

Agpaytech's Research
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An In-Depth Exploration of the e-Rupee Launch

Comprehensive Insights



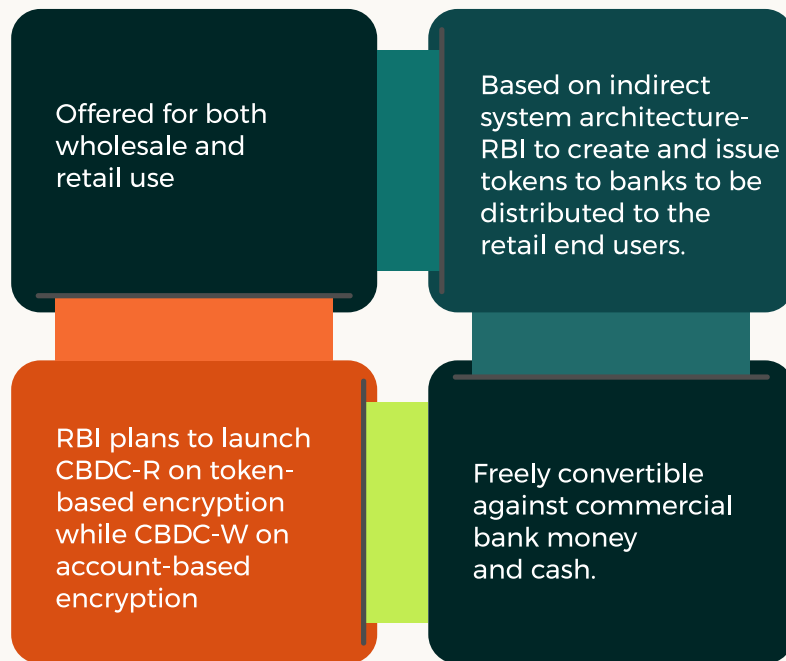
Introduction

The e-rupee, launched by the Indian government, marks a revolutionary shift in the nation's financial framework. This cutting-edge digital currency harnesses technology to facilitate safe and efficient transactions, greatly expanding financial accessibility for millions of Indians. However, as an electronic voucher or prepaid instrument, the e-rupee ensures targeted and transparent delivery of welfare programs, subsidies, and beneficiary benefits. Its adoption signifies a substantial stride towards a cashless economy, empowering individuals financially and refining the government's aid distribution while curbing leaks and fraud. As an innovative initiative, the e-rupee harbours the immense potential to reshape transactions, cultivating a more inclusive and streamlined financial landscape in India. Moreover, introducing e-currency aims to modernize the currency management system, reduce printing costs, and mitigate counterfeit currency to some extent.

General perspective of e-Rupee

₹ represents the digital rendition of India's current legal tender, comprising paper notes and coins. The Reserve Bank of India (RBI) has initiated ₹ across the same denominations available in physical cash circulation. Thus, ₹ functions as a digital token, representing the traditional currency. The RBI plans to disseminate this mode of transaction via Token Service Providers (TSPs), who will distribute ₹ to end users. Banks participating in the ₹ pilot program, such as HDFC, will procure the tokens from the RBI through TSP merchants. The issuance of ₹ will occur online, enabling the RBI to circumvent operational expenses associated with printing, storing, or transporting physical cash. According to an ACI Worldwide report, India led the way in real-time transactions, with 48 billion recorded in 2021, followed by China with 18 billion and Thailand with 9.7 billion. Central Bank Digital Currencies (CBDCs) are digital tokens akin to private cryptocurrencies issued by a central bank. As Per the RBI, a CBDC is a digital form of legal tender released by a central bank. It holds the same value as sovereign currency and can be exchanged one-to-one with fiat currency. Beyond encompassing fundamental characteristics of money-like being a store of wealth, a medium of exchange, a unit of account, etc, the proposed Digital Rupee boasts several critical features outlined below.

