



# Prospects of Unified Payments Interface (UPI) Systems on Business & Digital Payments Across India- A Review Analysis

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**Citation:** Deepak Chandak, (2024), Prospects of Unified Payments Interface (UPI) Systems on Business & Digital Payments Across India- A Review Analysis, *Educational Administration: Theory and Practice*, 30(1) 3197-3206

Doi: 10.53555/kuev.v30i1.7077

## ARTICLE INFO

## ABSTRACT

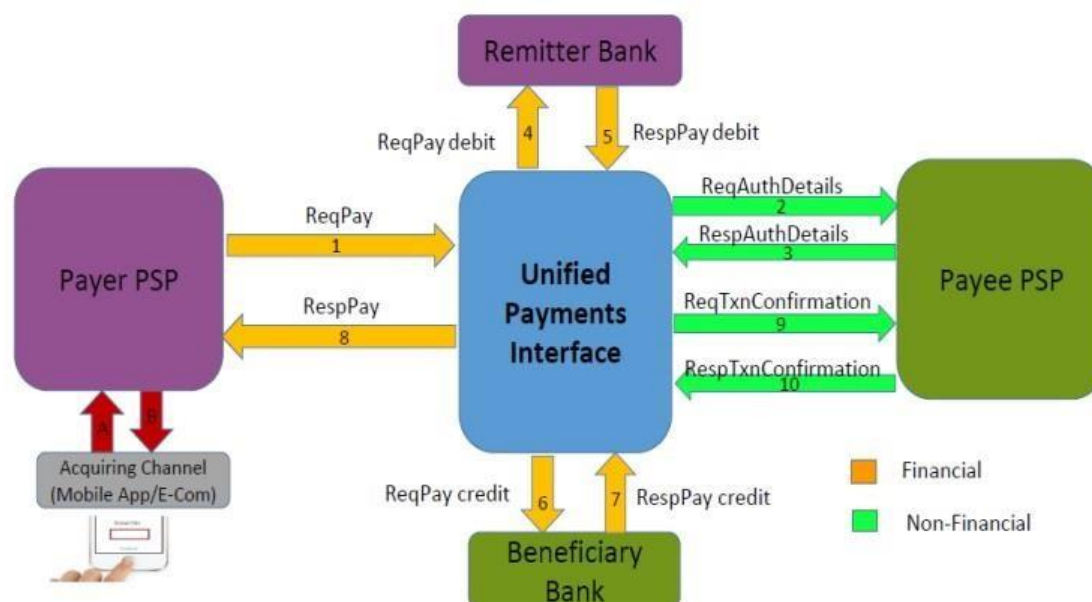
The Unified Payment Interface (UPI) platform has grown as a highly sophisticated = mobile-based payment system in recent times, offering substantial benefits to users and banks in India. The primary objective of UPI is to provide widespread accessibility, optimal performance, user-friendly experience, and clear visibility to its users. Despite the appealing characteristics and the substantial increase in internet and smartphone usage, the number of UPI users has not exhibited the anticipated level of development. In order to thoroughly analyse the issue, it is essential to understand the elements that impact the adoption, usage, and intention to suggest of UPI by current consumers. The popularity of UPI payments in India has recently surged due to their convenience and robust security features. This study analyses the development of payment systems in India and provides a comprehensive examination of the technology used in the Unified Payment Interface. The focus is on the architecture and security systems of the interface, which are explored through a review of empirical and theoretical literature. The UPI system represents a notable improvement over the existing payment system in terms of cost, user-friendliness, settlement speed, and security. It has been widely accepted by users. The modular API-based architecture of this system will facilitate the creation of inventive solutions for both consumers and companies. Currently, UPI is in its early stages of growth, and the creation of UPI solutions that focus on merchants will significantly enhance user acceptance. The Unified Payments Interface (UPI) has the potential to significantly increase the number of people participating in the digital economy and can serve as an effective means of promoting financial inclusion in India.

