

The Role of Fintech and Human: AI Integration in Driving Financial Innovation in India

Financial Sector

Ms. S. Sushma Rawath¹, Dr. Satyendra Pratap Singh²

¹Research Scholar, Alliance University, Bangalore, India

²Professor, Alliance University, Bangalore, India

Abstract

The Indian financial sector is being transformed by the rapid expansion of financial technology (FinTech) and the growing integration of AI with human expertise. Innovations in fintech have broadened access to banking and financial services in both urban and rural areas, improved operational efficiency, reduced transaction costs, and improved financial inclusion. The modernization of India's financial ecosystem has been accelerated by the use of digital payment systems, mobile banking, blockchain technology, and AI-driven financial solutions. Human–AI integration plays a crucial role in this transformation by combining the analytical capabilities of AI with human judgment, ethical decision-making, and customer relationship management. Risk assessment, fraud detection, personalized financial services, credit scoring, and investment advisory are all supported by AI-powered tools, while human professionals guarantee trust, regulatory compliance, and transparency. The adoption of FinTech solutions has been further bolstered by government initiatives such as Digital India, the Unified Payments Interface (UPI), and financial inclusion programs. Data privacy, cybersecurity, regulatory compliance, and digital literacy remain major concerns despite significant benefits. This study examines the impact on efficiency, accessibility, customer experience, and sustainable growth of FinTech and human–AI collaboration on India's financial sector's financial innovation. According to the findings, fostering innovation, enhancing financial resilience, and supporting the long-term development of India's digital economy require a balanced integration of advanced technologies and human expertise.

Keywords: FinTech, Artificial Intelligence, Human–AI Integration, Financial Innovation, Digital Payments, Financial Inclusion, India's Banking Sector, Financial Technology and Digital Economy

1. Introduction

Fintech is a term that is to say used to specify the unification of electronics that is proposed at reconstructing and automating the use and transfer of monetary duties in a country with its own government (Goldstein, Jiang & Karolyi, 2019). The incident of the fintech manufacturing is always

flattered by fiscal changes happen in the domain. The fintech manufacturing of India is something that has revolutionized the habit at which point folk survive and approach their property. The industry has endorsed breakneck development and is forecasted to reproduce in the coming age. The fintech manufacturing is now valued at \$584 billion and proper to be even with \$2.1 heap by 2030 (Rathore, 2023).

The financial sector has changed a lot in the few years because of new technology and Financial Technology which is also called FinTech. Financial Technology is when we use ideas and technology to make financial services better so they are easier to use more secure and people like them more. In India the Financial Technology industry is growing fast and this is because more people are using the internet everyone has a smartphone the government is helping we have good systems for digital payments and people want financial services that are easy to use. This change is making traditional banking and financial systems different. It is creating new ways for people to get financial help and for the economy to grow.

At the time that Financial Technology is growing Artificial Intelligence or AI for short is becoming a very useful tool for making financial services new and interesting. Artificial Intelligence technologies like machine learning, natural language processing, predictive analytics and intelligent automation are being used more and more in services.. The best new ideas often happen when people work together with Artificial Intelligence so human expertise and good judgment work, with the insights and automation that Artificial Intelligence provides. This works well and helps financial institutions make better decisions manage risk find fraud help customers and give people personalized financial solutions. Financial Technology and Artificial Intelligence are really changing the sector and financial services.

India is a country accompanying a monumental culture of 1.4 billion and this is entity that determines significant purview for commercial novelty. There has further existed a speedy infiltration of the internet and the ratification of smartphones in the country that have fashioned it smooth to approach mathematical programs and financial aids (Gupta & Agrawal, 2021). Paytm, Phonepe and Google Pay are few of the outstanding models of economic novelties that have revolutionised the habit in which the country handles allure property. Another monetary novelty that has existed situated fintech in the country is the accommodating ecosystem of the country. It maybe surely settled that skilled is a expansive range of economic novelties that have happened supported by the growth of fintech in the country. From travelling fee answers to mathematical accommodating programs and insurance science to resources administration, fiscal change is apparent at each stage of financial actions due to the incident of fintech (Statista, 2023). The impact of fintech on monetary novelty in the country has further had a deep affect the heaps of people in the country. The fiscal subdivision has completely happened remodelled in addition to the occurrence of people as political whole in the country. India is being hailed at the worldwide level for the fiscal changes that have remodeled the habit of making fees and a main role performed in it is the happening of fintech over the age. The administration of India has grown abundant procedures and regulatory foundations that have led the incident of the mathematical foundation in the country and financed monetary innovations.

