Politecnico di Torino

Degree Course: Engineering and Management

Department of Engineering and Management & Production

Cryptocurrency the future of FinTech

Literature Review

Submitted to: Candidate:

Prof. Elisa Ughetto   Sayeed Meesum Abbas

                                                       S280420

Acknowledgment

Abstract

Since the 2008 financial crisis, consumers now view Finance and Banks in a different light, and they are searching for services that will meet their demands. FinTech businesses have expanded significantly over the past few years, having an enormous influence on conventional banks and causing a significant shift in the way financial activities are done. The decision of this thesis topic is due to the evolution of blockchain technologies like cryptocurrency. Blockchain technology, in the opinion of academics, can assist the financial sector in achieving transparency, efficiency, and privacy of customer information. The rise of cryptocurrencies portrays an accurate reflection of the potential of blockchain technology for the banking sector. Because there is no unified regulation being deployed, policymakers are vying for the acceptance and implementation of blockchain-based applications.

Table of Contents

1. Financial Technology

1.1. Emergence of FinTech

Fintech is a term that combines the words finance and technology. It refers to both conventional financial service providers like banks, insurers, and other as well as the creation of new financial products powered by technology and start-up businesses that supply those solutions. Technology has advanced to fulfill client needs since the 19th century, setting important milestones. Although world economic crisis significant a trigger that fueled the interest in financial technology, consumer expectations are essential for the FinTech trend. The expansion of the financial industry as well as the provision of financial services are significantly influenced by financial offerings and services approach to the development by new tech, which produces better business models, platforms, etc. With time, technical advancements in the financial sector are influenced by customer needs. Fintech companies are experts in P2P lending, stock trading, cryptocurrency, crowdfunding, and other areas. Several catastrophic crises have struck the world in the past century, with the most prominent one in 2008 being as the last straw for technology within the financial sector. Revolut, which debuted being a virtual bank in 2015 & handled €15 electronic payments totaling million in its inaugural year, is one of the most well-known instances. Due to its user services and greater financial flexibility, this fintech start-up is generally appreciated and widely used, something that also is main goal of employing working capital innovation. The corona epidemic has ushered in a brand-new phase of fintech. People have made conscience living changes as a result of the outbreak and the speed at which it is spreading, which has raised fintech acceptance. Studies indicate that the growth of the epidemic has led to a 25% to 30% rise in the overall daily installations of fintech smartphone apps. Trading volumes on platforms for digital payments and digital currencies increased annually by more than 18%, while internet banking and strong authentication witnessed more notable increases of about 12%. Financial organizations invest 2.4% and 4% of their business in IT, compared to banking institutions, which invest 5% to 11% of their business in IT. Over a decade, something unusual was discovered in the relationship between technology and finances. Vodaphone and Safaricom in Kenya introduced M-Pesa in 2007, a novel

financial technology that enables users to transfer money using their smart phones rather than a bank. In 2009, a Japanese programmer named Satoshi Nakamoto created Bitcoin, a blockchain platform that keeps track of activities without a central authority. Smaller businesses began to gain from the fintech growth as a result. Venture capitalists and the financial system provide the majority of financing for fintech projects. The amount of funds venture capitalists invest in fintech impacts its financial success. Fintech enjoyed $116 billion in revenue worldwide in 2018, and $325 billion in 2022. In the next three to five years, traditional banking institutions around the world will concentrate on real technology to improve consumer retention.

Figure 1 FinTech History [1]

1.2. Banking Endorsement

A number of these new financial solutions have emerged as a result of the work of fintech companies. New competitive technological advances and digital services provide difficulties for banks. They force the banks to reconsider their restrictions and think about fair transactions. Banks partnered strategically with FinTech's to address this potential risk and started implementing their solutions. Banks have created fintech accelerators to encourage development while maintaining stability over already-established or authorized entities. Because of their scale and payment capabilities, banks are subject to extensive regulation. Lending institutions in the fintech space currently typically operate outside of this banking regulations and work lines. If fintech companies are monitored at all, they may be included in both current

and future legislative framework. A crucial tool for tax evasion, rules, and currency devaluation is cryptocurrency. In emerging economies, where there are few institutions to prevent this activity, this is especially troublesome. China is the only nation that has banned all bitcoin transactions as of yet. Such actions are not likely to have a significant impact on banks. The extraordinary expansion of fintech companies in the local and global finance sector poses a greater challenge to their position in this industry [2]. In the future, banking institutions can learn from the drive toward restructuring the bank, which adheres to the principle of using workforce specialization to concentrate in performing various tasks well. Comprehensive banks are segmented devices that operate by carrying out predetermined activities within discrete units. These have accumulated over time to become prohibitively expensive and rigid for the consumer, and that has sparked the financial boom as a platform for invention meeting needs [3]. On the other hand, due of security issues, P2P Technology does not provide a risk to banks. Awareness among consumers about secure financial transactions are still significant.

1.3. Diverse FinTech Markets

Over the past ten years, the variety of fintech businesses has grown tremendously. Digital advances have provided many investors with a new source of income. By using Capital sector and distributed ledger technology, both traders and owners may have new skills to exchange both data and skills effectively without relying on a centralized authority, thereby resolving the reliability issue. Robust financial technology companies give customers more options and ease. In numerous European nations, the financial sector is already being modernized thanks to the competition they offer to financial institutions [4]. The fintech industry in Europe has grown drastically to the center of the continent's financial environment from its periphery. There is currently at least one fintech among the top five financial institutions in each of the seven largest European nations the Holland, Belgium, Italia, French, the Great Britain [5]. Crowdsourcing and crowd financing are currently a global popular symbol. Entrepreneurs and other companies are permitted to offer shares on equity crowdfunding in order to raise money for business expansion. As a result, governments have specified the right guidelines for how businesses should be able to obtain startup capital. An initial public offering is yet another option for financing

(IPOs). These days, big investors are the only ones that can access IPOs. A key causes for this is that crowdfunding is primarily used by start-up businesses, whereas funds for IPOs are raised from several billions of dollars.

Financial services firms are working diligently to change technology economy. In order to maintain control over their holdings and grow their wallets, one must first hire an assets manager. The investment portfolios are managed by a type of financial manager called a robo-adviser. This technology is substantially better in terms of both price and performance. The majority of robot advisors charge set annual fees of less than 0.8% of the actively managed mutual funds. Innovation in this area has been brought in by fintech. Social trading allows anyone with a basic understanding of finance to simulate trades.

One of the most significant sectors of fintech is payments, which is continually developing. Because of these advancements, banks confront intense competition. Numerous new financial services have been created as a result of the blending of innovation, including peer-to-peer lending, electronic payments, cryptocurrencies, and the rapidly expanding mobile banking market. Electronic trading solutions have become more and more important with the growth of e-commerce. The rising use of mobile devices has improved the digital payment system. Cryptocurrency has been introduced as a method of protected online transactions.

2. Literature Review
2.1. FinTech's Revolution

A revolutionary new era in financial technology (FinTech) is on the horizon. With nearly $14 billion spent over the preceding 12 months, 45 percent growth in investment over the last year. They are making an investment because they think it will change the world. You'll be able to handle and transfer money more conveniently, affordably, and wisely thanks to fintech. FinTech will assist companies in paying their contractors and reduce the pricey surcharges that, particularly for modest companies, eat into earnings. There are numerous advantages to eliminating payment frictions that are not immediately obvious. Advocates for the middle income, underclass, and impoverished are particularly enthusiastic about FinTech. The way payments are made now is very biased. Even though you may not be aware

of it every time you use your credit card to make purchases and accrue points or miles, the store you are purchasing from will ultimately receive two to four percent less from you compared to a consumer who pays with cash [6]. Many citizens in developing nations like Nigeria, Kenya, and India now have easier access to money because to fintech. In order to provide financial services to such customers via smartphone applications in different locations, the companies have developed innovative techniques. According to the experts, policymakers must support fintech companies to develop technological advancements in order to address consumer expectations in regions where banks' financial services are subpar.

In the modern era, FinTech has expanded to include the creation and application of cryptocurrencies such as Bitcoin. Even if numerous FinTech industries are still growing today, a sizable portion of the business still concentrates on the conventional global banking sector [7]. On the other hand, many financial institutions still rely entirely on antiquated technologies and on-site servers for their content, networks, and business processes. As such, these companies run the risk of turning into the Blockbuster or Kodak of the financial industry. Interoperability and cloud technology are two things that are crucial for the success of financial systems. Over the past ten years, businesses have far too frequently adopted fintech gradually, implementing particular solutions to address particular issues. That is so because fintechs, or financial services firms, are frequently founded with this laser-like concentration. Financial services companies who are unable to provide consumers or corporate clients with an extraordinary level of service run the danger of losing them to competitors who can. The time has come for the industry to fully embrace fintech and create solutions that not only fit the new normal but also contribute to define it [8]. Internet services, a major driving force, particularly in emerging nations, are the focus of fintech.