**Keywords:** UPI, UPI adoption, Unified Payment Interface, API based architecture, digital economy, financial inclusion

## Introduction

The "Digital India" programme has significantly contributed to the progress and competitiveness of the banking sector in India (Khan, 2014). Indian banks are currently offering novel and sophisticated platforms to their customers for accessing financial services. Previously, it was necessary for the customer to physically go to a branch in order to get any service. The advent of mobile banking and internet banking has revolutionised the conventional banking sector. Now, customers have the option to access services without the need for a physical visit or with minimal visits to the branch. The study reveals that the banks' most esteemed and devoted clientele are utilising a combination of conventional and digital banking services, such as electronic banking (Hosseini, Abdolvand, & Harandi, 2022). The banking sector in India has undergone digitization, with the introduction of a new payment system called the Unified Payment Interface (UPI) by the national payments corporation of India (NPCI) in 2016. NPCI, which serves as a regulatory body for payments and settlement in India, developed this indigenous payment system specifically for instant transactions. The UPI payment

system facilitates real-time person-to-person (P2P) fund transfers. By operating on an Open-API (Application Programming Interface), it enables unrestricted access for users. The platform offers three primary advantages to the user: i) It is optimised for mobile devices, ii) It is integrated with Aadhar, a unique 12-digit code issued by the Indian government as proof of residency, enabling functionality even without internet access, iii) The platform is accessible to both smartphone and non-smartphone users. It allows customers to make immediate payments to merchants (P2M). This platform is utilised on mobile devices. The Reserve Bank of India (RBI) regulates this platform, which was created as part of RBI's green push to minimise paper usage in the banking sector. More information may be found in Figure 1.



**Fig. 1 UPI method of Digital Payments (Source: Bijin Philip, 2019)**

The Unified Payments Interface (UPI) has revolutionised the Indian financial environment in today's digital era. UPI has transformed the way people and businesses conduct transactions by providing seamless and immediate payment possibilities. UPI provides numerous prospects for growth and advancement, especially for small firms. Nevertheless, in order to maximise the advantages of UPI, it is essential to possess a thorough comprehension of its operation and advantages. This section will provide a detailed analysis of UPI, examining its complexities, characteristics, benefits, and diverse applications.

The Unified Payments Interface (UPI) is an instantaneous payment system created by the National Payments Corporation of India (NPCI). It enables immediate fund transfers between bank accounts using mobile devices. The UPI system allows users to connect several bank accounts to a single mobile application, creating a smooth and safe platform for carrying out transactions. The banks involved in this process are shown in Figure 2. UPI streamlines the entire process of transferring funds, making payments, or requesting money, hence eliminating the necessity of traditional payment methods such as cash or cards.

Name of the Bank	Status	Name of the Bank	Status
Federal Bank	PSP and Issuer	Axis Bank	PSP and Issuer
Bank of Maharashtra	PSP and Issuer	ICICI Bank	PSP and Issuer
The Janta Sahakari Bank	PSP and Issuer	Yes Bank	PSP and Issuer
Oriental Bank of Commerce	PSP and Issuer	Uco Bank	PSP and Issuer
Catholic Syran Bank	PSP and Issuer	Canara Bank	PSP and Issuer
Karnataka Bank	PSP and Issuer	Bhartiya Mahila Bank	PSP and Issuer
Development Credit Bank	PSP and Issuer	South Indian Bank	PSP and Issuer
Andhra Bank	PSP and Issuer	RBL Bank	Issuer Only
Union Bank	PSP and Issuer	IDBI Bank	Issuer Only
Vijaya Bank	PSP and Issuer	IDFC Bank	Issuer Only
United Bank	PSP and Issuer	Bank of Baroda	Issuer Only
Punjab National Bank	PSP and Issuer		

**Fig. 2 Banks Working as PSP (Payment System Players) or/ & Issuers**

(Source: Aarti Sharma (2016))

The UPI system enables immediate transfers of funds in both online and offline modes, without the need to input extensive information about the recipient's bank account (Mohapatra, 2017). The efficacy of UPI is also evaluated in studies that are centred around its prompt and expeditious payment system. According to Philip (2019), a transaction using UPI can be executed with a single swipe and without the need of intermediaries. A further study conducted on UPI demonstrated that UPI, with its distinctive characteristics, can have a substantial impact on promoting financial inclusion in India (Gochhwal, 2017).

