

# Revolutionising India's Financial Landscape: The Impact of Decentralised Finance

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**Abstract:** Since the inception of internet banking in India in 1998, only 370 million out of 870 million active internet users have used the web for digital banking [1]. A major chunk of India's population remains financially excluded and is unserved and underserved. Decentralised financing is a blockchain technology that has emerged as a platform offering global access to anyone with an internet connection, removing barriers and providing financial services to underserved populations, particularly in regions with limited access to traditional banking systems. Several decentralised finance (DeFi) projects and initiatives have emerged in recent years, offering secured and prompt peer-to-peer (P2P) lending and fundraising options without the involvement of intermediaries, to address financial inclusion and streamline traditional financial procedures. Despite the remarkable significance of DeFi, it is still in its infancy in terms of adoption in India. Adequate infrastructure, technological advancements, awareness, and regulatory support are key factors driving the penetration of DeFi [2]. This paper focuses on analysing the current status of DeFi adoption in India and exploring the impact and future potential of DeFi in reshaping the Indian financial ecosystem.

**Keywords:** Blockchain technology, Cryptocurrency, DeFi, Digital banking.

## I. INTRODUCTION TO (DeFi)

Financial services and products utilising blockchain networks, based on smart contracts, are known

as decentralised finance, or DeFi. In contrast to traditional financial systems, DeFi relies on decentralised networks, providing individuals with greater control over their financial transactions. With this autonomy, users are freed from reliance on intermediaries [3].

A DeFi system is an emerging peer-to-peer (P2P) financial system based on blockchain technology and cryptocurrencies that allows people and businesses to transact directly. By eliminating third parties such as banks from the financial system, DeFi reduces transaction costs and time. To access capital and financial services, consumers rely on centralised financial institutions such as banks and brokerages that are regulated by the Federal Reserve and Securities and Exchange Commission (SEC). With DeFi, individuals can conduct P2P transactions, challenging this centralised financial system.

During a Telegram chat held in 2018, Ethereum developers conceptualised and coined the term Definance to describe their resistance to creating a permissionless financial system. DeFi just clicked due to its similarity with Definance.

Decentralised financial systems and applications based on blockchain technology had been evolving before the term DeFi was coined in 2018. For example, Bitcoin, launched in 2009, laid the foundation for blockchain technology, while Ethereum introduced smart contracts in 2015 that served as a prerequisite for many DeFi applications. However, the story of DeFi really begins with MakerDAO's launch of a stablecoin pegged to the US dollar – DAI. By enabling people to lock crypto

as collateral and mint DAI through smart contracts, MakerDAO laid the foundation for transparent, DeFi on Ethereum [4].

The use of smart contracts on Ethereum protocols allows founders to borrow, lend, earn yields, and raise funds programmatically and transparently. An organisation issuing its own governance tokens may use the tokens to collateralise stablecoins (such as USD coin [USDC]) on a DeFi platform such as Aave to borrow at algorithmically defined interest rates. Other companies create market-driven token launches without middlemen by participating in Initial DEX Offerings (IDOs) or Liquidity Bootstrapping Pools (LBPs).

## II. OBJECTIVES OF (DeFi)

A fundamental principle of DeFi is P2P financial transactions, where individuals can exchange cryptocurrency for goods or services without intermediaries. DeFi offers several key advantages:

- *Accessibility:* Anyone with internet access can use DeFi platforms, enabling transactions without geographical limitations. A key benefit of DeFi is its capacity to offer services to individuals who are excluded from traditional banking systems or face limited access due to identification requirements or the lack of nearby branches in rural or underserved areas. By removing these obstacles, DeFi allows people in these regions to participate in saving, borrowing, and investing in various financial opportunities.
- *Lower Costs and Flexible Interest Rates:* DeFi allows users to directly negotiate interest rates and facilitate lending or borrowing of cryptocurrency without traditional banking fees. DeFi eliminates the need for traditional intermediaries, streamlining processes and lowering costs through increased efficiency. Unlike conventional financial systems that involve multiple parties in a single transaction, DeFi uses a P2P model that allows users to access financial services directly – often with significantly reduced fees.