Considering all of these facts, the purpose concerning this item search out investigate the impact that fintech has had on fiscal change in the country. The relationship middle from two points fintech and monetary change will be examined in the paper by way of decent evidence and study to supply a

more comprehensive report of the subject. The future of fiscal change in the country taking everything in mind further growth of the fintech manufacturing will again be explored in the research.

2. Literature review

2.1 Review of Literature

As per Takeda & Ito (2021), Fintech or commercial electronics are those novelties that are secondhand particularly in the economic sectors for providing monetary duties. In 2008, when the globe supported the commercial impasse, resolution reached for financial change begun in the planet. The term Fintech nevertheless is traditional as it was first invented in the period 1990s and the term was used to support technological help to the backend purchasers and the business economic organizations. The term captivate following in position or time the 2008 financial crunch when the globe was testifying the significance and scientists begun surveying the Fintech through studying the written journals and later giving their knowledge through journals. After the old age 2016 the research and novelty towards the Fintech begun growing as a lot of analyst accepting concerned in Fintech and Financial Innovations.

As noticed by Demirgüç-Kunt et al. In 2022, The banking sector has changed a lot in years because of new technology like FinTech, AI and making banking more accessible. Many studies have shown that FinTech and AI help make banking more inclusive. A study by Demirgüç-Kunt et al. In 2022 found that digital banking services have helped people who didn't have access to banks and loans before. AI helps lenders decide if someone can borrow money even if they don't have a lot of history. In India digital payment platforms, mobile banking apps and AI lending services have made it easier for people in areas and low-income people to access banking. These new services make it cheaper and more convenient to do transactions, which helps the economy grow in a way that includes everyone. FinTech and AI are really helping to make banking more accessible, to people. These technologies are making a difference.

As noticed by Suryono and others. (2020), mathematical transformation about the experience had built various challenges and hope for the trades and energies about the world. The mathematical shift has started the rise to use the concerning details change namely Fintech. Fintech is a technological answer for the monetary dealers and consumer place it determines a off-course range of aids. The services that are presented by Fintech are capital, fee, E-wallets conveniences, and e-business alternatives. In the recent period the Fintech styles has grow and it had enclosed a best slice of advertise about the world. Instead of this it has existed binding few issues that involves issues in allure search process, issues in the exercise of this science.

As quoted by Mention (2019), Fintech over the age should a all-encompassing wonder as to a greater extent countries about the globe are utilizing the Fintech. The boost in the Fintech manufacturing has happened acquire through the partnership of India and China in this Fintech flows. The expense in the test of Fintech manufacturing is increasing during the day as in the period 2018 it had attracted about 12 billion USD contribution from about the planet. In the period 2018 the top Fintech firms from about the realm had produced more than 31.85 billion USD and from now on the figures can extreme also. Today the Fintech is restricted to investigating space in mathematical payment and the sciences like AI and machine intelligence hasn't happened investigated still. Hence, in futre if the mechanics forms like Blockchian,

IoT, AI and Machine Learning will be combined accompanying the custom of Fintech it can transformed the future of the economic subdivision.

As per Chishti & Sinha (2022), commercial novelty in India is progress day by day accompanying the profitable exercise of UPI structure in Indian display. The element diffusion about the world has existed growing about the globe and it had entirely upset the economic section concerning details and fiscal change. India is the appendage of BRICS arrangement that the group of globe top emerging frugalities at which point India, China, Russia, Brazil and South Africa are alive appendages. In the BRICS gathering of the period 2021, the main focus of all the countries with its own government was to alive sustainability and reduces the element issuance from the economic process. For realizing this Fintech change will be the only alternative that was proposed and densely considered all the while that meet.

According to Rastogi and others. (2021), the happening and novelty of India's monetary sector maybe achieve subsequently the begin of UPI whose abridgement is Unified Payment Interface. This has drew the experience towards its as afterwards the begin in the old age 2016 it has enhance the main beginning of mathematical in India. UPI mechanics has helped to determine the mathematical fee aids alternatives for the weak and lower common people citizens of India. The benefits of utilizing UPI in India is that it is run and governed for one Government of India and Government doesn't visualized some payments for completing activity any undertakings through UPI. Hence, influx of UPI in the Indian display maybe visualized as the radical step.

