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Challenges and prospects of India's transition to a cashless economy: A comprehensive analysis

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Abstract

India's transition towards a cashless economy has significantly accelerated in recent years, driven by technological advancements and policy initiatives. However, this shift presents distinct challenges and opportunities for a nation as diverse and complex as India is. This study critically examines the challenges and future prospects of India's cashless economy through a comprehensive review of the existing literature and data. The findings indicate that a substantial segment of the population continues to rely heavily on cash, particularly in rural areas, due to inadequate digital infrastructure, limited financial literacy, and socioeconomic factors such as gender disparity and income inequality. Furthermore, concerns regarding privacy, security, and lack of trust in digital systems persist. Technological readiness and the digital divide also present obstacles to the adoption of cashless transactions. Despite these challenges, the Indian government has introduced various initiatives to promote a cashless economy, such as the Central Bank Digital Currency (CBDC), digital rupee (e₹), and Unified Payments Interface (UPI). The study concludes that the future of India's cashless economy appears promising with an appropriate combination of policy support, technological advancements, and societal adaptation. Addressing socioeconomic, technical, and infrastructural barriers can foster a more inclusive digital economy in the Philippines. This study recommends the continued development of digital infrastructure, financial literacy programs, and collaboration between the government, regulators, banks, and fintech companies to ensure a successful transition to a cashless economy in India.

Keyword: Cashless economy, digital payments, financial inclusion, digital infrastructure, financial literacy, Central Bank Digital Currency (CBDC), digital rupee (e₹), etc.

1. Introduction

In recent years, India has initiated a substantial transition towards a cashless economy, propelled by technological advancements and policy initiatives. This shift is part of a broader global movement towards digital economies; however, it presents distinct challenges and opportunities for a nation as diverse and complex as India. The momentum for cashless transactions significantly increased following the Indian government's demonetization initiative in 2016, which aimed to reduce corruption and promote the use of digital payments. Despite these efforts, the transition from cash to digital is ongoing, with several obstacles to overcome. India's progression towards a cashless economy is not without challenges. A considerable segment of the Indian population continues to rely heavily on cash due to issues such as inadequate digital infrastructure, particularly in rural areas, and a lack of financial literacy (Goswami *et al.*, 2022; Sinha *et al.*, 2018) ^[14, 36]. Additionally, socioeconomic factors, including gender disparities and income inequality, play crucial roles in digital financial inclusion. Research indicates that men, individuals with higher incomes, and those with more education are more likely to utilize digital financial services, whereas women and lower-income groups often remain marginalized (Ghosh and Chaudhury, 2020) ^[12]. Moreover, concerns regarding privacy and security affect users' adoption of digital payments (Sinha *et al.*, 2018) ^[36]. Privacy concerns and a lack of trust in digital systems have the potential to impede the widespread adoption of cashless payment systems. Furthermore, the technological readiness of the population, coupled with the existing digital divide, presents additional barriers to achieving a fully cashless society (Sinha *et al.*, 2018) ^[36]. Looking towards the future, the Indian government's initiatives, such as the introduction of

Central Bank Digital Currency (CBDC) and the continued development of financial technology, hold promise for overcoming these challenges. The launch of the digital rupee (e ₹) represents a pivotal step in advancing India's digital financial framework (Dash *et al.*, 2022; Haque & Shoaib, 2023) ^[10, 15]. These developments aim to enhance the efficiency and security of payment systems and ensure greater financial inclusion across diverse population segments. In conclusion, although the journey towards a cashless economy in India is fraught with challenges, the future prospects remain optimistic with the right combination of policy support, technological advancements, and societal adaptation. By addressing socioeconomic, technical, and infrastructural barriers, India has the potential to foster a more inclusive digital economy that benefits all citizens.

2. Background and context

The background and context of the study are elaborated upon in the following sections.

2.1 Defining a 'cashless economy' and its global relevance

A 'cashless economy' refers to an economic system in which transactions are conducted electronically rather than through the use of physical currency. The transition towards such an economy is of considerable global importance, as many countries recognize the efficiency, convenience, and transparency provided by digital payment systems. The enhanced ability to track transactions aids in reducing tax evasion and promoting economic transparency (Mukhopadhyay, 2016; Srouji, 2020) ^[25, 38].