### ***Key Features of UPI***

- **VPA (Virtual Payment Address)-** UPI allocates a distinct Virtual Payment Address (VPA) to every user, hence avoiding the necessity of sharing bank account information. This guarantees heightened security and privacy during transaction processes.
- **Payments Through QR Codes-** UPI enables businesses to generate QR codes that customers can scan for payment purposes. The contactless payment technique has been increasingly popular, particularly during the ongoing pandemic, due to its ability to minimise physical touch.
- **Instant Transfer of Money (Funds)-** UPI facilitates instantaneous monetary transactions round the clock, even on weekends and public holidays. This function is particularly useful for small firms that frequently need rapid access to funds for numerous operational objectives.
- **Fund Acceptance Requests-** Small enterprises have the capability to initiate collection requests using UPI, which allows them to solicit payments from their customers. This function optimises the payment collecting process, enhancing its efficiency and convenience for all parties involved.

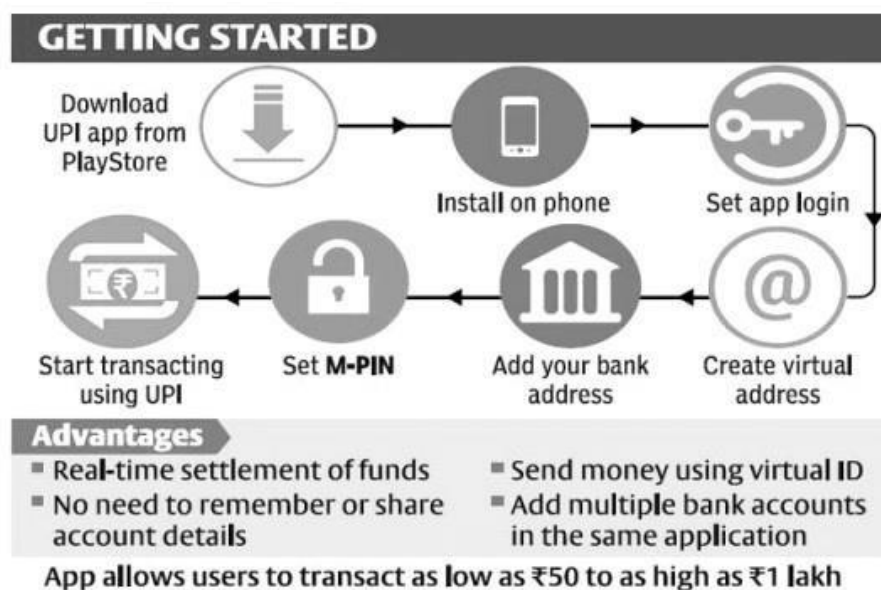
### ***Comparison of UPI with Other Options of Payments***

- **Cards Vs UPI-** UPI obviates the necessity of physical cards and the accompanying expenses and hazards. Furthermore, UPI payments eliminate the need for a card reader, providing a more convenient alternative for businesses and customers alike.
- **Wallets Vs UPI-** While digital wallets offer comparable features, UPI distinguishes itself by its interoperability. UPI enables customers to establish connections between various bank accounts, offering enhanced flexibility and convenience.
- **Cash Vs UPI-** Although cash transactions are still common, UPI provides a more secure and digitised option. By adopting UPI, organisations may mitigate the potential hazards linked to cash management, such as theft and the circulation of counterfeit currency.

Upon evaluating the characteristics, benefits, and comparisons, it becomes apparent that UPI provides a full resolution for small enterprises aiming to optimise their payment procedures and capitalise on development prospects. Small firms can optimise their operational efficiency, boost customer experience, and maintain a competitive edge in the current digitally-driven industry by using UPI.

