

## **Emergence of Blockchain Technology in Finance and Banking Sectors**

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**Abstract:** The financial and banking sector has some of the most interesting possibilities for the implementation of blockchain technology, which is a fundamental and underlying technology. Individuals are more likely to be receptive to adopting new technology as a result of the growing importance of modernisation in our day-to-day life. The use of a remote control to operate various gadgets and the use of voice notes to issue orders are both examples of how contemporary technology has found a place in our everyday life. It is possible to define blockchain technology as a data structure that stores transactional records. This data structure ensures safety, transparency, and decentralisation, and it eliminates the possibility of fraudulent activity or duplicate transactions without the participation of a third party. In India, the most experienced and reliable financial middlemen are found in the nation's banks. Since development, there have been a few significant shifts that have taken place in the functioning of financial sector. A massive change ahead from "normal banking" toward "accommodation banking" has taken place in India's financial institutions. Without the involvement of any other parties, a research was carried out to determine the degree of currency's openness. It is a research about the technological framework of blockchain technology as well as the banking industry. The banking sector plays the most important function, and it also includes the most significant obstacles. The use of blockchain technology is redefining what the future of banking will look like.

**Keywords:** *Blockchain Technology, Banking Sector, Financial Sector, Bitcoin, Cryptocurrency, Digital Currency*

### **1. Introduction**

Paper currency transactions, which were formerly commonplace but are now becoming less common as electronic payment becomes more prevalent in popular culture. The part of the development process of the central bank's digital money was examined towards the end of April 2020, and these tests served as "practise" for the eventual official issue. For instance, the Xiangcheng District of Suzhou employed digital money as a pilot in salary payment, and it was anticipated that the next Winter Olympics scenario would also be used as the implementation model of the trial. The financial sector is shaken up by the introduction of digital money, which is underpinned by the blockchain technology (Fosso et al., 2020). This innovation is, nevertheless, beneficial to the expansion of the sector. Since its introduction in 2008, blockchain technology has emerged as one of the most debated issues in fintech studies. It has also made its way into all areas of the standard finance market, thereby influencing the method of functioning used by the operation system of the financial sector as well as the entire social and commercial framework (Alam et al., 2021). It will alter not only the operational regulations and financial forms of the conventional financial sector, but also the fundamental steps to be followed and the

finance sector as a whole, beginning at the technological level. The fundamental ideas underlying the conduct of monetary operations as well as the associated regulatory framework.

Decentralization, openness, high credibility, sharing, as well as integrity of the information are some of the defining qualities of blockchain technology. Blockchain technology is a novel form of digital "distributed ledger" that is globally shareable, verifiable, and distributed digitally. Blockchain technology finds widespread use across many industries, including banking, smart manufacturing, trading digital assets, supply chain management, and much more. It finds widespread use across a variety of domains, including the digital financial transaction industry and the digital manufacturing sector. It is widely acknowledged as the fundamental component of the digital world (Aghdam et al., 2020). The capabilities of blockchain technology are shown to their greatest potential in the form of digital money, which relies on the system at its foundation. It is implemented throughout a variety of operational procedures at commercial banks. It does this by altering the fundamental transaction process as well as the transaction criteria used by commercial banks. This enhances the efficiency of transactions while also lowering the likelihood of fraud and operational issues.

Blockchain is a decentralized shared ledger that documents business activities in an unbroken line that is accessible to all parties engaged in a trade. Blockchain

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was first developed to track bitcoin transactions. “Blockchain technology has the ability to cause a disruption in the applications used in the financial sector as a result of the fact that it provides a permanent and tamper-proof tracking of transactions on a distributed system”. Blockchain technology has many different uses, including digital money, financing, know your customer (KYC) checks, global transfers of money, and more. However, there are problems with privacy, scalability, and security that require to be worked out before it can reach its full potential. Through the completion of an online training course for blockchain quality engineers, you will become an expert in blockchain technology (Chen and Bellavitis, 2020). Businesses across all sectors are doing considerable research on blockchain, and a number of different use cases are being evaluated. Even while the majority of use cases include several stakeholders anywhere along the value chain or at the industry level, other use concerns, like faithfulness and “Know Your Customer (KYC) procedures”, are exclusive to a single company.

