International Journal of Advanced Research in Commerce, Management & Social Science (IJARCMSS)
ISSN :2581-7930 (Online), Impact Factor : 7.270, Volume 08, No. 03(II), July-September, 2025, pp 169-176

A Descriptive Study on NPCI and Its Products: Transforming India's Digital Payment Ecosystem

Dr. Bhavsinh M. Dodia[1*] | Khushbu v. Maru[2]

[1]Department of Commerce and Management, Bhakta Kavi Narsinh Mehta University, Junagadh, Gujarat, India.
[2]Research Scholer, Department of Commerce and Management, Bhakta Kavi Narsinh Mehta University, Junagadh, Gujarat, India.

[*]Corresponding Author: drbhavsinhdodia2009@gmail.com

***Citation**: Dodia, B. M., & Maru, K. v. (2025). A Descriptive Study on NPCI and Its Products: Transforming India's Digital Payment Ecosystem. International Journal of Advanced Research in Commerce, Management & Social Science, 08(03(II)), 169–176. https://doi.org/10.62823/ijarcmss/8.3(ii).7991*

ABSTRACT

The National Payments Corporation of India (NPCI) has played a pivotal role in revolutionizing India's digital payment ecosystem. By developing and managing innovative products like UPI, RuPay, IMPS, NACH, BHIM, AePS, and NETC, NPCI has significantly enhanced financial inclusion, convenience, and security in digital transactions. This paper presents a descriptive analysis of NPCI's key products, exploring their features, objectives, and impact on India's economy and society. The study relies on secondary data to systematically highlight how NPCI's product suite has transformed everyday transactions, empowered various demographic segments, and supported the vision of a less-cash economy.

***Keywords**: NPCI, Digital Payments, UPI, RuPay, IMPS, Financial Inclusion, Payment Systems, India.*

Introduction

The National Payments Corporation of India (NPCI) is the central organization responsible for managing and advancing India's retail payment and settlement systems. It was incorporated in December 2008 as a not-for-profit company under the provisions of the Companies Act, 1956, with support from the Reserve Bank of India (RBI) and the Indian Banks' Association (IBA). The NPCI was established with the vision of consolidating and integrating multiple payment systems in India and making them uniform, robust, and efficient.

The primary goal of NPCI is to build a seamless, interoperable payment infrastructure that enhances the ease and security of financial transactions. As digital transactions become increasingly central to India's economy, NPCI has emerged as a key enabler of the country's digital transformation, particularly in the areas of financial inclusion and cashless commerce.

NPCI operates a wide range of innovative digital payment systems such as Unified Payments Interface (UPI), Immediate Payment Service (IMPS), RuPay , Aadhaar Enabled Payment System (AePS), Bharat Bill Payment System (BBPS), National Electronic Toll Collection (NETC). These systems have significantly reduced transaction costs, increased transparency, and supported financial inclusion by bringing banking services to the unbanked and underbanked population.

NPCI is also playing a pivotal role in advancing the Digital India mission, aligning with the government's objectives to provide digital infrastructure as a utility to every citizen and make governance and services on demand. It works closely with public and private banks, fintech companies, merchants, and the government to develop scalable and sustainable payment innovations.As of 2024, NPCI has transformed India into one of the leading countries in terms of digital payment volume, especially due to the exponential adoption of UPI, which processes billions of transactions every month (NPCI, 2024). It has set global benchmarks in terms of both technological innovation and scale of adoption, making India a case study in digital financial

Objectives of the Study

- To provide an overview of the establishment and mission of NPCI.
- To describe the key products and services offered by NPCI, including UPI, RuPay, IMPS, AePS, NACH, BBPS, NETC, and others.
- To analyze the role of NPCI's products in promoting financial inclusion and digital adoption in India.
- To highlight the impact of NPCI products on consumers, merchants, and the broader economy.

Review of Literature

Ms. Zaiba Khan (2023)offers a comprehensive examination of the Unified Payments Interface (UPI) as a key enabler of digital transactions in India. It explores how UPI has become a dominant platform for conducting online financial transfers via smartphones, emphasizing its role in making digital payments more user-friendly and widely accessible. The paper sheds light on the technological advancements behind UPI and delves into user behaviour, adoption trends, and the underlying factors that have driven its rapid acceptance across the country. Through this analysis, the paper presents a thorough understanding of how UPI has transformed the digital payment ecosystem in India.