2.2. Blockchain and its Mechanism

Blockchain is a distributed ledger system for storing digital records of transactions that cannot be controlled or affected by authorities, establishments, or groups. If the blockchain network is active, it enables a team of users to record activities in a shared database inside that community, outcomes that, when released, couldn't altered

changed. The way the data is organized in a blockchain differs significantly from how it is typically organized. In a blockchain, data is gathered in groups called blocks that each include sets of data. When a transaction is finished, it is secured and linked to the transaction that came before it to form the database server known as the blockchain. Blocks have predefined storage capacities. Following that additional probably block, all subsequent data is merged to create a fine block, which is subsequently linked to the server once it has been finished. Decentralized security and trust are made possible by blockchain technology in a number of ways. To start, new blocks are always sequentially and logically stored. In other words, they are constantly added to the blockchain's "finish." It is very difficult to go back and change the contents of a block once it has been added to the blockchain unless a majority of the network has agreed to do so. This is due to the fact that each block has its own hash, as well as the hash of the block that occurred prior to it and the aforementioned date. Hash patterns are created by a mathematical formula that transforms metadata into a combination of numbers and characters. If that data has been altered in any manner, the hash code is also altered [9].

Stuart Haber and W. Scott Stornetta, two researchers interested in implementing a system where document timestamps could not be altered, first proposed the concept of blockchain technology in 1991. But blockchain didn't have its first practical use until over 2 generations later, with the introduction of Bitcoin in January 2009 [10]. On a blockchain, the Bitcoin protocol is constructed. Bitcoin's anonymous founder, Satoshi Nakamoto, described the virtual money as "a new electronic cash system that's totally P2P, with no trustworthy 3P," in a research paper that introduced it [11]. It's important to note that blockchain is only utilized by Bitcoin to immutably record a ledger of payments in a transparent manner. In theory, though, blockchain could be used to axiomatically record any number of data points. This could take the shape of transactions, ballots in polls, goods stockpiles, government identification documents, ownership to properties, and also more, as was previously said. In addition to recording transactions, hundreds of thousands of projects are currently attempting to use blockchain technology to benefit society in other ways. Although blockchain has many benefits, there are still certain problems, such as

scalability. The network's capacity for transactions, the length and frequency of blocks, and process, all contribute to a scaling difficulty in Bitcoin. The issues of blockchain include compatibility, confidentiality, energy cost, stability, and regulatory frameworks. Techniques for POW and POS resolution are also under scrutiny. In POW, the mining typically solve difficulties in the form of mathematical puzzles in order to mine the blocks, which consumes a significant sum of electricity. The owner invests their asset in POS in order to gain additional resources. 51percent of the total of breaches may affect block chain technology, in which a lone entity commandeers the entire network and utilizes it for its own ends. Terms like "permissionless," "permission," and even "combination" can be used to describe various types of blockchain. Every user can join a network and connect directly the blockchain discreetly thanks to permissionless blockchains, which do not restrict the entitlements of the network's users. On the contrary, permissioned blockchains restrict both the network's accessibility and the privileges of each peer within it. Permissionless blocks are significantly safer than permissioned blocks since there are many more peers to authenticate the transactions. Corruption among peers would make network collaboration impossible [12].
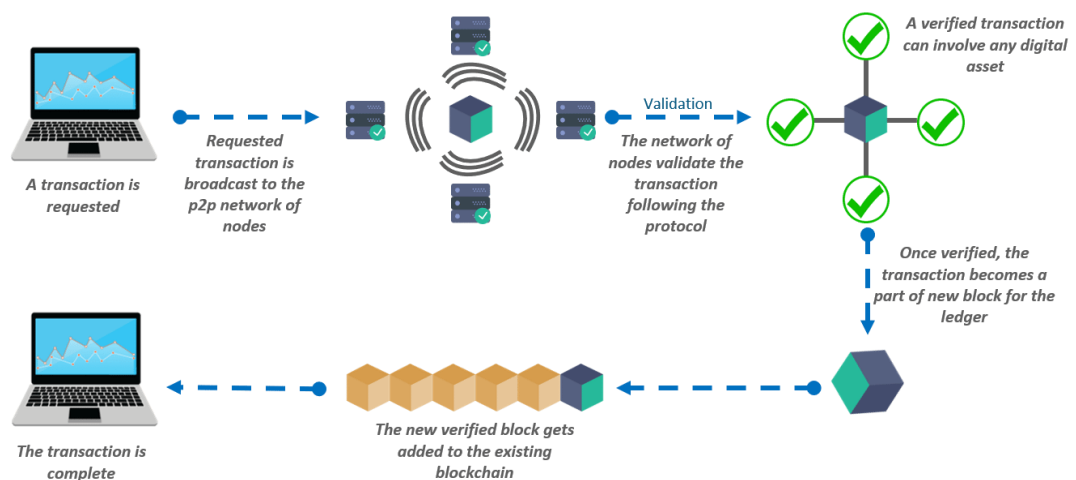

Figure 2 Blockchain Mechanism [13]

2.3. Crptocurrency Adaptability

The main yardstick for measuring the development of cryptocurrencies is the market for payment services and financial innovations. Cryptocurrencies are distinct from conventional currencies due to a number of features. The main advantages of cryptocurrencies are their flexibility in use and the security and reliability of information transmitted inside the system. The number of cryptocurrency transactions per second was noted in another study. Significant volatility, a weak connectivity infrastructure, and scalability problems are the main negatives. According to a market analysis, Bitcoin is the industry leader with a 65% userbase at the beginning of 2022 and about half of the total trading volume. Cryptocurrencies guarantee data privacy and minimize information inaccuracy thanks to the blockchain technology. Although there are many benefits, there are also some negatives to cryptocurrency. The international economy may be at risk from the threat of a single currency. Prices will need to be determined by multinational corporations, yet different countries have different living standards, which will lead to a worldwide financial inequity. There should be some assets to back cryptocurrencies in order for them to supplant traditional currencies. Prices sharply rise when there is good news about the regulation of cryptocurrencies, and conversely when there is bad news [14]. Now at moment of reporting, the marketplace for cryptocurrencies was estimated to be worth around $300 billion, with Bitcoin assets accounting for almost 80% of that total. Over time, the cryptocurrency market environment has rapidly expanded. The terms "cryptocurrency" and "block chain technology" are frequently confused by individuals in the ordinary group.. As was previously said, blockchain technology was first successfully applied to bitcoin (Nakamoto, 2008). Blockchain's distributed method enables transactions based on cryptocurrencies to be executed more easily and without the need for intermediaries like institutions, securities payment framework, and underwriters [15].

We cannot consider cryptocurrencies as a potential money stream due to their extreme unpredictability. They stand out as special securities with high risk and possible reward factors. The answer to this problem may lie in the innovative development of the legislative framework governing the classification and use of

cryptocurrencies. The development of the regulatory framework and the spread of cryptocurrencies could be the answer to this dilemma.
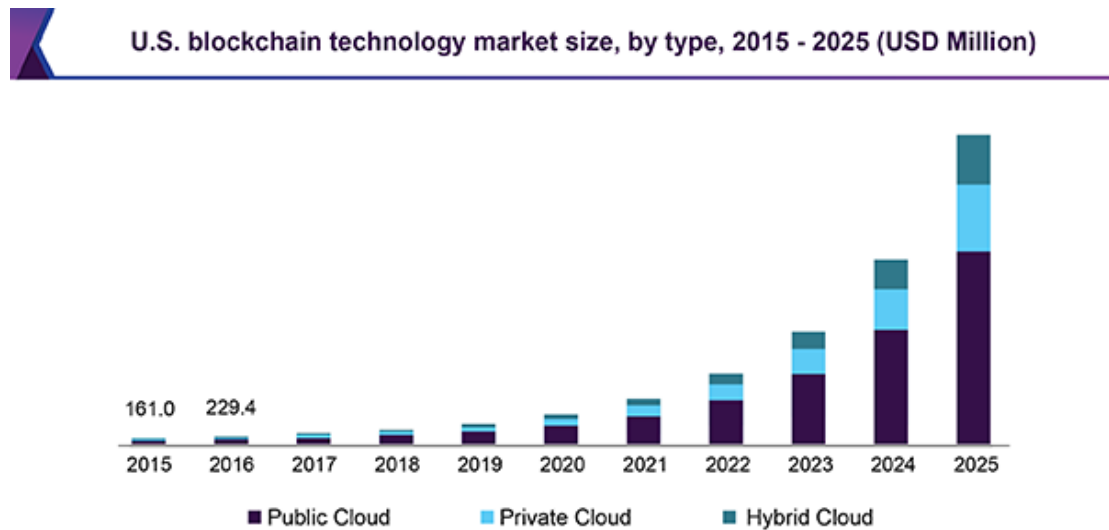
U.S. blockchain technology market size, by type, 2015 - 2025 (USD Million)

