



Prospects and Challenges: Fintech and Big Data in The Indian Finance Industry

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Abstract

The Indian financial services sector is undergoing a significant transformation propelled by the convergence of Financial Technology (FinTech) and Big Data applications. This paper explores the prospects and challenges arising from this integration, focusing on its impact on decision-making, client experiences, and operational efficiency in various financial institutions. The management of sensitive consumer data, regulatory compliance, and cybersecurity concerns are critical issues addressed within this context. The paper delves into the growth of Big Data applications in India over the past decade, showcasing a substantial increase in adoption rates and revenue generation. Additionally, it investigates the evolving landscape of the FinTech sector, emphasizing its role in providing personalized and efficient financial services. The interplay of Big Data and FinTech is examined, highlighting their contributions to risk management, fraud detection, cost reduction, and improved decision-making processes. Despite the promising prospects, the paper acknowledges challenges such as data privacy, security risks, regulatory compliance, and the scarcity of qualified talent. It also explores the role of these technologies in promoting financial inclusion and transforming the customer experience. The study concludes by emphasizing the need for a balanced regulatory framework, addressing skill gaps, and ensuring accessibility to fully unlock the potential of Big Data and FinTech in the Indian financial landscape.

Keywords: FinTech, Big Data, India, Data Privacy, Indian financial landscape

Introduction

The advent of Financial Technology (FinTech) and increased dependence on Big Data applications have recently caused a dramatic upheaval in the Indian financial services sector. By offering clients more effective, cost-effective, and accessible services, fintech, or the use of technology to supply financial services, has upended the status quo of the financial sector. The financial services sector has benefitted from better decision-making, enhanced client experiences, and higher operational efficiency because of Big Data's capacity to examine and comprehend large volumes of data. For financial institutions in India, including banks, insurance companies, investment firms, and other financial service providers, the confluence of Big Data and FinTech has opened up new prospects. The management and protection of sensitive consumer data, ensuring regulatory compliance, and tackling the rising cybersecurity concerns connected to the use of digital technology are some of the major problems that come with this change.

This paper aims to examine the prospects and challenges of Big Data and FinTech in Indian finance. The paper will explore how the integration of these technologies can enhance financial services and customer experience while recognizing the challenges that must be addressed for their successful implementation. Additionally, this paper will provide insights into the potential impact of Big Data and FinTech on the financial service industry in India and the wider economy.

Literature Review

Big data is a fast-developing industry, and its effects on organisations and society are not yet completely understood. Seven times faster than the rest of the information technology sector, the big data market is expanding. For contemporary culture and data scientists, big data presents both new potential and difficulties. However, it also holds the possibility of revealing demographic disparities and subtle patterns that were previously impossible to find with smaller datasets. Big Data has the potential to lead to new heights of economic and scientific value. The exponential increase of informational resources, which includes vast quantities of high-dimensional or unstructured data that can now be created and kept at a far lower cost than in the past, is what gave rise to the big data movement. While analyzing data with a huge number of magnitudes can present difficulties and complexities, it also offers opportunities for discovering new insights and patterns that were previously not possible with a smaller number of datasets [1]. Big Data is anticipated to have a substantial influence on business, engineering, and research. Data-driven methodologies are becoming more and more crucial to advancing science, and researchers are starting to see themselves as data consumers. For data analysis, the abundance of high-dimensional data presents both benefits and difficulties, thus it's critical to create reliable statistical techniques for handling Big Data. Consequently, the significance of statistical analysis in the context of Big Data is growing.

Over the decade, big data has experienced noteworthy growth in India. Starting from the year 2013 with around 50 applications, the field has rapidly expanded, reaching 300 applications by now. Table 1 below clearly depicts an overview of the growth and adoption of Big Data technologies in India over the past decade; the data is based on reports from industry, surveys, and government statistics, where the adoption rate has surged from a modest 5% to a significant 85%, showcasing the increasing integration of big data technologies across industries.