### ***Background***

The Reserve Bank of India has been diligently working towards establishing a digital payments environment in the country. RBI, with the assistance of the Indian Banks Association (IBA), facilitated the establishment of the National Payments Corporation of India (NPCI) as a central organisation for all retail payment systems in India. This organisation includes major banks as stakeholders and owners (Fig. 3). The formation of NPCI was driven by the objective of unifying and harmonising the diverse systems with different degrees of service, in order to establish a consistent and standardised business process for all digital payment systems across the country. The explicit goal was to establish a standardised and cost-effective payment system by utilising technology and promote financial inclusivity within the nation. The Unified Payments Interface (UPI) was the result of a progression of advancements by the National Payments Corporation of India (NPCI) over an 8-year period starting from its establishment in 2009.



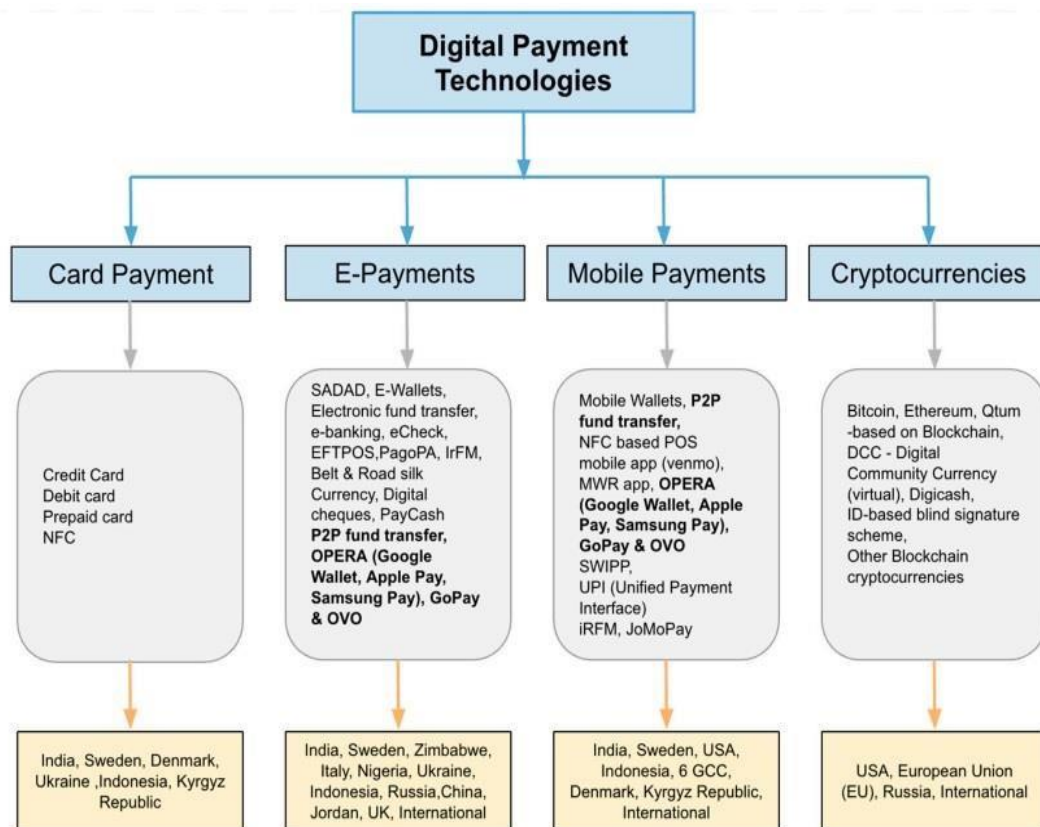
**Fig. 3 Stages of Digital Payments through UPI (Source: Aarti Sharma (2016))**

### Literature Study

In their collaborative study, Raharja, Sutarjo, Muhyi, and Herawaty (2020) examined the role of digital payment, specifically Go-Pay, as a facilitator for business opportunities. The study also explored emerging technologies related to digital payment, as depicted in Figure 4. The authors want to demonstrate how cashless platforms facilitate market opportunities by utilising a descriptive approach method and data analytical procedures from published studies. The results demonstrate that Go-Pay effectively promotes economic prospects by successfully fulfilling its role as a digital payment solution. Moreover, it enables consumers and merchants to exploit a vast market and acquire access to a diverse range of products and services. Chawala, Singhal, and Bajaj (2019) conducted a collaborative study on the awareness and adoption of the Unified Payments Interface (UPI) for digital payments. The authors attempted to determine the extent of individuals' awareness of the Unified Payment Interface and the factors that influence their choice of digital payment method. The objective of this study was to assess the implementation of UPI in the money transfer framework.