Figure 3 Blockchain Market [16]

3. Introduction to Cryptocurrency

3.1. Cryptocurrency

Cryptocurrencies are digital currencies that can be used for providing valuable insights and trade. They use cryptosystem to secure the confidentiality of transactions. These systems are the only administrators of these systems, which are composed of publicly accessible protocols. Most concerns, including how money will be allocated among these users, where and in what circumstances new coins will be introduced to the market, and how activities will proceed symmetric, are outlined in codebase. Anyone may examine this code at any moment, but it cannot be altered. However, each user's portion of all transactions in these currencies is tracked in a blockchain network [17]. The blockchain system's encryption schemes make it impossible for anyone to ever update anything on a user's laptop. It draws more attention than other global currencies because it is natural. In plenty of other terms, the authority or central organization does not manage or control cryptocurrencies. Virtual currencies are cryptocoins. They are transferable into actual money. Although Bitcoin is the most well-known cryptocurrency, there are over a thousand others, including Litecoin, Ethereum, Cardano, Solana, and Ripple. Cryptocurrency tokens are not part of the framework that establishes their value, they are decentralized, and

they are not subject to any one entity or body. The ecosystem of cryptography experts is driving this. They do not apply everywhere, and certain established legal regulations do [18].

A blockchain-based service called cryptocurrency only exists online. The database contains information on each client account's balance and any actions made on that account. The system is comparable to the financial system in this regard. The funds are transferred to a different account with an account number made from of the digits belonging to the sender's account. Only numbers are transported from one location to another; the rest of the information is merely information kept in the database. The operation of all cryptocurrencies is the same. There must be both private and public credentials, which take the form of arbitrary sequences of digits and letters, when using cryptocurrencies. Private credentials must be stored in a written and secure location and must never be shared with anyone. It is not advised to keep items in places that are simple to get to. All authorisation controlled by your private key will be lost if it is lost. In cryptocurrencies, a consensus is achieved on a transaction by a P2P network connection rather than by a central authority. This has been demonstrated to be among the most alluring and revolutionary features of cryptocurrencies. The evolution of various forms of cryptocurrency money into a structure governed by people rather than a central authority like banks is thought to point in this direction in the future. The expansion and development of the daily enables the recognition of the cryptocurrency coins, which are used to pay for products and services. Currently, among all cryptocurrencies, Bitcoin is the most well-known. Businesses are looking for ways to learn about cryptocurrencies like bitcoin. However, it does not appear to be simple to overcome Bitcoin's damaging advantage. Leading global businesses accept bitcoin payments, and the number of these businesses is increasing daily. Cryptocurrency theory is predicated on the fundamental tenet that there is no one, centralized database. Instead, each user has access to a large number of this database, and a plethora of users are simultaneously adding to it while seeing every transaction. This indicates that each copy of the ledger held by each owner is filled out concurrently. By looking at the data in the majority

of the system, a glitch in a user's notebook caused by a mistake or maliciousness is fixed and stability is guaranteed in nanoseconds.

In cooperation negotiations, there has always been a need for intermediaries to address the issue of uncertainty between the participants and the potential for failure of the parties to uphold their responsibilities. Currently, mediators work in a wide range of industries, from straightforward multi purpose credit acquisitions to letter of lending trading transactions. Nevertheless, numerous studies have cast doubt on the role that intermediaries play in enhancing market efficiency [19]. Projections for digital currencies vary greatly from one another. The primary cause of this discrepancy is the various methods used to forecast the circumstances that are anticipated to arise with the development of crypto currency. One or a few of the hundreds of cryptocurrencies that exist today, in the opinion of many analysts, can endure over the long run.
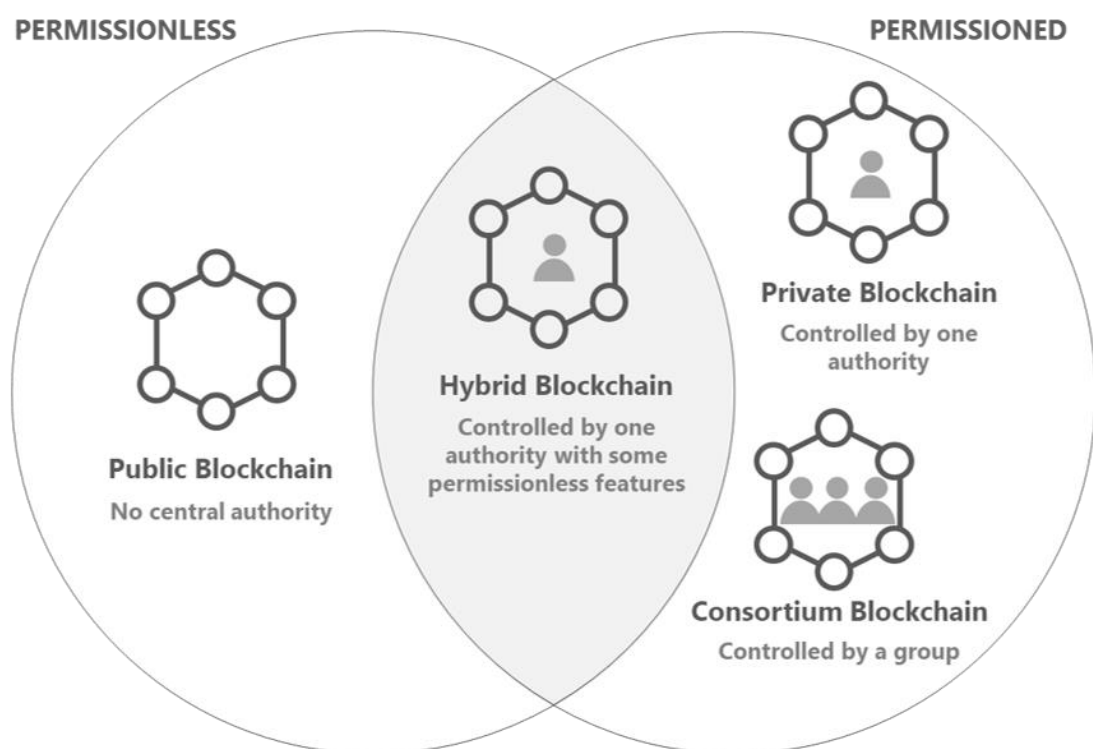

Figure 4 Blockchain Types [20]

3.2. Types of Cryptocurrency
3.2.1. Bitcoin

A cryptocurrency, such as Bitcoin, eliminates the need for a third party to be involved in financial transactions by acting as money and a means of

payment independent of any particular individual, organization, or business. It is available for purchase on numerous platforms and is given to blockchain miners as compensation for their efforts in validating transactions. By utilizing the alias Satoshi Nakamoto, an unidentified programmer or group of programmers presented Bitcoin to the general public in 2009. Since then, it has grown to emerge as the biggest well-known cryptocurrency globally. Numerous additional cryptocurrencies have been developed as a result of its popularity. These rivals either want to displace it as a means of payment or are employed in other blockchains and cutting-edge financial technology as service or token [21]. Block 0—the very first Bitcoin block—was mined on January 3, 2009. This text, which is often referred to as the "genesis block," may serve as evidence so the date the unit was generated either before or after "The Times 03/01/2009 Premier on the brink of second financial bailout," as well as provide pertinent political satire [22]. Every 210,000 blocks, bitcoin payouts are half. For instance, in 2009, the block reward was 50 brand-new bitcoins. The next halving took place on May 11, 2020, reducing the reward for finding a block to 6.25 bitcoins. A cryptocurrency wallet is required in order to use your Bitcoin. The private keys for your bitcoin are kept in wallets and are entered when you want to make a transaction. Numerous retailers, stores, and merchants accept bitcoin as payment for goods and services.