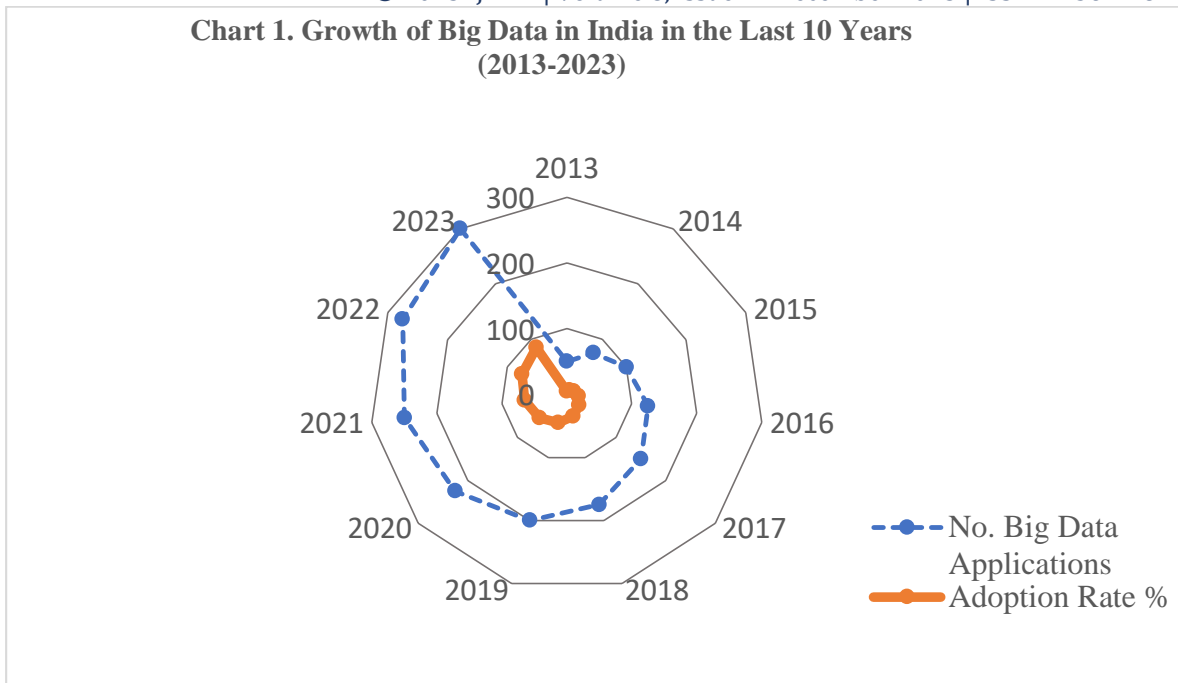
Table 1: Growth of Big Data in India in the Last 10 Years (2013-2023)

Year	No. Big Data Applications	Adoption Rate %
2013	50	5
2014	75	8
2015	100	12
2016	125	18
2017	150	25
2018	175	35
2019	200	45
2020	225	55
2021	250	65
2022	275	75
2023	300	85

(Source: Statista, 2023 and Internet)

This substantial growth has also translated into impressive revenue figures, with the industry generating \$100 million in the year 2013, soaring to an impressive \$5 billion by now. The continuous evolution and widespread adoption of big data in India have revolutionized decision-making processes, offered valuable insights, and driven innovation across various sectors.

Chart 1. Growth of Big Data in India in the Last 10 Years (2013-2023)



In this chart 1, the blue line represents the number of Big Data applications, the orange line represents the adoption rate percentage, and the green line represents the revenue in millions of dollars. Graph 1, illustrates the growth and trends of Big Data in India over the last ten years.

Numerous studies have acknowledged the influence of FinTech on the global financial services sector [2]. The significant changes in India's FinTech sector, including the emergence of new business models and an increase in digital payments, are examined in the article by [3]. It also talks about the challenges the industry is now experiencing, such as data privacy and cybersecurity worries. In the study by [4], an overview of the FinTech scene in India highlighted some of the major issues that are faced by various industries, including issues in cybersecurity, personnel management, and regulatory departments.

Big Data and Fintech

Recently, bigdata has significantly altered the FinTech (financial technology) industry. Personalized and efficient financial services can be provided to customers with the help of proper utilization of big data analytics in FinTech companies. A noteworthy benefit of bigdata for FinTech lies in procuring a deeper understanding of client behaviors and preferences. By analyzing widespread data sets, FinTech businesses can gain insights into their customer's or clients' financial objectives, buying behaviors, and risk tolerance. This recent understanding empowers these businesses to offer more customized and pertinent financial products and services to each individual, leading to increased client happiness and loyalty.

In FinTech businesses, big data plays a crucial role in risk management. They can spot possible fraud and better manage risk by accessing data from a variety of sources, including social media, transaction histories, and credit ratings. This aids FinTech businesses in preserving a reliable and respectable reputation within the sector. Big data may also help FinTech organizations save expenses and streamline operations. Automated data analysis, for instance, may be used to find inefficiencies and cut down on the time and resources needed to complete particular operations. Increased profitability and market competition may result in the end of this. Overall, the incorporation of big data in FinTech has transformed the sector by allowing businesses to make better-informed decisions and provide clients with more individualized and effective services. The collection, analysis, and use of data by financial institutions are being transformed by big data in fintech. Utilizing this data, businesses may develop prediction models that pinpoint new patterns in consumer behavior, market activity, and other facets of their operations [5].