2.2 India's historical reliance on cash and high cash-to-GDP ratio

Historically, the Indian economy has exhibited a significant reliance on cash transactions, as indicated by its high cash-to-GDP ratio. This reliance can be attributed to various socioeconomic factors, including limited banking penetration and the predominantly informal nature of a substantial portion of the economy, which has traditionally favoured cash transactions (Cnaan *et al.*, 2021; Lahiri, 2020) ^[9, 20].

2.3 The catalytic role of the 2016 demonetization exercise in accelerating digital payment adoption

In November 2016, the Indian government demonetized high-denomination currency notes, which comprised a substantial portion of the cash in circulation. This decisive action aimed to address issues related to black money and counterfeit currency and encourage a shift towards a cashless economy. Although this initiative initially led to an increase in digital payment adoption due to cash shortages, its overall impact was mixed because of infrastructure limitations and a rapid reversion to cash usage (Athique, 2019; Sivathanu, 2018) ^[4, 37].

2.4 Introduction of key enablers

Several strategic initiatives have been implemented to enhance the digital economy. The Pradhan Mantri Jan Dhan Yojana (PMJDY) aims to improve financial inclusion by facilitating the opening of bank accounts for the poor. The

Aadhaar initiative established a biometric identity framework crucial for verifying electronic transactions. The increasing penetration of mobile phones, coupled with the introduction of the Unified Payments Interface (UPI), has created a robust infrastructure for digital transactions, making them accessible and efficient for a broad user base. These enablers contribute to a more seamless integration into India's digital economy (Mukhopadhyay, 2016; Routray *et al.*, 2019) ^[25, 31].

This background examines how India is moving toward a cashless economy using digital platforms. It discusses the challenges of infrastructure and the need to include everyone financially. However, there are problems, such as a lack of infrastructure and digital skills, that need to be addressed for a smooth transition.

3. Statement of the problem

This background provides a comprehensive analysis of India's progression toward a cashless economy through the adoption of digital platforms, addressing infrastructure challenges, and promoting financial inclusion. However, this transition is accompanied by challenges, such as infrastructure deficiencies and digital literacy, which must be addressed for a seamless transformation.

4. Significance of the study

The examination of India's transition to a cashless economy holds significant implications across various domains. This transition is intricately linked to initiatives aimed at enhancing financial inclusion, as digital payment innovations facilitate the integration of unbanked populations into the formal financial system (Cnaan *et al.*, 2021; Goswami *et al.*, 2022) ^[9, 14]. The shift towards a cashless economy has the potential to stimulate economic growth by improving transaction efficiency and expanding financial services, particularly in rural areas (Rastogi *et al.*, 2021; Tee & Ong, 2016) ^[29, 39]. Notable challenges include the digital divide, cybersecurity risks, and socioeconomic factors that influence the adoption of cashless payments. Addressing these challenges is essential for developing inclusive solutions (Mukhopadhyay 2016; Srouji 2020) ^[25, 38]. This study provides insights for policymakers to support digital financial literacy and infrastructure to promote financial inclusion (Kuznyetsova *et al.*, 2022; Vyas & Jain, 2021) ^[19, 42]. India's experience offers valuable lessons when compared with other countries' transitions to cashless economies, aiding in the development of future strategies (Srouji, 2020; Tee and Ong, 2016) ^[38, 39]. This study serves as a guide for India's progression towards an inclusive cashless society while minimizing the associated risks (Sharma, 2016) ^[34].

5. Literature Review

Numerous social science scholars have conducted extensive research on various dimensions of India's cashless economy. The most recent and pertinent research articles have been selected for this study and are presented in the following sections.

Roopadarshini and Lakshminarayana (2018) ^[30] studied how cashless transactions affect India's economy. In a cashless economy, people use cards or digital methods instead of cash to make payments. This has benefits such as better tax

collection, increased transparency, reduced corruption, and easier tracking of expenses. However, India's move to cashless payments faces problems, such as limited Internet access, low financial knowledge, and insufficient electronic systems. The government supports digital payments through payment banks, mobile wallets, and the UPI. The authors believe that digitization will improve economic transparency and make organizations more competitive.

Sandhya and Rudrani (2025) ^[33] examined how India is moving towards a cashless economy with the Digital India program, which encourages electronic payments. A cashless economy uses e-banking, cards, and digital wallets to facilitate such transactions. The government offers incentives such as fuel discounts and support for rural point-of-sale systems. Major challenges include high cash use at 13% of GDP, low digital literacy, and poor internet access in rural areas. The JAM infrastructure, prepaid payments, increased card use, and RBI support have facilitated cashless growth. Success requires government work on infrastructure and cybersecurity, as well as public involvement.