- *Security and Transparency:* Transactions and smart contracts are recorded on a blockchain, making them publicly verifiable while maintaining user anonymity. Since blockchains are immutable, transaction records cannot be modified.
- *Independence:* Unlike traditional financial systems, DeFi operates without centralised institutions, reducing administrative costs and reliance on third parties.

While P2P lending in DeFi still involves interest and fees, it expands financial opportunities by connecting lenders and borrowers globally, removing the restrictions of conventional banking systems.

## III. LITERATURE REVIEW

[5] The author highlighted the risks related to security, instability, and regulatory uncertainty associated with DeFi adoption and recommended integrating DeFi with traditional finance for a stronger and adaptive financial system.

[6] The paper reported the emergence of DeFi and crowdfunding as a strategic and viable channel for startup funding. The study concluded that crowdfunding and DeFi are integral components of entrepreneurial financing. Smart founders use crowdfunding for brand and market traction, DeFi for liquidity and incentives, and venture capitals (VCs) later when scaling beyond grassroots capital. So, integration, not substitution, can serve as a key to success for a startup, too.

[20] The study explored how DeFi is fundamentally reshaping the financial landscape. The study further explored that DeFi systems – powered by blockchain, smart contracts, and decentralised frameworks – are rapidly emerging as alternatives to traditional banks. The study highlighted key advantages, including bypassing third-party intermediaries, boosting transparency, lowering transaction costs, and extending financial services to unbanked and underserved populations, and concluded that DeFi's use of borrowing, lending, and trading protocols is revolutionising financial services in unprecedented ways.

[7] The paper discussed the current status and future scope of decentralised financing in India. The study highlighted DeFi as a solution for promoting financial inclusion in India through providing access to financial services for underserved populations. Further, scalability, interoperability, and user experience, as part of technical advancements, also play a pivotal role in driving the future growth of DeFi in India. The researcher recommended emphasising education and awareness programmes and partnership between DeFi platforms and traditional financial institutions for promoting this innovation.

[8] The paper indicated DeFi as a potential option to serve individuals and communities in marginalised groups, excluded from access to formal finance due to non-accessibility, high cost, and stringent policies. The study also discussed various challenges and threats associated with the adoption of digital financing as cryptocurrency and recommended bridging the digital gap for unlocking the potential of DeFi in India.

[9] The paper highlighted that, in spite of high volatility, stablecoin run, unstopability, irreversibility, lack of transparency, pseudonymity, and risk of money laundering. Since DeFi's growth is mainly fueled by innovation and information technology, it is expected to keep expanding quickly in developing countries in the future.

[2] The study reported regulatory challenges, financial stability concerns, loss of control, lack of monetary policy, tax evasion, illicit activities, and most importantly customer protection as main reasons restricting the government from adopting DeFi further. Among the risks associated with the DeFi ecosystem are code vulnerabilities, smart contract vulnerabilities, scalability, network congestion, regulatory and compliance issues, external dependencies, user errors, phishing attacks, scams, price volatility, market volatility, governance consensus risks, and liquidity risks.

#### IV. NEED OF THE STUDY

In spite of the vast penetration of the traditional banking system in India, a majority of the population

is still deprived of formal access to finance and timely and adequate financing. As per the GlobalFindex database 2021, around 22% of the adult population around the globe lacks access to formal finance, and the situation is even worse in India.

Most of the studies emphasised integrating traditional financing with DeFi, considering the unbankable population size around the world and the risk relating to security, instability, and regulatory uncertainty. Undoubtedly, this untapped platform can help transform India's financial economy through DeFi with a transparent, open, and accessible alternative to the existing banking system.