Figure 1: Workflow of digital Rupee



Source: ACI Worldwide

Distinguishing e-Rupee from UPI, RTGS, and Other Payment Alternatives

The utilization of e-rupee resembles UPI in that both sender and receiver must be registered on a specific platform to transfer funds, yet they fundamentally differ. UPI operates on a bank account level, directly transferring funds from the sender's bank to the receiver's bank. However, if either bank experiences downtime, the transaction remains incomplete. In contrast, the e-rupee, serving as a digital representation of physical currency, extends beyond mere payment; it functions as a unit of account and store of value, reflecting a claim on the reserve bank's balance sheet. Unlike UPI or other transfer modes, e-rupee's usage isn't confined solely to payments. It operates on a blockchain network akin to cryptocurrencies such as Bitcoin and Ethereum, controlled and maintained by the RBI. Consequently, e-rupee transactions aren't reliant on bank server availability unless the blockchain network is inactive, the e-rupee system remains operational. Importantly, e-rupee transactions are legally recognized by the RBI. Despite differing backend technologies, the monetary exchange value using the e-rupee remains equivalent to that of UPI, RTGS, NEFT, or other methods where 1 e-Rupee is equivalent to 1 Indian Rupee.

Types of the CBDCs

Central Bank Digital Currencies (CBDCs) can be categorized into two main types: general-purpose, known as Retail CBDC (CBDC-R), and Wholesale CBDC (CBDC-W). Retail CBDC (₹-R) is envisioned as accessible to a broad spectrum, encompassing the private sector, non-financial consumers, and businesses. Conversely, Wholesale CBDC (₹-W) is tailored for restricted access, specifically targeting select financial institutions. Wholesale CBDC is designed to facilitate interbank transfers and associated wholesale transactions within the financial sector. On the other hand, Retail CBDC serves as an electronic form of currency primarily intended for retail transactions, akin to the functionality of traditional cash.

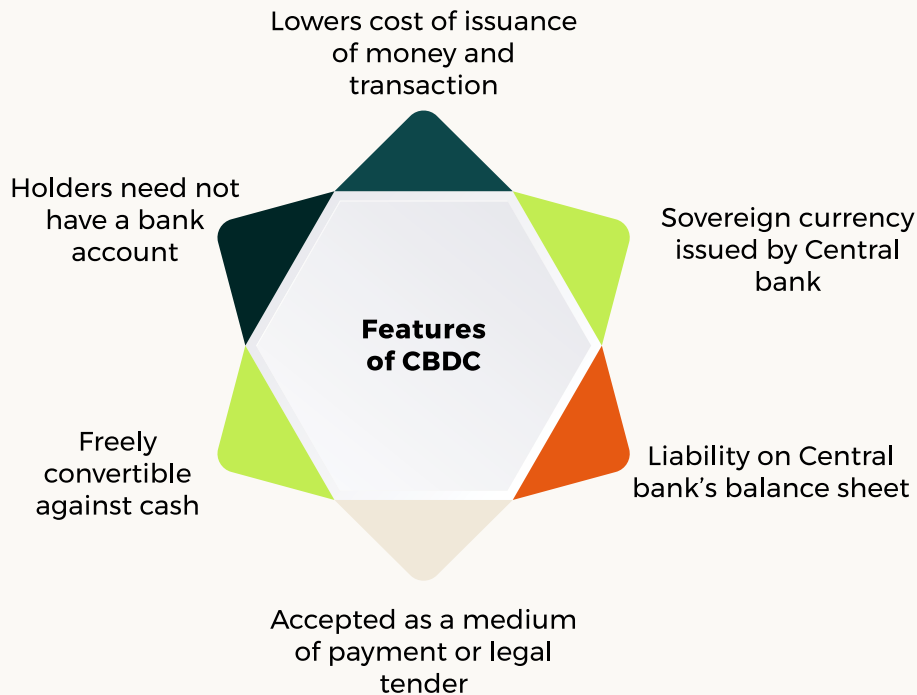
Table 1: Difference between Retail CBDC and Wholesale CBDC

Retail CBDC	Wholesale CBDC
Retail CBDC would be potentially available for use by all viz. private sector, non-financial consumers, and businesses.	Wholesale CBDC is designed for restricted access to select financial institutions.
Retail CBDC is an electronic version of cash primarily meant for retail transactions.	Wholesale CBDC is intended for the settlement of interbank transfers and related wholesale transactions settlement.
Retail CBDC can provide access to save money for payment and settlement as it is a direct liability of the central bank.	Wholesale CBDC has the potential to transform the settlement systems for financial transactions and make them more efficient and secure.