### **1.1 Implementation of Blockchain Technology in India's Banking and Finance Industry**

A blockchain is a digital, unchangeable, distributed ledger that continually and systematically tracks transactions. Blockchain technology may disrupt the global financial system by enabling a broad variety of choices for how people interact with money and values. For each future activity to be recorded to the ledger, the corresponding consent of the participants in the network, also frequently referred to as nodes, is necessary (De Meijer, 2016). This produces a constant system of control over errors, manipulation, and data quality, administration, and direction. A blockchain consists of a sequence of blocks, each of which acts as a database for information pertaining to a transaction and connects to the block that came before it in the chain of that transaction. These interdependent aspects of the structure produce a logical chain that acts as the conduit for the principal transaction.

On the Blockchain, all data is shared as copy-and-paste versions of themselves. Without a centralised authority, participants individually authenticate any information they get. Even if one of the nodes fails, the others will continue to carry out their actions or perform their functions, preventing any disruptions from occurring. A transaction may only be finalised on the Blockchain if it receives unanimity of support from all of the participants involved in the transaction. Regulations that are founded on consensus, on the other hand, are amenable to modification in order to meet varied conditions.

Putting building blocks through cryptographic maintenance so that they may be added to the chain.

Because of this, erasing, changing, or copying blocks that have already been generated prior to placing them on the network is absurd, since doing so would impede the formation of true digital assets and assure a high degree of reliability and confidence. In addition, the decentralised storage of a blockchain is generally recognised to be very robust against the occurrence of failures (Bott, 2017). Despite the lack of a considerable number of network users, blockchain is able to eradicate the possibility of a single failure point occurring. The data that is stored on a blockchain cannot be altered.

#### **1.1.1. Public Blockchain: Bitcoins**

Open source software is used for every public blockchain. To put it another way, everybody may join in on the action on this blockchain. After the transaction that is supported by the Blockchain, each participant may examine the new configuration blocks, and as a result, everyone can actually participate in the agreement on the mechanism by which blocks are joined to only the current state of the chain.

Cryptography is applied to enable rapid transactions more safe and secure as well as to manage the formation of novel units of money in cryptocurrency, which acts as a method of commerce. Cryptography was advanced in the late 1990s and has been employed in a variety of applications since then. Ethereum, Bitcoin, Ripple, and Litecoin are among the most well-known digital currency, along with a number of others (Chang et al., 2020). Cryptocurrencies like Bitcoin and Ethereum provide users more control over their own transactions, which makes them more resistant to identity fraud. They protect the operator against the danger of fraud and deception due to the fact that the transactions are final and unable to be reversed once they have been completed.

Additionally, it eliminates the requirement to concern about centralised authorities while sending and receiving monetary transactions at any time of day or night, from any location on the planet. Everyone who took part in the transaction may see the quick verification that was performed on it. Converting money into decree money entails a transaction fee that is, on average, not very high. However, there are several constraints associated with the use of digital currency. The use of digital money is becoming an increasingly important financial tool. This will result in an increase in risk, deception, and volatility associated with digital currencies.

#### **1.1.2 Permissioned Blockchain: Trade Finance Application**

A recognised blockchain is distinct from a public blockchain in that the power to attest to the legitimacy of a transaction is delegated to just a selected few nodes

that have been subjected to a rigorous approval process (Zheng et al., 2018). It is possible that only participants will be able to read the blockchain, or it might be made available to the whole public.

- **Loans and Credits**

The emergence of blockchain technology performs a significant role in the reduction of obstacles that are associated with the traditional lending procedure. This is specifically true in respect to the process of identity verification. On the other side, Blockchain is constructed using a technology called distributed ledgers, which both protects and decentralises customer data. Its operation is as simple as keeping client information in distributed ledgers rather than centralised databases. This reduces the risk of cybercrime.

The use of blockchain technology enables accurate, encrypted, and confidential customer profiling. In addition, information as well as transaction data are made available to all members in the network, without the confidentiality of the customers being compromised in any way (Cucari et al., 2022). The technology of distributed ledgers eliminates the need for maintaining duplicate records, which results in a reduction in both the time and the cost connected with the process.

Because the blockchain is based on the principle of immutability, it is impossible for any participant to change the transactions that are stored in the distributed ledger once they have been recorded there. However, if a mistake is committed when retaining the record, it has to be added to the error reversibility, which is a feature that is always obvious. The procedure for applying for a loan or borrowing money is now more trustworthy, secure, and time-efficient due to the use of blockchain technology. Recording financial information in a transparent, accurate, and timely manner contributes to a more accurate evaluation of credit risk.