Big Data's rise has opened the door to several potential new uses, including personalized healthcare, improved internet security, and the digital humanities. For instance, because of the accessibility of enormous amounts of personal data, companies may provide customized services that take into account the unique interests of their clients. For instance, Target

examines consumer transaction histories to forecast demands. Similar to this, historical information on network traffic may be utilized to quickly locate the origin and intended victims of network-based assaults, enhancing internet security. Additionally, the availability of health-related metrics including a person's biological traits, habits, activities, and environmental variables might help with illness diagnosis and the choice of customized therapies. Finally, Bigdata can impact the field of humanities by enabling digital analysis of cultural and historical data.

Big Data applications have become more popular in India in recent years. Businesses and organizations across a wide range of industries are utilizing Big Data to obtain insights and make wise choices as a result of the expanding availability of data and technological improvements. From personalized marketing and customer service to healthcare and agriculture, Big Data is being used in diverse domains to improve efficiency, productivity, and outcomes. The government is also investing in initiatives such as the National Data Sharing and Accessibility Policy (NDSAP) to facilitate data sharing and utilization across different sectors. Overall, Big Data is expected to play a significant role in India's development and growth in the coming years.

With the proliferation of data from diverse sources such as social media, sensors, and IoT devices, organizations are using Big Data analytics to gain insights, make informed decisions, and improve their operations. Due to the rapidly evolving nature of the industry and the lack of centralized data, it is challenging to provide precise and up-to-date figures on the use of big data in the fintech industry in all countries. However, the global Big Data market in the financial services industry is projected to reach over 38 billion dollars in a couple of years, growing at a CAGR of around 17 percent. Specifically, in Asia-Pacific, the fintech industry is expected to reach around three hundred billion dollars in the coming two years, growing at a CAGR of approximately 16 percent [23].

FinTech

Financial technology, commonly known as FinTech, has its roots in the Financial Services Technology Consortium (FSTC) project initiated by Citigroup in the early 1990s. The FSTC aimed to promote technological cooperation efforts among financial institutions [6]. FinTech has had a significant impact on the financial services industry, with new technologies such as mobile banking, peer-to-peer lending, and blockchain revolutionizing the way financial services are delivered. These technologies have enabled financial institutions to offer more convenient, faster, and cheaper services to their customers. The Financial Services Technology Consortium project, which Citigroup launched in the early 1990s, is credited with sparking the development of fintech. Since that time, financial technology, or FinTech, has expanded to include a range of financial services delivered via digital channels. Since then, the term "FinTech" has expanded to include a wide range of technical advancements that are revolutionizing the financial services sector. As new technologies develop and the financial services sector continues to advance, the effect of FinTech is anticipated to increase over the next years.

Payments and money transfers, lending and financing, wealth and asset management, insurance, and regulatory technology (RegTech) are the five main sectors of fintech today. FinTech is not only about creating new financial products and services but also about leveraging technology to make existing financial services more accessible, efficient, and convenient for customers. Mobile devices and other technology platforms play a critical role in enabling this transformation by providing customers with real-time access to their financial information and transactions and enabling them to manage their finances on the go. Also, push notifications via SMS or other electronic notification channels are one of the ways in which FinTech companies are leveraging technology to provide customers with timely and relevant information about their financial activities [7].

FinTech in the Indian finance industry

India's FinTech industry has been growing rapidly in recent years, fuelled by government initiatives to promote financial inclusion and digitization of the economy. The purpose of this literature study is to present an overview of the current state of FinTech in the Indian financial sector and the major variables influencing its development. India's FinTech industry is

anticipated to expand at a CAGR of around 25 percent by the next two years, according to a KPMG analysis, driven by rising smartphone penetration, rising digital literacy, and the government's aim for financial inclusion. India is one of the marketplaces for fintech that is expanding quickly worldwide [8]. The study also reveals that, behind the US and the UK, India has the third-highest number of FinTech startups in the globe, with more than twenty-two thousand FinTech businesses operating there [9].