Kolte and Humbe (2019) conducted a collaborative study on the UPI/BHIM payment system in India. Researchers analyse the beneficial influence of the UPI and BHIM applications on the digital payment system. A modest disparity in gender awareness of smart phones was identified, with students displaying significant enthusiasm for real-time payments and their integration into savings accounts.





**Fig. 4 Emerging Technologies for Digital Payments (Source: Khando Khando (2023))**

An article titled "Review of Unified Payment Interface Advancement Towards Digitalization and Challenges Faced" was co-authored by Boke and Harkare (2018). The authors analysed the difficulties that consumers encountered during the era of digitization. It was discovered that although UPI is not difficult to comprehend, it remains underutilised, which contributes to the issue of digital illiteracy in India. The adoption of cashless services by the Indian populace would increase transparency and facilitate the process. Consequently, a digital system will aid in the reduction of black money.

Gochhwal (2017) reached the conclusion that UPI has facilitated the use of mobile phones as the predominant payment devices for both initiating and receiving transactions. By capitalising on India's high tele density, UPI empowers all bank account holders to conduct mobile-based digital transactions. UPI enables even the most modest merchant to begin accepting digital payments in India, where the infrastructure for merchant payment acceptance is inadequate, all without requiring a point-of-sale (POS) device. UPI has eliminated the requirement for parties to know the intricate payment information of one another, thereby streamlining the payment process for all parties involved. In regard to all alternative payment systems, it is not inaccurate to assert that UPI stands as the preeminent payment system globally.

Collaborative research conducted by Buckley and Mas (2015) examined the emergence of digital payments as a specialised field. The authors delineate the fundamental distinctions between a payments mindset and a banking perspective, while also providing a historical context that shaped the development of both domains. It initiates a discourse regarding the suitability of conceptualising the digital payments sector as a burgeoning industry distinct from banking, and if this is the case, what constitutes its fundamental characteristics and how a sense of professionalism might develop. Ultimately, this study scrutinises the significant constraints in vision, knowledge, and human capacity that presently impede the rate of advancement in the realm of digital payments.

Various empirical researches are being presented here for reference-

**Table 1 Empirical Research Review for Digital Payments through UPI**

Authors & Year	Study Context	Utilized Theory	Key Findings
Fahad et al. (2022)	Digital payments through UPI	DOI (Diffusion of Innovation)	The primary determinants of UPI adoption relative advantage, complexity, and observability have a significant positive correlation with users' intention to use. Additionally, higher intention to use and satisfaction correlate positively

			with existing users' recommendations of UPI. In summary, the study model provides insights into the ways in
			which various facets of UPI impact usage and recommendation intentions.
A. V. Harikrishnan (2023)	Customer Preferences towards UPI Payments	Empirical Research	UPI has been widely adopted, and UPI providers continue to enhance their offerings to optimise the user experience.
Akshaya Kumar Sahu et al. (2023)	UPI in Indian digital payment system	Empirical research	The turnaround of UPI can be attributed to several transformative challenges, such as the existence of a resilient infrastructure, evolving customer expectations, proactive government measures, and technological advancements. In pursuit of enhanced financial literacy, the future may witness a realignment of the duties of ecosystem participants and a consolidation of market participants.
Shruti Chaure (2023)	Impact of UPI payments on Customer Satisfaction	Exploratory Research	Customers hold a positive perception of unified payment interface services (UPIs), and there exists a correlation between the educational attainment of respondents and their usage of UPIs. A greater proportion of individuals with advanced degrees utilise UPI services. The proliferation of smartphone users and internet penetration in this region have contributed to the increased accessibility of UPI services.
Dr. N. Velmathi (2019)	Digital payment awareness	Empirical Survey Research	It is imperative that financial institutions undertake the requisite measures to educate semi-urban and
	among small scale vendors		rural populations regarding the benefits associated with the internet banking and e-banking services they offer.
Kuhu Bose (2023)	Digital payments-Student's Perspective	Empirical Survey Research	Customers view unified payment interface services in a favourable light. The mobile revolution, both globally and domestically, has provided an additional benefit for the implementation of UPI, which has consequently contributed to a decline in corruption. UPI is gaining popularity as a method for paying minor bills.
Dr. S. Kamalasaravanan et al. (2022)	UPI payments-Merchant's Perspective	Empirical Survey Research	The prevalence of digital payments has experienced substantial growth, with merchants spanning from small shops to large retail sectors adopting this method. Merchants hold a high level of awareness regarding digital payments, and a significant majority have remained unaffected by cyberattacks initiated by UPI services.