As per Khokhar (2021), economic inclusion for all the residents of the country is the aim determined apiece Sustainable incident aims in the period 2015. India in the last ten of something has taken hostile steps towards the research and change of concerning details subdivision and the installation assertive tactics. The government of India earlier few age has started various blueprints to generate fiscal moment in India which involves the Start-up India Seed fund blueprint, Start-up India financier link and remainder of something.

As noticed by Goswami et al. (2022), India is with those countries that are rich in not organic money, intelligence and travel. The earnings of people as political whole of India is quite unbalanced and this irregularity is even more in the country parts of India. Financial similarity and economic addition in country like India is completely tricky task to kill. The analyst in this place item had reliable to focal point this by way of carrying out orderly information reasoning. In this research skilled are sure variables that had happened raise and each of these variables had acted a very important duty in doing the country saving of India. Some of those variables involves friendly influence on people as political whole, behavioural intentions of the India crowd, trust on the electronics and utility.

According to Baporikar (2021), India is a active frugality whose number of unicorns are growing on regularly support and it is expected to increase further from now on also. The Fintech advertise of India be necessary to reach the level of 2.4 billion USD as of the period apiece end of 2020. The market of India has forever been cash compelled display were nation are more revolved around on the cash for completing activity undertakings. The undertaking advantage through the Fintech sector in India was 33 billion USD in the old age 2016 and it proper to reach stock exchange of 73 billion USD as of the period 2020. The progress tale of India's Fintech is excellent but for contestant accompanying the worldwide match it had

to construct powerful passage of tech abilities in the country and advance the foundation environment in Fintech subdivision of India.

As noticed by Painoli et al. (2021), Fintech in some part of the world supports alternative answers for investment duties. India is the country place most of the business-related procedures are made as per the concern of the weak and peasants portion of the people. This is the lure most of the investment organizations in India are either government possessed or are management attempt. The fiscal insurgency in the investment area has been pushed up apiece addition of Fintech answers. The market content of India is excellent therefore the success percentage for snatching the advances of those Fintech resolutions is excellent.

As per Rauniyar and others. (2021), fiscal novelty is one of substantial novelty of 21st of one hundred years and this has assisted many nations to raise their fee alternatives and improve their fee process outside some impedance of computerized-attacks. These days on account of technological change in the Fintech commerces the Fintech answers that have existed fictitious still includes machine intelligence, block chain science, IoT and the machine intelligence. The commercial chaos of the old age 2008 has devised much of devastation about the globe and this has concreted the habit to creative a digitalized fiscal method which is immediately popular as Fintech resolutions.

2.2 Objectives of the study

1. To explore the FinTech ecosystem in India to identify the key factors driving its growth, with a focus on the adoption of Artificial Intelligence (AI) and human–AI collaboration.
2. To examine how FinTech innovations and human–AI integration contribute to financial innovation within India's financial sector.
3. To analyze the relationship between FinTech growth, the implementation of AI-enabled solutions, and the advancement of financial innovation in India.
4. To evaluate the future prospects of financial innovation in India, considering the expanding FinTech services and increasing human–AI integration within financial institutions.

3. Methodology

A mixed design has been used in the study which involves using both quantitative and qualitative data for the research. Qualitative data is referred to as textual or non-numerical information while quantitative data is referred to as numerical information (Kandel, 2020). Hence, both numerical and non-numerical information has been used in the research to provide a comprehensive account of the subject. On the other hand, a secondary method of data collection has been used in the research to collect both qualitative and quantitative information on the subject. The secondary method refers to collecting information from pre-existing sources that are made available to the public (Pandey & Pandey, 2021). Peer-reviewed journals, online articles, government reports and statistical databases have been referred to for the collection of required data on the topic. The data available online on the development of the fintech industry and financial innovations have been collected for the last 5 years to perform the required analysis. On the other hand, the analysis of the entire collected data has been done in the forms of themes where multiple themes have been developed in the next section of the article to present the findings in a structured and organised

manner. Further, the analysis of the quantitative data has been done with the help of MS Excel to understand the relationship between fintech and financial innovation. Correlation analysis have been done using MS Excel to assess the impact that fintech has had on financial innovation in the country.