Bitcoin attracted the attention of investors and speculators as it gained prominence. Cryptocurrency exchanges that enabled bitcoin sales and purchases first appeared between 2009 and 2017. Demand gradually increased as prices started to rise, and in 2017, it finally broke the $1,000 barrier. Many people bought bitcoins with the intention of holding them because they thought the price would keep rising. The market grew rapidly once traders started using bitcoin exchanges to conduct short-term transactions. Since Bitcoin's price has increased so quickly recently, large investors have been interested in it. On December 31, 2019, the price of bitcoin was $7,167.52; a year later, it had increased by more than 300% to

$28,984.98. It soared throughout the first half of 2021, reaching a record high price of almost $69,000 in November. It then dropped over the ensuing several months, fluctuating around the $40,000 mark [23]. Therefore, rather than buying Bitcoin to use as a means of exchange, many people do it for its financial potential. Its digital form and absence of a fixed value, however, make its purchase and use fraught with dangers. For instance, the Numerous investor advisories on Bitcoin investments have been released by the Securities exchange Commission (SEC), Financial Industry Regulatory Authority (FINRA), and Consumer Financial Protection Bureau (CFPB).

3.2.2. Ethereum

Ethereum is a blockchain-based decentralized global software application at its heart. Most people are familiar with it because of its native cryptocurrency, ether (ETH). Everyone can use Ethereum to develop any secure digital technology. It has a token created to compensate users for work done in favor of the blockchain, but if accepted, users may also use it to pay for material products and services. Accessible, configurable, encrypted, and distributed are all features of Ethereum. It is the blockchain of choice for programmers and businesses building technology atop it to transform numerous sectors and how we go about our daily lives [24]. Smart contracts, a key component of decentralized apps, are supported natively. Smart contracts and blockchain technology are used in many decentralized finance (DeFi) and other applications [25]. Like other cryptocurrencies, Ethereum makes use of blockchain technology. A very long series of blocks comes to mind. Each newly formed block with new data adds all the information from each block. A single copy of the blockchain is spread across the network. A network of automated systems that come to an agreement on the truthfulness of transaction data authenticate this blockchain. The blockchain cannot be altered unless the network as a whole agrees to do so. It is quite safe because of this. An algorithm known as a consensus protocol is used to achieve consensus. Ethereum employs the proof-of-stake mechanism, in which a community of users known as validators collaborates to produce new blocks and validate the data they contain. The blocks provide a list of

attestations (validators' signatures and votes on the block's authenticity), transactions, and other data regarding the blockchain's current status.

Ethereum 2.0 is an enhanced version of the current the network powered by Ethereum to do two things: on the one hand, remove recurring limitations and, on the other, emphasize the significance of Ethereum's strengths. Given that the existing Ethereum network's inability to scale is its most well-known drawback, it is asserted that the development team created Ethereum 2.0 in order to put more dependable infrastructures in place and speed up transaction processing. According to market value, Ethereum, the second-largest cryptocurrency, has made the most significant update in its five-year history. It is asserted that Eth2, which stands for a very significant milestone in the development of the Ethereum blockchain, has been reached on the way to Ethereum 2.0. According to reports, the development of new technologies in the field of new blockchains and decentralized apps has risen dramatically since the introduction of Ethereum. It is highlighted that some of the biggest and most innovative advances in the distributed finance (DeFi) system have a long-standing and reliable foundation in the Ethereum platform.

3.2.3. Solana

A blockchain platform called Solana is intended to run scalable, distributed apps. It was established in 2017 and is an accessible initiative that is currently managed by the Geneva-based Solana Society. San Francisco-based Solana Labs developed the blockchain [26]. In terms of the volume of transactions it can handle, Solana is far faster than competing blockchains like Ethereum and has substantially cheaper transaction fees. The Solana blockchain-based cryptocurrency, also known as Solana (SOLUSD), which trades under the ticker symbol SOL, experienced a price increase of about 12,000 percent of overall in 2021. Its market cap at one point exceeded $66 billion, making it the fifth-largest crypto at the moment [27]. SOL was not spared from the 2022 cryptocurrency massacre despite its popularity. On October 3, 2022, SOL's market value had decreased to roughly $11.17 billion. It fell to ninth place in terms of value and volume [28]. Solana's architecture attempts to show off a

collection of software techniques that, when used in conjunction with a blockchain, remove software as a speed constraint. Combining these two factors enables transaction throughput to grow in line with network bandwidth. Accessible, reliable, and distributed are all requirements for a blockchain that are met by Solana's architecture. According to its architecture, the maximum theoretical throughput on a 40-gigabit network is 28.4 million TPS and 710,000 TPS, respectively [29]. The proof-of-stake (PoS) and proof-of-history (PoH) consensus models are both used by the solana blockchain. PoH enables such transactions to be timestamped and validated very quickly; PoS allows Based on how many coins or tokens they own, auditors (those of us who authorize operations uploaded to the network record) can confirm operations [30].

3.2.4. Ripple

Digital payment network and protocol Ripple uses the XRP coin as its own. Comparable to the SWIFT system used by banks and financial intermediaries to transact across currencies for international money and security transfers, Ripple's primary procedure is a system for added value for customers and repatriation in transferring money. The premined crypto token is traded under the ticker XRP. The organization and network are referred to as Ripple, and the cryptocurrency token is called XRP. The function of XRP is to act as a temporary settlement layer denomination and as an intermediary exchange mechanism between two networks or currencies. Chris Larsen and Jed McCaleb, who co-founded Ripple, launched it for the first time in 2012. Any type of currency, including usd, pounds, francs, and cryptocurrencies like litecoin and btc, can be transferred without any issues using the peer-to-peer, open-source Ripple network. Major banks and financial services organizations are among the clients of Ripple, a worldwide payments network. To speed up currency conversion, XRP is incorporated into its goods. Explore a money transfer structure where the two parties on either end of the transaction use their preferred middlemen to get the money in order to comprehend how the system operates. In essence, Ripple functions as a computerized transfer of funds system. Hawala is an illegal method of delivering money, usually

through countries, without swapping any real money. A "gateway" is the word used by Ripple to describe the third party that acts as the trust intermediary between two parties looking to perform a transaction. For the Ripple network, the gateway acts as a reputation broker, accepting and transferring funds to accessible accounts. By registering, anyone or any business can launch a gateway, giving them the right to serve as the network's mediator for maintaining cash flow, financial regulations, and transferring funds [31]. It might be argued that transactions can monitor anything on the network due to the transparency and semi-anonymous characteristics of Bitcoin, exposing the idea of secret cryptocurrency money. Using blockchain technology, confidential cryptocurrencies enable the dispersed transfer of transactions between individuals while maintaining privacy. We can say that the trend toward adopting cryptocurrencies that offer complete anonymity is growing as users who want to transact business in a private setting find these cryptocurrencies to be more and more appealing. It can be claimed that governments will need to approach these cryptocurrencies more cautiously because the full anonymity function of confidential cryptocurrencies, given their nature, will make money laundering and illicit activities more accessible and may constitute a threat to economic security. Cryptocurrencies have been built with a high level of privacy within the coin ecosystem. The list below includes some of the most popular and extensively utilized privacy cryptocurrencies.

Figure 5 Ripple [32]

3.2.5. Cardano

In honor of Augusta Ada King, Countess of Lovelace (1815–1852), widely regarded as the first computer programmer, Cardano's cryptocurrency is called Ada. The blockchain's PoS consensus algorithm uses Ada. It is awarded to users who take part in a stake pool as compensation for their contributions to the blockchain. Cardano's development started in 2015, and the platform was released in 2017 by Charles Hoskinson, a co-founder of Ethereum. As an Ethereum alternative, Cardano has positioned itself. Both platforms work with comparable technologies, including smart contracts, and aim to create a connected, decentralized system [33]. Comparing its "third-generation" platform to Ethereum's "second-generation" label, Cardano sees itself as an upgraded version of the latter. The blockchain platform aims to offer banking services to unbanked people worldwide [34]. The Ouroboros consensus mechanism powers the Cardano platform. The first proof of stake (PoS) protocol developed to lessen the energy consumption associated with proof of work (PoW) mining is called Ouroboros, and it was developed by Cardano during its foundation period. It accomplishes this by removing the proof of work algorithm's heavy reliance on processing power. Currently, cryptocurrencies verify transactions using two main consensus algorithms.