### 1.1.3 Private Blockchain: Loyalty Application

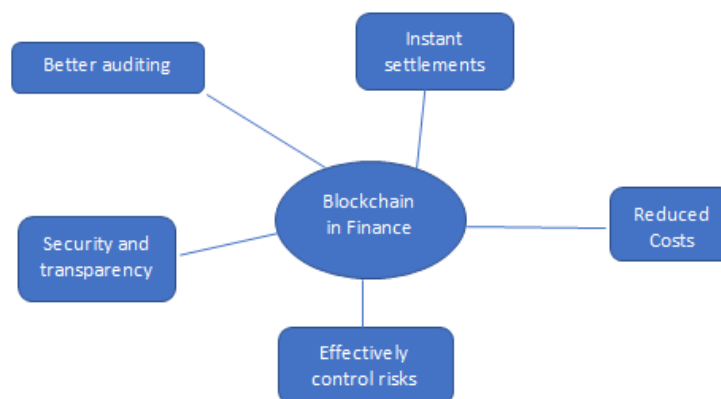
A private blockchain is one in which the addition of new blocks is restricted to only one company. Administration of databases and auditing of databases are both essential applications or portions of a single organisation. In this scenario, giving members of the public the opportunity to read or check content is not essential.

### 1.1.4 Blockchain Application by Government Banking Bodies

The blockchain is used in the financial institutions that are run by the government. In contrast to the settlement that takes place at the close of each business day, the real-time gross settlement is the continual operation of registering interbank payments in the records of the central bank (Guo et al., 2016). Since it greatly enhances volume of transactions and network resilience, blockchain enables central banks to manage real-time gross settlement systems (RTGS) more quickly and securely.

## 1.2 The implementation of Distributed Ledger Technology (Blockchain) in India's Financial Services Industry

It is simple to comprehend how the characteristics of blockchain make it well-suited for use in financial systems. Blockchain not only makes it easier and safer to process transactions, but it also helps to develop trust between the parties involved in a trade. It may even be used to swiftly identify persons by using digital IDs as a form of identification. Blockchain technology is already being used by banks as well as other types of financial organisations in order to improve the quality of the services they provide, eliminate instances of fraud, and lower the costs charged to clients. Use examples for blockchain-based financial services that are gaining popularity in the market include the following five examples:



**Fig 1:** Blockchain in Finance

### 1.2.1 Cross-Border Transactions

Historically, moving money across international boundaries has been a time-consuming and costly process. This is due to the fact that money transfer systems often have to go through many institutions before arriving at their ultimate destination. When used to international financial dealings, “blockchain technology” has the potential to speed up, improve, and reduce the cost of the process.

### 1.2.2 Trade Finance Platforms

Trade finance is another potentially fruitful use of blockchain technology in the financial industry. The use of blockchain trade finance systems by several banks enables the creation of payment systems between participants, which improves both transparency and efficiency while also presenting new options for income generation (Accenture digital, 2017).

### 1.2.3 Clearing and Settlements

Because of its superior capacity for precise recording, blockchain may one day make obsolete the conventional settlement and clearing processes that are now in place. This would allow financial institutions to complete transactions more quickly and at a lower cost.

### 1.2.4 Digital Identity Verification

Individuals may be identified by banks as well as other financial organisations using IDs that are enabled by blockchain technology. Banks are able to boost public confidence while safeguarding themselves against fraud and greatly accelerating the verification system when they use blockchain technology to secure the personally identifiable information of their customers.

### 1.2.5 Credit Reporting

The information that is included in a customer's credit report may have a significant effect on that customer's financial future. Recent breaches of traditional server-based credit reporting data have demonstrated that blockchain-based credit reporting is a more secure alternative to conventional server-based credit reporting (Shen, 2016). Blockchain-based credit reporting is much more trustworthy. When determining credit ratings, blockchain technology may potentially make it possible for businesses to take into consideration elements outside of the norm.

## 1.3 Activities Conducted by the RBI Regarding Blockchain

The RBI has been keeping a careful eye on the developments that have been made with blockchain technology. A workshop was held in July 2016 by the Institute for Research and Development in Banking

Technology, which is the technological advances research branch of the Reserve Bank of India (RBI) (Trivedi et al., 2021). The purpose of the workshop was to investigate the potential “applications of blockchain technology” in the Indian the banking and financial sector. Participants included scholars, bankers, regulatory agencies, as well as technology providers.