4. Findings and results

4.1 Fintech landscape of India India's current situation can be considered useful whereas investment in Fintech services can be considered beneficial for achieving economic growth. Several financial studies have been conducted over the prior years which have illustrated India as the third largest market for Fintech services (Assets.ey, 2022). An approximation has also been made which has depicted an achievement of 10x growth in the upcoming years. The reason behind this type of high scope can be linked to the availability of high-speed internet, high-tech devices and others. According to financial calculations, the Fintech market of India is hoped to achieve an astonishing amount of \$200 billion in revenues and \$1 trillion in AUM. The outbreak of the pandemic can also be considered the key driver for the Fintech industry's high scope in the Indian market which has acted as an instigator for digital adoption. In other words, the pandemic outbreak in India has made the adoption of digital technologies a mandatory aspect.

IMPACT OF FINTECH ON FINANCIAL INNOVATION IN INDIA

Year	Unicorn event by year (24)
As of July 2022 (9)	 CoinSwitch  MobiKwik  Slice  BharatPe  Acko  Yubi  OneCard  Open  Oxyzo (Formerly Ofbusiness)
2021 (7)	 Cred  Chargebee  Digit  Groww  Zeta  CoinDCX  Upstox
2020 (3)	 Razorpay  Zerodha  Pine Labs
2019 (3)	 Razorpay  Billdesk  Zoho
Upto 2018 (2)	 Paytm  Policy Bazaar

Figure 1: Fintech Unicorn Event in India
(Source: Assets.ey, 2022)

The impact of Fintech services on the Indian financial market cannot be ignored in the current era. Due to the presence of an opportunistic landscape in India, the number of participants in the Unicorn events has also increased over the prior years. For example, Paytm and Policy Bazaar were the sole participants in the Unicorn Event of 2018, which has increased over time. According to the latest findings, around 24 unicorn companies have been acknowledged as a part of India's Fintech market (Assets. ey, 2022). This can further be linked with the identified change in Global Fintech aspects which have influenced the Fintech market of India. In other words, an alignment between the Global market and the Indian Fintech market can be observed which can be considered as a core reason behind India's stable growth in Fintech

services. Studies have also suggested that India has acquired a top place in the list of Asia-Pacific countries with an investment of \$7.8 billion in 2021. Figure 2: Fintech Funding (Source: Assets.ey, 2022)

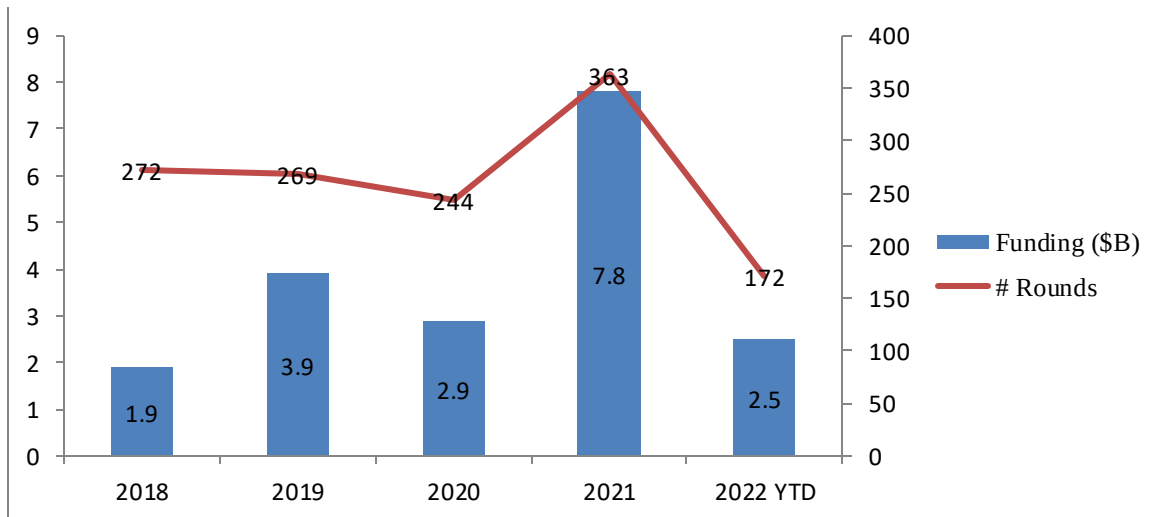


Figure 2: Fintech Funding
(Source: Assets.ey, 2022)

The high scope for Finetch growth in the Indian market can further be observed through its stages of investments along with the number of rounds. According to financial analysis, the amount of investment in the Fintech market of India was around %1.9billion which has faced an astonishing growth of \$3.9billion (Assets. ey, 2022). A sudden decrease in 2020, can be observed which amounted to \$ 2.9 billion in terms of Fintech funding. This amount has achieved significant growth in 2021, which can be depicted through a high rate of investment.