Before transactions are posted to the blockchain, proof of work, the technology behind Bitcoin, requires users to solve challenging cryptographic problems. This is often referred to as mining cryptocurrencies. The other main consensus technique, proof of stake, uses less energy because it is not dependent on cryptocurrency mining. Instead, it relies on a consensus among several independent random validators before a transaction is recorded on the blockchain [35].

Staking controls a node's ability to open blocks on the blockchain under Cardano's PoS mechanism. The quantity of Ada that a node long-term owns is equal to its stake. An individual's interest in a pool that is secured by a committed amount of Ada is known as a stake. Because it is held as security for truthful behavior validation, pledged Ada cannot be used or spent by the bearer. Rewards in the form of transaction fees are granted to users who have pledged Ada. According to how much Ada a user has bet, incentives are given out. Cardano employs the Proof-of-Stake (PoS) consensus algorithm, in which users "stake" a coin in exchange for the chance to become a validator. There are two methods that users can take part in the staking and validation process. You have the option of operating or owning a stake pool. Trusted server nodes called stake pools do the task of validating transactions. An individual who has assigned Ada to a pool is a stake pool owner. You can either make your own private stake pool or invite other people to join it. By committing your Ada to another pool, you can also acquire ownership of a pool. A dependable individual is designated as the stake pool operator and is responsible for renting servers, keeping an eye on the node, holding the pool key, and other pool administration duties [36].

Cardano is intended to be developed in "eras" named after significant personalities in poetry and computer science history, including Voltaire, Byron, Shelley, Goguen, and Basho. The Basho period (present, late August 2022) is one of scale and optimization, with the goal of giving Cardano new capabilities. With previously revealed smart contract features and system upgrades, Voltaire is the final period of Cardano development and is designed

to add voting and treasury management to the blockchain and network [37]. Between Cardano and Bitcoin, there are a number of significant distinctions. Peer-to-peer payments are the main goal of the Bitcoin system. Cardano is an ecosystem that enables other developers to build scalable blockchain networks, tokens, decentralized applications, and other use cases. Cardano employs PoS for its consensus instead of rewarding Ada in a Bitcoin-like competitive mining process. Because mining-specific computers don't need a lot of electricity to run, this decreases the energy and waste footprints. Users of Cardano can stake their Ada by installing appropriate wallet software on their laptops or other devices and starting to get rewards.

3.3. FinTech's Future
3.3.1. Remittance

Remittances are described as earnings that are sent back to one's home country from a place where they have immigrated to work. Both formal and informal contexts classify these movements. Unauthorized transactions include Hawala and the movement of actual cash. Remittances are sums of money sent to settle a bill. However, transferring money to family members is a common aspect of remittances. They are frequently sent to relatives in their own countries by international workers. Using a bank's electronic payment system or an electronic money transfer service like Western Union is the most typical way to send money abroad. The majority of the time, these solutions come with a cost. The recipient may receive transfers in as little as five minutes. The economy of small and emerging nations depend more and more on remittances. They also contribute significantly to disaster relief, frequently going beyond official development assistance (ODA). They aid in reducing global poverty and raising the standard of living for citizens of low-income countries [38].

The fintech sector has increased significantly over the past few years, and it is expected to reach USD 310 billion in 2022, up USD 182 billion from 2018. Many companies are still lagging behind the digital revolution as they continue to use antiquated payment processing methods to fulfill orders and

finish backend tasks, even while firms all over the world adopt fintech solutions. The fintech sector has increased significantly over the past few years, and it is expected to reach USD 310 billion in 2022, up USD 182 billion from 2018. Many companies are still lagging behind the digital revolution as they continue to use antiquated payment processing methods to fulfill orders and finish backend tasks, even while firms all over the world adopt fintech solutions. Using virtual accounts, which can be set up quickly, and online cross-border payment methods, which are developing into effective, accessible payment remittance ways, financial technology is growing its reach and efficiency in the international banking sector. Online payment providers make it easy to prevent fraud, and businesses can feel secure about their global transactions thanks to encrypted two-factor authentication and in-app SMS verification processes that authenticate the payee and recipient [39].

Blockchain technology is frequently at odds with the institutionalized economy since it emerged outside of it. Since their debut, cryptocurrencies have developed quickly in support of remittance systematization and economic growth. They have established an appropriate avenue for international trade. Cross-border payments were one of cryptocurrencies' initial and most intriguing features. Instantaneous payments as well as unalterable and public transaction logging are guaranteed by cryptocurrencies and DLTs. By collecting processing fees, commercializing customer data, and further integrating such transaction channels into intricate financial solutions, standardization transforms transfers into equity that may be exchanged. It is very safe to send money using bitcoins. All transactions would be recorded on a public ledger while maintaining the highest level of security for the parties concerned. Because data is distributed across a vast network of computers, or nodes, which are constantly checking and confirming the accuracy of the records, there is also very little chance of data manipulation. In contrast to IBAN and other systems, this technique of sending remittances is the most secure, private, and verifiable one currently available, making hacking far more difficult because a hacker would need to

infiltrate a significant number of computers to acquire information. For instance, the non-cash remittance service company SureRemit enables users to send money across borders for costs that range from 0% to 2%. Rebit is a different service that facilitates money transfers to the Philippines, mostly from Canada, Japan, and South Korea. Rebit also plans to expand to the Middle East, while Coins.ph is another business employing a comparable business model in the Asia-Pacific region [40]. Another significant business in this field is Ripple Labs, which operates the RippleNet payments network and issues the XRP cryptocurrency. The Ripple network has a number of well-known participants, including Bank of America and Santander. However, Ripple just released Payburner, an integrated payments system and digital wallet that enables consumers around the world to make payments in XRP in a matter of seconds. These cross-border payments are still available to its business clients. This is actually a feature that is easily accessible in the digital sphere and can be added as a chrome extension in Google Chrome. Stablecoins are therefore among the finest cryptocurrencies to utilize when remitting money overseas. Inflation won't be a problem because these are pegged to fiat currencies, and fiat-backed stablecoins are also maintained by strong liquidity. Therefore, stablecoins like BUSD, USDT, or USDC are all excellent choices. Naturally, bitcoin remittances are a desirable alternative if remittance fees are draining your bank account. It's up to you and your family whether they continue to be the best way to send money to family members who live overseas, but it's undeniably a changing sector that is set to become even more powerful in the future.
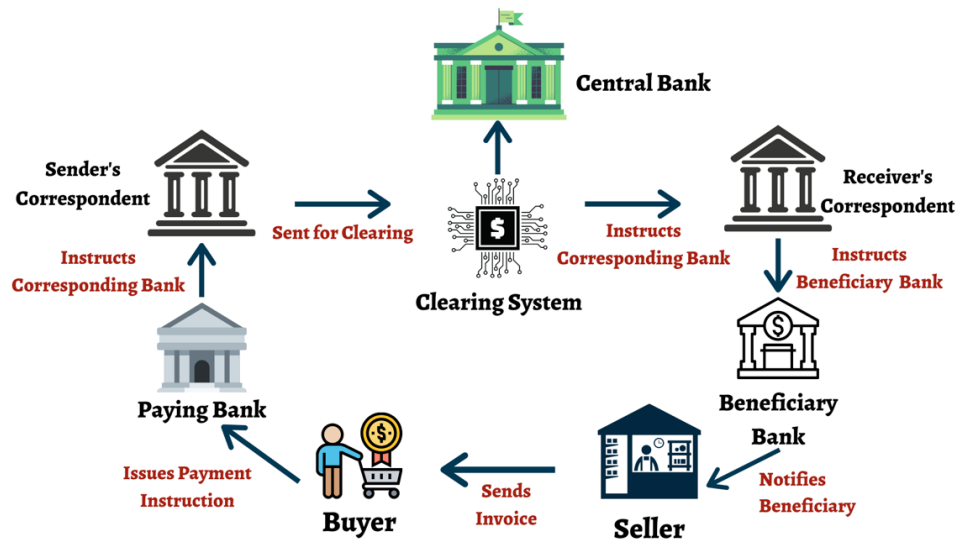
Figure 6 Cross-Border [41]

3.3.2. Financial Payments

Consumer expectations and habits are rapidly evolving as the globe enters a new era of digitalization, with a clear shift towards cashless transactions and practical subscription models. This has opened the door for a wide range of new digital financial services, together with legislative reforms that are changing the market's norms. The COVID-19 pandemic has sped up the process of how fintech, or the application of digital technology to financial services, is transforming the future of finance. Building more equitable and effective financial services and fostering economic growth are both made possible by the ongoing digitization of money and financial services. The borders between financial firms and the financial sector are becoming increasingly hazy as a result of fintech's rapid transformation of the industry [42]. Nowadays, a variety of retail payment services are provided by non-bank institutions. The issue of where to draw the regulatory boundary is brought up by this. Financial authorities must now determine whether their regulatory frameworks adequately reflect the risk profile of various payment systems. This assessment benefits from a thorough awareness of other nations' regulatory frameworks [43]. The two most well-known payment fintechs are PayPal and Square, but there are others that are engaged on international lending markets. Since 2016, Tyro Payments has been conducting business in

