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Analysis of Digital Payment System in India

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Introduction

The initiation of demonetization in India on November 8, 2016, by Prime Minister Narendra Modi, marked a pivotal turn in the nation's economic discourse, notably catalyzing the expansion of digital payment systems. The announcement to nullify the legal tender status of 500 and 1,000-rupee notes, which constituted a substantial 86% of the circulating cash, set the stage for an accelerated embrace of digital financial transactions. This maneuver was not merely a financial reform but a strategic impetus towards the digitalization of the Indian economy, reflected in the surge from a mere 10% to a significantly higher proportion of digital transactions.

The evolution of India's digital ecosystem has been propelled by a synergistic confluence of governmental digitalization campaigns, burgeoning internet and smartphone accessibility, and the flourishing e-commerce sector. Initiatives such as Digital India, Make in India, and Startup India exemplify the government's commitment to embedding digital technologies across various domains including healthcare, education, and agriculture, thereby fostering an ecosystem ripe for startup innovation. The projection by the Internet and Mobile Association of India, estimating internet users to reach 800 million by 2023 and mobile wallet users to approach 900 million by 2025, underscores the digital penetration reshaping India's economic landscape.

In alignment with the objective to expedite digital transactions, the government earmarked a target of 2,500 crore digital transactions in the 2017-18 budget through instruments like UPI, USSD, Aadhaar Pay, IMPS, and debit cards. This initiative is a cornerstone in the government's vision to diminish cash reliance and augment digital payment adoption. Despite the substantial shift towards digital payments facilitated by increased smartphone and internet usage, a significant segment of the population persists with cash transactions. Incentivizing digital payment adoption among merchants, through subsidies for point-of-sale terminals and tax benefits, embodies a strategic approach to transition towards a cashless society.

The government's fiscal allocation to boost digital payment transactions signifies a pivotal step towards realizing a cashless society. This investment is poised to broaden the adoption of digital payment methods, thereby diminishing cash reliance. Furthermore, the government's strategy to incentivize merchant adoption of digital payments, alongside infrastructural enhancements, is anticipated to cultivate a fertile ground for digital transactions to thrive. This endeavor not only aims at augmenting financial inclusion but also at integrating a wider demographic into the formal banking and financial services sphere. The progressive adoption of smartphones and the internet is democratizing access to digital payments, envisaging a more inclusive, efficient, and secure financial ecosystem.

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The digital payment ecosystem in India has witnessed remarkable growth, spurred by governmental initiatives, an upsurge in internet and smartphone utilization, and the burgeoning e-commerce industry. Key innovations like the Unified Payments Interface (UPI) and the Bharat Interface for Money (BHIM) app have been instrumental in facilitating real-time inter-bank transactions, thereby enhancing the convenience and security of digital payments. These developments reflect the escalating acceptance and integration of UPI as a preferred platform for digital transactions, indicative of the broader trend towards a digitally empowered economy.

Theoretical information

The concept of digital payment encompasses transactions facilitated through digital or electronic means, rather than the traditional exchange of goods or services for cash. The landscape of digital transactions underwent a transformative shift following the demonetization initiative undertaken in India in 2016. This pivotal movement heralded the adoption of digital payment methodologies, marking a departure from the conventional cash-centric transactions.

Demonetization served as a catalyst, accelerating the transition towards digital financial exchanges. It underscored the necessity for an economy less reliant on physical currency, propelling the adoption of digital platforms for financial transactions. This shift not only reflected a change in transactional methodologies but also signified a broader movement towards financial digitalization, aligning with global trends of increasing digital financial services.

The adoption of digital payment systems represents a significant evolution in the financial transaction landscape, facilitating a more streamlined, efficient, and transparent means of conducting financial exchanges. This shift is indicative of the broader digital transformation that the financial sector is undergoing, a transition that has been significantly expedited by policy interventions such as demonetization.

Why pay digitally?

The adoption of digital payment mechanisms presents distinct advantages, notably for small enterprises within India. The contemporary market landscape anticipates the availability of digital transaction options, promising swifter and more secure financial exchanges without the imposition of risks or additional fees. Enhanced security is a hallmark of digital payments, with mobile devices offering further authentication through fingerprints and other biometric validations, thereby mitigating potential risks.

The shift towards a cashless economy introduces multiple benefits for commercial transactions:

- The necessity for cash management is obviated, significantly lowering the risk of theft and diminishing expenses related to security measures and cash storage.

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- Transactions executed digitally tend to be processed more rapidly, leading to reduced wait times for customers and improving the overall retail experience, which in turn, catalyzes sales.
- Digital transactions generate detailed transaction records, facilitating straightforward accounting processes, simplifying operational management, and aiding in adherence to tax regulations.