Big Data and FinTech in Indian Finance

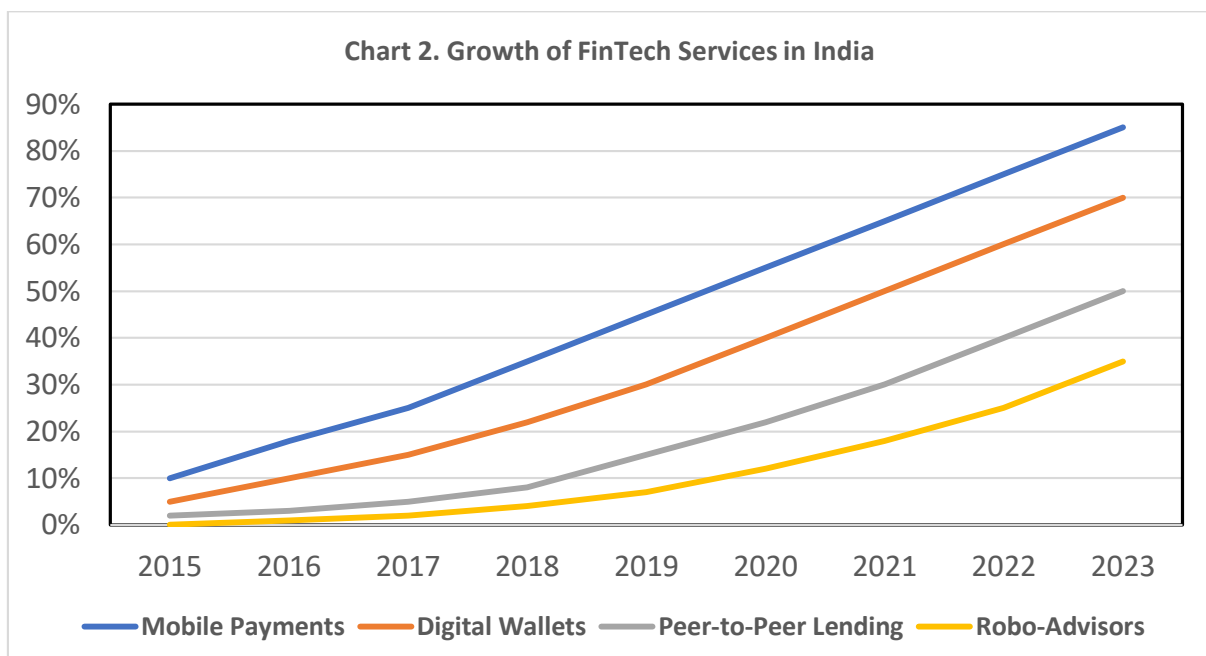
The government's efforts to transition to a cashless society are one of the main factors boosting FinTech development in India. Digital transactions and the use of FinTech solutions have benefited greatly from initiatives like the demonetization of high-value currency notes in 2016 and the launch of the Unified Payments Interface (UPI). The lack of access to traditional financial services in rural regions is another factor influencing the development of FinTech in India. According to a report by the World Bank, around 77 percent of India's adult population had access to formal financial services in the year 2021. FinTech solutions are seen to be a means to close this gap and give the unbanked population access to financial services. The development of the fintech sector, which offers cutting-edge services like peer-to-peer lending, robo-advising services, and mobile banking, has put traditional banking practices in India under pressure.

Table 2: The Adoption of Fintech Services In India Over Time

Year	Mobile Payments	Digital Wallets	Peer-to-Peer Lending	Robo-Advisors
2015	10%	5%	2%	0
2016	18%	10%	3%	1%
2017	25%	15%	5%	2%
2018	35%	22%	8%	4%
2019	45%	30%	15%	7%
2020	55%	40%	22%	12%
2021	65%	50%	30%	18%
2022	75%	60%	40%	25%
2023	85%	70%	50%	35%

(Source: Statista, 2023 and Internet)

Table no. 2 illustrates the growth and adoption of various FinTech services in India, such as mobile payments, peer-to-peer lending, digital wallets, and robo-advisors, over a specific period and the increasing trend of FinTech adoption in the Indian financial service industry. Graph 2 visually demonstrates the growth of FinTech services in India over time, allowing readers to observe the changing adoption rates for each service.



However, the rapid growth of the FinTech industry in India has also created challenges, such as regulatory ambiguity, cybersecurity risks, and the need for more financial literacy among the general public. The Reserve Bank of India (RBI) has developed legislation for digital payments and built a regulatory environment to encourage innovation in the FinTech sector to address these problems. FinTech has the potential to change the Indian financial sector and promote financial inclusion by making financial services more accessible and affordable for underprivileged and unbanked people. According to the report's authors [10], a supportive regulatory environment is required to foster sector innovation while also addressing concerns about consumer safety and financial sustainability.