Source: Central bank digital currency ministry of finance

On the other hand, CBDCs can adopt either a “token-based” or an “account-based” structure. A token-based CBDC operates as a bearer instrument, like banknotes, implying that whoever holds the tokens at a specific time would be presumed as their owner. In contrast, an account-based system necessitates the maintenance of records detailing balances and transactions for all CBDC holders, indicating ownership of the monetary balances. Considering the attributes provided by both forms of CBDCs, a token-based structure is the preferred choice for CBDC-R. This preference stems from its similarity to physical cash, making it more suitable for general retail use. Meanwhile, an account-based CBDC may be more suitable for CBDC-W, especially for restricted financial institution use cases.

Figure 2: Features of CBDC



Source: Central bank digital currencies ministry of finance

Impact of e-Rupee in India 2023

As of March 2023, data from the RBI's Handbook of Statistics on the Indian Economy for FY23 indicates that the Central Bank Digital Currency (CBDC) or e-rupee in circulation amounted to ₹16.39 crore. Within this circulation, ₹10.69 crore comprised wholesale CBDC, while ₹5.70 crore constituted retail CBDC. The e-rupee, serving as the digital representation of India's legal tender, mimics physical currency and is issued to banks across various denominations. The circulation peaked with ₹500 CBDC notes at ₹2.71 crores, followed by ₹200 notes at 1.16 percent. Denominations ranging from 50 paise to ₹100 had circulation percentages below 1 percent, fluctuating between 0.01 and 0.83 percent. The RBI introduced the CBDC pilot for the wholesale segment, CBDC (W) or e₹-W, in November 2022. Initially designed for settling secondary market transactions in government securities, the central bank now aims to broaden the e-rupee's utilization to encompass other inter-bank money markets. The retail pilot, CBDC (R) or e₹-R, commenced a month later, in December 2022, within a closed user group comprising participating customers, banks, and merchants. Initially involving eight public and private sector banks, the retail e-rupee has since expanded to encompass more banks and now features interoperability with UPI QR codes. In July, RBI Deputy Governor T Rabi Sankar mentioned the involvement of 13 banks in the retail CBDC pilot for UPI interoperability. However, extending this pilot to the remaining 20 to 25 banks is expected to take additional time.



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Digital currencies, among them the e-rupee, still represent a relatively new and intricate technology, potentially facing regulatory challenges that require resolution for the e-rupee's successful integration.

Challenges of e-Rupee

Launching digital currencies has encountered specific challenges in ensuring a smooth rollout of these currencies. India's current implementation of a digital currency necessitates a robust infrastructure, educational programs, and comprehensive regulations to ensure its safety, reliability, and usability. Digital currencies, among them the e-rupee, still represent a relatively new and intricate technology, potentially facing regulatory challenges that require resolution for the e-rupee's successful integration. Currently, India lacks well-defined guidelines for using digital currencies, with some recommendations advocating for their outright prohibition. Adopting a digital currency demands a robust infrastructure, educational initiatives, and appropriate regulations to safeguard its functionality and usefulness. It is crucial to meticulously consider digital currencies' potential risks and challenges, such as regulatory compliance and technological complexities, to facilitate their successful integration and sustained effectiveness.

Scalability issue

India boasts a vast population and a swiftly growing digital economy. However, a significant challenge lies in scalability, as existing networks may encounter difficulties in efficiently handling substantial transaction volumes concurrently. To overcome this hurdle, technological advancements and network upgrades are essential. The architectural framework needs scalability, enabling it to effectively manage substantial transaction volumes and many user accounts. This adaptation is crucial to accommodate the expanding digital landscape in India sustainably.



