Indian Journal of Computer Science and Technology
Volume 5, Issue2 (May-August 2026), PP: 1084-1086.
www.indjcst.com **ISSN No: 2583-5300**

Measuring Cashless Economy Readiness: An Empirical Study of Digital Payments in India

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To Cite this Article: *Sarthak Kumar*[1], Dr. Densy John Vadakkan[2], "Measuring Cashless Economy Readiness: An Empirical Study of Digital Payments in India", Indian Journal of Computer Science and Technology, Volume 05, Issue 02 (May-August 2026), PP: 1084-1086.*

Abstract: *In recent times, the rapid evolution of digital technology has significantly impacted traditional payment systems, giving momentum to the creation of a cashless economy. Digital payment systems like mobile wallets, internet banking, debit/credit cards, and Unified Payments Interface (UPI) facilitate fast, secure, and effective financial transactions. This article attempts to explore the impact of digital payment systems on the creation of a cashless economy through a descriptive and analytical method of research based on secondary data from government reports, financial reports, and studies conducted by experts. This article proposes a new index called Cashless Economy Readiness Index (CERI), which takes into account technological preparedness, digital access, digital payment user base, and institutional preparedness. The findings reveal that there has been a steady increase in the number of people using digital payment systems, showing that people are gradually moving towards a cashless economy, indicating that India has been structurally transformed to create a cashless economy.*

Key Word: *Digital Payments, Cashless Economy, UPI, Financial Inclusion, Cashless Economy Readiness Index (CERI)*

I. INTRODUCTION

In the era of rapid digital transformation, financial transactions are increasingly shifting from traditional cash-based systems to digital payment platforms. The concept of a cashless economy has gained global attention due to the widespread adoption of smartphones, improved internet connectivity, and the development of secure digital financial infrastructure[1,2]. Governments, financial institutions, and technology companies are actively promoting digital payment systems to enhance transparency, efficiency, and financial inclusion in modern economies.

In India, the transition toward a cashless economy gained significant momentum after the demonetization initiative introduced in 2016. This policy encouraged individuals and businesses to adopt digital payment methods such as Unified Payments Interface (UPI), mobile wallets, internet banking, and contactless card payments. Digital payment systems provide several advantages over traditional cash transactions, including faster processing, improved transaction tracking, reduced risk of theft, and lower operational costs.

Despite the rapid growth of digital payment technologies, several challenges continue to hinder the complete transition toward a fully cashless economy. Issues such as cybersecurity threats, digital illiteracy, unreliable network connectivity, privacy concerns, and uneven digital infrastructure remain significant barriers towidespread adoption. User trust and awareness play a critical role in influencing the acceptance of digital payment technologies, particularly in rural and semi-urban regions.

Digital payment systems contribute to broader economic development by improving financial transparency and promoting financial inclusion. The increasing use of digital transactions enhances traceability, strengthens tax compliance, and reduces the size of the informal economy. This research introduces a composite measurement framework called the Cashless Economy Readiness Index (CERI), which evaluates the readiness of users, institutions, and digital infrastructure for large-scale digital financial transformation.

II. LITERATURE REVIEW

The development of digital payment technologies has received considerable attention from researchers, policymakers, and financial institutions. Several studies have examined the adoption, impact, and challenges associated with the shift towards a cashless economy.

Authors have emphasized the importance of digital payment systems in improving financial inclusion. Mobile banking, UPI, and digital wallets have empowered the unbanked population to avail themselves of formal banking services. These systems minimize the use of cash and make transactions faster, especially in developing countries. However, the usage of these systems differs depending on digital literacy and trust factors.

Previous studies have explored the effect of government initiatives in encouraging cashless payments. Initiatives such as demonetization, the Digital India campaign, and rewards for digital payments have greatly influenced the adoption of digital payments. There was a notable rise in UPI transactions and mobile wallet payments after the implementation of these initiatives. However, some studies revealed that the use of cash is still prevalent due to habits and lack of digital access in rural areas.

Issues related to security and privacy are still prominent in the literature. Various authors have pointed out that

cybersecurity threats, fraud, phishing, and data breaches are important factors hindering the adoption of digital payments. Although improvements in encryption and authentication have increased system security, the perception of risk still affects adoption behavior.

