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# TRANSFORMING THE INDIAN RETAIL BANKING ECOSYSTEM: A REVIEW OF FINTECH ADVANCEMENTS

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## ABSTRACT

Technology developments have revolutionised the financial lending industry since they have made it easier for borrowers to get loans. Due to the widespread use of digital technology, every industry in the economy faces novel challenges. Given this context, the study was conducted to evaluate and gain an understanding of the challenges encountered during the adoption of fintech lending and to respond to the emerging opportunities in the financial sector. The study's primary objective was to investigate and understand the obstacles to introducing fintech financing. There has been much recent empirical research indicating that it creates much value for investors. Over time, technological progress has come to dominate every industry. The investigation of machine learning and A.I. integration in the financial technology and banking security sectors. Financial technology can process massive quantities of data and forecast the future more precisely than people can. “Fintech has flourished thanks to the development of cutting-edge computer technologies, including the Industrial Internet of Things (IIOT), artificial intelligence (A.I.), smartphone apps, cryptocurrencies, virtual reality (V.R.), digital twins, and fifth-generation (5G) wireless networks. Fraud detection and prevention, personalised financial advice, robo-advisory, credit underwriting, chatbots and virtual assistants, risk management, blockchain integration, and so on are all examples of current technical advancements in the area of fintech and the security of the banking industry”. Cloud computing is becoming more popular in the financial sector because it enables the safe and efficient storing and administration of massive amounts of financial data. In addition, fintech companies are investing in cybersecurity measures to protect themselves from online fraud and hacking.

**Keywords**: Innovation In The Financial Sector, Payments, Safety, Banking, Financial Services, Development, IOT

## I. INTRODUCTION

Financial technology (also spelt fintech or Fin-tech) is a neologism formed by combining the words "financial" and "technology," and it describes the integration of new Internet-based technologies like cloud computing and mobile Internet with traditional banking industry functions like transaction banking and lending [1]. The term "FinTech," short for "financial technology," describes the technological developments in the financial sector. The "disruptive," "revolutionary," and "digital weaponry" [2] of FinTech will tear down barriers and traditional banking institutions. Arner et al. [3] define fintech as a new market that merges finance and technology by using innovative digital methods instead of more conventional financial institutions. "fintech" refers to software, algorithms, and apps used in the financial sector. Sometimes hardware is employed as well, such as internet-connected piggy banks. “Fintech platforms facilitate

everyday monetary transactions, including depositing checks, transferring funds between accounts, paying bills, and applying for financial help."

The financial industry has been eager to embrace A.I. technology in recent years owing to its capacity to process massive volumes of data and make forecasts with more precision than humans. "Financing industry A.I. developments that are particularly noteworthy include Robotic Process Automation (RPA): RPA automates common and repetitive processes in finance, lowering the stress on humans and enhancing productivity [4]." Chatbots and V.A.s are employed in the banking industry to answer questions, provide suggestions, and generally be more helpful to customers. Artificial intelligence algorithms analyse transaction patterns and spot anomalous behaviour to detect and prevent financial crime. Predictive Analytics Financial institutions increasingly turn to predictive analytics to assist them analyse data and anticipate future trends and results. Automated trading, often known as algorithmic trading, is the practice of purchasing and selling financial assets using A.I. algorithms fed market data and other relevant information. In order to save time and money, credit scoring and lending institutions are increasingly turning to artificial intelligence (A.I.) to analyse data about prospective borrowers and then make loan choices based on that information. In the financial industry, A.I. is used with blockchain technology to increase safety, lessen the possibility of fraud, and expedite operations. These are a few of the most notable A.I. developments in banking. A.I.'s utilisation is anticipated to continue to rise, resulting in more productivity, a better customer experience, and lower overall costs. Fintech, short for "financial technology," brings revolutionary new services to the financial sector. Some of the most important fintech developments in the banking sector include Money transfers with mobile banking: Customers may manage their funds more conveniently on the road thanks to mobile banking and payment applications. Apple Pay and Google Wallet are examples of digital wallets that enable users to save and use their payment information digitally. Peer-to-peer (P2P) lending is a kind of alternative lending in which borrowers and investors meet online instead than at a bank or other financial institution. Robotic investment advisers, or "robo-advisors," are computer programmes that mimic the services of a human financial advisor. Blockchain is a distributed ledger that may make financial transactions more safe and transparent, and it might eventually cause a revolution in the banking industry. Open banking is making banking records available to outside parties to facilitate the development of novel banking services and products. What we call "Insurtech" is the use of technology in the insurance sector to offer improved services to policyholders. The financial services sector uses A.I. to identify and prevent fraud by analysing financial transaction trends and alerting any suspect behaviour. The financial services sector is being revolutionised by fintech technologies, some of which are listed above. As technology advances, there will undoubtedly be more ground-breaking ideas in the years to come. The financial technology (fintech) business is quickly expanding, and innovations are constantly appearing. Future developments in financial technology are anticipated to be influenced by the following technological trends: New applications for artificial intelligence (A.I.) and machine learning (ML) are constantly appearing in the financial technology sector. Financial services will become more individualised, fraud will be prevented, and the customer experience will be enhanced thanks to A.I. and ML [5]. Blockchain technology makes Secure and transparent transactions possible, which will continue to be utilised by the fintech sector and might eventually challenge established financial services [6]. Fintech firms will have easier access to client financial data. They can provide more financial services and products due to open banking and API-driven design. Fingerprint and face recognition systems, among others, will be utilised for biometric identification to make it easier and safer for clients to use online banking. For example, online