The design of any digital currency framework should incorporate robust security measures to mitigate these risks effectively. These measures may include multifactor authentication, encryption protocols, real-time monitoring systems, and prompt alert mechanisms.

Privacy and security concerns

The Reserve Bank of India (RBI) maintains a centralized record of all transactions, which authorities might utilize for supplementary purposes. India faces a significant challenge with a high frequency of cyber-attacks and elevated cyber security risks. Introducing a digital currency could potentially escalate these threats, increasing the risk of digital theft. Consequently, cyber security threats remain a paramount concern in this context. The design of any digital currency framework should incorporate robust security measures to mitigate these risks effectively. These measures may include multifactor authentication, encryption protocols, real-time monitoring systems, and prompt alert mechanisms. Implementing such comprehensive security features is essential to safeguard against potential cyber threats and protect the integrity of the digital currency system.

Competition from other payment options

The e-rupee is poised to encounter competition in usability support systems, innovative mechanisms, and transaction fees from existing digital payment options like bank-based systems and cryptocurrencies. In a price-sensitive market like India, high transaction fees could deter users. Thus, the architecture should prioritize offering cost-effective transaction fees to encourage acceptance and usage. India's substantial unbanked and underbanked population suggests the potential use of incentive mechanisms to promote digital currencies. Strategies like referral or transaction rewards could be integrated with popular payment gateways like digital wallets and UPI to facilitate the exchange of digital currency for fiat cash. To foster public trust, the government must establish clear guidelines and ensure widespread education regarding digital currency use and associated risks.

Technology Perspective to Launch e-Rupee

As Central Bank Digital Currency (CBDC) represents a digital form of currency, technological aspects are pivotal in translating overarching policy objectives into seamless implementation nationwide. Within the technology framework, the concept note outlines several functionalities deemed desirable for potential inclusion in CBDCs. Some of these are highlighted below.

Offline access

Given that substantial portions of rural and semi-urban areas in the country encounter connectivity and internet challenges, the concept note proposes the incorporation of an offline capability within the CBDC architecture.

Integration with the existing payment systems and interoperability

CBDC aims to complement and seamlessly integrate with the current payment infrastructure available in the country. This integration seeks to achieve co-existence, promote innovation, and enhance efficiency for end users within the financial ecosystem.

Cross-border payments enabler

The Reserve Bank of India (RBI) suggests collaborating with other central banks and networks to develop an infrastructure to enable effortless and smooth international transactions.

Security considerations precede the comprehensive technological framework for CBDCs. The concept note has proposed specific principles focusing on security measures. These principles encompass the development of an advanced risk management framework, meticulous testing of user interfaces, implementation of robust cryptography, and fortification against potential threats like quantum attacks.

Data analytics

CBDC platform is anticipated to generate extensive real-time datasets. Leveraging appropriate analytics can aid in evidence-based policymaking, bolster enforcement of anti-money laundering regulations, and serve as a valuable data source for financial service providers, facilitating insights into financial product trends, among other benefits. In a DLT system, the ledger is typically managed collectively by multiple entities in a decentralized manner. Each update, such as for individual transactions, necessitates synchronization among the nodes of all participating entities. This characteristic limits the volume of transactions processed through this system, resulting in slower speeds than conventional centrally controlled ledgers.



Comparison of the e-Rupee and other CBDCs

Central Bank Digital Currencies (CBDCs) are designed to offer a secure, efficient, and dependable method for transacting digital currency, potentially complementing, or even replacing physical cash within an economy. Various countries have been exploring the feasibility of introducing CBDCs. Among these, the People's Bank of China has made considerable progress in developing its CBDC, the Digital Currency Electronic Payment (DCEP). The Central Bank of the Bahamas also launched a CBDC called the Sand Dollar in 2020. Meanwhile, Sweden's central bank, the Riksbank, is exploring the potential launch of an e-krona, expected to operate as an account-based system with users storing their e-krona in digital wallets.