Furthermore, digital payments afford businesses the opportunity to gather extensive customer data, invaluable for analytical and market segmentation purposes. This data acquisition enables merchants and financial institutions to tailor digital payment solutions, loyalty schemes, and promotional offerings more effectively, aiming to bolster customer loyalty and attract new clientele. Traditional credit card services, alongside innovative financing solutions like the Buy Now, Pay Later (BNPL) models, are underpinned by digital payment systems, expanding consumers' access to credit facilities.

How do digital payments work?

Parties involved

The execution of a digital payment transcends the mere act of clicking a button; it involves a complex network of intermediaries that ensure the smooth processing of transactions. The digital payment landscape is underpinned by several key participants, including the merchant (payee), the consumer (payer), financial institutions, and the payment network infrastructure. Herein, the term 'merchant' encompasses a broad spectrum of entities ranging from local convenience stores and large retail establishments to online marketplaces and various service providers offering digital payment solutions for the settlement of transactions.

In this ecosystem, the financial institution that initiates the withdrawal of funds from the payer's account is identified as the issuer bank. Conversely, the acquirer bank represents the financial institution on the merchant's side, responsible for depositing the transaction amount. This necessitates that both the payer and payee possess bank accounts equipped with online banking capabilities, enabling them to engage in digital transactions effectively.

Working of digital payments system

To elucidate the operational mechanics of digital payment systems, consider the following scenario. Anjali Singh decides to purchase apparel valued at INR 5,500 from Rupesh Garments, located on the bustling Kalbadevi Road in Mumbai. She chooses to execute the payment digitally, either by employing her debit card at the Point of Sale (PoS) terminal or by utilizing the Unified Payments Interface (UPI) through a designated application's QR code within the store.

Upon the initiation of the transaction with Anjali's debit card, the PoS terminal undertakes a series of verifications. It commences with validating the sufficiency of funds in Anjali's bank account, contingent upon her authentication through the input of her transaction PIN. Post verification, if

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the account holds adequate funds, the transaction proceeds; the stipulated amount is withdrawn from Anjali's account and subsequently deposited into Rupesh Garments' business account. Conversely, in transactions involving a credit card, an initial verification of the payer's credit limit is conducted by the card issuing entity to ensure transaction feasibility.

In scenarios where Anjali opts for a digital purchase via an eCommerce platform, the process intricately involves a payment gateway. This digital conduit, affiliated with the eCommerce entity, requests a transaction authorization from Anjali, typically via a One-Time Password (OTP) or PIN. Following successful authorization and verification of Anjali's account balance, the payment gateway facilitates the transfer of funds from her account to that of the eCommerce portal. This sequence ensures a seamless transaction, pending the accuracy of the provided payment details and the sufficiency of account funds.

Different digital payment methods

India has witnessed a significant diversification in digital payment methods over the years. Some of these methods have gained prominence recently, while others have been integral to India's financial landscape for over a decade.

Unified Payment Interface (UPI): UPI has revolutionized the way transactions are conducted, merging multiple bank accounts into a single mobile application for effortless fund transfers. This system facilitates direct bank-to-bank transfers with minimal effort, bypassing the need for entering card details. Remarkably, UPI achieved widespread adoption within two years—a milestone that took credit cards much longer to reach in the Indian context.

Mobile Wallets: Mobile wallets serve as digital repositories where individuals can store funds for subsequent transactions. Users can top up these wallets from their bank accounts, enabling them to conduct transactions conveniently. Prominent examples include Paytm, PhonePe, and MobiKwik, highlighting the role of both banks and private entities in expanding these services.

Internet Banking: Internet banking provides a platform for executing payments and transfers via a bank's website, necessitating only a reliable internet connection. This method has become ubiquitous among Indian banks, supporting various standard transaction methods such as NEFT, RTGS, and IMPS.

Mobile Banking: Mobile banking represents the evolution of banking into the mobile domain, allowing users to manage their finances through dedicated applications on their smartphones. This method is celebrated for its convenience, allowing users to access banking services such as account management, transactions, and investments anytime, anywhere.

Banking Cards: The usage of banking cards (debit, credit, and prepaid cards) for digital payments is a well-established practice. These cards offer a secure and convenient payment alternative to cash, with newer applications enhancing the management and security of card transactions.

Unstructured Supplementary Service Data (USSD): USSD enables transactions without an internet connection, using a simple dial code (*99#) across all telecom providers. This service supports

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essential banking functions like fund transfers and balance inquiries, making digital banking accessible to a broader audience.