However, the road to mass adoption of DeFi is plagued by regulation, infrastructure, and awareness concerns. Moreover, very little literature claiming successful adoption of DeFi in India is available to date. So, the current study will examine the level of adoption of DeFi and the impact of DeFi on fostering financial inclusion and economic empowerment.

#### V. OBJECTIVES OF THE STUDY

- To analyse the growth and adoption of DeFi and cryptocurrency in India and globally.
- To explore the impact of decentralised financing on reshaping the traditional financial system.

As a qualitative study, secondary data is the main source of information in this study. A variety of websites, recent online articles, and news, among others, were reviewed for this study.

DeFi has been one of the most exciting and revolutionary innovations in recent years within the blockchain and cryptocurrency ecosystem. It leverages blockchain technology to disrupt the conventional path of financial systems without the need for intermediaries, giving out financial services that are more transparent, accessible, and efficient [10].

##### *A. Emergence of Cryptocurrency in India*

Bitcoin was the first cryptocurrency to appear in India in 2009. Cryptocurrency exchanges were first launched in 2013 after the first commercial transaction took place in 2010. Over the past few

years, it has caught everyone's attention in India. A total of USD5.37 billion (INR410 billion) is estimated to be held in crypto assets by 15 to 20 million investors in India [11].

As the most renowned name for cryptocurrency is Bitcoin, any alternative digital currency to Bitcoin is termed an altcoin. Ethereum is the most popular of them all.

### *B. Growth and Recent Trends in the Cryptocurrency Market*

There is a daily influx of cryptocurrency purchases from Indians, and its projected growth rate (compound annual growth rate [CAGR]) is not surprising: 54.11% between 2024 and 2032. Cryptocurrency's growth is fuelled by a number of

factors, including an expanding digital economy, government efforts to promote digital projects, and the rise of cryptocurrency startups and exchanges.

There were around 50 different cryptocurrencies by the end of 2013, and the number rose by 10 times in just one year at the end of 2014. Within a decade, the number has increased a lot, and currently, there are around 17,134 total cryptocurrencies. However, discounting many 'dead' cryptos leaves only around 10,000 (approximate) active cryptocurrencies.

Table I shows the ranking of the top 10 cryptocurrencies (out of 9,541 listed) on CoinMarketCap in terms of their market capitalisation, highlighting their respective market share in the total crypto market volume. Bitcoin, followed by Ethereum and Tether, outshone in the cryptocurrency market.

TABLE I: RANKING OF THE TOP 10 CRYPTO CURRENCIES BY MARKET CAPITALISATION AND PRICE

	Name	Price	Market Capitalisation (Data in Billion)
1	Bitcoin (BTC)	USD106,979.20	USD2,127.19
2	Ethereum (ETH)	USD2,454.30	USD296.28
3	Tether (USDT)	USD1.00	USD157.54
4	XRP (XRP)	USD2.09	USD123.83
5	BNB	USD644.27	USD90.77
6	Solana (SOL)	USD142.23	USD76.02
7	USDC	USD1.00	USD61.70
8	TRON (TRX)	USD0.27	USD25.71
9	Dogecoin (DOGE)	USD0.16	USD24.20
10	Cardano (ADA)	USD0.56	USD19.74
	Total Market Capitalisation		USD3,280.00

Source: <https://coinmarketcap.com/> (as of June 27, 2025, 3:00 pm)

Out of 9,541 listed cryptocurrencies on CoinMarketCap, the top 10 cryptocurrencies account for 91.55% of market share in terms of total market capitalisation, as shown in Table I.

Market capitalisation has increased from USD612.92 billion in January 2018 to USD3,280 billion, indicating a CAGR of 25.06% over the last 7.5 years.

Further, Bitcoin had been dominating the market with a 65% share, followed by Ethereum at 9%. Remaining currencies have a share of around 26%. Again, among the top cryptocurrencies, Bitcoin is currently priced at USD106,972, while PAX Gold (USD3,300.29), Tether Gold (USD3,289.13), and Ethereum (USD2,454.30) are traded at premium prices.