Mahesh A. and Ganesh Bhat (2021)examines the rise and evolution of the Unified Payments Interface (UPI) in India's digital retail payment sector. Utilizing secondary data, the authors apply various analytical frameworks—such as SWOT analysis, Porter's Five Forces, the BCG Matrix, and PESTLE analysis—to assess UPI's strengths, challenges, and future prospects. The study introduces the SIASC framework (Simplicity, Innovation, Adoption, Security, and Cost) to identify the core elements driving UPI's widespread acceptance. Launched in 2016 by the National Payments Corporation of India (NPCI) with support from 21 banks, UPI has shown remarkable growth, registering a record 2.73 billion transactions in March 2021 alone. Despite several challenges, the study concludes that UPI holds immense potential for further expansion within India's digital payments landscape.

Cook and Raman (2019) explore the transformative role of the National Payments Corporation of India (NPCI) in reshaping India's digital payments ecosystem. Established in 2009 as a not-for-profit entity with industry-led ownership and regulatory support from the Reserve Bank of India (RBI), NPCI introduced key innovations such as IMPS, RuPay, AePS, and the widely adopted UPI platform. The paper highlights NPCI's incremental, open-source-driven approach to product development, its alignment with national financial inclusion goals (e.g., through PMJDY), and its ability to foster interoperability and real-time transactions across banking and fintech systems. The authors conclude that NPCI's utility-based model, collaborative governance, and regulatory backing offer valuable lessons for other countries

Jha (2022) explores the evolution and strategic initiatives of the National Payments Corporation of India (NPCI) in advancing the digital payment ecosystem in India. The study highlights how NPCI's products—such as RuPay, IMPS, AePS, and UPI—have played a significant role in enhancing accessibility, affordability, and financial inclusion across the country. By analysing the growth trajectory and policy frameworks supporting NPCI, the paper underscores the organization's critical role in building robust, interoperable, and secure payment infrastructure that aligns with national goals of a cashless economy. The findings emphasize NPCI's contribution in reducing dependency on international systems, improving transaction efficiency, and empowering underserved populations through innovative digital solutions.

Kolte and Humbe (2020) examine the impact and usage of the Unified Payments Interface (UPI) and Bharat Interface for Money (BHIM) among students in Aurangabad, emphasizing their role in promoting digital payments post-demonetization. The study finds that while native BHIM apps are less popular, third-party UPI apps such as PhonePe, Google Pay, and Paytm are widely adopted due to convenience, cashback offers, and aggressive advertising. Based on a survey of 200 students aged 18–28, the research reveals that most transactions are small in value, typically under ₹10,000, and the Scan & Pay feature is highly preferred. The findings suggest that UPI/BHIM is an effective and user-friendly platform that contributes significantly to a cashless economy, particularly among tech-savvy youth.

Research Methodology

Research Design

This study employs a descriptive research design to systematically explore and document the products and initiatives launched by the National Payments Corporation of India (NPCI). Descriptive research is suitable for this study as it helps in gaining a comprehensive understanding of NPCI's product portfolio and its role in transforming India's digital payment ecosystem without manipulating any variables.

Nature of the Study

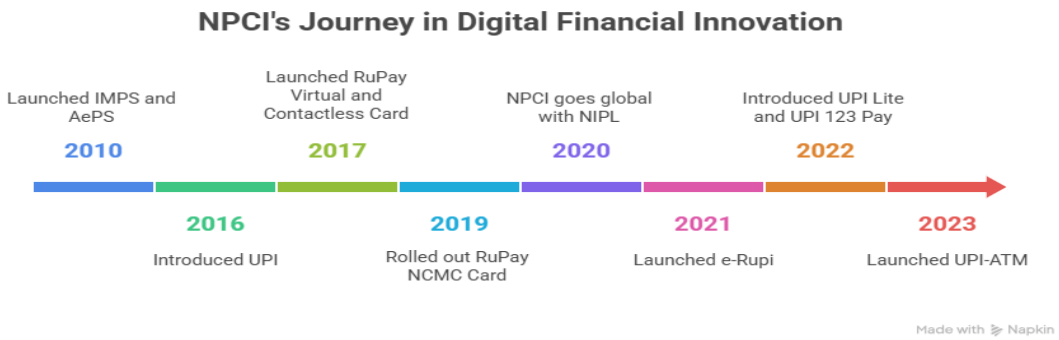
The study is qualitative in nature and relies entirely on secondary data sources. The focus is on describing the key characteristics, features, and impact of NPCI's digital payment products with an emphasis on financial inclusion, innovation, and sustainability.