Australia under a full banking license. Apart from the BigTechs in China, the payment fintechs that provide credit in developing nations include Paytm, Mswipe, and Pine Labs in India; KopoKopo in Kenya, which provides loans to businesses that accept Lipa na M-Pesa payments; and iKhokha in South Africa. Many of these fintechs provide loans to businesses that accept electronic payments using their point-of-sale (PoS) terminals. The fact that payment fintechs are digitally savvy and have access to data on the (digital) sales of merchants is an often cited justification for why they have entered the lending market. A payment fintech can evaluate a merchant's creditworthiness based on their digital payment footprints. The claim that payment fintechs directly access the borrowing merchant's cash flow when processing transactions receives less attention. They can compel loan repayment before the merchant can spend the sales income elsewhere, giving them the absolute seniority over all other creditors. The lending fintech is included into many credit products offered by payment fintechs (like PayPal and Square) so that it automatically deducts a part of each transaction it completes for the borrowing business. In other words, the borrowing merchant only receives the residual funds from each transaction completed through the fintech's point-of-sale (PoS) device while the fintech retains a percentage of each transaction that goes toward loan repayment. The proliferation of payment fintechs that offer credits with automatic sales-based repayment will likewise pick up steam as the importance of digital payments grows. Nevertheless, despite the advantage of the enforcement technology, companies that offer sales-based credit still need to properly assess and oversee their borrowers. They must also make their credit contract strong enough to disincentivize the adoption of alternate payment methods. However, even outside of payment fintechs, digital transformation and the Internet of Things can support similar financial products and assist address these problems [44].

Cryptocurrencies are quickly gaining popularity around the world as customers choose innovative, easy-to-use, secure payment options more frequently. Businesses must alter to accommodate this transformation and

provide additional options for customers at the moment of purchase. A number of payment processors have also acted quickly to adapt their platforms to support cryptocurrency transactions, enabling businesses to accept cryptocurrency payments from clients. Transaction volumes will increase as a result of customer demand and a strong reaction from a number of payment service providers. As a result, established financial institutions would find it difficult to ignore this potential for much longer. When used as a means of exchange for goods and services online, cryptocurrency is essentially a value token or instrument. The underlying technology of cryptocurrencies, blockchain, which is a decentralized system, organizes and records transactions over a network of computers. As the money of the future, with the ability to remove central intermediaries from the payment value chain, and with a higher level of security than conventional payment systems, blockchain is what cryptocurrency aficionados champion. In order to process the crypto payments, a crypto payment service provider works as a middleman between the payer and the recipient. This enables retailers to accept cryptocurrency payments both online and offline. The supplier of the service manages the intricate backend workflow of cryptocurrency payments and provides buyers and sellers with a smooth payment solution. The ability to make anonymous payments with cryptocurrencies was one of the main reasons they were created. This reason is frequently overlooked in the frenzy created by the media and the financial industry, which is concentrated on price fluctuations. Prices are significant, but given that cryptocurrencies are gaining so much traction and acceptance, understanding how to pay with them is more crucial. In the past, transmitting a cryptocurrency required entering a transaction code into your computer's command line. As with utilizing an app to send or receive money to and from your bank account, the once complicated procedure of sending and receiving cryptocurrency is now far more straightforward. The application you use will determine how the payment is started, but generally speaking, it goes like this. Although cryptocurrency is still in its early stages, there are more and more sites where you may use it to pay for goods and services. The majority of companies who

take cryptocurrencies as payment do so via cryptocurrency payment gateways, which are payment service providers that typically guarantee cryptocurrency to fiat conversion at the time of the transaction to prevent price slippage [45]. Crypto payments have quicker settlement cycles than credit card payments and may be less expensive because of decreased transaction fees. With the ability to facilitate frictionless transfer of cryptocurrency payments from anywhere in the world, crypto payment systems have the potential to create a borderless payment network. The companies that offer cryptocurrency payments assert that they ensure transparency in the highly erratic exchange rates between cryptocurrencies and fiat money. These services give businesses numerous options for accepting international payments. Customers might be hesitant to pay into a person's bitcoin wallet, but an established payment service provider handling the payment would inspire a lot more trust and confidence. As a result, merchants can also develop a trustworthy and authentic identity in the world of virtual payments [46].
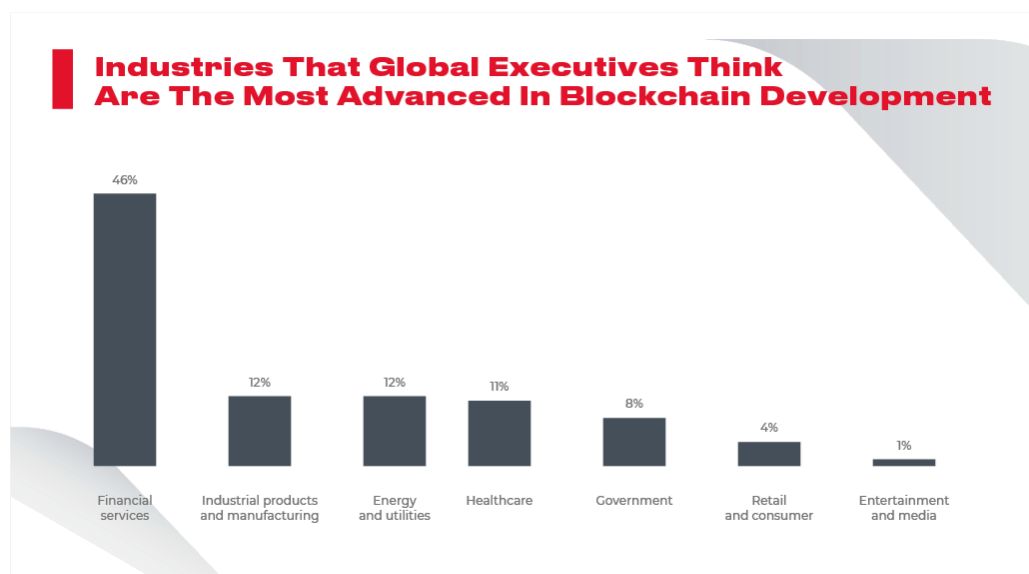

Industries That Global Executives Think Are The Most Advanced In Blockchain Development

Figure 7 Blockchain Industry [47]

3.3.3. Smart Contracts

In a smart contract, the conditions of the arrangement between the buyer and seller are directly encoded into lines of code, making it a self-executing contract. The agreements and underlying code are spread throughout a

decentralized blockchain network. Transactions are traceable and irreversible, and the code regulates their execution. Without the requirement for a centralized authority, a legal framework, or an external enforcement mechanism, smart contracts enable trusted transactions and agreements to be made between dispersed, anonymous individuals. Although blockchain technology is now primarily thought of as the basis for bitcoin, it has developed well beyond supporting the digital currency.