Adoption of cryptocurrency in India is also significant. Around 7.1% of the Indian population owns cryptocurrency. The Chainalysis 2021 Global Crypto Currency Adoption Index places India second overall, behind Vietnam. During 2021, 59% of crypto users in India were male, but in the last year there has been an intense surge in women investors in this segment. WazirX, one of the largest cryptocurrency exchanges in India, reports that 66% of its users are under 35 years old, and that female users increased by over 1,000% in 2021 [12].

As per the 2024 Global Crypto Adoption Index, India ranked first among the top 20 countries on usage of centralised exchange and DeFi assets during 2023–24, as an outcome of increased preference for cryptocurrency.

## VI. APPLICATIONS OF BLOCKCHAIN IN (DeFi) SYSTEM

Blockchain forms the backbone of secure and transparent transactions by preventing tampering and removing the need for trust in third parties. Decentralised systems help lower operational costs and improve access by using distributed ledger technology to eliminate intermediaries. Tools like decentralised exchanges (DEXs), automated liquidity mechanisms, and smart contracts are enhancing the speed, fairness, and inclusivity of modern financial services.

Blockchains are distributed, secure databases. Transactions are recorded in blocks and verified through automated processes on a blockchain. Once a transaction is verified, the block is closed and encrypted; another block is created with information about the previous block and newer transactions. It is termed blockchain because the information in each block is ‘chained’ together. When a blockchain network is large and fast enough, they are termed most secure as previous blocks cannot be changed without affecting subsequent blocks. Blockchains are secure because of this concept and other security protocols.

Tokens and cryptocurrencies are held by private keys using wallet applications that can transmit

information to a blockchain. Virtual tokens representing value can be accessed using these keys. The tokens are transferred by sending an amount via a wallet, which then generates a different private key for the recipient. This secures their ownership of the token, and the blockchain design prevents the transfer from being reversed.

A DeFi application communicates with a blockchain, enabling users to make purchases, pay loans, make gifts, trade, and use their money in any way they want without the involvement of a third party. They are programs that are installed on devices such as a personal computer, tablet, or smartphone that simplify their use. DeFi would still exist without the applications, but users would need to be comfortable using the command line or terminal in the operating system on their devices.

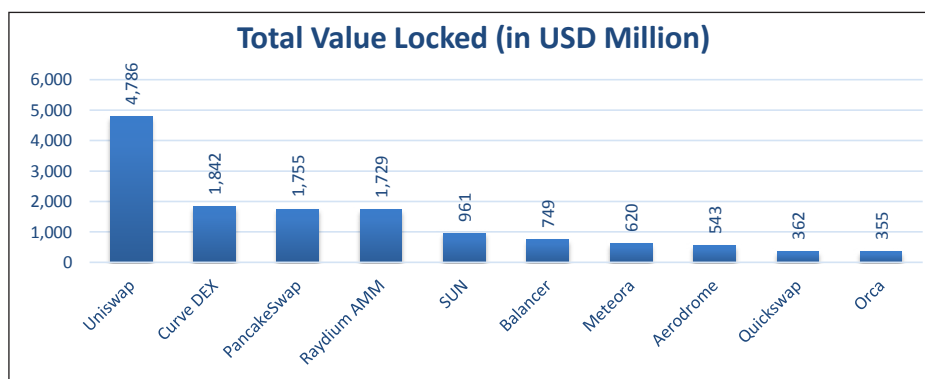
*Dapp*: Dapps use blockchain technology to deliver financial services such as lending, trading, and managing digital assets without taking permission from any centralised body or financial institution. Dapps such as Uniswap, Aave, and Compound with worldwide accessibility can render seamless and transparent services.

Leading DeFi platforms such as Uniswap, Aave, and MakerDAO have each developed unique roles within the DeFi space. Uniswap transformed crypto trading by introducing the Automated Market Maker (AMM) system, which enables users to swap tokens directly without traditional order books. Aave has become a top choice for decentralised lending and borrowing, offering innovative features such as flash loans and flexible interest rates. MakerDAO contributes to the ecosystem’s stability through its decentralised stablecoin, DAI, which is backed by collateral and managed via a system of smart contracts [13].