Infrastructure and technological readiness are essential for a cashless system to exist. A stable internet connection, smartphone usage, and a good payment gateway are essential. In areas where the internet connection is unstable, people are likely to revert to cash transactions. This is important to ensure sustained growth.

III. PROPOSED METHODOLOGY

This research employs a structured framework for analysis that combines data analysis with behavioral and infrastructural elements to offer a comprehensive assessment of the digital payments system. The framework incorporates four major modules: data collection, preprocessing and classification, analytical modeling, and impact evaluation.

Data Collection: Secondary information sources include reports from central banks, government publications, payment network statistics, and financial technology surveys. Key variables include frequency of digital transactions, preferred payment methods (UPI, cards, wallets, net banking), user demographics, internet accessibility, perceived security and trust levels, and barriers to adoption.

Data Preprocessing and Classification: Collected data undergoes preprocessing to improve quality and consistency. Users are classified into adoption categories such as: high digital adopters, moderate adopters, low adopters, and cash-dependent users.

Analytical Modeling: Correlation analysis is employed to determine the relationship between digital payment use and the decrease in cash dependence. Regression analysis identifies influential factors affecting adoption such as ease of use, security perception, and infrastructure availability.

Impact Evaluation Framework: The evaluation is based on key performance indicators (KPIs) including: growth rate of digital transactions, reduction in cash circulation, user adoption index, transaction success rate, and financial inclusion indicators.

Development of CERI Composite Index: The Cashless Economy Readiness Index (CERI) is calculated through the weighted normalization of important dimensions such as Usage Intensity, Trust Level, Digital Access, and Transaction Diversity.

IV. RESULTS AND DISCUSSION

The computed CERI values indicate a steady increase in the readiness of the digital payment ecosystem during 2015-2024. The index increased from 0.31 in 2015 to 0.86 in 2024, indicating a strong structural transition toward a cashless economic system. The sharp increase after 2016 reflects policy interventions, expansion of internet connectivity, and rapid adoption of real-time payment systems such as UPI.

Empirical Findings: The results show significant and robust growth in digital payment usage, coupled with a corresponding reduction in reliance on cash as a percentage of total transaction value. Results demonstrate exponential growth in real-time payment systems, with UPI being the most preferred mode of transaction. The number of transactions per capita grew year by year, while high-value cash transactions showed a corresponding decline.

Analysis of Regression Results: Internet penetration and financial inclusion are the most significant factors in determining digital payment adoption. A one percentage point increase in internet access leads to a statistically significant increase in the average number of digital transactions per capita. Policy actions serve as catalytic accelerators, indicating that infrastructure readiness determines adoption sustainability.

Behavioral Diffusion Patterns: Behavioral diffusion modeling shows an S-curve pattern of adoption. Initial stages of adoption are marked by usage in urban and technology-savvy populations, followed by a swift transition to semi-urban and rural areas. The data shows that adoption is nearing maturity in well-connected areas and growing in low infrastructure areas.

V.CONCLUSION

This research offers empirical support that the adoption of digital payments is a crucial factor in the structural growth of a cashless economy. By combining large-scale transactional data, macroeconomic variables, and behavioral diffusion models, this paper demonstrates that digital payment systems produce a persistent decrease in cash usage, rather than a short-term policy response.

The empirical results show that digital payment adoption has strong persistence and equilibrium properties with economic formalization and transaction efficiency. Time series analysis confirms the long-term substitution relationship between digital and cash payments. Regression analysis shows that connectivity, digital access, and financial inclusion are the key determinants of digital payment adoption. Diffusion analysis shows that digital payment adoption has predictable growth patterns with large expansion possibilities in less connected and semi-urban areas.

The study contributes to existing knowledge by suggesting an integrated analytical framework that takes into account institutional readiness, economic factors, and user behavior simultaneously. The introduction of the Cashless Economy Readiness Index (CERI) provides a systematic and measurable approach to determine readiness for digital financial transformation. The results emphasize the importance of continuing investment in digital infrastructure, financial accessibility, and user capability building to promote cashless growth.

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