Nick Szabo, an American computer scientist who created the virtual currency "Bit Gold" in 1998, more than a decade before the creation of bitcoin, first suggested the idea of smart contracts in 1994. In truth, Szabo has refuted claims that he is the genuine Satoshi Nakamoto, the person who created bitcoin anonymously [48]. Smart contracts, as described by Szabo, are computerized transaction protocols that carry out a contract's terms. He desired to bring POS (point of sale) and other electronic transaction techniques' capability into the digital sphere [49]. An agreement between a landowner and an underwriter can serve as a real-world Fintech example that uses smart contracts. When a contract term is fulfilled, the insurance company has an obligation to reimburse the landowner. The selected bitcoin address receives the money automatically. Ethereum is a decentralized platform that aids in the execution of smart contracts. Smart contracts enable significant innovation in the Internet of Things. Most modern producers maintain centralized control utilizing their Internet of things. Smart contracts, that are dispersed throughout the whole system and aid resource conservation, can contain the hashes necessary for software updates. Smart contracts may reduce administrative and operating costs, reduce investment risk, and improve the quality of economic services. Traditional stock markets have been affected by the lengthy settling times. Smart contracts can shorten the settlement period from 20 days to one week, increasing client satisfaction [50]. Important building blocks for products in the blockchain and cryptocurrency industries are smart contracts. Using a smart contract, you can finalize a transaction when a verifiable event, like a payment, has occurred. If

you're doing anything other than buying and holding cryptocurrency, chances are you've used smart contracts because they run in the background of many consumer crypto products. Stablecoins, decentralized exchanges, and NFTs are examples of applications for smart contracts. It can be useful to understand smart contracts through an example because they typically function in the background of the end-user experience. Let's say you locate someone who is willing to trade and you want to exchange one type of cryptocurrency for another. However, since you don't know this individual, you want to be certain that they will fulfill their half of the bargain if you pay them cryptocurrency. A smart contract that you and your opponent create could guarantee that the transaction won't take place unless you both receive payment. A fundamental drawback of any smart contract that utilizes a blockchain is that it can only rely on data that is kept in the network's records. And blockchains for cryptocurrencies typically contain data about the movement of that particular cryptocurrency and associated assets. As an illustration, you could create a smart contract that stores digital assets that would be paid to a contractor after the work on your property is complete. But whose decision is it to call a job finished? A smart contract would be of little assistance in a disagreement over whether the project was completed satisfactorily if there was no reliable means to include information about the status of construction that could be verified by both parties. To authorize the computer software to release the funds, a third party would be required. In order to solve this problem, blockchain developers invented the idea of a "oracle," which feeds outside knowledge into a blockchain system. Let's use the contractor's example and suppose this was an HVAC project. It might be possible to confirm that the job has been finished as indicated by using data from a sensor or thermostat [51].
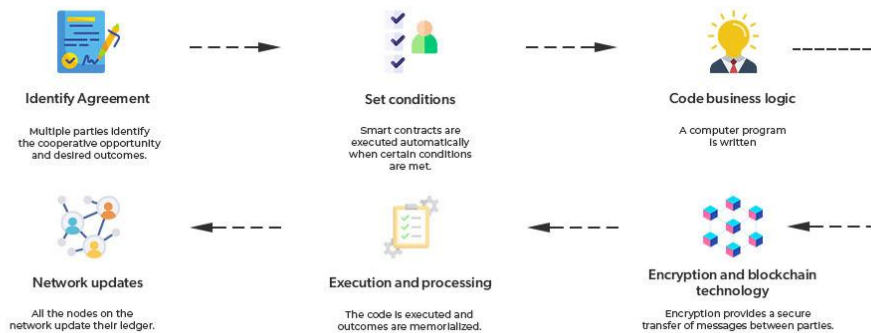
Figure 8 Smart contract Procedure [52]

3.4. Adoption Challenges

Time lags and high transaction costs define the state of services in the banking industry. Due to its capacity to lower transaction costs and boost the efficiency of cross-border transactions, blockchain has been heralded as a revolutionary technology. But huge institutions are already starting to doubt blockchain's capacity to address these issues and if the technology is advanced enough to support widespread use. Leaders in the banking sector, including large banks like the Central Bank of Russia, the Bank of Canada, and the Central Bank of the Netherlands, have voiced these concerns. Technical advancement It must be embraced by a substantial portion of the population for it to be successful in the market and spread throughout that community. The adoption of technology has been examined from a wide range of angles, including those of technology management and marketing, as well as in a wide range of industries and businesses, including small businesses. The fact that blockchain technology is still in its infancy continues to be the biggest barrier to acceptance for the FinTech industry. There are unidentified causes and vulnerabilities, as well as a lack of standardization and regulation. These, however, won't prevent it from becoming extensively used. Regulations will undoubtedly be passed, standards will be set, and trust will inevitably increase. Over the next years, important improvements will take place that will influence how blockchain is used in the financial sector and make it simpler to deploy. Understanding and deconstructing the distinctions between the underlying technology (Blockchain) and the digital

currency is the first step toward achieving this (Bitcoin). Even when this stops being a problem for the majority of firms, it is still a demonstrable conundrum for users who are unfamiliar with the technology. The value that Blockchain can actually offer for the FinTech sector and use cases has also been the subject of a lot of hoopla. This is largely because various people may have different meanings for the term "blockchain." For instance, while some businesses use Blockchain as a storage technique, others see it as a platform. These fundamental issues together result in inconsistent assertions and hypes that eventually result in greatly exaggerated statements [53].

Addressing how cryptocurrency exchanges verify customer identities and accounts as a key component of Know Your Customer (KYC) and anti-money laundering procedures is one of the main obstacles preventing widespread adoption of cryptocurrencies. According to a CipherTrace report from 2020, 56% of the 800 bitcoin exchanges and over-the-counter trading desks examined had insufficient or shoddy KYC procedures. Crypto exchanges have struggled to efficiently recruit people to their platform while simultaneously reducing fraud, much like traditional financial institutions. When a user opens a new account or makes a trade or transfer, for example, a cryptocurrency company may need to confirm their identity. Delivering a convenient customer experience is just as vital as following the law. Working in teams is the most practical way to tackle this problem. Utilizing a tested verification method will enable integration to happen more rapidly for the benefit of your clients. Speed is crucial in the quick-paced world of cryptocurrencies. Since these issues have affected many neobanks in addition to cryptocurrency exchanges, the fintech market has seen a growth in the number of identity verification services. Blockchain is susceptible to fraud and scams, much like many other consumer-facing services. Public blockchains can experience significant levels of fraud because they reduce the requirement for trusted third parties to authenticate transactions. For instance, from October 2020 to March 2021, the Federal Trade Commission (FTC) received approximately 7,000 complaints about cryptocurrency investment schemes, with claimed losses increasing more than tenfold, to above $80 million. Understanding the flaws and constraints in technologies like blockchain and using them in ways that

don't help attackers is crucial. Even while it is impossible to stop all fraudsters, it is possible to better recognize and manage risks to lessen their impact. The proper data analytics and monitoring tools, along with the use of a strong risk management approach, can aid in the early detection of issues. Regulatory changes are a constant challenge since they call for businesses to interpret rules and modify procedures as necessary [54].

4. Conclusion

The fintech ecosystem is always changing and entering new eras. Blockchain/DLT is here to stay and is slowly ingraining itself into every aspect of civilization. By enabling customers to conduct financial transactions effectively on a mobile device, fintech enhances customer service by offering customers more individualized services. Consumers are becoming increasingly tolerant of subpar customer service and unclear financial transaction rules and regulations. It is crucial to understand that these advances in digital and internet that make our society better also come with a lot of obstacles, such as rising consumer privacy and information security dangers. Cloud services are used by financial firms to achieve high quality and efficiency but they also introduce additional security risks. With the goal of enabling users to own their data and reduce their reliance on middlemen, many fintech companies are working together to address blockchain adaptation [55]. For institutions, it will take time to consider all of the benefits and risks of blockchain. While some businesses may afford to hold off on implementing new technology until everything is certain, most can't. Innovation will accelerate in the coming years as capital markets and technology merge more closely. The success of businesses will depend on their capacity to make wise choices based on prior knowledge. The importance of cryptocurrencies in a decentralized system is crucial. FinTech companies are trying to come up with a way to employ cryptocurrency in P2P transactions while adhering to the rules. Even despite the present restrictions do not apply to cryptocurrencies, regulators are gradually coming to understand the advantages of this blockchain-based innovation. The global community is moving toward blockchain-based innovations brought by digital infrastructure. Many traditional firms now operate in an unsettling climate because to blockchain technology. These blockchain developments are all connected to cryptocurrencies. The potential for blockchain-based solutions in the

future are essentially endless. Businesses in the payment processing and fintech sectors will encounter new difficulties as the cryptocurrency revolution spreads and the businesses who adopt new technology will be strategically positioned in the market.

5. Bibliography

[1] AILabPage, "Evolution of Fintech: The 5 Key Eras," [Online]. Available: https://www.e-zigurat.com/innovation-school/blog/evolution-of-fintech/.

[2] B. N. S. K. Danny McGowan, Is fintech disrupting the banking sector?, Birmingham : BANKS & FINANCIAL MARKETS, 2022.

[3] A. Graham, "FINANCE PROCESSES," 2022. [Online]. Available: https://www.toptal.com/finance/investment-banking-freelancer/fintech-and-banks.

[4] M. &. Company, "Europe's fintech opportunity," 2022. [Online]. Available: https://www.mckinsey.com/industries/financial-services/our-insights/europes-fintech-opportunity.

[5] S. E. index, "Excluding insurance and stock exchanges," 2021.