As of mid-2025, DeFi protocols collectively hold around USD112.346 billion in total value locked (TVL), highlighting their growing influence within the financial sector. Platforms such as Aave have seen notable expansion, with its TVL reaching USD25 billion (as of June 29, 2025) across various blockchain networks. Meanwhile, Compound continues to play a key role in DeFi lending, maintaining a TVL of approximately USD2.56 billion.

*DEX:* There has been a significant increase in the TVL of DEX around the world; it was around USD26.82 million in the first week of January 2020. Within a span of five years, there has been a multifold growth in total trading volume, making it around USD19.41 billion as of June 29, 2026.

TVL indicating the total value of money locked inside the smart contracts at DEX platforms by the top 10 DEXs. Uniswap is heading all other DEXs in terms of TVL, followed by Curve DEX and PancakeSwap as the three major leading DEXs (as of June 29, 2025).



Source: <https://defillama.com/dexs>

Fig. 1 : Total Value Locked (TVL) Across the Top 10 DEX Platforms, Showing Uniswap Leading the Market Followed by Curve and PancakeSwap as of June 29, 2025

Further, total trading volume has shown a significant increase over the last five years. Trading volume of DEXs has increased from USD545.5 million in December 2019 to USD9.158 trillion at the end of June 2025.

*Smart Contracts – Enabling Automated Transactions:* Smart contracts are self-executing programmes built on blockchain networks that carry out predefined terms without requiring intermediaries. They help reduce operational costs, minimise human error, and enforce agreements automatically. In the DeFi space, smart contracts power key functions such as borrowing, lending, trading, and yield farming, ensuring secure and transparent execution. Platforms such as Ethereum, Solana, and Binance Smart Chain leverage these contracts to run a wide range of DeFi applications.

Ethereum was the first blockchain to introduce highly adaptable smart contracts when it launched in 2013. It introduced Solidity, a JavaScript-like programming language that made it easy for front-end developers to begin building decentralised applications. Further, BNB Smart Chain, originally developed as part of Binance's ecosystem, evolved from Binance Coin and was transitioned to its own

dedicated blockchain in 2019 to function as a native asset. It operates using a Proof-of-Stake Authority (PoSA) consensus mechanism, designed for speedy transactions and minimal fees. Limited scalability and slower processing during peak usage spurred a second generation of open blockchain networks to address such shortcomings.

Collectively, these protocols illustrate how DeFi is reshaping conventional financial systems by building on a global, transparent, and permissionless foundation. Each brings its own advantages to the ecosystem.

However, they also encounter specific hurdles – such as vulnerabilities in smart contracts, concentrated governance structures, inefficiencies in capital usage, and reliance on unstable crypto assets or centralised forms of collateral. These challenges highlight the critical need for continuous innovation, rigorous security audits, and active community involvement to support their long-term sustainability.

## VII. CHALLENGES FACING (DeFi)

While DeFi holds immense potential, several significant obstacles must be addressed before it can

achieve widespread adoption. The primary issues revolve around regulation, security, scalability, and user experience.