banking and financial planning are just two areas where V.R. and A.R. will provide users with a more engaging and dynamic experience. Faster and more accurate data processing and decision-making are just two ways quantum computing can potentially upend the financial technology sector. Faster and more dependable connections made possible by introducing Fifth Generation (5G) networks will pave the way for developing novel financial services and products. These are a few emerging technologies that will likely determine the course of fintech. More novel approaches are expected to appear in the future years as technology develops [7]. The Internet of Things (IoT) is the networked collection of everyday physical things that can process, transmit, and receive data. Therefore, such devices may be remotely handled and monitored owing to their connection and computational power [7].

## II. LITERATURE REVIEW

### *A. Fintech in India*

New products and services have been created due to digital transformation in the financial industry. The Fintech ecosystem (F.E.) comprises five entities: startups, tech firms, governments, clients, and traditional financial institutions like banks. The economy is boosted, the consumer experience is enhanced, and social inclusion is pushed forward thanks to their combined efforts [8]. Artificial intelligence (A.I.), blockchain technology (blockchain), cloud computing (cloud computing), big data, and cloud computing have all introduced disruptive innovations to the conventional financial industry [8]. “In the last decade, the use of digital currencies (like Bitcoin and other crypto assets), digital advisory and trading systems, artificial intelligence (A.I.), machine learning, P2P finance, crowdsourcing, mobile payment systems, and even new monetary capabilities have all increased in popularity.”

In 2015, a new era of financial technology companies emerged in India. India has been at the forefront of this shift. According to the Faster Payments Innovation Index, "India's Immediate Payment Service (IMPS) is the only system at level five, making it the most advanced digital payments system in that country." [9]. “Alternative lending, payments, WealthTech, InsurTech, Neobanking, and EmergingTech, are just a few subsegments that makeup India's FinTech ecosystem.”

Millions more Indians are now using online banking (Unified Payment Interface) because of the proliferation of digital wallets and UPI. As a consequence, India's Fintech industry has expanded. A recent international poll found India's embrace of financial technologies was second only to China's. [10]. “According to the most recent data from the National Payment Corporation of India (NPCI), UPI transactions increased over F.Y. 2020-2021.” Both the volume and average value of transactions have increased. March 2021 had 2,732 million UPI transactions, up from 999.6 million in April 2020, with a total value of Rs 5,04,886 crores, up from Rs 1,51,141 crores. [11].

The last two years have seen India open up to FinTech companies, leading to a rise in the use of digital financial models. Paperless loans, mobile banking, digital payments, mobile wallets, insurance, loans, and more have all been revolutionised by fintech, which has had an impact on every facet of the traditional banking system. “Traditional points of access to financial services in India have been banking institutions.” The usage of financial technology companies like Paytm, Razorpay, Google Pay, Amazon Pay, PhonePe, MobiKwik, and others has grown in recent years. These digital solutions are becoming more critical as more and more people use them to pay for everything from hotel stays to mobile phone recharges to supermarket

shopping. Since April 2020, when just 153 banks were implementing UPI, that number has more than doubled to 216. In April 2016, when the platform first went live, just 21 banks were participating [11]. (Fig. 1).