Kalgutkar (2022) ^[17] studied how India is moving towards a cashless economy and using more digital payments. After the 2016 demonetization, India started using less cash and more digital transactions for payments. This study used existing data to examine the trends in digital payments. It was found that digital transactions increased after demonetization, and the amount of cash compared to GDP decreased accordingly. Digital payments as a percentage of GDP grew from 660% in 2014-15 to 862% in 2018-19, with more retail electronic payments. India still faces problems such as poor connectivity, a lack of infrastructure, and security concerns. While moving towards a cashless economy, both cash and digital payments are important for different economic needs; therefore, a balanced approach is needed.

Joshi (2018) ^[16] examined the problems and solutions of cashless payments in India. The government wants more cashless payments to fight corruption and boost the economy. This study discusses the problems and solutions for payment methods such as mobile banking, cards, RTGS/NEFT, and UPI. The major problems are low digital skills, lack of internet, security issues, poor rural infrastructure, and high fees. Solutions include better online transactions, improved security, and the use of Mobile POS systems. Moving to a cashless economy has benefits, such as easier tax collection, but it is important to address these problems.

Arora and Kaushik (2018) ^[3] studied how a cashless economy affects Indian banks using SWOT analysis. A cashless economy uses electronic methods for transactions. In India, demonetization has accelerated this change. The study examined payment methods such as banking cards, USSD, AEPS, UPI, mobile wallets, and Internet banking. The SWOT analysis found strengths such as more Jan Dhan Yojana accounts, better banking knowledge, and higher profits. Weaknesses included the digital divide and lack of digital skills. Opportunities included a larger customer base, and threats included cybersecurity risks. The study concluded that cashless transactions have mixed effects on the economy. Good infrastructure and digital education are important, especially in rural areas.

Verma (2017) ^[41] looked at India's demonetization and its effects on moving to a cashless economy. Demonetization means stopping a currency from being legal money. India did so in 1946, 1978, and 2016. In 2016, the goals were to cut down on black money, fake currency, and money for terrorism funding. A cashless economy uses digital payment methods to facilitate transactions. India is the fourth-highest country in terms of cash usage. The main cashless methods are Mobile Wallets, Plastic Money, Net Banking, UPI Apps, and AEPS. This study discusses the benefits of business, banking, real estate, taxes, education, and IT. The major problems are insufficient bank access, a preference for cash, poor infrastructure, and cybersecurity issues. Demonetization led to more tax returns and digital payments but slowed GDP growth. The study suggests that a cashless economy is needed and that the government and RBI should work on cybersecurity to make digital access easier.

Maheswari (2018) ^[21] examined India's transition to a cashless economy. In a cashless society, people use digital methods for transactions instead of cash transactions. Demonetization pushed India towards using less cash, with online transfers, cards, e-wallets, and UPI applications replacing cash transactions. The benefits include lower costs for handling money, clearer transactions, increased revenue, and lower expenses. However, there are challenges, such as reliance on cash, weak digital infrastructure, merchants not trusting the system, and poor Internet in rural areas. While cashless transactions have benefits, the government needs to teach people about the system and its benefits.

Abraham (2019) ^[1] studied how 80 retailers in Trivandrum, India, started using cashless payments. After demonetization, 85% of them used POS machines and e-wallets. They found that cashless payments were faster and helped maintain better recordkeeping. The main problems were internet issues and device breakdowns. Retailers suggested better device protection and faster internet. Despite these problems, 92.5% of respondents wanted to continue using cashless payments. The study shows that to improve cashless payments; India needs better infrastructure and government assistance.

Chandrakala (2019) ^[7] looked at India's move towards a cashless economy, where people use digital ways to pay. The government's 'Digital India' program aims to make society more digital. The study found benefits such as increased transparency, better access to financial services, lower costs, better tax collection, and easier tracking of spending. However, challenges such as the cost of equipment, low literacy, poor infrastructure, lack of digital skills, preference for cash, and cybersecurity issues persist. This study discusses payment methods such as cards, online transfers, mobile wallets, and UPI applications. The study states that a cashless India could make the economy more open, but there are still significant challenges to be addressed.