Aadhaar Enabled Payment System (AEPS): AEPS leverages India's unique identification system, Aadhaar, to facilitate banking transactions with biometric authentication. This system aims to foster financial inclusion by ensuring that banking and financial services are accessible to all segments of society.

Micro ATMs: Micro ATMs are compact devices deployed by business correspondents to offer basic banking services, such as cash withdrawal and deposits, through Aadhaar-linked transactions. These devices play a crucial role in extending banking services to underserved areas.

Point of Sale (PoS) Terminals: PoS terminals are digital payment devices used in physical retail environments, allowing card-based transactions. Recent advancements have introduced contactless payment capabilities, streamlining the transaction process further.

Prepaid Cards: Distinct from debit cards, prepaid cards are loaded with a fixed amount of money and can be used for transactions until the balance is exhausted. These cards, which require KYC compliance, are often used for corporate incentives and rewards.

The proliferation of digital payment methods underscores the ongoing efforts to:

- Incentivize adoption through user benefits;
- Enhance transaction security;
- Increase operational efficiency;
- Foster integration within the payment ecosystem.

Benefits of digital payments systems

The adoption of digital payment methods offers significant advantages, catalyzing women's economic empowerment by providing them with enhanced control over their finances and opening avenues for greater economic opportunities. It contributes to inclusive growth, unlocking financial opportunities for those previously marginalized, and facilitates a more efficient allocation of resources within the economy. The traceability and accountability inherent in digital transactions enhance transparency and security, substantially reducing the likelihood of corruption and theft.

Digital payments expand financial inclusion by broadening access to essential financial services such as savings accounts, credit, and insurance products. They offer cost-saving benefits through improved efficiency and speed, especially beneficial to individuals in remote areas by providing direct access to government programs without the necessity of extensive travel or enduring lengthy queues.

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In terms of environmental sustainability, digital payments support climate resilience efforts by enabling individuals and governments to respond more effectively to climate-related and disaster risks. This is achieved by facilitating immediate access to funds in emergencies and supporting investments in more resilient, climate-friendly assets and infrastructures. The proliferation of digital payment solutions, including user-friendly and secure platforms like BHIM-UPI, has significantly improved the quality of life, financial inclusion, and economic development. The pandemic underscored the value of contactless payments, ensuring the continuity of business operations while adhering to social distancing measures.

Key benefits of leveraging digital payments include:

- **Instantaneity and Convenience**: Digital transactions, through platforms like BHIM-UPI and IMPS, allow for immediate fund transfers, bypassing the constraints associated with cash transactions. BHIM-UPI, for instance, offers a streamlined payment process through mobile devices, enhancing the ease of transactions.
- **Promotion of Financial Inclusion**: The accessibility of digital payment systems enables seamless financial transactions, reducing barriers for those hindered by the logistical challenges of traditional banking access. Innovations such as UPI 123PAY extend these benefits to feature phone users, further democratizing financial services.
- **Enhanced Governmental Transparency**: Digital payments address and mitigate issues of leakage and fraud in cash transactions, particularly in the distribution of social security benefits, ensuring that funds reach their intended recipients directly.
- **Efficiency in Transaction Speed**: Digital payments transcend geographical limitations, enabling instant transactions that are not bound by the physical movement of cash.
- **Innovations in Toll Collection**: The NETC system exemplifies the application of technology in streamlining toll payments through Radio Frequency Identification, reducing delays on toll roads.
- **Simplified Bill Payments**: The Bharat Bill Payment System exemplifies the integration and ease of access in bill payments across diverse channels, offering a unified platform for managing various bill payments.
- **Access to Credit**: Digital transaction histories serve as a financial footprint, enhancing individuals' and businesses' credit accessibility by providing verifiable data on cash flows.
- **Security**: Compared to cash transactions, digital payments reduce the risk of theft and loss, supported by rigorous authentication processes to ensure transaction security.

These advancements underscore the transformational impact of digital payment systems on the socio-economic fabric, enhancing efficiency, security, and inclusivity across the financial spectrum.

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Drawbacks of digital mode of payments in India

The digital payment landscape, while transformative, is not devoid of challenges. Technical glitches, security vulnerabilities, limited safeguards for consumers, and associated costs constitute significant impediments to the universal adoption of digital transactions. The efficacy of these payment methods is intrinsically linked to the reliability of internet connectivity, which, in regions with sporadic or non-existent internet access, renders these services ineffective.

Digital transactions, encompassing online shopping, bill settlements, and personal transfers, offer a wide array of conveniences. Yet, the applicability of specific digital payment platforms may be restricted by the nature of the transaction, necessitating a careful selection of the payment method to suit particular transaction requirements.