## 2. Review Of Literature

In his white paper from 2008, Satoshi Nakamoto suggested "a peer-to-peer version of digital money that would enable digital transactions to be sent straight from one person to the other without going through a financial institution or third party." This would make it possible for online payments to be made without having to go through a third party. This eventually served as the basis for the most widely used implementation of blockchain technology, which is known as bitcoin.

Sveinlnes (2015) conducted research on the "possible application of the blockchain technology to allow authorities to employ the open, secure, distributed, and affordable database technology." It was emphasized that Bitcoin might be a promising technique for authenticating a wide variety of persistent papers in the government sector, and this point was driven home by the previous sentence.

The researchers “Yli-Huumo et al. (2016)” retrieved 41 main publications from scientific databases and analysed the present research, shortcomings, and future prospective of blockchain technology from a from a technical perspective. According to the figures, eighty percent of the study is focused only on Bitcoin as opposed to other uses of blockchain technology. The majority of the research are concentrating on the many advantages offered by blockchain technology. Despite this, a significant number of the difficulties associated with scalability on the Blockchain have not been investigated.

In their 2016 presentation, “J. Leon Zhao, Shaokun Fan, and Jiaqi Yan” provided an overview of the research as well as development of blockchain technology. According to the findings of the study, broad adoption of Bitcoin in the commercial and financial sectors would pave the way for new avenues of research and development in the corporate world. “The Institute for Development and Research in Banking Technology (IDRBT)”, which was founded in 2017 by the Reserve Bank of India, has carried out a substantial amount of research to investigate the potential “applications of blockchain technology within the Indian Banking and Financial Sector”.

### 3. Research Methodology

A review of the previous academic study in the field was carried out. Every form of study should begin with a thorough evaluation of the existing literature. Because of the increasing number of multidisciplinary studies and the dearth of accumulated information in a particular field, the use of a literature review as a research technique in the field of business is more important than it has ever been.

#### 3.1 Data Collection

The first step in doing a literature review is to gather the necessary data. The reliability of the outcome is

**Table 1.** Keywords, databases, and search string.

Keywords	“blockchain”, “blockchain technology”, “banks”, “banking”, “financial institution”, “banking sector”, “impacts”, “applications”, “outcome”, “blockchain and banking”, “blockchain technology application”, “impact of blockchain”.
Databases	ABI Inform, academic search elite, emerald, sage premier, science direct, springer open, google scholar
Search string	(“impact” OR “effect” OR “application”) AND (“blockchain” OR “blockchain technology”) AND (“banking industry” OR “banks” OR “financial institution”)

#### 3.2 Inclusion and Exclusion Criteria

It is essential to have criteria for inclusion and exclusion while searching for particular information. The results of performing fundamental search procedures are often comprehensive and extensive. Therefore, it is essential to get rid of any documents that are not linked. Several distinct criteria were used in the grading of the papers. The day of the searches was ten years later, on April 10, 2020. The author went through and analysed every article published between 2015 and the present day. The conditions for participation and nonparticipation are outlined in the table that follows.

#### 3.3 Searching and Selection of Related Articles

The process of collecting data has reached its conclusion with this stage. Individual assessments were made on each of the articles that were acquired after applying the inclusion and exclusion criteria. Reading the abstracts and the main body of the papers was how this part of the selection process was carried out. There were a total of 4,033 items sent through the screening process, and only 6 were chosen. Both Springer Open as well as Google scholar turned up identical articles, thus the latter platform was used to get rid of the redundant content.