Patel and Masalawala (2024) ^[28] examined how India is moving towards a cashless economy using electronic payments such as debit/credit cards, NEFT, and RTGS. They studied digital payment efforts and their economic effects. India's digital payments market is expected to grow by 400 billion with a 50% annual growth rate. A 5% rise in cashless payments could save Rs. 500 crores per year. The benefits include lower currency costs, easier payment, and

better tracking. A survey in Mumbai showed that 83% of people noticed the economic effects of digital payment methods. The UPI is popular because it has no merchant fees, while cards account for 5% of retail digital payments. The main challenges are limited smartphone use and security issues. This shift helps e-payment startups and digital acceptance. The study concludes that India is progressing towards a cashless economy, but challenges remain.

6. Research gap

A review of studies on cashless transactions in India reveals several research gaps. Most research focuses on cities, not rural areas; therefore, we do not know much about rural issues. Many studies are short-term and do not track changes over time. There is insufficient research on the effectiveness of cybersecurity in India. More studies are needed on how different people use and accept cashless payment methods. Government policies that promote cashless transactions require thorough evaluation. Few studies have compared India's progress with that of other developing countries. More research is needed on how cashless economies affect financial inclusion, especially among marginalized groups. There is a lack of studies on new technologies such as blockchain and AI. We need to understand their impact on sectors such as agriculture, small businesses, and the informal sectors. There is also little research on the environmental effects of moving to a cashless economy.

7. Research objectives

The objectives of the present study are as follows:

- i) To examine the evolution and current state of cashless transactions in India;
- ii) To identify and critically analyse the socio-economic, technological, and regulatory challenges to achieving a cashless economy;
- iii) To assess the potential benefits and future prospects of this transition for India's economic development; and
- iv) To propose strategic recommendations for policymakers and stakeholders in this regard.

8. Research methodology

This study utilized a descriptive methodology that exclusively relied on pre-existing data and literature. Data were obtained from a diverse array of pertinent and recent research articles, journals, papers, academic publications, and online resources. A comprehensive review of the existing literature and data on India's transition to a cashless economy was conducted. The analysis incorporated recent and relevant research articles, journals, papers, and academic publications on the subject, alongside an examination of online resources for current data and information. A descriptive approach was adopted to analyse and synthesize the collected information. No primary data collection was undertaken; the study relied entirely on secondary sources and preexisting data. The methodology aimed to examine the evolution and current state of cashless transactions in India, identify challenges, assess potential benefits and future prospects, and propose recommendations based on a literature review and analysis of existing data.

9. The landscape of cashless payments in India

This section of the study is organized into three subsections: Evolution of Digital Payments, Key Instruments and Platforms, and Role of Regulatory Bodies. Each of these subsections is discussed in detail in the following sections.

9.1 Evolution of digital payments

The progression of digital payments in India represents a significant transformation, characterized by numerous pivotal developments and challenges. The following is a structured overview.

9.1.1 Demonetization as a catalyst

The demonetization initiative of November 2016, which resulted in the withdrawal of 86% of currency notes, substantially advanced India's transition to cashless transactions. This measure was partially intended to encourage digital payment (Chandrasekhar & Ghosh, 2017) ^[8].

9.1.2 Digital financial revolution

In pursuit of advancing digital transactions, India has been investing in infrastructure to enhance digital payments through initiatives such as the Unified Payments Interface (UPI) and digital wallets, thereby facilitating more efficient and rapid financial transactions (Mukhopadhyay, 2016) ^[25].

9.1.3 Introduction of digital currency

The introduction of the digital rupee (e-Rupee) by the Reserve Bank of India constitutes a substantial advancement in the nation's digital payment infrastructure. This initiative was designed to facilitate business transactions while simultaneously strengthening the overall payment system (Haque & Shoaib, 2023) ^[15].

9.1.4 Challenges with infrastructure and accessibility

Notwithstanding these advancements, substantial challenges persist owing to insufficient digital banking infrastructure, particularly in rural regions, which frequently results in limited financial inclusion and digital banking engagement (Cnaan *et al.*, 2021) ^[9].

9.1.5 Privacy and cost concerns

Concerns regarding privacy, identity theft, and the increased costs associated with digital payments persist, potentially deterring individuals from fully transitioning to cashless transactions (Chandrasekhar and Ghosh, 2017) ^[8].