- *Regulation:* DeFi's decentralised and global structure makes it inherently difficult to regulate. Financial authorities around the world continue to grapple with how to define and monitor the wide variety of DeFi protocols. Without clear rules, many institutional and retail investors remain hesitant to enter the space. Effective regulation must strike a careful balance – protecting users without stifling innovation. Excessive oversight could hinder growth, while too little could expose users to scams and manipulation.
- *Security Risks:* Security is arguably DeFi's most pressing concern. The open-source nature of most protocols, coupled with the complexity of smart contracts, creates opportunities for vulnerabilities to be exploited. In recent years, several high-profile hacks have resulted in the loss of millions of dollars in user funds. Although smart contract audits and security practices are improving, protecting users remains a critical challenge as DeFi continues to evolve.
- *Scalability:* As more people engage with DeFi platforms, the need for infrastructure that can handle higher transaction volumes becomes more urgent. While Layer-2 scaling solutions and alternative blockchains are making progress, there is still a long way to go before DeFi can operate seamlessly at scale without bottlenecks or high fees.
- *User Experience:* For the average person, using DeFi platforms can be intimidating. From managing wallets and private keys to navigating DEXs, the user experience is often complex and technical. Simplifying interfaces, improving wallet functionality, and making protocols more intuitive are essential steps towards broader adoption. Although improvements are being made, DeFi still has a usability gap to bridge.

Indian markets depict the potential of cryptocurrency with wide adoption among investors and businessmen. However, new taxation policies

imposing 30% tax on crypto gains, alongside a 1% Tax Deducted at Source (TDS) on transactions, introduced by the government, have created a complex landscape for crypto traders, startups, and financial institutions. As a result of these policies, speculative trading was curtailed and digital asset transactions became more transparent. Taxation brought legitimacy to the sector, but it also led to a decline in trading volumes on Indian exchanges as investors looked for alternatives offshore [14]. As a result, the blockchain sector in India has seen a large number of startups move operations to more crypto-friendly countries such as Dubai and Singapore, raising fears of brain drain. This migration has resulted in a potential loss of USD420 million in revenue for the government since taxation on digital assets was introduced in July 2022.

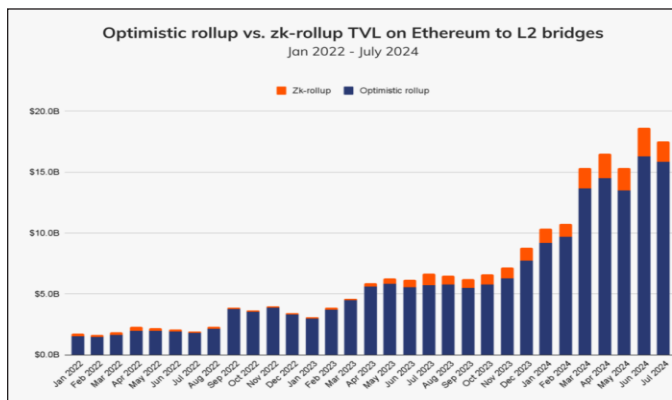
In spite of various challenges and obstacles amid the growth of DeFi, some banks and investment firms are integrating blockchain-based financial products into their portfolios, bridging the gap between traditional finance and DeFi. The RBI's Central Bank Digital Currency (CBDC) initiative is one of the stepping stones, indicating the government's willingness to experiment with digital assets within a controlled framework. As a result of digital penetration, Indians, especially the younger generation, have been prompted to diversify their portfolios by investing in new-age investments such as cryptocurrency. India has emerged as a global leader in cryptocurrency adoption, topping the Chainalysis Global Crypto Adoption Index. The report, which tracked adoption across four sub-categories in 151 countries, showed India has ranked first in the usage of centralised exchange and DeFi assets from June 2023 to July 2024 [15]. According to a recent report on cryptocurrency investments in India, 17.6% of them are held in DeFi utility tokens such as SushiSwap, DIA, and Yearn. Finance, DFIMoney, Aave, and Compound, among others.

This has created an explosively developing market that is pulling in individual consumers and institutional investors alike. With DeFi on the rise, a number of major trends and developments are defining its future.

## A. Key Trends Shaping the Future of DeFi Adoption

- Layer-2 Scaling Solutions:** Scalability is a major challenge for DeFi. The Ethereum-based DeFi platforms, which are well-known, have been experiencing high transaction fees and network congestion for some time. Investors with lower funds have been restricted by this. To solve this problem, Layer-2 scaling solutions are emerging. Transactions are executed off-chain while maintaining the security and decentralisation of the primary blockchain. With Layer-2 solutions, DeFi applications will be more efficient and more accessible by lowering transaction fees and speeding up transactions.