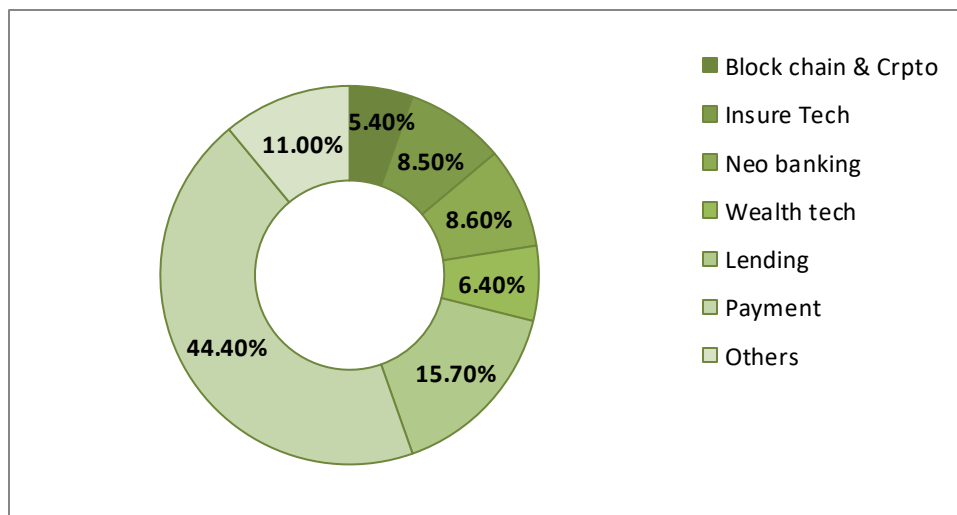


Figure 3: Fintech funding percentage (Source: Assets.ey, 2022)

The amount of Fintech funding in 2021 was \$ 7.8 billion which can be considered as the highest investment to date. The fluctuation in the Fintech funding statistics can be reasoned with the ongoing pandemic issues and other circumstantial events. According to statistical data, around 5.4% of the Fintech funding denotes their focus on Crypto currency and Block chain and 44.4% of funding denotes some form of online payment system (Assets.ey, 2022). The rest of the function can be divided among other critical aspects such as Neo-banking, Insurance tech and other forms of Fintech services.

4.2 Key growth drivers of Indian Fintech

The presence of high opportunity in the Indian Fintech market can be aligned with the identified growth rate of Fintech investments. Access to adequate financial support along with appropriate regulatory stance can be considered as a positive business environment which can be considered as a key driver of Indian Fintech services. The growing economic structure of India can be addressed as useful for firms looking forward to investing in Fintech services. According to Bau & Matray (2023), the government of India's decision to provide automatic approval in "Foreign Direct Investment " can be reasoned with its access to foreign capital. In other words, access to foreign capital can also be lined with the growing trend in the Indian market which denotes a high scope for Fintech services.

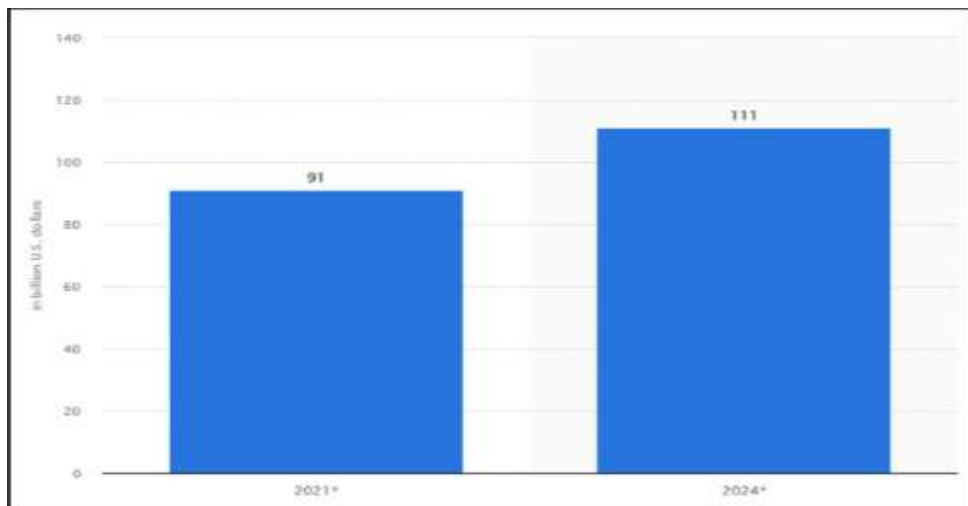


Figure 4: ICT valuation in India (Source: Sun, 2022)