### UPI Adoption Strategies

**1. Recognising the Significance of UPI Adoption for Small Businesses:** In the contemporary digital era, it is imperative that small businesses adopt cutting-edge payment solutions in order to maintain competitiveness and prosper. The Unified Payments Interface (UPI) has significantly transformed the Indian market by introducing a novel approach to conducting transactions. UPI provides immense opportunities for small businesses to streamline operations, improve the customer experience, and stimulate development by virtue of its security, speed, and convenience.

**2. Evaluating Payment Gateways Compliant with UPI:** Small enterprises must select a dependable payment gateway that supports UPI transactions as one of the initial steps in adopting UPI. Due to the fact that numerous payment gateway providers offer UPI integration, it is critical to evaluate and compare their

transaction fees, features, customer support, and integration simplicity. For example, well-known alternatives such as Razorpay, PayU, and Instamojo accommodate the requirements of small enterprises by providing smooth UPI integration in addition to alternative payment modalities.

**3. Incorporating UPI into Pre-Existing Payment Systems:** It is common for small enterprises to utilise pre-existing payment systems, including conventional point-of-sale (POS) terminals or internet-based payment gateways. Increasing sales and providing consumers with additional payment options are two benefits of integrating UPI into these systems. Certain payment gateway providers provide APIs or modules that enable organisations to seamlessly integrate UPI into their pre-existing systems. By in addition to credit/debit cards and internet banking, small businesses can expand their consumer reach and ensure a seamless payment process by accepting UPI as a payment method.

**4. Utilising UPI for Offline and Online Transactions:** The adaptability of UPI enables small enterprises to facilitate payments in both digital and physical environments. In order to streamline the checkout process for consumers, enterprises may incorporate UPI into their ecommerce platforms or mobile applications for online transactions. Moreover, offline establishments have the opportunity to utilise UPI by producing dynamic QR codes that clientele can scan with any UPI-enabled application in order to conduct immediate payments. By doing away with the requirement for cash transactions, this solution effectively mitigates the risk of theft and offers consumers a streamlined payment experience.

**5. Implementing Incentives and Discounts for UPI Payments:** Small enterprises may extend enticing incentives and discounts for UPI payments in order to promote UPI adoption among their clientele. Offering a 5% discount on UPI-enabled purchases, for instance, could encourage consumers to select this method of payment rather than others. Furthermore, in order to incentivize UPI transactions, small enterprises may establish partnerships with payment service providers or institutions to offer cashbacks or rewards. These incentives serve the dual purpose of encouraging UPI adoption and fostering customer loyalty.

**6. Customer Education Regarding the Advantages of UPI:** Despite the increasing prominence of UPI, certain customers may remain uninformed about its benefits. A pivotal function that small businesses can fulfil is to inform their clientele of the advantages of UPI. This may be accomplished via personalised interactions, social media campaigns, or in-store signage. Businesses can foster consumer confidence and promote the adoption of UPI as the favoured payment method by emphasising the transaction speed, security, and convenience it offers.

**7. Remaining Informed about UPI Innovations:** UPI functions as a dynamic payment ecosystem that undergoes consistent introductions of novel functionalities and advancements. To maximise UPI's capabilities, small enterprises must remain current on these developments. As an illustration, the implementation of UPI 2.0 introduced invoice generation capabilities, overdraft provisions, and supplementary security protocols. By monitoring such advancements, small enterprises can adjust their approaches and maintain a competitive edge, thereby guaranteeing sustained expansion and prosperity.