Optimistic rollups and zero-knowledge (ZK) rollups are leading the way. Between January 2022 and July 2024, the cumulative value bridged (TVL) from Ethereum to rollup-based Layer-2 networks was roughly US\$ 186.4 billion for optimistic rollups, compared to about US\$ 20.8 billion for ZK-rollups. The TVL bridged between optimistic rollups and Ethereum was approximately USD186.4 billion, whereas it was only USD20.8 billion for ZK rollups.



Source: <https://www.chainalysis.com/blog/zero-knowledge-rollups-optimistic-rollups-overview/>

Fig. 2 : TVL Bridged from Ethereum to Layer-2 Rollups Between January 2022 and July 2024, Indicating Significantly Higher Liquidity in Optimistic Rollups Relative to ZK Rollups

- Cross-Chain Interoperability:** Currently, the DeFi ecosystem is splintered across a number

of blockchains, and there are barriers to interoperability. Inefficient and fragmented liquidity results from users' inability to transfer assets from one network to another. A cross-chain interoperability solution addresses this issue by enabling seamless communication between blockchains. In addition, interoperable frameworks such as Polkadot and Cosmos enable assets to be transferred between networks via bridges such as Wormhole, Synapse, and LayerZero. DeFi protocols will be more useable and liquid when cross-chain technology is used, as users will be able to interact with them on different chains.

- Evolution of DeFi 2.0:** DeFi 2.0 represents the next generation of DeFi, aiming to address the shortcomings of earlier DeFi models. Key innovations in this phase include protocol-owned liquidity (POL), wherein, instead of depending on third-party liquidity providers who can remove their funds at any time, the systems adopt models where the protocol controls and sustains its liquidity, contributing to greater stability.

Further, the rise of decentralised Autonomous organisations (DAOs) is reshaping governance, giving community members a more direct role in decision making and protocol development. Apart from this, newer DeFi platforms are integrating automated mechanisms to manage risk, enhancing security, and minimising vulnerabilities to hacks or system failures.

These advancements are helping DeFi evolve into a more robust, inclusive, and durable financial ecosystem, better equipped to handle market volatility and long-term growth.

- Gamification and Social DeFi:** Gamification is becoming a key feature in DeFi, making financial participation more engaging through interactive experiences. Play-to-Earn (P2E) and GameFi projects integrate DeFi elements into games, allowing users to earn rewards via staking and liquidity mining. Meanwhile, Social DeFi merges finance with social media, with platforms such as Friend.tech and Lens Protocol enabling P2P lending,

tipping, and content monetisation, attracting a wider audience beyond traditional finance enthusiasts.

- *Emergence of Stablecoins and Algorithmic Finance:* Stablecoins play a vital role in the DeFi ecosystem by providing a reliable medium of exchange and a stable store of value. However, algorithmic stablecoins have faced significant challenges, including de-pegging and system failures. Looking ahead, the Indian ecosystem can anticipate the emergence of more regulated stablecoins, including CBDCs, designed for greater safety and compliance. Innovations in algorithmic models will also aim to create more resilient and sustainable stablecoin systems. In addition, as regulatory frameworks evolve, stablecoins are expected to become more integrated into traditional financial systems, bridging the gap between DeFi and conventional banking infrastructure.
- *Enhanced Security Measures:* Security remains a top concern in the DeFi space, where frequent hacks and exploits have led to substantial financial losses. To mitigate these risks, the industry is adopting advanced security measures such as:
  - *Multisignature Wallets:* Requiring multiple approvals for transactions enhances overall security.
  - *Decentralised Insurance:* Platforms such as Nexus Mutual offer protection against smart contract failures.
  - *Audits and Bug Bounties:* Increased code audits and incentive programmes encourage early detection of vulnerabilities.