The studies look at the major players, market trends, and challenges the industry is currently facing while providing a general overview of the FinTech ecosystem in India. The study also includes a poll of Indian FinTech investors and entrepreneurs, which provides details on the industry's potential for growth and the variables affecting investment. In addition to highlighting the key areas of innovation in the Indian fintech industry, such as digital payments, loans, and wealth management, the paper also discusses the regulatory environment for fintech enterprises in India [8]. Finally, due to government efforts, the need for financial inclusion, and the disruption of conventional banking structures, the FinTech sector in India is expanding quickly. Even if there are obstacles to overcome, FinTech has great potential to change the Indian banking sector. In the context of India, [11] made an important contribution to the literature on the nexus between big data and fintech. In particular, the report emphasizes the rising importance of big data in risk management, fraud detection, client segmentation, and personalized marketing as the FinTech sector develops.

According to this research, big data analytics has a substantial impact on the growth and development of the fintech sector in India and has several prospects for innovation. To fully realize the potential of big data in FinTech, issues including legal impediments, data privacy, security concerns, and the scarcity of competent people must be overcome.

Use Cases of Big Data in Indian Financial Service

The use of big data analytics has revolutionized the way in which the financial services industry operates in India. The abundance of data available from various sources such as social media, customer transactions, and digital platforms has made it possible to create new products, services, and solutions that cater to the evolving needs of customers. Some of the major applications of big data in the Indian financial services sector include the following:

- **Risk Management:** By offering insights into consumer behavior, creditworthiness, and market trends, big data analytics plays a crucial role in controlling financial risk. Big data may be used by financial organizations to evaluate credit risk, find fraud, and enhance their underwriting procedures [11;12; 13].
- **Customer Segmentation and Personalization:** Financial organizations may provide individualized goods and services by using big data analytics to better understand client preferences and behaviors. In order to provide tailored marketing campaigns and specialized financial solutions, banks, for instance, can utilize big data to segment clients based on their spending patterns, income levels, and other demographic criteria [14].
- **Fraud Detection:** Big data analytics are used by financial institutions in India to spot and stop fraud by evaluating massive amounts of data to find suspicious trends and abnormalities [15].
- **Regulatory Compliance:** Big data is used by financial institutions in India to adhere to legal obligations like KYC (Know Your Customer) and AML (Anti-Money Laundering) laws. Financial institutions can detect possible risks and take the necessary precautions to comply with regulatory obligations by studying client data and transaction patterns [16].
- **Wealth Management:** Big data analytics is used by wealth management companies in India to study market trends, track client activity, and oversee investment portfolios. Wealth management companies may foresee market developments and provide their customers with individualized investment suggestions by utilizing predictive analytics.

Big data analytics is becoming a crucial component of the Indian financial services sector. By leveraging the power of big data, financial institutions can gain valuable insights into customer behavior, market trends, and regulatory requirements, which enables them to create innovative products and services and improve their operational efficiency.

Prospects and Challenges

Many studies show that the digital revolution has significantly impacted the Indian banking sector, with the emergence of new technologies such as mobile banking, internet banking, and digital wallets. FinTech startups have played a crucial role in disrupting traditional banking, leading to increased competition and innovation. Traditional banks face in embracing digital transformation, including legacy systems, regulatory compliance, and cultural resistance to change. However, the banks can overcome these challenges by investing in digital infrastructure, partnering with FinTech startups, and adopting agile working methodologies [17]. The key to success for FinTech startups in India is to innovate and differentiate themselves from established players. The startups that can offer unique solutions to address the challenges faced by consumers in the financial sector are most likely to succeed [18]. Potential for FinTech to drive financial inclusion in India, particularly in underserved segments such as rural areas. The FinTech industry has the potential to offer innovative solutions that can increase access to financial services and reduce the costs of traditional banking [19].

Big data and FinTech have the potential to transform the Indian banking industry, but careful attention must be paid to the challenges and risks associated with these technologies. The literature suggests that policymakers and industry leaders should work together to develop a regulatory framework that encourages innovation while protecting consumers and ensuring the stability of the financial system [20]. Big data and FinTech have the potential to transform the Indian banking sector, but careful attention must be paid to the challenges and risks associated with these technologies. Policymakers and industry leaders should work together to develop a regulatory framework that encourages innovation while protecting consumers and ensuring the stability of the financial system [21]. Another study by [22], describes some of the specific applications of big data analytics in the Indian banking industry, such as customer segmentation, fraud detection, and credit risk analysis. They also discuss some of the challenges that must be overcome to fully realize the potential of these technologies, such as data quality and accessibility, talent shortage, and regulatory compliance.