9.1.6 Socioeconomic factors

The continued reliance on cash is partially attributable to socioeconomic disparities and the digital divide, wherein numerous populations lack the requisite digital financial literacy to facilitate a seamless transition (Srouji, 2020) ^[38].

9.1.7 Technological innovations

The implementation of technologies such as 5G and blockchain is anticipated to further facilitate the adoption of digital payments by enhancing operational efficiencies and promoting financial inclusion (Dash *et al.*, 2022) ^[10].

9.1.8 Accessibility for disabled populations

Research indicates that both cash and digital payment

methods may be inaccessible to individuals with disabilities, highlighting the necessity for platforms to ensure transaction accessibility for all users (Kameswaran and Muralidhar, 2019) ^[18].

9.1.9 Policy considerations

There urgent requirement for policy interventions to facilitate a seamless transition, ensure financial inclusivity, and address infrastructure deficiencies that impede the adoption of digital payments (Mukhopadhyay, 2016) ^[25].

The transition to a cashless economy in India presents a multifaceted challenge, necessitating a balance between promoting digital adoption and ensuring equitable access to infrastructure and literacy across diverse socioeconomic groups. Although innovations such as the e-Rupee signify substantial progress, considerable effort is required to address the prevailing challenges.

9.2 Key instruments and platforms

The principal instruments and platforms facilitating cashless transactions are delineated in the following key points:

9.2.1 Unified Payment Interface (UPI)

The (UPI), developed by the National Payment Corporation of India, represents a mobile-centric, real-time interbank payment system. It significantly enhances the convenience and security of digital payments, which are characterized by a user-friendly interface, reduced settlement times, and robust security features. The modular API architecture of the UPI facilitates innovative consumer solutions and promotes financial inclusion, thereby advancing the integration of a substantial segment of the population into the digital economy (Gochhwal, 2017; Rastogi *et al.*, 2021) ^[13, 29].

9.2.2 Mobile wallets

Mobile wallets in India are instrumental in advancing the transition towards a cashless economy by offering digital monetary applications and services. These platforms provide significant benefits, including convenience and personalized marketing. However, frequent user switching among providers has been observed. Critical quality factors that influence continued usage encompass information, system, and service quality, all of which affect perceived usefulness and security (Routray *et al.*, 2019; Ul *et al.*, 2017) ^[31, 40].

9.2.3 Card payments

Credit and debit card payments play a pivotal role in facilitating cashless transactions, enabling seamless financial interactions both online and offline. Despite their simplicity and widespread popularity, these payment methods face challenges, notably the escalating risk of fraud. This has necessitated the development of sophisticated fraud detection and prevention techniques that employ machine learning and blockchain technology (Balagolla *et al.*, 2021; Malini & Pushpa, 2017) ^[5, 22].

9.2.4 Aadhaar Enabled Payment System (AePS)

The Aadhaar Enabled Payment System (AePS) in India uses the Aadhaar biometric identity to ensure secure digital transactions. This system enhances financial access and inclusion by facilitating Aadhaar-based transactions without necessitating physical interactions with banking institutions.

It plays a significant role in advancing digital financial initiatives, particularly among unbanked populations (Adelaja *et al.*, 2024; Panagariya, 2022) ^[2, 27].

9.3 Role of regulatory bodies

The following are the principal aspects concerning the function of regulatory authorities in the domain of cashless transactions in India:

9.3.1 Influence on diffusion

Regulatory bodies in India are pivotal in disseminating cashless payment technology. They exert a substantial influence on the adoption of this technology within the country's unorganized retail sector, which functions as an intermediary between the state and marginalized communities (Mishra *et al.*, 2021) ^[23].

9.3.2 Policy enablers

The shift towards a cashless economy is facilitated by policy interventions formulated by regulatory authorities. These policies are designed to enhance the inflow of funds into bank accounts, which serves as the primary catalyst for the adoption of cashless payment methods by both consumers and merchants (Mukhopadhyay, 2016) ^[25].

9.3.3 Unified Payment Interface (UPI)

The National Payment Corporation of India, as a regulatory authority, introduced the Unified Payment Interface (UPI), a mobile-centric, real-time interbank payment system. The UPI is intended to revolutionize and universalize digital payments throughout India, thereby promoting financial inclusion (Gochhwal, 2017) ^[13].

