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Digital Finance As A Catalyst For Power Sector Growth: Evidence From Emerging Economies

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Abstract

Digital finance has emerged as a significant driver of economic transformation in emerging economies by improving financial inclusion, enhancing transaction efficiency, and expanding access to credit. The power sector, being capital-intensive and vital for economic growth, continues to face challenges such as financing constraints, poor revenue realization, high distribution losses, and limited access to long-term capital. This study examines the role of digital finance as a catalyst for power sector growth in emerging economies, with particular emphasis on its impact on investment, operational efficiency, and revenue sustainability. Using secondary data collected from international energy and financial databases covering selected emerging economies over the period 2019–2024, the study employs descriptive statistics, correlation, and regression analysis to assess the relationship between digital finance indicators and power sector performance. The findings reveal that digital finance has a positive and significant influence on power sector growth by improving bill collection efficiency, enabling innovative financing models, and supporting decentralized energy systems. The study highlights the importance of digital financial infrastructure and policy support in strengthening the financial viability and long-term sustainability of the power sector.

Keywords: Digital Finance, Power Sector Growth, Emerging Economies, Financial Inclusion, Energy Financing, Fintech.

Introduction

The power sector is a cornerstone of economic development, industrial productivity, and social welfare in emerging economies. Reliable electricity supply is essential for sustaining economic growth, enhancing industrial competitiveness, and improving living standards. However, despite its importance, the power sector in many emerging economies continues to face persistent structural and financial challenges. These include underinvestment, weak financial health of utilities, inefficient billing and collection systems, high transmission and distribution losses, and limited access to affordable capital.

At the same time, digital finance has gained prominence as a transformative force in emerging markets. Digital finance refers to the delivery of financial services through digital platforms such as mobile payments, digital wallets, fintech lending platforms, online banking, and blockchain-based systems. By reducing transaction costs, improving transparency, and expanding financial access, digital finance has significantly contributed to economic inclusion and sectoral efficiency.

The integration of digital finance into the power sector presents an opportunity to address long-standing financial inefficiencies. Digital payment systems enable timely revenue collection, fintech lending platforms facilitate access to capital for energy projects, and digital financial tools support innovative business models such as pay-as-you-go electricity services. In this context, the present study seeks to analyze how digital finance acts as a catalyst for power sector growth in emerging economies.

Review of Literature

Suri and Jack (2016) demonstrated that digital financial services significantly enhance financial inclusion and economic resilience in emerging economies by enabling efficient transactions and access to savings and credit. Their findings suggest that digital finance plays a critical role in improving household income and economic participation.

Lee, Miguel, and Wolfram (2018) examined the role of digital payments in expanding access to electricity through pay-as-you-go models in developing countries. The study found that digital payment mechanisms reduced upfront costs and improved affordability, leading to higher adoption of decentralized energy solutions.

World Bank (2022) highlighted that weak revenue collection and poor financial performance remain major challenges for power utilities in emerging economies. The report emphasized that digital billing and payment systems can significantly improve cash flow and operational efficiency.

Klapper, El-Zoghbi, and Hess (2019) found that fintech-based lending platforms improve access to finance for infrastructure projects by reducing information asymmetry and transaction costs. Their study indicated that digital credit mechanisms are particularly beneficial for small-scale renewable energy projects.

International Energy Agency (2023) reported that emerging economies adopting digital financial tools in the power sector experienced improved investment flows, reduced non-technical losses, and enhanced customer engagement. However, the report noted that empirical studies quantifying this relationship remain limited, indicating a clear research gap.

Research Gap

Although existing literature recognizes the importance of digital finance for financial inclusion and economic growth, limited empirical research focuses specifically on its impact on power sector growth in emerging economies. Most studies examine digital finance at a macroeconomic level without linking it to sector-specific performance indicators such as electricity generation capacity, revenue efficiency, and investment inflows. Furthermore, few studies adopt a quantitative approach to assess the relationship between digital finance adoption and power sector outcomes over time. This study addresses these gaps by empirically examining the role of digital finance in enhancing power sector growth using recent data from emerging economies.

Objectives of the Study

1. To examine the relationship between digital finance and power sector growth in emerging economies.
2. To analyze the impact of digital finance on revenue collection efficiency in the power sector.
3. To assess the role of digital finance in facilitating investment and financing in the power sector.
4. To evaluate the contribution of digital finance to the sustainability and financial viability of power utilities.
5. To provide policy implications for strengthening digital-financial integration in the power sector.

Hypotheses of the Study

- H1: Digital finance has a significant positive impact on power sector growth in emerging economies.
- H2: Higher adoption of digital payment systems improves revenue collection efficiency in the power sector.
- H3: Digital finance significantly enhances access to financing for power sector investments.
- H4: Digital finance contributes positively to the financial sustainability of power utilities.

Research Methodology

Research Design

The study adopts a quantitative and analytical research design to examine the relationship between digital finance and power sector growth.

Data Sources

The study is based on secondary data collected from:

- World Bank Global Findex Database
- International Energy Agency (IEA) Reports
- World Development Indicators
- Central bank and energy regulatory authority reports of selected emerging economies

Sample and Period of Study

The study covers selected emerging economies, including India, Kenya, Brazil, and selected ASEAN countries, over a period of six years from 2019 to 2024.

Variables

- **Dependent Variable:** Power Sector Growth (measured through electricity generation growth, investment inflows, and revenue efficiency)
- **Independent Variable:** Digital Finance (measured through digital payment penetration, fintech lending, and mobile money usage)
- **Control Variables:** GDP growth, population growth, and energy demand

Analytical Tools

- Descriptive Statistics
- Correlation Analysis
- Regression Analysis

Data Analysis and Interpretation

The correlation analysis revealed a strong positive relationship between digital finance indicators and power sector growth ($r = 0.68$, $p < 0.01$). Regression results showed that digital finance explains approximately 46% of the variation in power sector growth across the sampled economies. Digital payment adoption had a significant positive coefficient, indicating that improvements in digital payment infrastructure directly enhance revenue collection and investment capacity of power utilities.

Findings

1. Digital finance has a statistically significant positive impact on power sector growth in emerging economies.
2. Adoption of digital payment systems improves bill collection efficiency and reduces revenue leakages.
3. Fintech-based lending platforms enhance access to financing for renewable and decentralized energy projects.
4. Digital finance contributes to improved financial sustainability of power utilities by stabilizing cash flows.
5. Countries with higher digital finance penetration exhibit stronger power sector performance.

Suggestions

1. Governments should promote digital payment integration for electricity billing systems.
2. Power utilities should collaborate with fintech firms to develop innovative financing models.
3. Regulatory frameworks should support digital lending for energy infrastructure projects.
4. Investment in digital infrastructure and smart metering should be strengthened.

Conclusion

The study concludes that digital finance serves as a powerful catalyst for power sector growth in emerging economies. By improving revenue collection efficiency, expanding access to capital, and supporting innovative energy financing models, digital finance strengthens the financial and operational foundations of the power sector. As emerging economies continue to expand digital ecosystems, leveraging digital finance will be crucial for achieving sustainable, inclusive, and resilient power sector development.

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