Some of the specific applications of big data and FinTech in the Indian financial industry, such as digital payments, wealth management, and insurance. Some of the challenges that must be overcome to fully realize the potential of these technologies, such as data privacy and security concerns, regulatory challenges, and the need for skilled professionals [16]. The collaborations between FinTech startups and traditional banks could be a key driver of innovation and growth in the industry whereas, the adoption of emerging technologies such as blockchain and artificial intelligence could offer significant opportunities for FinTech startups to differentiate themselves and offer unique solutions [19]. FinTech has the potential to revolutionize the Indian financial sector, but it also faces obstacles including capital shortages and regulatory barriers.

Prospects of Big Data and FinTech in Indian Finance:

1. **Better Customer Experience:** Financial institutions may offer individualized and seamless customer experiences with the use of big data analytics. Banks may provide specialized goods and services that are suited to each individual client's demands by studying consumer data.
2. **Greater Efficiency:** Big data analytics are being used by Indian FinTech businesses to automate a variety of procedures, including loan processing and underwriting. This may result in cost savings, improved productivity, and a quicker time to market innovative financial goods and services.
3. **Financial Inclusion:** India's financial inclusion might be enhanced via big data and fintech. Financial organizations may locate underserved communities and provide goods and services that are tailored to their unique need by utilizing big data analytics.

4. **Fraud Detection:** Indian financial organizations may use big data analytics to identify and stop fraud. Banks can spot trends and abnormalities that can point to fraud by studying enormous volumes of data.

Challenges of Big Data and FinTech in Indian Finance:

1. **Data Privacy and Security:** The problem of data privacy and security is becoming increasingly urgent as Indian financial institutions gather and analyze enormous volumes of data. There is a chance that private consumer information might be stolen, resulting in identity theft and other online crimes.
2. **Lack of Qualified Talent:** India lacks qualified individuals to work in the big data and FinTech industries. Financial institutions may have trouble locating the requisite skills to successfully adopt these technologies as the demand for such talent rises.
3. **Regulatory Compliance:** There are several regulatory restrictions that apply to the usage of big data and FinTech in Indian banking. Financial institutions must conform to data privacy laws and other regulations to avoid penalties and legal challenges.
4. **Accessibility:** Despite big data's and FinTech's potential to increase financial inclusion, it is still difficult to guarantee that underprivileged groups have access to these technologies. This covers concerns like online accessibility and digital literacy.

In conclusion, despite the promising futures of big data and FinTech in Indian finance, there are still several obstacles to overcome before these technologies can fully realize their promise. Financial firms must make an effort to meet regulatory standards and address concerns about data security and privacy. Additionally, initiatives should be taken to solve the skills gap and increase underprivileged communities' access to these technologies.

Conclusion

The need for FinTech solutions in India is being fuelled by the rapid adoption of technology, rising levels of mobile usage, and expanding Internet penetration. The country's urban, educated, and young population is also a factor in the development of the fintech sector, as are certain underserved customers and small and medium-sized businesses. FinTech offers the Indian finance sector tremendous benefits, but it also creates new legal and regulatory issues. If not adequately controlled, the financial sector's high rate of innovation might result in disruptive innovation. Therefore, to encourage the development of a strong and sustainable financial system in India, regulatory and supervisory agencies need to take these difficulties and challenges into account.

In conclusion, big data and fintech have the potential to completely transform the Indian banking sector. Large data sets are becoming more widely available, and technological developments have opened up new business models and expansion possibilities.

Financial organizations may employ big data analytics to make data-driven choices, lower risk, and enhance customer experience. Big data is being used by fintech businesses to create cutting-edge goods and services that meet the demands of tech-savvy Indian customers. Examples include mobile payment systems, robo-advisory platforms, and digital financing solutions. The use of big data and fintech in the Indian financial sector is not without its difficulties, though, including issues with data privacy, cybersecurity threats, and regulatory compliance. To safeguard the security and privacy of consumer data, it is vital that industry participants follow moral and accountable practices.

Fintech and big data have the potential to completely change the Indian financial sector by increasing efficiency, accessibility, and financial inclusion. To realize the full potential of the Indian financial sector, industry participants must adopt these technologies while also tackling the accompanying difficulties.

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