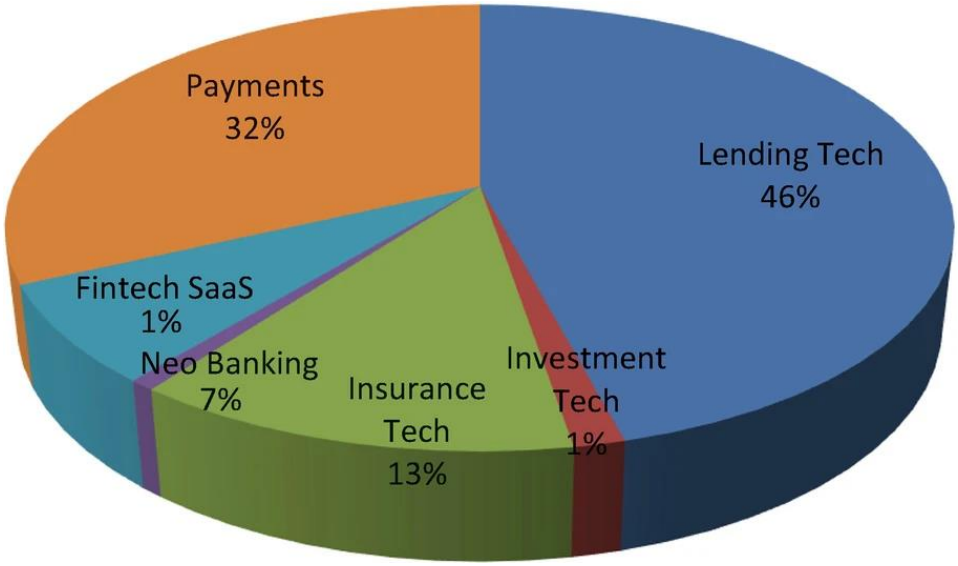


*Fig. 1: Indian Fintech market size in 2021 ($Bn). Source: Inc42plus (Singh, 2022)*

### *B. Opportunities Posed by Fintech to Indian Banking Sector*

The United States and China are the world's leaders in financial technology, with India coming in at number three [12]. Due to the size of the Indian population and the fact that many parts of the country lack adequate access to banking services, FinTech firms in India have a tremendous opportunity for growth. According to a report by Moody's Investors Service, fintech payment businesses in India are responsible for the country's meteoric rise in the use of digital payment methods. However, they may need help to parlay their market domination into a competitive advantage in other areas of the financial sector. To better compete with Fintechs, large Indian banks have significantly expanded their portfolios of digital goods [13].

The RBI has decided to let private firms compete with the NPCI in the market to increase competition. The central bank is working to strengthen the rapidly growing digital payment infrastructure in the country by enlisting the help of significant enterprises, private banks, and Fintech firms. “The growth of the fintech industry in India is fueled by several macroeconomic factors, such as supportive government and regulatory initiatives, India's demographic dividend, rising national disposable incomes, a large unbanked population, rising Internet access and smartphone penetration, and a rapidly expanding e-commerce market.” New Payments Consortium of India (NPCI) believes that the new umbrella entities (NUEs) will help the Reserve Bank of India (RBI) achieve its stated aim of de-risking India's retail payments ecosystem.

As a result of the fintech revolution, several new and essential subfields have emerged. The aforementioned "defi," "insuretech" (insurance technology), and "regtech" are only a few examples. The National Payments Corporation of India (NPCI) plans to create UPI lite, which would provide offline UPI capabilities to ease digital payments. With this method, you may pay as much as Rs. 200 (USD 2.67) [9]. The Open Credit Enablement Network (OCEN) was created to help people access credit nationwide. “OCEN might allow the

numerous components of the loan value chain by serving as a common language of communication across the many LSPs, TSPs, lenders, and borrowers."

There may be repercussions for developing new payment systems with introducing the New Umbrella Entities (NUE) architecture in 2020 to enable retail payment services (RPS). "Possible future developments that might affect the Indian FinTech ecosystem include the Open Network for Digital Commerce (ONDC), which aims to democratise digital commerce, and the Central Bank Digital Currency (CBDC) initiative, which aims to oversee the cryptocurrency market." Lack of trust and dissatisfaction are common reasons private clients contemplate switching to a different financial institution or considering FinTech as their principal service provider [14, 15].