Implementing UPI could significantly impact small businesses, providing them with an array of advantages including heightened consumer experience, increased speed, and convenience. In the current digital era, small businesses can optimise their growth and unleash the complete potential of UPI by conducting thorough evaluations of payment gateways, integrating UPI into pre-existing systems, capitalising on its adaptability, providing incentives, educating customers, and remaining informed about innovations.

## Discussions

Digital payment and transfer methods include credit and debit cards, Internet banking (NEFT/IMPS/RTGS), mobile banking, digit-wallets, Aadhar enables Payment Service (AePS), and the Unified Payments Interface (UPI). UPI provides numerous benefits via services including instantaneous payment via QR code, fee payments, fund transfers between bank accounts and wallets, donations, insurance purchase and renewal, utility bill payment via Bharath BillPay, and more. The NPCI has enabled users to link their overdraft accounts to UPI 2.0, which features a one-time payment mandate and improved security measures. 'No need to designate a beneficiary' is one of its distinctive advantages. This feature enables users to conduct transactions securely by utilising a Virtual Payment Address (VPA) rather than disclosing sensitive technical information (e.g., account number, IFS code, name). Despite encountering cyber threats and technological obstacles, UPI possesses numerous prospects in the contemporary digital landscape on account of its fundamental strengths. SIASC stands for Cost-effective, Simplicity, Innovation, Adoption, and Security. "As an impending cash crunch approaches and the majority of individuals have little cash on hand, they are rushing towards cashless transactions." The proliferation of smartphone users and internet access has enabled the implementation of digital payment services in such circumstances. As a consequence of the COVID-19 pandemic, there has been a noticeable shift in consumer preference towards contactless payment methods as opposed to alternative

payment alternatives. Recently emerging as an enticing alternative due to the pervasive use of smartphones and associated applications, mobile payment systems are the subject of considerable interest. Aspects such as anticipated performance, social impact, cost, security, and data privacy are regarded as significant determinants of mobile payment system adoption. Users derive advantages from the efficiency and expediency of digital transactions facilitated by UPI. Its growing prevalence, particularly in the retail payment sector, can be attributed to the fact that it is simpler to access via smartphone than alternative digital payment methods. UPI could potentially be utilised by regulators to maximise financial inclusion in the nation. If regulators intend to impose a service tax on UPI in the future, they should exercise caution and prioritise the enhancement of the current banking network to facilitate the provision of payment services by FinTech companies. In order to rectify consumer complaints, PSPs must establish efficient mechanisms for addressing grievances. The primary drawback of UPI is that its usage is restricted to individuals who possess bank accounts. Without exception, the unbanked rural populace remains mute. Future research could involve examining users' perspectives on UPI and other e-payment alternatives, with the intention of analysing the findings through the application of systematic behaviour models.

### Conclusions

UPI has facilitated the use of mobile phones as the primary means of accepting and transmitting payments. By capitalising on India's high teledensity, UPI empowers all bank account holders to conduct mobile-based digital transactions. UPI enables even the most modest merchant to begin accepting digital payments in India, where the infrastructure for merchant payment acceptance is inadequate, all without requiring a point-of-sale (POS) device. UPI has eliminated the requirement for parties to know the intricate payment information of one another, thereby streamlining the payment process for all parties involved. In regard to all alternative payment systems, it is not inaccurate to assert that UPI stands as the preeminent payment system globally. By means of its standardised APIs, UPI has facilitated communication between banks and enabled payment systems from disparate institutions to operate in tandem. UPI operates without intermediaries, in contrast to card networks, thereby facilitating instantaneous settlement and reduced transaction costs. In contrast to alternative digital payment methods such as cards, which necessitate several days to finalise the transaction and settlement procedure, UPI expedites the payment process to mere seconds. As a result of its robust, secure, and safe platform and abundance of security features, UPI is more secure than any other payment system currently in use. Incorporating biometric authentication into UPI will not only increase the security of payments, but will also represent a significant step towards integrating cutting-edge technology into the existing payments system. UPI has the potential to significantly facilitate financial inclusion in India and grant access to the digital economy to a vast segment of the population.

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