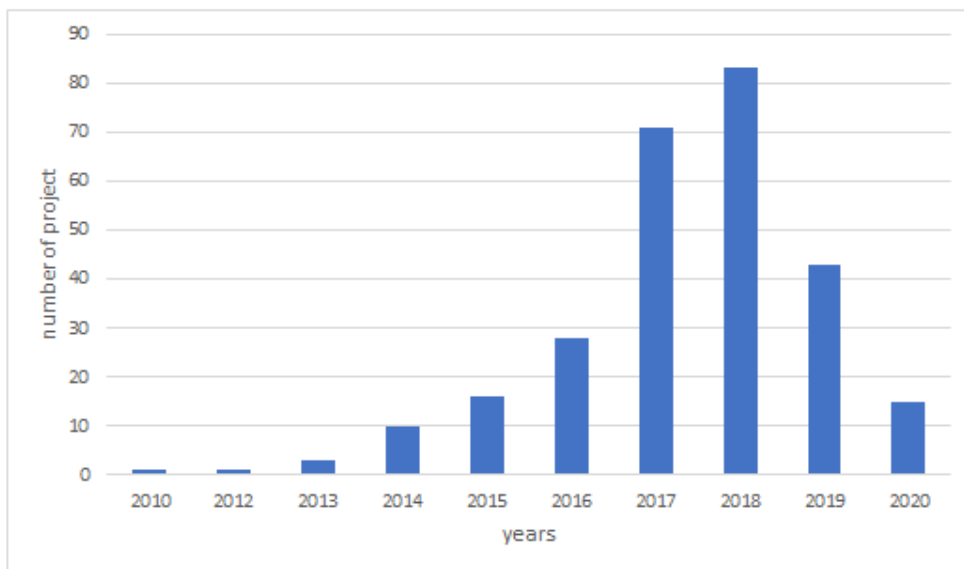
determined by making sure they use the right database and keyword. Therefore, a researcher need to experiment with various combinations and assess the relevance of the articles that are retrieved. Centria University of Applied Sciences generously contributed the datasets that were used in the creation of this paper. The author performed several searches using a variety of keywords and string lengths, then analysed the results. In each of the databases, the identical search phrase was used. The used databases, keywords, and string sets are detailed in Table 1.

#### 3.4 Data Analysis

The literature review process is finished off with an analysis of the data. At this point, a comprehensive study was conducted on the six publications that were chosen, and data were retrieved using a methodical approach. The table presents a categorization of the effects that were covered in each of the articles. In the course of looking over each article, fifteen distinct effects were discovered. The five most significant effects connected to the banking business were further narrowed down to 15, which are detailed under the following section.

### 4. Result and Discussion

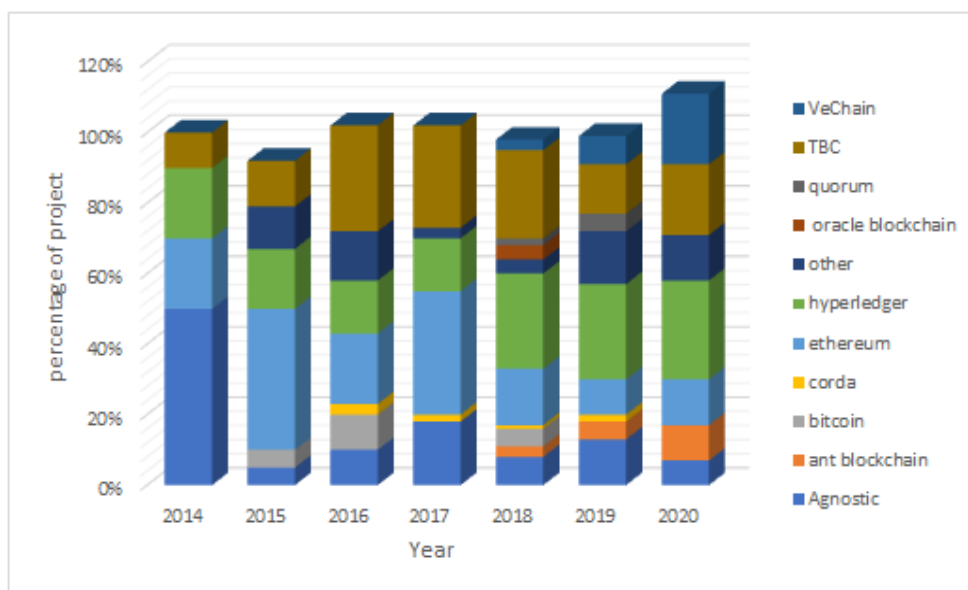
The findings suggest that the blockchain technology is getting ready to bring about a significant change in the financial sector. It seems that the technology will be able to tackle the issue of inefficiency faced by banks by doing away with third parties, hence enhancing efficiency while also lowering costs. Cross-border payments, trade finance, "knowing your customer" initiatives, the capital market, and regulatory requirements and oversight are the five areas that stand to benefit the most from blockchain technology.



**Fig 2.** Blockchain projects created in each year

The number of initiatives is shown in Figure 2 together with the year in which they were initiated. In 2018, the number of new projects will reach its highest point ever, with 57% 4 of all projects having been established in 2017 and 2018 alone. Following the year 2018,

a reduction in the total number of projects can be witnessed. The data for 2020 is only incomplete for the year, but it already has almost as many projects as 2015. There were no projects that were identified to have been initiated in 2011.