Suppose FinTech can increase customer satisfaction through better service and offerings (such as reduced rates and fees, quicker, more flexible, transparent procedures, etc.). In that case, they may capitalise on customers' dissatisfaction with incumbents and gain market share. "Time and again, mobile banking has shown its ability to reduce transaction costs that would otherwise be incurred by either the bank or the borrower." Microfinance institutions have used credit scoring to increase loan officer productivity and increase access to credit [16]. Crowdfunding in the form of equity investments presents possibilities for the financial technology sector. Entrepreneurs may reach a large audience and get support for their early-stage initiatives by promoting them online. Despite traditional banks' enormous customer bases and easy access to financing, many FinTech startups that provide convenience and flexibility will be unable to develop beyond a certain point owing to a shortage of capital. This is why the most successful FinTechs will likely merge with others of their kind, allowing them to serve their clients better and expand their business without adding new employees.

Indian banks may leverage FinTech to produce appropriate financial solutions to meet the needs of the country's financially excluded people. Increasing investments and using digital onboarding are necessary to reach the first aim. Like direct benefits transfer, practical usage of the Aadhaar ecosystem might incentivize individuals to engage with digital platforms (DBT). [17].

## III. Technology and Indian Banks

The Hold Bank of India's real-world stance is another crucial factor in adopting innovative banking innovations in India. The Reserve Bank of India (RBI) has recently adopted a cautious but practical approach to adopting new technologies, routinely pushing banks to adopt new developments via regulation whenever doing so would improve the bank's customer experience and efficiency. The terms of governors Raghuram Rajan and his successor, Urjit Patel, are especially illustrative of this phenomenon. RBI's aggressive promotion of new technology utilisation extends beyond merely creating administrative processes. It has employed a combination of legislation, evangelism, and concerted work with businesses to make things easier and more productive. The Public Installment Company of India (NPCI) is an excellent example of a concept that may reduce the cost of electronic transactions significantly. "The controller's academic/research arm, the Institute for Development and Research in Banking Technology (IDRBT), studies the potential and pitfalls of developing automated areas." It is no fluke that both of these groups are actively involved in blockchain proof of concept testing. This is a very unusual case involving India. When it comes to innovation, India is dead centre. India is a pivotal region for reassessing innovations, and it is home to businesses that command a large share of the global core banking market. Two of the three largest

providers of centre banking arrangements, Infosys and TCS, are headquartered in India. Recently, a lot has also been happening in India's fintech industry. The nation has become a significant hub for the financial technology industry. Although traditional financial institutions and new financial technology companies have historically had a tense relationship, some of India's most innovative financial institutions, including ICICI Bank, Pivot Bank, and HDFC Bank, have forged productive partnerships. These financial institutions have organised hackathons and contests to identify the most promising innovations, and some have even made their application programming interfaces available to the participating fintech.

## IV. IMPACT OF EMERGING TECHNOLOGIES ON FINANCIAL SECTOR

### *A. Artificial Intelligence*

The Influence of A.I. on the FinTech Sector: Artificial intelligence (A.I.) has been used to automate the underwriting of loans, cutting down on the time and money needed to assess loan applications. Lending choices may be made instantly after AI-powered systems analyse massive data sets. Fintech organisations may benefit from using A.I. risk assessment algorithms trained on historical data to make more educated lending choices. This may lower the risk of loan defaults and boost the accuracy of loan pricing [18]. Detecting fraud is possible with the help of A.I. systems that can be taught to recognise red flag behaviours. This has allowed fintech firms to reduce the possibility of financial loss by detecting and blocking fraudulent transactions in real-time. Artificial intelligence chatbots in customer care have allowed faster response times and less stress for human employees. The customer service experience may be enhanced by training A.I. algorithms to recognise and react to consumer demands. Advice on financial planning may be tailored to an individual's needs and aspirations using A.I. algorithms. This has aided fintech firms in providing individualised financial services, which has increased patronage. These are only a handful of the many applications of A.I. in the financial technology sector. As more and more financial processes are automated and optimised using A.I. algorithms, the influence of A.I. in fintech is only expected to increase. As can be seen in Figure 2, the market is expected to expand by 16.5% each year. [19].