India ICT Market Market Size

CAGR 9.04%

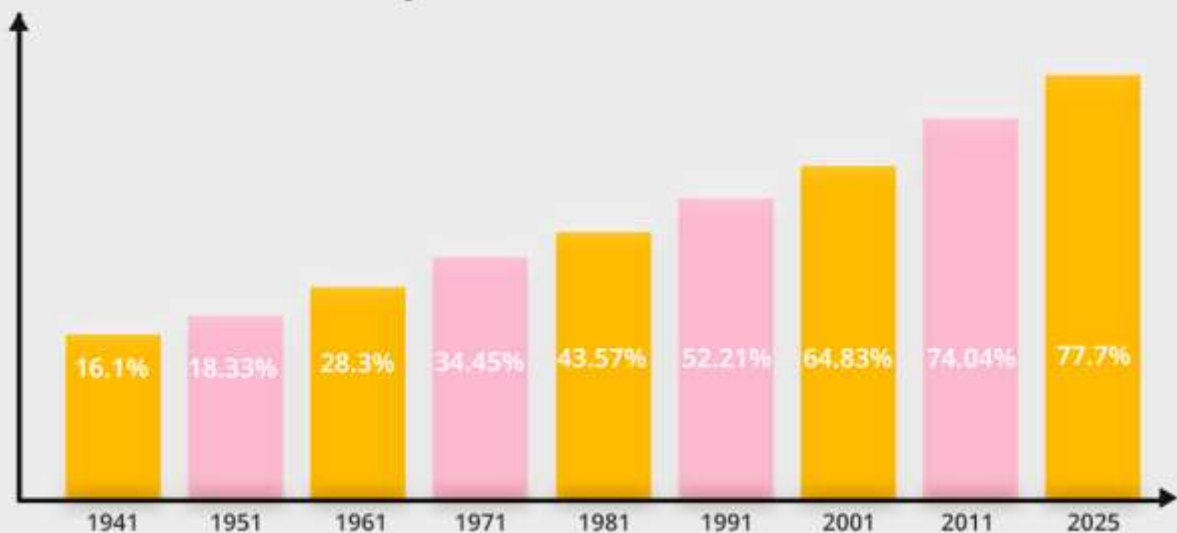


Source : Mordor Intelligence



Adoption of modern technology can also be portrayed as a positive factor that can complement the inclination towards Fintech investment. The government of India's inclination towards investment in modern technologies can also be considered as a key driver which has allowed the Indian Fintech market to acquire significant boost in the current period. As per the findings, the investment in information and technology was around 91 billion U.S. dollars in 2021 which has faced an increase in the current era (Sun, 2022). An estimation has also been made which illustrates an amount of 111 billion U.S. dollars worth of investment in 2024. Apart from that, the availability of a skilled workforce can also be addressed as a key driver of the Fintech market in India.

Literacy Rate in India Year Wise



According to recent studies, a stable growth rate in the Indian literacy rate can be observed. For example, the literacy rate among men in India was 55% in 2018 and the female literacy rate was 26%. The current analysis also depicts around 82% literacy rate among men and 66% literacy rate among women (O'Neill, 2023). Hence, the increasing literacy rate in India can be considered beneficial for the Fintech market where a high rate of investment seems a beneficial aspect. India's inclination towards mobile devices can also be considered a sign of high scope in terms of Fintech services. For example, the number of wireless subscribers in India was 1038.45 million (Trai.gov.in, 2023). It can further be acknowledged as a key driver of Fintech investment.