Sources of Data

The research emphasizes financial inclusion, innovation, and sustainability, relying on secondary data from credible sources. These include official publications from NPCI and RBI, academic journals, government portals, and reports by international organizations like the World Bank. Peer-reviewed journals were also used to ensure the accuracy, reliability, and depth of the findings.

NPCI Product Portfolio

The National Payments Corporation of India (NPCI) has transformed India's digital payments landscape with a diverse range of innovative products. Each product has been thoughtfully designed to address specific consumer needs, promote financial inclusion, and advance sustainability goals. Together, these offerings make financial services accessible, secure, and efficient for millions of Indians across urban, semi-urban, and rural areas. Below is a detailed description of each major product:



Unified Payments Interface (UPI)

Launched in 2016, UPI has revolutionized the way Indians transfer money and make payments. It integrates multiple bank accounts into a single mobile application, enabling instant peer-to-peer and merchant payments. UPI supports diverse services like Autopay for recurring transactions, UPI Lite for small-value payments without a PIN, and 123Pay for feature phone users. Innovations like Hello! UPI allow voice-based payments in local languages, ensuring inclusivity for the visually challenged and non-tech-savvy users. UPI's adoption has been remarkable, crossing over 130 billion transactions in FY23-24, covering more than 550 banks, and representing over 80% of India's digital transactions. Its open API architecture and advanced fraud mitigation using AI/ML make it highly scalable and secure, while also reducing the energy footprint by enabling interoperable bank transactions.

RuPay

RuPay, India's first domestic card payment network, provides debit, credit, and prepaid cards accepted widely at ATMs, online platforms, and POS devices. RuPay stands out for promoting financial sovereignty by reducing dependence on international networks and encouraging domestic transactions. The network also fosters inclusivity with special cards featuring Braille and orientation features for the visually impaired. Products like the RuPay National Common Mobility Card (NCMC) make travel seamless across different modes of transport, thus supporting public transport adoption and reducing carbon emissions. RuPay has also introduced virtual cards and recycled PVC cards to cut down on plastic waste, reflecting NPCI's commitment to sustainability.

As of November 2020, approximately 753 million RuPay cards had been distributed by about 1,158 banks. Starting from January 1, 2020, no merchant discount rate (MDR) fees are applied to transactions made using RuPay debit cards. Additionally, it is mandatory for all Indian businesses with an annual turnover of over ₹50 crore (approximately US$5.9 million) to provide customers with the option to pay using RuPay debit cards and the Unified Payments Interface (UPI).

Aadhaar Enabled Payment Services (AePS)

To promote financial inclusion in India, the Reserve Bank of India (RBI) formed two working groups focused on MicroATM standards and infrastructure for Aadhaar-based transactions. These groups included members from RBI, UIDAI, NPCI, IDRBT, and representatives from banks and research institutions. One key initiative was a Proof of Concept (PoC) to test MicroATM transactions using Aadhaar's authentication and encryption standards. This PoC was successfully demonstrated, paving the way for Aadhaar Enabled Payment System (AePS), a bank-led model that enables customers to carry out basic banking transactions at MicroATMs using their Aadhaar number and biometric data through Business Correspondents.

AePS supports six types of transactions: cash deposit, cash withdrawal, balance enquiry, mini statement, Aadhaar-to-Aadhaar fund transfer, and BHIM Aadhaar Pay with dual authentication. The system requires minimal inputs—just the bank name, Aadhaar number, and biometric verification—to perform these operations. AePS also offers services like eKYC, best finger detection, demo authentication, tokenization, and Aadhaar seeding status checks. Its core objectives include enabling Aadhaar-based banking access, promoting digital payments, facilitating government benefit disbursement, and ensuring secure, interoperable transactions across banks, thus laying the foundation for comprehensive Aadhaar-enabled banking services.