9.3.4 Market dynamics

Regulatory bodies function as crucial market participants in formulating policies and implementing systems such as the UPI. This role encompasses not only guiding technological progress but also addressing issues related to security, user adoption, and the perceived value of technology, all of which are vital for establishing an effective cashless payment ecosystem (Gochhwal, 2017; Mishra *et al.*, 2021) ^[13, 23].

9.3.5 Innovation and security

The modular architecture of the UPI, as promoted by regulatory initiatives, facilitates the creation of innovative solutions that are specifically designed to meet the needs of consumers and businesses while simultaneously ensuring robust security protocols. This approach enhances user confidence and promotes the adoption of cashless payment systems (Gochhwal 2017) ^[13].

10. Promotion of digital India and cashless economy by the Indian government

The Central Government of India has instituted a series of initiatives aimed at advancing the Digital India campaign and fostering a cashless economy. The following are some of the principal elements of these initiatives:

10.1 Demonetization

In 2016, the government demonetized high-value currency

notes to reduce corruption and promote digital transactions (Pal *et al.*, 2018) ^[26]. This policy resulted in an initial surge in the adoption of digital payment methods in China.

10.2 Digital wallets and UPI

The advent and promotion of mobile wallets and the Unified Payments Interface (UPI) have significantly enhanced the accessibility and convenience of digital payments for the general public (Routray *et al.*, 2019; Sakib *et al.*, 2024) ^[31, 32].

10.3 Central Bank Digital Currency (CBDC)

The Reserve Bank of India is investigating the potential implementation of a Central Bank Digital Currency (CBDC) to further advance financial inclusion and the digital economy (Banerjee & Sinha, 2023) ^[6].

10.4 Digital financial literacy

Efforts to enhance digital financial literacy are pivotal in promoting the widespread adoption of cashless payment systems. Educating the populace about digital financial tools is essential for bridging the gaps in their utilization (Shehadeh *et al.*, 2024) ^[35].

10.5 Financial inclusion policies

The government's strategies for financial inclusion, in conjunction with cashless policies, are designed to incorporate the unbanked population into the digital financial ecosystem. This integration aims to mitigate inequalities and promote economic growth (Mouna and Jarboui, 2021) ^[24].

10.6 Socio-demographic considerations

Socio-demographic factors, including income, education, and gender, continue to influence the adoption of digital financial services. Initiatives are being implemented to address these disparities, highlighting the necessity of developing policies tailored to distinct demographic segments (Ghosh & Chaudhury, 2020; Shehadeh *et al.*, 2024) ^[12, 35].

10.7 Challenges and recommendations

Challenges such as low financial literacy, limited Internet access, and resistance in rural areas where traditional practices persist remain significant (Cnaan *et al.*, 2021; Dash *et al.*, 2022) ^[9, 10]. Continuous improvements in information quality and system security are recommended to enhance the sustained use of digital payment systems (Routray *et al.*, 2019) ^[31].

These initiatives represent a holistic strategy to facilitate India's transition towards a digital and cashless economy while simultaneously ensuring the inclusion of all societal segments.

11. Challenges to a cashless economy in India

The transition towards a cashless economy in India encounters several challenges, as delineated below:

11.1 Digital divide

There pronounced disparity in access to digital technologies between urban and rural areas. Numerous rural and semi-urban regions are deficient in essential digital infrastructure and basic digital literacy, thereby impeding a

comprehensive transition to cashless transactions (Cnaan *et al.* 2021) ^[9].

11.2 Infrastructure deficiencies

The requisite banking and connectivity infrastructure to facilitate extensive digital financial transactions is insufficient in various regions of India, particularly in rural areas. This infrastructure deficiency impedes the comprehensive transition to a cashless economy (Chandrasekhar & Ghosh, 2017) ^[8].

11.3 Behavioural and cultural hurdles

Cultural practices and entrenched trust in cash transactions present substantial obstacles. Many individuals, particularly in rural regions, are accustomed to cash transactions and are reluctant to adopt digital payments due to cultural inertia and a lack of trust in digital systems (Athique, 2019; Dash *et al.*, 2022) ^[4, 10].

11.4 Cybersecurity and privacy risks

The expansion of digital payment systems is accompanied by an increased risk of cyber threats, including fraud, identity theft, and privacy breaches. The security infrastructure frequently fails to keep pace with technological advancements, raising concerns regarding the protection of personal and financial data (Chandrasekhar & Ghosh, 2017; Fabris, 2022) ^[8, 11].