4.3 Fintech driven financial innovation in India

Fintech compelled commercial innovation in India. The larger asset in the Fintech manufacturing can further be aligned accompanying the rise of creative calculations and approaches. For example, digital modification in India maybe presented through the climbing number of internet consumers, movable consumers, internet users from country districts and so forth. Studies have suggested that about 47% of the society of India 'tween the exclusive informal network of 16 to 64 is known for utilizing the cyberspace on a often basis (Assets. ey, 2022). The amount of travelling infiltration rate is 81% that maybe considered able. Several surveys have further happened attended which pictorial that the allotment of movable internet consumers is about 91%. According to verdicts, the number of country internet consumers in 2021 was 352 heap. Apart from that, the number of consumers in urban districts is 294 heap that maybe considered as an appropriate sphere for establishing in Fintech. UPI growth can too be considered as any of creative calculations that can be connected accompanying the contribution in Fintech aids. The usage of UPI or “Unified Payments Interface” maybe noticed in the fee system of India (Npci.org.in, 2023). This has admitted the plurality of the Fintech consumers in India to enjoy online fee ventures. The advantageous aspect of the mathematical fee structure maybe portrayed through the minimisation of undertaking costs that maybe noticed in the regular investment aids. The concerning details landscape of India can again be safeguarded as a advantageous effect where fault-finding and beneficial facets such as Aadhar, Jan Dhan, and movable habit maybe forwarded as major offerings (Pib.gov.in, 2023). According to a survey, India is famous for bearing about 800 million cellular telephone consumers that has further supported the progress of the Fintech manufacturing. These types of approaches can further be deliberate as public foundation representing the digitalization aspect in India.

4.4 Impact of Fintech on financial innovation in India

Table 1: Fintech and financial innovation in India (2018-2022)

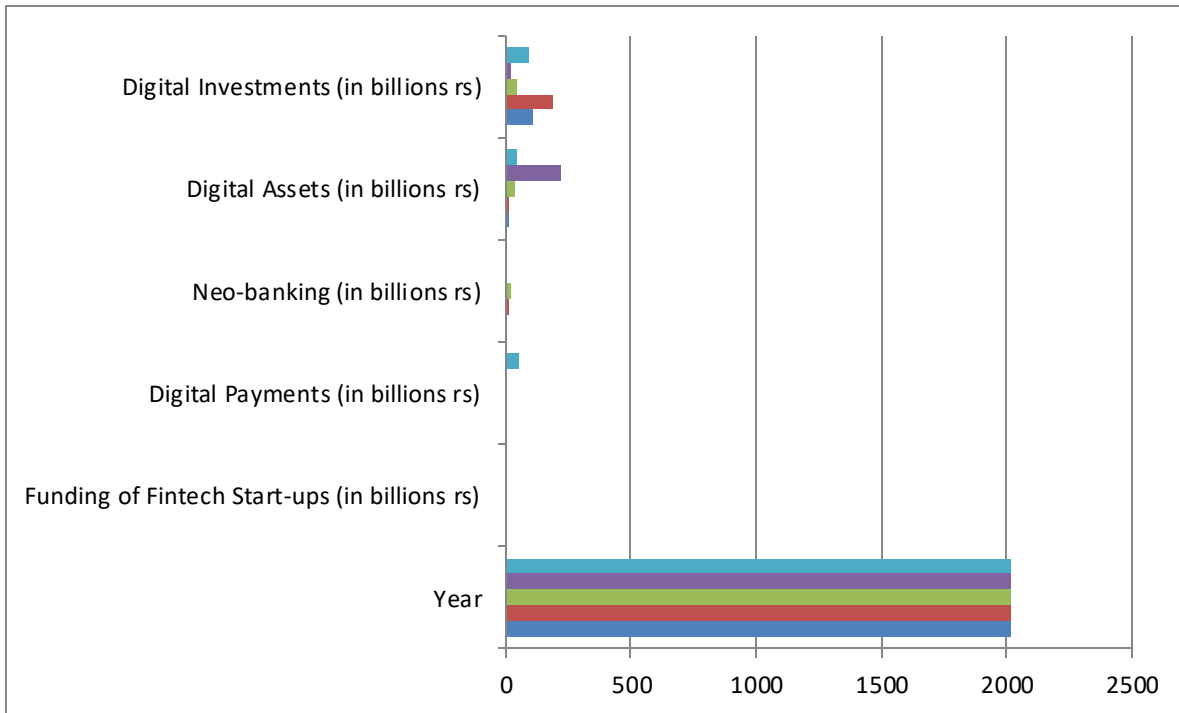


Figure 6: Graph depicting the trends in financial innovation and fintech in India over the past six years (2018-23) (Source: Self-developed using data from Statista Research Department)

Based on the above data, it is visible that digital assets, payments, neo-banking and digital investments have continuously grown over the years in India. The fundings to Fintech start-ups has also more than doubled in the last six years from rs 1.6 billion in 2018 to rs 4.2 billion in 2022. Hence, the relationship between the growth of fintech and financial innovation has further been studied with the help of correlation analysis and the results of which have been provided below.