The evolution of these systems and their differences will be intriguing to observe. However, comparing the specifics of different CBDCs proves challenging, as each country's circumstances, needs, and objectives are unique. Consequently, these variations can lead to distinct features and functionalities within each CBDC, making direct comparisons complex.

Table 2: Comparison between the e-rupee and CBDC

CBDC	e-Rupee	Sand Dollar	E-Krona	DCEP
Launch Date	Pilot project launched on 1st December,2022	October,2020	Still in the development and testing phase, with no official launch dates yet.	Trial began in April, 2020
Technology	Centralized blockchain based system that follows a hybrid mode.	Centralized blockchain based system that works on a two-tier model.	Centralized blockchain based system two-tier architecture.	Centralized, permissioned blockchain based system, two-tier architecture.
Payment Mechanism	Prepaid digital currency	Digital version of fiat currency.	Digital version of fiat currency	Prepaid digital currency
Accessibility	Available to anyone with a smartphone	Available only to residents of the Bahamas	Expected to be accessible only to Swedish residents.	Available to anyone with a smart phone
Interoperability	Not Interoperable with other digital currencies	Designed to be interoperable with other digital currencies	Expected to be interoperable with other blockchain based currencies.	Not interoperable with other digital currencies
Offline Capabilities	Expected to have an offline feature	Require Internet connectivity	Require internet connectivity	Has offline payment feature
Privacy	Still evaluating privacy issues.	Uses a privacy-enhancing technology called Zero-knowledge proofs	Still evaluating privacy issues	The Chinese government has indicated that DCEP transactions will be traceable which has raised some privacy concerns

Source: BenchCouncil Transactions on Benchmarks, Standards and Evaluations



A Workflow for Facilitating Payments

Earlier this year, the Union Budget announced the introduction of CBDCs, accompanied by an appropriate amendment to the RBI Act 1934. Furthermore, beginning November 1, 2022, the RBI initiated the pilot program for CBDC-W (wholesale) and is strategizing to launch the inaugural pilot for the retail segment. CBDC exhibits significant potential to enhance existing payment systems, catering to a broader user base while facilitating cross-border transactions. However, achieving a solution that meets requirements demands extensive stakeholder consultations, adherence to relevant international benchmarks, and an iterative approach to technology design. Given the evolving nature of this domain, monitoring the progress of CBDC implementation in India and globally remains crucial.

Ease of Use and Impact on Current Payment Infrastructure

The concept note emphasizes the existence of robust payment infrastructures like RTGS, NEFT, and UPI, which emphasizes that CBDCs can serve as an additional avenue for digital payments rather than replacing existing payment platforms. However, ensuring that the proposed framework seamlessly integrates with the current financial ecosystem is crucial and avoids causing unnecessary confusion among users.