11.5 Economic and operational issues

The comprehensive transition to digital currency remains economically and operationally unfeasible. The establishment and maintenance of digital payment systems incur significant costs, and the operational challenges associated with ensuring seamless transactions at all levels are considerable (Ghosh & Hom Chaudhury, 2020; Mukhopadhyay, 2016) ^[12, 25].

These challenges highlight the complexities India faces in shifting towards a fully cashless economy. While progress has been made, addressing these issues is crucial for a sustainable transition.

12. Prospects and opportunities of a cashless economy in India

The potential and opportunities for establishing a cashless economy in India can be examined through several critical dimensions, including government initiatives, technological advancements, socio-economic benefits, and the strategic utilization of the demographic dividend. The following points provide a detailed exploration of these dimensions.

12.1 Government initiatives and policy support

The Indian government has actively promoted a cashless economy as part of its broader digitalization initiative. The introduction of the Unified Payment Interface (UPI) by the National Payment Corporation of India represents a significant advancement, offering a secure and efficient real-time interbank payment system (Gochhwal 2017) ^[13]. Additionally, the establishment of a Central Bank Digital Currency (CBDC), such as the e-Rupee, signifies a major government-led effort to modernize the payment system, enhance transaction security, and facilitate more efficient business operations (Haque and Shoaib, 2023) ^[15].

12.2 Technological innovation and fintech growth

India has experienced significant growth in financial technology, which plays a crucial role in bridging the gap between the banked and unbanked populations. FinTech solutions, such as mobile money services and digital wallets, provide affordable and reliable transaction options, thereby promoting financial inclusion in developing countries (Goswami *et al.*, 2022) ^[14]. The adoption of mobile-centric payment systems, such as UPI, further exemplifies India's technological readiness to support a cashless economy (Gochhwal, 2017) ^[13].

12.3 Socio-economic benefits

12.3.1 Increased transparency

Digital payment systems mitigate the prevalence of black money and corruption by enhancing transaction traceability and transparency. This development is consistent with global trends, wherein cashless systems improve tax collection accuracy and strengthen government controls (Yakean, 2020) ^[43].

12.3.2 Financial inclusion

The transition towards cashless systems is intrinsically linked to financial inclusion, particularly in integrating the unbanked population into the formal economic structure. Empirical evidence indicates that technological solutions substantially enhance the financial inclusion of underprivileged demographics, thereby facilitating entrepreneurial activities and economic participation, even in rural areas (Cnaan *et al.*, 2021; Goswami *et al.*, 2022) ^[9, 14].

12.3.3 Efficiency and convenience

Digital transactions are expedited, more convenient, and frequently cost-effective alternatives to traditional cash-based transactions. The integration of card payments, e-wallets, and online banking services facilitates seamless financial transactions for individuals and businesses, thereby enhancing overall consumer satisfaction and business efficiency (Gochhwal, 2017; Yakean, 2020) ^[13, 43].

12.4 Demographic dividend

India's youthful and technologically adept population is particularly well-positioned to adopt digital payment systems, presenting a significant demographic advantage. As an increasing number of individuals within younger age cohorts attain digital literacy and become financially active, the transition towards a cashless economy is anticipated to gain momentum. This demographic advantage has the potential to serve as a powerful catalyst for the proliferation of digital financial services and innovations across the country (Cnaan *et al.*, 2021) ^[9].

13. Findings of the study

The study concludes that, although India encounters considerable challenges in its transition to a cashless economy, significant opportunities for economic growth and financial inclusion exist, provided that the barriers are effectively addressed. Based on the preceding discussions, the key findings of this study on the cashless economy in India are as follows:

13.1 Transition to a cashless economy

- India is making a significant shift towards a cashless economy, driven by technological advancements and policy initiatives such as demonetization.
- This push gained momentum after the 2016 demonetization, which aimed to reduce corruption and promote digital payments.
- However, this shift remains a work in progress, with several challenges to overcome.

13.2 Challenges

- A significant portion of the population still relies heavily on cash, especially in rural areas of the country.
- Issues include insufficient digital infrastructure, lack of financial literacy, and socioeconomic factors such as gender disparities and income inequality.
- Concerns regarding privacy, security, and lack of trust in digital systems exist.
- Technological readiness and the digital divide present barriers.