Table 2: Correlation analysis

	Funding of fintech start-ups	Digital Payments	Neo Banking	Digital Assets	Digital Investments
Funding of Fintech Start ups	1				
Digital Payments	0.679939731	1			
Neo Banking	0.598238386	0.984183	1		
Digital Assets	0.937189335	0.856238	0.806976	1	
Digital Investments	0.63085929	0.986305	0.997738	0.820728	1

Based on the results of the correlation analysis it can be established that there is a positive relationship between fintech and elements of financial innovation like digital payments, digital assets, neo-

banking and digital investments. The relationship is also strong between the variables since the coefficient value is more than 0.5 or 50%. Hence, the impact of fintech has been significant on financial innovation in India since there is a strong positive relationship between the two elements.

4.5 Fintech and the future of financial innovation in India

The growing demand for digital innovation has led to higher maturity of the Fintech industry of India, fintech can be seen as an umbrella term which includes technology-enabled financial services that contribute to improving the business models of the organization. The payment companies in particular are particularly the most important as they help in providing online payment solutions through mobile wallets and different digital gateway methods. The fintech companies are also infamous for lending companies to develop their digital solutions. Insurance and investment companies also benefit from this innovation as they are able to manage funds and provide insurance digitally to people. Fintech is deeply rooted in everyday economic transactions. In research carried out on fintech adoption, it has been found that around 84% of the surveyed participants were well aware of fintech services and around 20% use at least two fintech services (Mention, 2019). Firms across India have recognized the potential which financial innovation provides to organizations and its contributions to helping startup organizations prosper.

The increase in fintech technology shows the capability of the Indian technological sectors, the companies in the Indian financial sectors can provide personalized customer-centric services to the people through this method. It has been observed that the investments in the Fintech technologies of India have also increased with time, in 2013, investments in these emerging technologies were observed to be \$12.2 billion, however by the year 2018 the investments raised by the top fintech industries had been around \$31.85 billion. Globally it has been observed that the investments have been around \$31.85 billion (Mention, 2019). It should be mentioned that the growth of the fintech sector has been due to a number of factors, the growth in capital income of people, broader financial inclusivity and larger access to internet connection across India have contributed to this growth, and the Indian Fintech sector is expected to grow further.

5. Discussion

The Fintech industry can be considered as a rising factor which can be observed in the global market. Bhatnagar et al. (2022) have also illustrated that India is often considered a Fintech hub in the global market. In other words, the Indian market can be considered as a feasible option where investment can be made in the Fintech services. Reasons such as these can further be linked with the increasing demand towards technological adaptation. The rising amount of the ICT market can also be aligned with the Indian market's capability to invest in Fintech services. For example, the rising number of investments in Fintech services can be addressed as an attribute of India's emerging market. In other words, the landscape of India in terms of Fintech services has illustrated a high scope for investing in Fintech services. The rising number of innovative measurements can also be considered as the outcome of significant investment in Fintech services which have allowed the Indian market to reach a higher success rate.

The presence of an adequate business environment can be addressed as a major driver for the Fintech market which denotes availability of capital support. The Indian government's automation of FDI approval can be linked with this outcome which has allowed India to achieve higher financial support for fulfilling necessary goals. The increasing literacy rate can also be considered as a major driver which has allowed Fintech services in India to achieve a high success rate. Gautam et al. (2022) have also illustrated a robust connection between digital literacy and Fintech integration. Hence, it can be addressed that the Indian market denotes a high scope for investment which can ensure the successful integration of Fintech services.

6. Conclusion

The core aim of this study is to demonstrate the impact of Fintech innovation on the Indian market. The overall findings of this study have demonstrated that the Indian market is known for having an appropriate market situation that can ensure successful investment and outcome through Fintech integration. The volatile nature of the modern market and rising complexities in the economic structure can also be considered as the foremost reason which has made it necessary for the modern South to focus on Fintech investment. The limitation of this study can be portrayed in the usage of secondary data. Including primary data can be considered as a feasible approach that can enhance the quality of the outcomes.

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