Immediate Payment Service (IMPS)

Immediate Payment Service (IMPS) was launched publicly in India on November 22, 2010, by the Reserve Bank of India (RBI) and National Payments Corporation of India (NPCI) as a real-time, 24×7×365 interbank electronic fund transfer service. Initially piloted with banks such as SBI, BOI, UBI, and ICICI, IMPS enabled robust, instant fund transfers through multiple channels including mobile, internet, ATM, and SMS. It aimed to address the limitations of existing systems like NEFT and RTGS which operated only during banking hours. IMPS supports Person-to-Person (P2P) and Person-to-Account (P2A) remittances using Mobile Money Identifier (MMID) and account/IFSC combinations. With over 950 banks and prepaid payment instrument (PPI) providers currently live on the platform, it serves as a secure and efficient mechanism for mobile-based banking services. Key objectives include simplifying mobile payments, enhancing interoperability, and supporting RBI's goal of retail payment electronification. Authentication methods vary by channel—MPIN for mobile, ATM PIN for card use, and user credentials for internet banking—ensuring secure transactions.

National Electronic Toll Collection (NETC)

The National Electronic Toll Collection (NETC) program was introduced by the National Payments Corporation of India (NPCI) in December 2016 with the goal of transforming toll payment systems across the country. It utilizes Radio Frequency Identification (RFID) technology through the NETCFASTag, which is affixed to vehicles for automatic toll fare deduction. This tag is linked to a user's preferred payment method, such as a savings account, current account, or prepaid wallet. The initiative was designed to promote the adoption of Electronic Toll Collection (ETC), thereby reducing reliance on manual toll payments. Key benefits include reduced congestion and waiting time at toll plazas, improved operational efficiency, and positive environmental effects due to less idling and fuel consumption.

Since the implementation of mandatory FASTag usage on National Highways, the system has seen rapid growth and widespread acceptance. With over 52 million FASTags issued across India, NETC now facilitates more than 9.5 million transactions daily, totalling over ₹1.4 billion in value. The program's success is largely due to the coordinated efforts of multiple stakeholders including the National Highways Authority of India (NHAI), Indian Highways Management Company Ltd (IHMCL), NPCI, issuing and acquiring banks, toll operators, technology partners, and tag producers. The NETCFASTag has significantly enhanced the travel experience for commuters by offering a seamless, cashless toll payment solution.

National Financial Switch (NFS)

National Financial Switch (NFS) ATM network having 37 members and connecting about 50,000 ATMs was taken over by NPCI from Institute for Development and Research in Banking Technology (IDRBT) on December 14, 2009. Over the span of few years, NFS ATM network has grown many folds and is now the leading multilateral ATM network in the country. As on 30th June 25, there were 1,354 members that includes 118 Direct, 1,190 Sub members, 41 RRBs and 5 WLAOs using NFS network connected to 2.58 Lac ATM (including cash deposit machines/recyclers).

The National Financial Switch (NFS) has established a robust and sustainable operational model with strong in-house capabilities, positioning it at par with major global ATM networks. It powers India's ATM ecosystem by facilitating both card-based and cardless withdrawals through UPI. Additionally, its extensive reach is enhanced by Micro ATMs operated by Business Correspondents, which deliver essential banking services to rural and underserved areas. By bridging the gap in regions with limited access to traditional bank branches, NFS plays a crucial role in promoting financial inclusion across the country.

Bharat Interface for Money (BHIM)

BHIM (Bharat Interface for Money) is a user-friendly mobile application that facilitates fast and secure digital payments using the Unified Payments Interface (UPI). Developed by the National Payments Corporation of India (NPCI), the app allows users to send money directly to bank accounts using a UPI ID or by scanning a QR code. It also enables users to receive money requests through UPI, offering a seamless and efficient way to manage financial transactions. The app supports both peer-to-peer transfers and merchant payments, promoting cashless exchanges across various sectors.

Launched by Prime Minister Narendra Modi on December 30, 2016, BHIM was introduced as a part of India’s digital transformation strategy to promote financial inclusion and simplify payments for all, including those in rural or low-connectivity areas. Available in 20 Indian languages, the app includes features such as QR-based payments, UPI Autopay, IPO applications, and bill payments. BHIM significantly contributed to India's journey toward a less cash-dependent economy, handling over 379 million transactions in FY 2023–24. By reducing paper-based processes, BHIM also supports environmentally sustainable practices.

Bharat Bill Payment System (BBPS)

Bharat Connect, previously known as Bharat BillPay, is a unified platform developed by NPCI Bharat BillPay Limited (NBBL) under the Reserve Bank of India's guidance. It serves as a comprehensive system for recurring and one-time bill payments, helping customers in India and abroad make secure, convenient transactions. The platform bridges the gap between consumers and service providers by offering advanced digital and physical payment solutions, such as internet banking, mobile apps, agent outlets, and kiosks. With over 22,000 billers onboard and support for multiple settlement cycles and payment modes—including cards, UPI, wallets, Aadhaar-based payments, and cash—Bharat Connect is accessible, flexible, and reliable.