13.3 Government initiatives

- Introduction of Central Bank Digital Currency (CBDC) and development of financial technology.
- Launch of the digital rupee (e₹) to advance India's digital financial framework.
- Programs such as the Pradhan Mantri Jan Dhan Yojana (PMJDY) increase financial inclusion.
- Implementation of Aadhaar for biometric identity verification.
- Promotion of the Unified Payments Interface (UPI) for digital transactions.

13.4 Benefits and opportunities

- Enhanced efficiency and security of payment systems are also expected.
- Potential for greater financial inclusion across diverse population segments.
- Increased transparency in transactions and reduced tax evasion.
- Growth in financial technology innovations and digital payment systems.

13.5 Future prospects

- The future looks optimistic with the right combination of policy support, technological advancement, and societal adaptation.
- Addressing socioeconomic, technical, and infrastructural barriers can foster a more inclusive digital economy in the Philippines.
- The continued development of digital infrastructure and financial literacy programs is required.

14. Conclusion

The transition towards a cashless economy in India presents both significant challenges and promising opportunities. While substantial progress has been achieved through government initiatives such as demonetization, the introduction of the Unified Payments Interface (UPI), and the launch of the digital rupee, several obstacles remain. The digital divide between urban and rural areas, infrastructure

deficiencies, behavioural and cultural barriers, cybersecurity concerns, and socioeconomic disparities continue to hinder the full adoption of digital payments across all segments of society. However, the prospects for a cashless economy in India are encouraging. The country's young, tech-savvy population provides a demographic advantage in embracing digital financial services. Ongoing technological innovations in fintech are bridging the gaps between banked and unbanked populations. The shift towards cashless transactions offers potential benefits, such as increased transparency, enhanced financial inclusion, and improved economic efficiency. A multi-faceted approach is necessary to realize these benefits. This includes continued government support through policy initiatives and infrastructure development, particularly in rural regions. Efforts to improve digital literacy and address privacy and security concerns are thus crucial. Additionally, tailoring digital payment solutions to diverse socioeconomic groups can help ensure more inclusive adoption of digital payment solutions. In conclusion, although the path to a fully cashless economy in India is complex and challenging, the potential rewards in terms of economic growth, financial inclusion, and technological advancement are substantial. With sustained efforts from the government, industry, and society, India has the potential to overcome existing barriers and leverage its strengths to create a more inclusive and efficient digital financial ecosystem.

15. Recommendations

Following an analysis of the research topic, the following recommendations are proposed for various stakeholders:

15.1 For government

- i) **Infrastructure development:** It is imperative to continue enhancing digital infrastructure nationwide, with particular emphasis on rural areas, to facilitate cashless transactions.
- ii) **Subsidies and incentives:** Implement financial incentives to encourage businesses and consumers to transition to digital payment systems.
- iii) **Policy support:** Develop regulatory frameworks that promote cashless transactions while ensuring the security and privacy of the users.
- iv) **Partnership with the private sector:** Collaborate with private sector entities to harness technological advancements and innovations in digital payment systems.

15.2 For regulators (RBI)

- i) **Regulatory framework:** Establish a comprehensive and coherent regulatory framework for digital payments to ensure security and efficiency.
- ii) **Encourage CBDC implementation:** The implementation of Central Bank Digital Currency (CBDC) should be considered a means to enhance financial inclusion and stability (Banerjee & Sinha, 2023) ^[6].
- iii) **Monitoring and evaluation:** Consistently assess the effects of digital payment systems and adjust policies as necessary to maintain financial stability.

15.3 For banks and FinTech

- i) **Investment in security:** Emphasizes the

implementation of cybersecurity strategies to safeguard against fraudulent activities in digital transactions.

- ii) **Collaboration:** Financial institutions should engage in strategic partnerships with fintech companies to advance digital financial services and develop innovative solutions for cashless transactions.
- iii) **Customer education:** Allocate resources to educate consumers on the advantages and applications of cashless payment systems.

15.4 Public awareness

- i) **Educational campaigns:** Implement comprehensive national awareness initiatives to emphasize the advantages and security features of digital payment systems.
- ii) **Financial literacy programs:** Initiatives aimed at enhancing financial literacy and proficiency in utilizing digital payment systems should be developed.
- iii) **Community engagement:** Engaging community leaders to advocate for the adoption of digital payment systems and address local concerns.

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