[6] A. KLEIN, "The Coming "FinTech" Revolution," 2016. [Online]. Available: https://democracyjournal.org/magazine/42/the-coming-fintech-revolution/.

[7] T. E. Time, "Why India is at the forefront of a fintech revolution," [Online]. Available: https://economictimes.indiatimes.com/why-india-is-at-the-forefront-of-a-fintech-revolution/articleshow/86936413.cms.

[8] F. Monthly, "For All The Talk Of A Fintech Revolution, It Is Only Just Beginning," [Online]. Available: https://www.finance-monthly.com/2020/07/for-all-the-talk-of-a-fintech-revolution-it-is-only-just-beginning/.

[9] A. HAYES, "Investopedia," 2022. [Online]. Available: https://www.investopedia.com/terms/b/blockchain.asp#citation-36.

[10] Coinbase, "What is Bitcoin?," [Online]. Available: https://www.coinbase.com/learn/crypto-basics/what-is-bitcoin.

[11] S. Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," 2009. [Online]. Available: https://bitcoin.org/bitcoin.pdf.

[12] [. K. E. W. E. Wang, "Types of blockchains".

[13] Shashank, "Defining Blockchain Technology," 2019. [Online]. Available: https://www.edureka.co/blog/blockchain-technology/.

[14] A. M. a. E. L. V. Denisova, ""Blockchain infrastructure and growth of global power consumption,"," *International Journal: Energy and economic policy,,* vol. 9, pp. 22-29, 2019.

[15] K. R. J. G. K. Abderahman Rejeb, "Cryptocurrencies in Modern Finance: A Literature Review," *Etikonomi,* vol. 20, pp. 93-118, 2021.

[16] S. Martin, "Top 9 Blockchain Trends Everyone Must Know About in 2021 — Latest Updated," 2020. [Online]. Available: https://medium.com/dataseries/top-9-blockchain-trends-everyone-must-know-about-in-2020-2d865beb0c4f.

[17] B. W. C. J. L. a. G. J. M. Akins, "A whole new world: Income tax considerations of the Bitcoin economy," vol. 12, pp. 25-58., 2014.

[18] B. a. S. S. Akolkar, "Tether (USDT) Conspiracy Tosses Again As We Arrive at The D-Day," 2021. [Online]. Available: https://coingape.com/tether-usdt-conspiracy-tosses-again-as-we-arrive-at-the-d-day-of-january-15/.

[19] J. K. A. K. a. W. S.-J. Ahn, "The role of intermediaries in facilitating trade.," *International Economics,* vol. 84, pp. 73-85, 2011.

[20] T. Brew, "Types of Blockchain (Part 4- Blockchain Series)," 2022. [Online]. Available: https://community.neohttps://medium.com/techskill-brew/types-of-blockchain-part-4-blockchain-basics-c0b2e40c1780ntools.io/web3-guide/.

[21] J. FRANKENFIELD, "What is Bitcoin?," 2022. [Online]. Available: https://www.investopedia.com/terms/b/bitcoin.asp.

[22] J. Redman, "10 Years Ago Bitcoin's Genesis Block Changed the Course of History," 2019. [Online]. Available: https://news.bitcoin.com/10-years-ago-bitcoins-genesis-block-changed-the-course-of-history/.

[23] Coinbase, "Bitcoin BTC," 2022. [Online]. Available: https://www.coinbase.com/price/bitcoin.

[24] J. FRANKENFIELD, "Investopedia," 2022. [Online]. Available: https://www.investopedia.com/terms/e/ethereum.asp.

[25] wackerow, "INTRODUCTION TO SMART CONTRACTS," 2022. [Online]. Available: https://ethereum.org/en/developers/docs/smart-contracts/.

[26] "History," 2022. [Online]. Available: https://docs.solana.com/history.

[27] CoinmarketCap, "solana," 2022. [Online]. Available: https://coinmarketcap.com/currencies/solana/.

[28] coinmarketcap, "solana," 2022. [Online]. Available: https://coinmarketcap.com/coins/.

[29] "Solana documentation," 2022. [Online]. Available: https://docs.solana.com/introduction.

[30] E. PICARDO, "What is Solana," 2022. [Online]. Available: https://www.investopedia.com/solana-5210472#citation-11.

[31] J. FRANKENFIELD, "What is Ripple," 2022. [Online]. Available: https://www.investopedia.com/terms/r/ripple-cryptocurrency.asp.

[32] A. Govind, "Should Ripple's XRP Be Classified as a Security?," 2019. [Online]. Available: https://medium.com/swlh/should-ripples-xrp-be-classified-as-a-security-409ec3662d94.

[33] C. Hoskinson, "IOHK-TEAM," 2022. [Online]. Available: https://iohk.io/en/team/charles-hoskinson.

[34] C. Organisation, "Enterprise," 2022. [Online]. Available: https://cardano.org/enterprise/.

[35] C. Organisation, " The Blockchain Revolution Started With Bitcoin. It Continues Now With Ouroboros," 2022. [Online]. Available: https://cardano.org/ouroboros/.

[36] C. Docs, "About stake pools, operators, and owners," 2022. [Online]. Available: https://docs.cardano.org/development-guidelines/operating-a-stake-pool/about-stake-pools.

[37] I. S. PROJECT, "CARDANO ROADMAP," 2022. [Online]. Available: https://roadmap.cardano.org/en/.

[38] C. B. MURPHY, "Remittance: What It Is and How to Send One," 2022. [Online]. Available: https://www.investopedia.com/terms/r/remittance.asp.

[39] I. Ionescu, " How fintech is changing international remittance and expanding business," July 2022. [Online]. Available: https://thepaypers.com/expert-opinion/how-fintech-is-changing-international-remittance-and-expanding-business--1257449.

[40] CRYPTO, "Crypto Remittances: Everything You Need to Know," 2021. [Online]. Available: https://juno.finance/blog/onjuno-crypto-remittances-guide.

[41] T. D. Fifth, "Cross Border Payments: The Evolution," 2021. [Online]. Available: https://thedigitalfifth.com/the-evolution-of-cross-border-payments/.

[42] A. S. Michael Geller, "Fintech and the Future of Finance," 2022. [Online]. Available: https://www.worldbank.org/en/publication/fintech-and-the-future-of-finance.

[43] J. P. C. B. M. J. a. A. L. Johannes Ehrentraud, "Fintech and payments: regulating digital payment services and e-money," *FSI Insights ,* 2021.

[44] K. R. J. SCHÄUBLIN, "Payment fintechs' debt enforcement technology," 2022. [Online]. Available: https://blogs.worldbank.org/allaboutfinance/payment-fintechs-debt-enforcement-technology.

[45] N. REIFF, "How to Pay with Cryptocurrency," 2022. [Online]. Available: https://www.investopedia.com/ask/answers/100314/what-are-advantages-paying-bitcoin.asp.

[46] B. N. A. Kaduthanum, "Moving toward a cashless society with crypto payments," 2022. [Online]. Available: https://www.tcs.com/crypto-payments-currency-future.

[47] PWC, "TOP-RATED BLOCKCHAIN USE CASES BY INDUSTRY," [Online]. Available: https://innovecs.com/blog/blockchain-use-cases/.

[48] coinbase, "Who is Satoshi Nakamoto?," 2022. [Online]. Available: https://www.coinbase.com/learn/crypto-basics/who-is-satoshi-nakamoto.

[49] N. Szabo, "Smart Contracts," 1994. [Online]. Available: https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html.

[50] S. H.-N. W. X. J. M. I. ZibinZheng, ""An overview on smart contracts: Challenges, advances and platforms,"," Future Generation Computer Systems,, 2020., pp. 475-491.

[51] A. Rosen, "What Are Smart Contracts in Cryptocurrency?," 2022. [Online]. Available: https://www.nerdwallet.com/article/investing/smart-contracts.

[52] P. Hooda, "Smart Contracts in Blockchain," 2022. [Online]. Available: https://www.geeksforgeeks.org/smart-contracts-in-blockchain/.

[53] F. TEAM, "The Blockchain Opportunity and the Challenges for Adoption," 2017. [Online]. Available: https://www.fintechtalents.com/the-blockchain-opportunity-and-the-challenges-for-adoption/.

[54] D. Whitcomb, "3 Roadblocks to Widespread Crypto Adoption," 2022. [Online]. Available: https://www.paymentsjournal.com/the-rise-and-rise-of-bnpl/.

[55] D. Penn, "How Fintech is Embracing the Metaverse," 2022. [Online]. Available: https://finovate.com/how-fintech-is-embracing-the-metaverse/. .