Several specific concerns arise in the context of digital payments:

1. **Elevated Transaction Costs**: Notwithstanding the shift to digital platforms, credit card transactions continue to incur substantial fees. The high processing charges levied by credit card companies, augmented by additional fees from online payment processors, can cumulatively erode profit margins, even though they may appear minimal at the outset.
2. **Complexities with Recurring Payments and Refunds**: The straightforwardness associated with refunds and payments via traditional credit cards contrasts sharply with the complexities encountered with virtual cards. The disposability of virtual card numbers post-transaction complicates refund processes and recurring payment setups, necessitating manual intervention for each subsequent transaction.
3. **Challenges in Processing Virtual Cards**: The adoption of virtual cards is further hindered by the limitations of some payment processors to accommodate them, placing the onus on merchants to manually process such transactions. This requirement not only introduces inefficiencies but also diverts valuable time and resources.

These challenges underscore the need for a nuanced approach to integrating digital payments into the broader financial ecosystem, addressing the inherent drawbacks to enhance the security, reliability, and user experience of digital transactions.

Data Analysis

Secondary data has been used.

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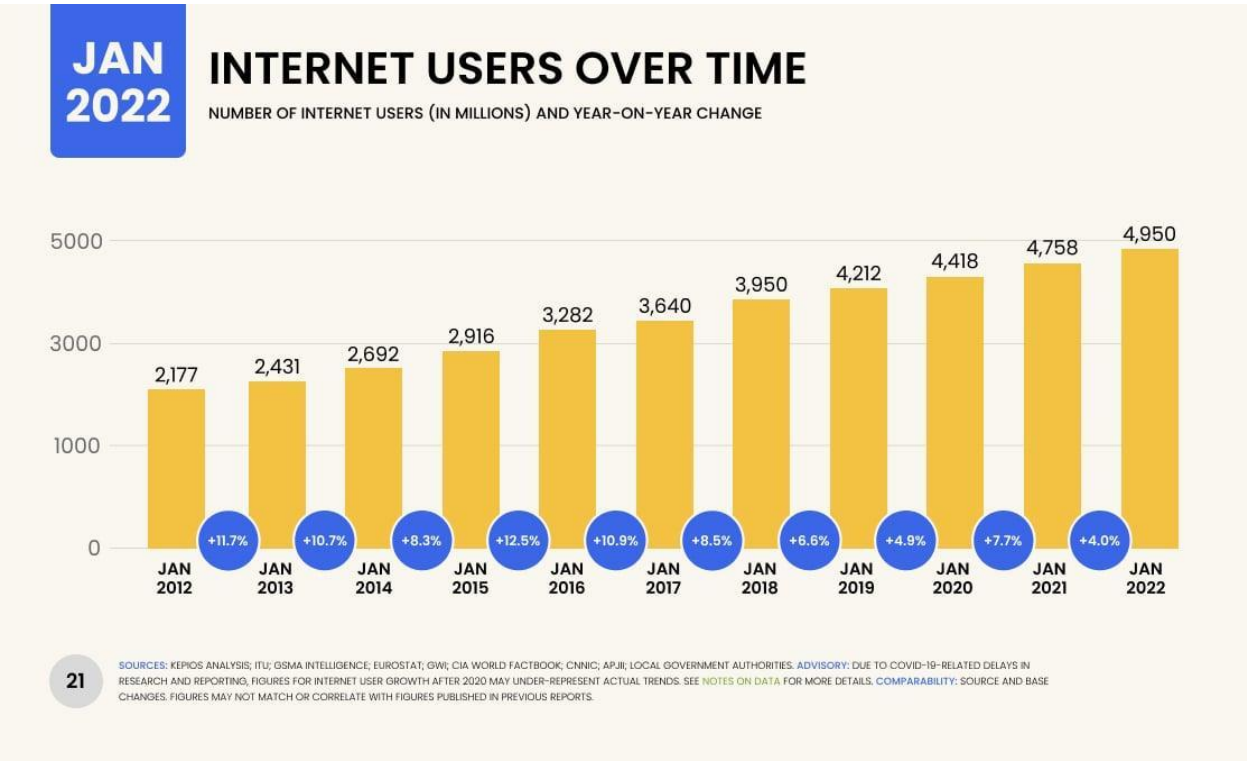
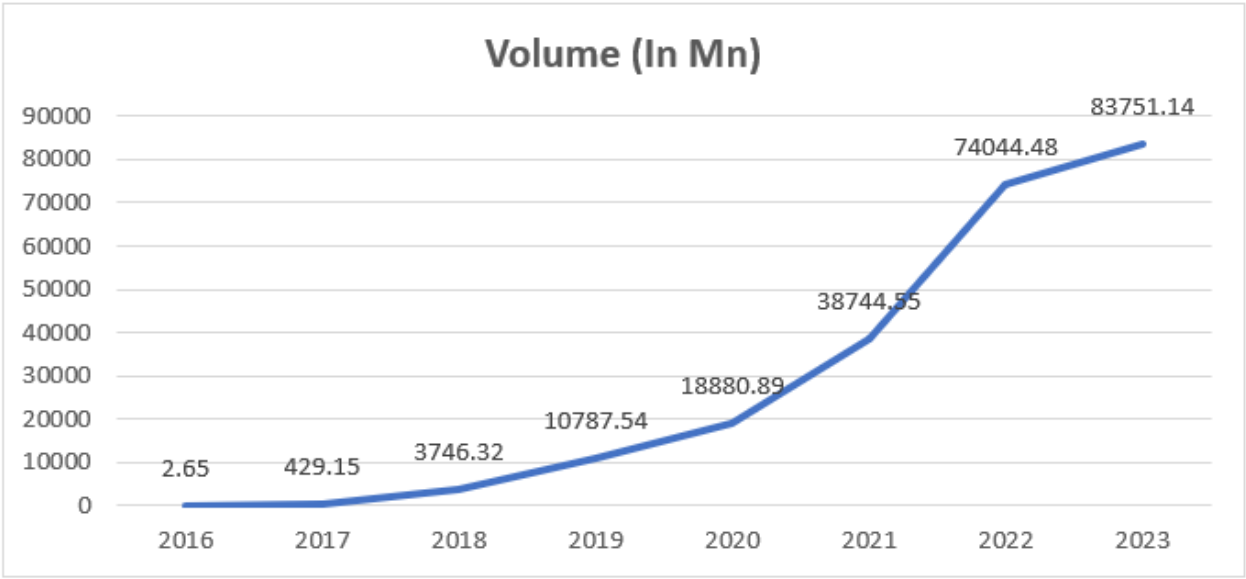