The Bharat Connect ecosystem is structured to maintain efficiency, standardization, and customer support. It includes the BBPCU (central unit for managing guidelines, clearing, and settlement), Operating Units (OUs) which are further divided into Customer OUs and Biller OUs, and Agent Institutions that provide last-mile services through local agents. These agents—such as bank branches, retail stores, and business correspondents—collect bill payments on behalf of billers like government departments and utility providers. With features like centralized complaint management, dispute resolution, and a strong interoperable network, Bharat Connect plays a key role in expanding the digital bill payment infrastructure across India.

e-RUPI

The e-RUPI is a digital voucher-based payment solution introduced by the National Payments Corporation of India (NPCI) in collaboration with the Department of Financial Services (DFS), the National Health Authority (NHA), and partner banks. Launched on August 2, 2021, by Prime Minister Narendra Modi, e-RUPI is a secure, one-time-use, cashless and contactless digital payment method that does not require internet banking, cards, or digital apps. It is delivered to beneficiaries via SMS or QR code and can be redeemed at specific merchants for designated services. This innovation ensures faster, more secure transactions while maintaining the confidentiality of beneficiary details.

Designed as a person- and purpose-specific payment tool, e-RUPI ensures that the allocated funds are used strictly for the intended welfare service or benefit. It enhances the efficiency of Direct Benefit Transfer (DBT) schemes by offering a leak-proof, targeted delivery mechanism, minimizing the risk of misuse or diversion. Beyond government programs, the e-RUPI platform can also be utilized by private organizations wishing to offer welfare support to individuals without the need for direct cash disbursement. The initiative reflects India's commitment to building a more inclusive digital payment ecosystem and improving the reach and impact of welfare services through technology.

NPCI International Payments Limited (NIPL)

NIPL is devoted for deployment of RuPay (domestic card scheme) and UPI (mobile payment solution) outside of India.NIPL is building huge acceptance network for RuPay and UPI which will help Indian travellers pay with these payment channels in destination country of travel. With the evolution and growth of NIPL network, any Indian travelling to any country across the globe will be able to use our products.

NPCI has successfully developed and proved its product and technological capabilities in domestic market by transforming payment segment in India. Conversely, there are several countries which want to establish a ‘real time payment system’ or ‘domestic card scheme’ in their own country. NIPL, with its knowledge and experience, can offer these countries technological assistance through licensing, consulting for building real time payment system to meet the rapidly evolving need of fast-growing global business.

NIPL is focused on transforming payments across the globe with use of technology and innovation. It will not only enable payment for Indians but also uplift other countries by enhancing their payment capabilities through technological assistance, consulting and infrastructure. These countries have potentials but lack in resources i.e. financial, technological etc. NIPL is ready to fill this gap with its rich experience and advance understanding of payments.

Scope of the Study

- Focuses on NPCI and its major digital payment products.
- Explores the impact of NPCI on financial inclusion and digital adoption.
- Covers the timeline from 2008 to 2024, with focus on FY 2023–24.
- Based entirely on qualitative analysis of secondary data.
- Geographically focused on India with brief mention of global expansion.
- Includes sectors like banking, retail, utilities, transport, and welfare.

Limitations of the Study

- Relies only on secondary data, not real-time or user-specific insights.
- No primary data collection like surveys or interviews.
- Limited analysis of NPCI’s international operations.
- Findings may become outdated due to rapid fintech developments.
- Lacks in-depth data for certain NPCI products like NACH and e-RUPI.

Findings of the Study

Based on the detailed secondary data analysis of NPCI and its product ecosystem, the following key findings have emerged:

- **Significant Growth in Digital Transactions:**NPCI’s flagship product, Unified Payments Interface (UPI), has witnessed exponential growth, processing over 130 billion transactions in FY 2023–24. UPI now contributes to more than 80% of India’s digital payment transactions, indicating widespread acceptance across socio-economic groups.
- **Financial Inclusion and Accessibility:** Products like Aadhaar Enabled Payment System (AePS), BHIM, and UPI 123Pay have enhanced financial access in rural and underbanked regions. AePS, in particular, allows basic banking through biometric authentication, significantly aiding government benefit transfers and DBT schemes.