Anonymity of transactions

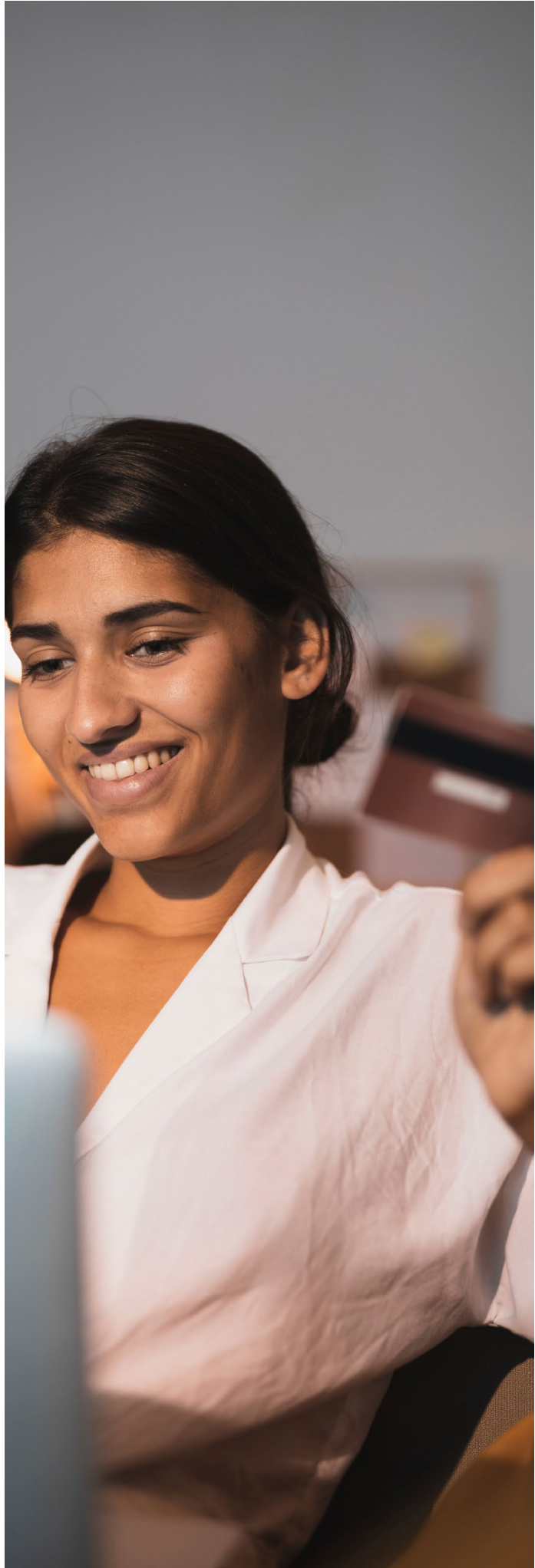
One crucial aim behind introducing CBDCs is to reduce reliance on physical cash within the economy. However, deliberation on incorporating programmability features to monitor the end use of funds should be considered carefully. Implementing such features might deter people from transitioning to CBDCs from the existing cash system.

Comparison with virtual cryptocurrencies

The concept note strongly discourages using and adopting private cryptocurrencies, citing their high volatility and disruptive impact on the conventional financial system. Many central banks worldwide have identified the rise of cryptocurrencies as a critical motivation for developing CBDCs, aiming to meet users' needs for digital transactions with a reasonable degree of anonymity. However, CBDCs would function as digital currencies and wouldn't be tradable on exchanges or other platforms, so they might not be directly comparable to these cryptocurrencies. Observing the evolution and shifts in behavioural patterns related to the use of cryptocurrencies following the introduction of CBDCs will be intriguing.

Impact on financial statement audits

Auditors tasked with evaluating entities handling and engaging in digital or virtual assets, including CBDCs, must consider additional risks associated with these assets during audit engagements. They will need to assess these risks meticulously, scrutinize pertinent internal controls governing the execution of such transactions, and conduct specific substantive procedures to gather sufficient audit evidence related to these asset balances. This process encompasses the evaluation of cybersecurity risks and other pertinent IT considerations relevant to the audit scope.



Conclusion

In conclusion, the advent of the e-rupee represents a significant stride toward transforming India's financial landscape. With its innovative approach leveraging digital technology, e-Rupee promises to revolutionize transactions, fostering financial inclusion and accessibility for millions. Its implementation signifies a pivotal shift toward a cashless economy, offering secure and efficient digital payment solutions that cater to diverse user needs. However, the successful integration of e-Rupee necessitates careful attention to various aspects, including technological advancements, security measures, user-friendly interfaces, and seamless integration within existing financial infrastructures. As the journey continues, continuous evolution and adaptation will be pivotal in harnessing the e-rupee's full potential, offering immense opportunities for a more inclusive and efficient financial ecosystem in India.

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Agpaytech Ltd. is a company pioneering in the Fintech space with a focused approach to building robust technologies for e-commerce Card Processing Solutions for Payment Service Providers (PSPs). Additionally, we provide Compliance and Regulatory Umbrella, Remittance-as-a-Service (RaaS), Banking-as-a-Service (BaaS), Foreign Exchange, Cross Border Payments, and digital currency technology.

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