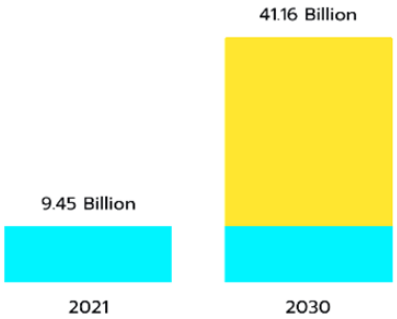


***Fig.2 The FinTech market's worldwide implementation of Artificial Intelligence (A.I.), Source [19]***

### *B. Machine Learning*

Here we will look at how machine learning has affected the financial technology sector. The financial markets, including stock prices and loan default rates, may be predicted using predictive models that have been constructed using ML algorithms. The predictive accuracy of these models is higher than that of more conventional statistical approaches. ML algorithms have been used to classify clients into subgroups according to their spending habits and other financial preferences. As a result, fintech businesses can now

increase consumer engagement and happiness by targeting specific demographics with their marketing and product offers. Detecting Fraud in Real Time: ML Algorithms Have Been Used for This Purpose. These algorithms have been taught to spot fraud indicators by analysing massive volumes of past transactions. As a result, fraud detection accuracy has increased compared to older approaches. In credit scoring, ML algorithms have been used to evaluate an applicant's creditworthiness by considering several factors, including but not limited to income, job history, and credit history. These algorithms are more reliable in assessing creditworthiness than more conventional techniques. Optimisation of Investment Portfolios by Machine Learning Algorithms Machine learning algorithms has been used to optimise investment portfolios by considering risk aversion, investment objectives, and market circumstances. Evidence suggests that these algorithms boost portfolio returns over more conventional approaches. These are only some of the first findings from ML experiments in the financial technology sector. Increased machine learning use in finance could produce exciting new products and services for individuals and corporations.

### *C. Blockchain Technology*

Blockchain technology has been used to ensure the safety of online financial transactions by recording them permanently on a decentralised ledger. Because of this, financial transactions are more transparent, and the danger of fraud is lower. Banks and clearinghouses are no longer necessary in decentralised financial systems made possible by blockchain technology. As a result, the efficiency of financial systems has increased while transaction costs have decreased. The blockchain has been used to develop and transact digital assets like cryptocurrencies; because of this, people and businesses now have more options for making investments [20]. International money transfers may now be made quickly and safely thanks to blockchain technology, cutting down on time and money spent. This has widened the range of individuals who may have access to banking services in emerging nations. Tracking the flow of products and resources via the supply chain using blockchain technology has increased the openness and efficacy of supply chain management. These are some preliminary findings from blockchain technology experiments in the financial technology sector. New and exciting financial services for consumers and companies are on the horizon due to the expanding application of blockchain technology in this sector. Figure 3 [21] depicts the North American market value for Blockchain-based Distributed Ledger Technology (DLT) in millions of U.S. dollars.

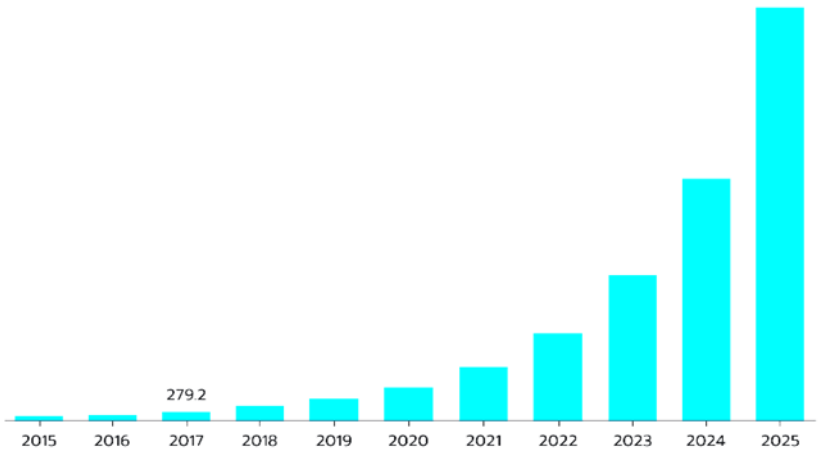


*Fig. 3 Blockchain DLT market in North America, Source [21]*

### D. Biometrics

To ensure that only authorised parties can access sensitive financial data, biometrics like fingerprint, iris, and face recognition are increasingly employed. "Benefits to Users Nearly 94% of those employed in the industry believe that ease of use is a top priority for users in authentication systems, and biometrics has been used to simplify the login and authentication process for financial services, allowing customers quicker and easier access to their accounts." Identity theft and account takeover are only two examples of fraud reduced because of biometrics. Because of this, financial transactions are safer, and fraud is less likely to occur. The worldwide market for biometric technology is expanding (Figure 5) [22], as seen in Figure 4. Using biometrics has enhanced the consumer experience by making it easier and safer to access banking services. Fintech organisations' bottom lines have improved thanks to biometrics since it has lowered the price of conventional authentication methods like passwords and security tokens [23].