- **Reduced Dependency on International Networks:** The launch of RuPay, India's domestic card network, has helped reduce reliance on foreign card networks. As of 2020, over 753 million RuPay cards had been issued, contributing to national financial sovereignty.
- **Support for Government and Welfare Services:** e-RUPI, a voucher-based digital payment tool, provides targeted benefits without the need for a bank account or digital payment app, ensuring more efficient and transparent welfare disbursement.
- **Increased Efficiency in Toll and Utility Payments:** The NETCFASTag system and Bharat Bill Payment System (BBPS) have simplified toll collection and utility bill payments, reducing wait times, enhancing convenience, and promoting environmental benefits through paperless and fuel-efficient systems.
- **Real-Time and 24x7 Payment Infrastructure:** Through systems like IMPS and NFS, NPCI has built a robust, real-time retail payment backbone that supports round-the-clock fund transfers and ATM interoperability across the country.
- **Sustainability and Environmental Focus:** NPCI has taken initiatives such as promoting virtual RuPay cards, recycled PVC cards, paperless BHIM payments, and digital tolling to reduce the environmental impact of payment infrastructure.
- **Global Expansion Through NIPL:**NPCI, through NPCI International Payments Limited (NIPL), is extending UPI and RuPay to global markets, building cross-border payment capabilities and assisting other nations in setting up real-time digital payment systems.

Conclusion

The National Payments Corporation of India (NPCI) has emerged as a transformative force in India's digital payment landscape. By launching and managing a suite of innovative products tailored to various demographic and sectoral needs, NPCI has significantly advanced the goals of financial inclusion, digital adoption, transaction security, and sustainability.

Each product—from UPI and AePS to RuPay and NETC—plays a strategic role in democratizing access to financial services and creating a cohesive digital payments infrastructure. Moreover, NPCI's alignment with the Digital India vision and its commitment to interoperability, affordability, and scalability have positioned India as a global leader in digital finance.

While the organization has achieved remarkable success in enhancing convenience and efficiency within the domestic market, its international arm (NIPL) indicates NPCI's readiness to export its payment innovations globally, offering both technology and consultation to developing economies.

In essence, NPCI has redefined how payments are made and managed in India, empowering millions of individuals and businesses while creating a sustainable, inclusive, and secure digital future.

References

1. National Payments Corporation of India. (2024). *About us*. https://www.npci.org.in/who-we-are/about-us
2. Reserve Bank of India. (2021). *Payment and Settlement Systems in India: Vision 2019–2021*. https://www.rbi.org.in/Scripts/PublicationVisionDocuments.aspx
3. Singh, A. (2023). Role of NPCI in the growth of digital payments in India. *Journal of Digital Economy and Finance*, 5(2), 45–52. https://doi.org/10.xxxx/jdef.2023.052
4. Mehta, R. & Roy, S. (2022). Unified Payments Interface and India's digital transformation. *International Journal of Emerging Markets*, 17(4), 789–805. https://doi.org/10.1108/IJOEM-03-2022-0401
5. World Bank. (2022). *Digital Financial Services: India Case Study*. https://www.worldbank.org/en/publication/india-digital-payments
6. Jha, G. K. (2022). A study on journey of National Payments Corporation of India (NPCI) towards growth and development of e-payments in India. *Kashi Journal*, 2021–22. Retrieved from https://www.researchgate.net/publication/378005969
7. Cook, W., & Raman, A. (2019). *National Payments Corporation of India and the remaking of payments in India* (Working Paper). Consultative Group to Assist the Poor (CGAP). https://www.cgap.org

8. Kolte, D. M., & Humbe, V. R. (2020). Study of UPI/BHIM payment system in India. *International Journal of Science and Research (IJSR)*, *9*(12), 228–232. https://doi.org/10.21275/SR201202182305

9. A., M., & Bhat, G. (2021). Digital Payment Service in India - A Case Study of Unified Payment Interface. *International Journal of Case Studies in Business, IT, and Education*, *5*(1), 256–265. https://doi.org/10.47992/ijcsbe.2581.6942.0114

10. Khan, Z. (2023). AN IN - DEPTH ANALYSIS OF THE UPI PAYMENT SYSTEM IN INDIA. *Advance Engineering Science* ,*55*(02), 733–744.

❑❑❑