem.

Analytical Framework

This study analyses Digital Public Infrastructure (DPI) as an economic enabler by examining how digital platforms improve market efficiency, financial inclusion, and governance outcomes. The analysis uses two major components of India's DPI ecosystem:

1. **Unified Payments Interface (UPI)** – representing digital financial infrastructure.
2. **Direct Benefit Transfer (DBT)** – representing digital governance and welfare infrastructure.

The analytical framework is based on the assumption that DPI influences economic growth through four major channels:



Comparative Analysis of UPI and DBT

Dimension	UPI	DBT
Nature	Market-oriented digital infrastructure	Government service delivery infrastructure
Main Objective	Digital payments and financial access	Efficient welfare transfer

Dimension	UPI	DBT
Primary Beneficiaries	Consumers, businesses, financial institutions	Citizens receiving government benefits
Economic Channel	Productivity, innovation, formalization	Inclusion, welfare efficiency
Growth Impact	Expands digital economy	Supports inclusive development

The analysis demonstrates that UPI and DBT represent complementary dimensions of DPI. UPI strengthens economic transactions, while DBT strengthens social and institutional foundations of growth.

Discussions

Digital Public Infrastructure as a New Economic Institution

The findings of this study demonstrate that Digital Public Infrastructure (DPI) has evolved beyond being a technological innovation and has become an important economic institution supporting growth, inclusion, and governance efficiency. Traditional economic infrastructure such as roads, electricity, and communication networks facilitates the movement of physical goods and information, whereas DPI enables the movement of financial value, identity verification, and public services through trusted digital networks.

India's experience with UPI and DBT illustrates how scalable and interoperable digital systems can create economy-wide benefits. International development institutions increasingly recognize DPI as a foundation for inclusive digital transformation because digital identity, payment systems, and secure data exchange platforms enable citizens and businesses to access economic opportunities more efficiently.

UPI and the Transformation of Digital Financial Ecosystem

The analysis indicates that UPI has significantly changed the structure of India's payment ecosystem by introducing a low-cost, real-time, and interoperable payment mechanism. Unlike traditional payment systems that often depended on closed networks, UPI provides a common digital platform connecting banks, fintech companies, merchants, and consumers.

The major economic contributions of UPI can be discussed through three dimensions:

a) Reduction in Transaction Costs

UPI reduces payment friction by enabling instant transactions with minimal infrastructure requirements. This improves market efficiency by allowing consumers and businesses to conduct transactions quickly and conveniently.

b) Financial Inclusion and Democratization of Digital Finance

A major contribution of UPI is the expansion of digital financial participation. By connecting bank accounts with mobile-based payment systems, UPI enables individuals and small enterprises to participate in formal financial activities.

c) Support for Entrepreneurship and Economic Formalization

Digital payment records generated through UPI can support formal economic participation by improving transaction visibility. Small businesses and entrepreneurs can potentially benefit from improved financial histories and easier integration with digital commerce.

The growth of digital payment ecosystems also encourages innovation in fintech, e-commerce, and financial services.

Policy Implications

1. Strengthening Digital Inclusion

Future DPI policies should focus on:

1. Expanding rural internet infrastructure.
2. Improving digital literacy.
3. Ensuring accessibility for vulnerable populations.

2. Developing Strong Data Governance Frameworks

Policy priorities should include:

1. Data protection mechanisms.
2. Cybersecurity standards.
3. Responsible use of digital information.

3. Encouraging Innovation Ecosystems

Government should continue supporting:

1. Open digital platforms.
2. Fintech innovation.
3. Public-private partnerships.

Conclusion

The analysis demonstrates that UPI has fundamentally changed India's payment landscape by providing a secure, real-time, and low-cost digital payment infrastructure. By reducing transaction barriers, increasing access to formal financial services, and encouraging fintech innovation, UPI has supported the expansion of the digital economy and strengthened economic participation among consumers, entrepreneurs, and small businesses. Its open and interoperable architecture illustrates how public digital platforms can stimulate private-sector innovation while creating economy-wide benefits.

The combined experience of UPI and DBT highlights that DPI contributes to economic growth through multiple channels: reducing transaction costs, expanding financial inclusion, improving productivity, promoting economic formalization, and strengthening institutional efficiency. Unlike traditional infrastructure, which primarily facilitates the movement of physical resources, DPI enables the efficient movement of financial value, information, and public services, thereby creating new opportunities for inclusive economic participation.

A successful DPI model requires a combination of open architecture, institutional capacity, public trust, and inclusive policy design. Therefore, India's experience with UPI and DBT demonstrates that Digital Public Infrastructure can serve as a powerful foundation for sustainable economic growth, efficient governance, and inclusive development in the digital era.

References

1. Agarwal, S., Alok, S., Ghosh, P., & Gupta, S. (2023). Digital payments and financial inclusion: Evidence from India's Unified Payments Interface. *Journal of Financial Intermediation*, 54, 101012.
2. Bharat, R., & Chawla, S. (2022). Digital transformation and inclusive growth: The role of financial technology in emerging economies. *Information Technology for Development*, 28(4), 789–808.

3. D'Silva, D., Filková, Z., Packer, F., & Tiwari, S. (2019). The design of digital financial infrastructure: Lessons from India's Unified Payments Interface. *BIS Quarterly Review*, 55–66. Bank for International Settlements.
4. International Monetary Fund. (2022). *Digitalization and inclusive growth: The role of digital financial infrastructure*. International Monetary Fund.
5. Khera, R. (2017). Impact of Aadhaar on welfare programmes. *Economic and Political Weekly*, 52(50), 61–70.
6. Ministry of Finance, Government of India. (2023). *Economic Survey 2022–23*. Government of India.
7. National Payments Corporation of India. (2024). *UPI product statistics and digital payment ecosystem reports*. NPCI.
8. Reserve Bank of India. (2022). *Payments and settlement systems in India: Vision 2025*. Reserve Bank of India.
9. Sen, A., & Choudhury, P. (2023). Digital public infrastructure and economic development: Emerging lessons from India. *Journal of Development Policy and Practice*, 8(2), 155–174.
10. Sinha, A., & Sharma, R. (2021). Digital financial inclusion and economic growth: Evidence from emerging economies. *Journal of Asian Economics*, 76, 101375.
11. United Nations Development Programme. (2023). *Digital public infrastructure for inclusive development*. United Nations Development Programme.
12. World Bank. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience*. World Bank.
13. World Bank. (2023). *Digital public infrastructure and development: A framework for inclusive digital transformation*. World Bank.
14. Zetzsche, D. A., Arner, D. W., Buckley, R. P., & Barberis, J. N. (2020). Digital finance platforms and financial inclusion: Opportunities and challenges. *European Business Organization Law Review*, 21, 1–30.