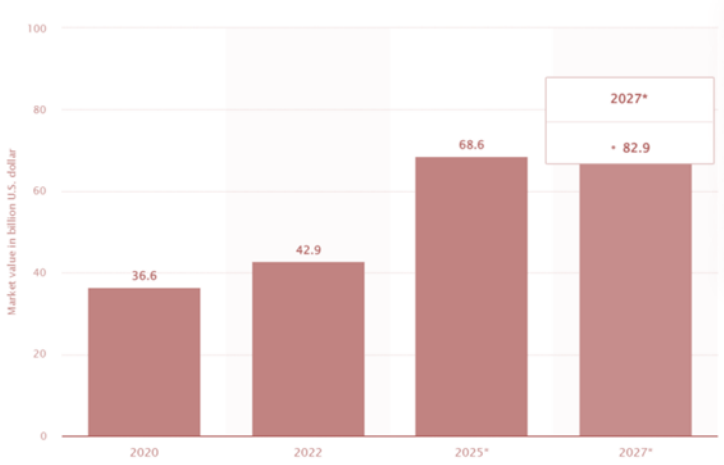


*Fig. 4 The global market for biometric technologies, Source [22]*

### E. Internet of Things

Some preliminary data from IoT (Internet of Things) experiments in the financial technology sector are as follows: Customers have managed their money better and made educated choices thanks to the adoption of IoT devices like smartwatches and fitness trackers to gather and analyse financial data. Increased Productivity: Internet of Things (IoT) devices have been utilised to automate financial procedures like payment processing, cutting down on the time and resources formerly required for these tasks. The convenience and ease with which consumers can now manage their accounts thanks to IoT devices has enhanced customer experience. The increased data gathering made possible by IoT devices has helped fintech firms obtain valuable insights and make data-driven choices by providing access to massive volumes of financial data. Fraud Detection & Prevention Fraudulent activities, such as unauthorised transactions & identity theft, have been reduced thanks to the deployment of IoT devices. Because of this, financial transactions are safer, and fraud is less likely to occur. These are but a handful of the findings from early IoT in financial technology experiments. Increased Internet of Things (IoT) adoption in this sector will undoubtedly bring up exciting new financial products and services for individuals and organisations.

### F. Cyber Security

Protection of Sensitive Financial Data from Cyber Threats like Hacking and Data Breaches [24] has Been Improved Through the Use of Cybersecurity Measures Like Encryption and Secure Data Storage. Security

measures in cyberspace have been utilised to reduce fraud by thwarting phishing scams and other forms of online money theft. Because of this, financial transactions are safer, and fraud is less likely to occur. Customers are more likely to use a fintech company's product or service when it has implemented strong cybersecurity safeguards, enhancing consumer trust. "Compliance with industry regulations and standards, such as the Payment Card Industry Data Security Standard (PCI DSS) and The General Data Protection Regulation (GDPR), has been improved thanks to increased cybersecurity measures implemented by fintech companies." Profitability and productivity have increased for fintech businesses due to the automation of security procedures and better protection of sensitive customer data. These are only a sampling of the findings from early Cyber Security in financial technology experiments. The necessity for safe financial services and the prevalence of cyberattacks on fintech businesses point to a bright future for cybersecurity in this sector.

## V. CONCLUSION

The financial technology field has used many different technologies to boost efficiency and quality of service. For instance, Artificial Intelligence (A.I.) and Machine Learning (ML) are utilised to construct prediction models that analyse massive data to detect fraud, spot trends, and make real-time investment choices. By creating immutable and verifiable records of economic exchange, Blockchain Technology (B.T.) paves the way for creating decentralised finance (DeFi) systems. Automating routine operations like account reconciliation using RPA saves time and money by cutting down on human error. Financial institutions may take advantage of CC's scalability and adaptability by storing data and programmes remotely on the cloud. Big Data Analytics (BDA) may aid investment choices and custom portfolios, which examine massive data to find trends. Fingerprints, irises, and face recognition are just a few examples of biometrics that may be used to verify a person's identity. The Internet of Things (IoT) paves the way for developing "smart" homes and communities that can automatically execute financial transactions by tracking them in real-time via linked gadgets. Using Natural Language Processing (NLP), chatbots and virtual assistants are developed to aid customers in a more tailored manner. The protection of financial data and the prevention of fraud is a primary issue in financial technology, making cybersecurity (C.S.) solutions like firewalls, encryption, and multi-factor authentication essential.

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