Internet users since 2012 to jan2022.



Volume of transactions done with UPI from 2016 to 2023.

The Unified Payments Interface (UPI), introduced in 2016 by the National Payments Corporation of India (NPCI), has experienced exponential growth, dramatically transforming the digital

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payment landscape in India. An analysis of the annual growth rates up to January 2023 reveals a compelling narrative of UPI's ascendancy and its pivotal role in India's financial ecosystem.

- In its inaugural year, 2017, UPI witnessed an astounding 900% year-on-year growth, facilitating over 100 million transactions valued at INR 67 billion.
- The momentum continued in 2018, with a 246% increase in transactions, crossing the INR 1.5 trillion mark.
- 2019 saw a 67% growth, with transactions surmounting INR 2.9 trillion.
- The growth trajectory persisted into 2020, recording a 63% increase and transactions worth more than INR 4.3 trillion by December.
- 2021 marked another milestone with a 72% growth rate, as transactions exceeded 1.49 billion, amassing a value of INR 5.6 trillion in June alone.
- The year 2022 culminated with UPI transactions reaching a staggering INR 125.95 trillion, a 1.75-fold increase year-on-year, constituting nearly 86% of India's GDP for the fiscal year 2022.
- By the close of 2023, the total volume of UPI transactions had escalated to 83.75 billion.

The table below further illustrates the significant uptick in the adoption of digital transactions across India from the fiscal year 2017-18 to 2022-23, underscoring the nation's swift move towards digitalization:

FINANCIAL YEAR (FY)	**TOTAL NUMBER OF DIGITAL TRANSACTIONS (IN CRORE) #**
2017-18	**2,071**
2018-19	**3,134**
2019-20	**4,572**
2020-21	**5,554**
2021-22	**8,840**
2022-23	**9,192***

These insights not only highlight UPI's monumental growth but also reflect the broader trend of digital transaction adoption in India, marking a significant shift in consumer behavior and the financial transaction paradigm.

Conclusion

The analysis unequivocally demonstrates a marked escalation in the utilization of digital payment systems such as UPI, credit cards, and BHIM since 2016. This significant uptrend can be attributed to a constellation of factors, including the demonetization initiative, the proliferation of internet

access, and the widespread adoption of smartphones. Additionally, governmental policy interventions aimed at promoting digital methodologies for accessing a myriad of public services, ranging from tax filing to various other civic utilities, have substantially catalyzed the enhanced engagement with digital platforms and internet usage.