**Fig 3:** Projects using a particular blockchain

The percentage of companies that utilise various blockchains may be broken down by inception year in Figure 2, which can be viewed below. Ethereum, which is employed by 23% of all projects, and Hyperledger, which is utilised by 21% of all projects, are the two primary blockchains that have been embraced. 13% of projects do not specify a blockchain to use. Twenty-three percent of the initiatives fall into the "To Be Determined" category since they do not reveal the blockchain that they use. These projects are either in the process of conducting tests or making decisions

regarding which blockchains to utilise, or they are already operational but do not wish to disclose the type of blockchain solution that they currently employ. Researchers also saw that in 2015, 2016, and 2017 there were a greater number of projects that were established on the Ethereum platform than there were Hyperledger projects. However, they noticed that the situation has reversed itself for projects that have been formed in 2018, 2019, and for 2020 so far. The year 2017 saw the creation of the largest percentage of Ethereum-based projects, accounting for forty percent of the total number

of Ethereum-based projects in existence today. This is around two years after Ethereum was released in July 2015, showing a delay in the construction of applications employing this blockchain technology.

When compared to existing systems like Swift, blockchain enables financial institutions to complete international financial transactions in a more timely and cost-effective manner. Customers benefit from increased efficiency and clarity in the transaction as a result of the elimination of third parties. By structuring contracts with the assistance of smart contracts, trade financing might be done in a manner that is both effective and inexpensive. In addition to that, it may be of assistance in monitoring the delivery of the deal and in minimising the risk. In a similar vein, a smart contract may be used in a blockchain network's banks to verify, record, and disseminate information on the identification of clients. Banks will be able to save a significant amount of time and money as a result of this, and regulatory agencies will have an easier time controlling money laundering and other terrorist activities. Settlement of trades may occur in real time on the capital market, and it does so in a way that is both highly efficient and completely transparent.

In addition, blockchain technology may be able to assist financial institutions in automating the processes of financial reporting and compliance. Since the data that is recorded in blocks cannot be changed, the authorities may put their faith in them. In addition to all of these benefits, blockchain technology also has a few drawbacks. The fundamental principle behind blockchain is hard to perform and needs a significant amount of work. Since 2015, large banks have been investigating blockchain technology, but they are not yet ready to use it. Before using blockchain technology, financial institutions should first find a way to overcome challenges in areas like regulation, trust, technology, energy consumption, and cost. The primary objective of this study was to control the effects that "blockchain technology" will have on the banking industry. The findings of the study designate that "blockchain technology" will have a significant effect on cross-border payments, trade finance, the capital market, getting to know your customers, and regulation. To summarise, the distributed ledger technology has significant likely to revolutionise the "financial industry".

The results indicate that there is still a significant amount of study to be done in this area given that the technology is still in its formative stages. Throughout the course of the investigation, researcher came across many important innovations. Therefore, He was aware that doing study on these subjects is going to be quite important. The

paper makes three suggestions for avenues of inquiry for further study. The first concept for a subject is the use of blockchain technology by central banks; hence, a potential research question may be "How may central banks apply blockchain technology?" Second, He discovered that banks and Fintech companies have to work together in order to advance the application of "blockchain technology"; hence, any concept that is connected to this might be an excellent subject for study. In conclusion, doing study on how blockchain may be regulated would be a fascinating issue.

## 5. Conclusion

The usage of "blockchain technology" in the financial service industries is only getting off the ground at this point. Interoperability and advances in transaction processing are two types of future developments that researchers are looking forward to seeing. As a consequence of these enhancements, the training programmes centred on the Blockchain technology will become more useful to the financial institutions. According to a report published by Research Dive, the global blockchain market will provide significant benefits to the financial sector in the future. This is primarily due to the fact that banking and financial institutions are progressively utilising blockchain implementations in payment procedures to can provide safe transactions and global transactions at lower costs.

And also the impact will remain as a result of the continued growth of IoT advancements, which are transforming various different industrial sectors. The use of "blockchain technology" in the banking and financial sector will hasten the processing of transactions, eliminate the need for paperwork, and provide a more secure setting. On the other hand, it is believed that blockchain would also provide new choices for saving money. It may make it easier for customers to complete their trips and stimulate the transmission of protected data. You may improve your prospects by participating in the online course offered by KnowledgeHut for Blockchain Quality Engineer.

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### Declarations

Author declares that all works are original and this manuscript has not been published in any other journal.

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