Strengthening security infrastructure will help build greater trust in DeFi platforms, encouraging wider adoption and user participation. Integration of artificial intelligence (AI) and machine learning (ML) has helped in reshaping risk management and fraud detection in the decentralised financing system.

Blockchain algorithms can detect odd trends and abnormalities that could indicate potential dangers, such as front-running phishing schemes or flash loan exploits in real time. In addition to learning from past

transactions, these models can adapt proactively to new attack tactics.

Monitoring wallet interactions with ML tools can alert network participants and smart contracts in real time to suspicious activity. Various platforms, such as Chainalysis and TRM Labs, already use such technology to comply with security and anti-money laundering regulations. Decentralised financial services will be more secure, reliable, and scalable with the use of intelligent systems, which will enhance operational efficiency and risk control.

### *B. Way Forward for DeFi*

The evolution of DeFi will be shaped by technological innovation, regulatory developments, and its increasing overlap with traditional financial systems. As DeFi continues to mature, greater institutional participation, enhanced security standards, and broader user adoption are expected, bringing decentralised financial services closer to everyday users.

- *CBDCs:* Governments and central banks globally are exploring CBDCs as a way to bridge traditional finance with blockchain-based infrastructures. Although centralised in nature, CBDCs could complement DeFi by improving regulatory alignment, boosting liquidity, and expanding financial access. By enabling programmable transactions and offering stablecoin alternatives backed by state-issued assets, CBDC integration could help DeFi deliver more secure and compliant financial solutions, without losing its decentralised foundation.
- *Decentralized Identity and Privacy Innovations:* One of the core challenges DeFi faces is balancing user privacy with regulatory demands. Emerging technologies such as decentralised identity (DID) systems and ZK proofs (ZKPs) are creating ways for users to verify their credentials without exposing sensitive data. These solutions can help DeFi platforms meet Know Your Customer (KYC) and Anti-Money Laundering (AML) requirements while preserving anonymity and user control. As

privacy-preserving tools continue to develop, they will play a key role in making DeFi more trustworthy and attractive to mainstream users.

Market size for DeFi is estimated at USD32.36 billion in 2025 and is forecast to reach USD1,558.15 billion by 2034, growing at a CAGR of 53.80% between 2025 and 2034. The North American region is leading the market, accounting for a 37% share in 2024, followed by a 29% share of Europe and a 23% share of the Asia-Pacific region [16].

The persistent demand for transparent, accessible, and permissionless financial services has led to the growth of this market. With a growing culture of financial inclusion and a growing tech-savvy population, the Asia-Pacific is predicted to grow at the highest CAGR in the DeFi market during the forecast period. As mobile-first financial services grow, internet connectivity expands, passion for digital innovation grows, and DeFi adoption will accelerate. A number of startups have launched user-friendly, scalable DeFi platforms aimed at the retail market in this area. Creating developer training, engaging the community, and educating the public about cryptocurrencies are also driving the upsurge. With ongoing advancements in digital identity, regulation, and interoperability, DeFi is poised to significantly reshape the Indian financial system and global finance. Its ability to integrate with existing financial institutions while staying true to the principles of openness, accessibility, and decentralisation will be a decisive factor in its long-term success.

## VIII. CONCLUSION

DeFi is poised for significant expansion, supported by innovations in Layer-2 technologies, cross-chain interoperability, AI, and the growing trend of real-world asset tokenisation. As regulations evolve and security mechanisms become more robust, interest from institutional investors is expected to rise, contributing to greater stability and trust within the DeFi ecosystem.

Despite ongoing challenges – such as regulatory ambiguity and vulnerabilities in smart contracts – DeFi continues to gain traction globally. Its ability

to offer accessible, transparent, and permissionless financial solutions positions it as a powerful tool for economic inclusion, especially in developing markets such as India. The long-term success of DeFi will rely on clear policy frameworks, continuous technological refinement, and designs that prioritise ease of use. Integrating DeFi with conventional financial systems will not only bridge the two worlds but also unlock new opportunities for innovation and inclusive growth.

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