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Can digital currency technology help reduce transaction costs and improve access to financial services for underbanked populations?

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Abstract

Research on the impact of digital currency technology on exchange costs is progressing, with studies highlighting various aspects. Blockchain technology is seen as a mechanism that can reduce transaction costs by enforcing contract execution through encryption, bringing transactions closer to conditions of a perfectly competitive market. Additionally, the issuance of digital currency can influence currency circulation speed and money multiplier, affecting financial system risk and supervision. While the influence of Bitcoin on exchange rates is noted to be negligible, the importance of embracing decentralization and digital money for cost reduction and transparency in enterprises is emphasized. Furthermore, the introduction of central bank-issued digital currencies (CBDCs) is being explored, with different design options impacting transaction costs for various stakeholders.

Keywords: Digital Currency, Financial Services, Transaction Costs.

Introduction

Blockchain technology is an economic and technological innovation that is considered one of the newest types of public platforms in terms of its unique architecture and uses data encryption technology and has features such as decentralized and pervasiveness and also has a decentralized ledger that reproduces trust (Liebenau & Elaluf-Calderwood, 2016; Lindman et al., 2017). Therefore, this technology can provide a platform for recording transactions and sharing data between participating parties in a more efficient, transparent and verifiable manner (Workie & Jain, 2017). Also, its implementation in the legal system can lead to many changes in the industry, economy, etc. Due to its immutability, this platform has the potential to save and record all types of electronic exchanges and concluded contracts in full and by inserting a time stamp on them. On the other hand, it is worth mentioning that the contracts concluded in this platform are beyond the control of financial intermediaries, which means that what is concluded under the title of contract in this platform is all the stages of negotiations until its finalization, without the involvement of any financial intermediary. Like the banks or the government, and after concluding the

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transactions, the terms of these contracts are recorded in the form of encrypted codes on this platform, and this process is done by artificial intelligence. According to the given instructions, this supercomputer reads the contents of the contracts and if it confirms their compliance with the predefined regulations, it stores the contracts in the blocks of this chain in an orderly but unspecified manner (Mougayar, 2016).

Theoretical statement

The emergence of blockchain technology

The evolution of blockchain began in 1991, when Stuart Haber and Scott Sturta started working on creating a secure chain of blocks covered by cryptographic algorithms (first version). This idea did not have the Mehrzaman factor in that year. Years later in 2008, a group of experts known as Satoshi Nakamoto created and then developed the concept of blockchain.

The first example of blockchain was designed after the invention of Bitcoin as the first cryptocurrency as a platform in which these currencies can be transferred. The two concepts of decentralized data and decentralized database are the main components of blockchain. With the ever-increasing growth of Bitcoin, the blockchain has undergone rapid changes. The decentralized structure of the blockchain is one of its main features, which makes it possible to create interactions and exchanges between the components of a blockchain network without the need of any third party. The high security of transactions that are based on blockchain technology led to the emergence of different digital transaction systems such as Ethereum, cryptocurrency, Litecoin, Ripple, which are able to perform a large number of transactions in a fraction of a second (Antova & Tayachi, 2019). Between 2013-2015 due to the extreme fluctuations in the price of Bitcoin in the global markets. Efforts were made to solve this issue, such as replacing Ethereum instead and implementing the Ethereum blockchain platform, which is capable of storing various types of data. Messages containing identity information, ownership documents, bank accounts, transfer of digital securities, financial transactions and data, messages containing the provisions of contracts concluded on this platform, therefore, the blockchain unveiled its new version (version Second) which was based on the development of Ethereum and finally in 2018 a new version of the blockchain was unveiled, which is called Blockchain 3. The next version, the newest version of the blockchain, which is called Neo, uses an open source platform and was created for the first time in China (Abojeib & Farrukh, 2019).

Blockchain structure and architecture

Blockchain structurally provides a secure way to manage transactions in a peer-to-peer distributed manner. To better understand this issue, we will review the related and key terms and concepts of this technology, which are considered as components of this ecosystem, as follows:

• Node or node: Any computer or machine that is connected to the blockchain network

of the Internet and installs and runs the software related to the blockchain in order to join the blockchain network is called a node or node, which contains an independent copy of the entire content of the ledger. It is blockchain (Rastogi, 2022). For example, in the Bitcoin blockchain network, every computer must install and run the Bitcoin wallet software.

• Block: is a data structure that is used to store a set of transactions.

• Block chain: A chain of blocks where each block has a short and unique encrypted message from the previous block and are placed next to each other in a specific order is called a block chain.

• Transaction: The smallest building block of a blockchain, which is referred to as records or information (every content provider is a blockchain).

• Shared ledger (distributed): A distributed ledger is a data structure that is managed within any blockchain software. When a computer runs the blockchain software, a corresponding ledger is created for that node.

• Consensus: It is a set of rules and regulations to carry out blockchain operations.

• Consensus Algorithm: Consensus algorithm is implemented as part of blockchain software. This algorithm defines the rules of the game in the blockchain ecosystem. It defines blockchain networks. Blockchain networks can use different algorithms for consensus, which determine how the nodes of the blockchain network participate in the consensus process. Among the types of consensus algorithms, the following algorithms can be mentioned:

1. Proof of work
2. Proof of shares
3. Proof of the elapsed time

• Smart contract: It is a translation of an agreement between the service provider and the client, which includes words with the general terms and conditions of that contract, which has been converted into computer language (code). The actors of a smart contract are digital assets and 2 or more parties to the contract. The smart contract is defined and implemented within the blockchain and brings a significant level of trust, security and savings to blockchain-based transactions (Huang, 2023).

Main features of blockchain technology

The key features of blockchain technology are as follows:

• Authentication and providing confidentiality in blockchain networks: authentication is done through the use of public and private key cryptography. For this purpose, a public and private key pair is assigned to each node or node in the blockchain network. As the name suggests, the public key is accessible to everyone, searchable, and all nodes of the blockchain network use the individual's public key as a unique identifier. However, the private key of each node is kept confidential by that node itself, and if the private key of each node is disclosed, the security of the

transactions of that node and related transactions will be jeopardized. According to the feature of public-private key encryption, if for example two nodes A and B want to exchange data together, in such a way that A wants to send data to B that only he can see or read, A must first Encrypt the data using B's available public key and then send it to B. After receiving the encrypted data, B can open and read the encrypted data using his private key. This process is called asymmetric encryption.

• Immutability and strengthening of data (authenticity of information) through hashing functions: Another feature of the blockchain network is that they are resistant to changing and converting data records. To achieve this goal, hash functions are used. Composer functions are one-way functions that receive data values as inputs and have a fixed-length output as the value of the composer function. In synergistic functions, there should be 2 different outputs for every two different inputs. In the blockchain network, after each transaction, the network nodes can calculate the hash value corresponding to their data record and attach it to their data record by applying the hash algorithm. In this case, any change and transformation in the content of the record will lead to the production of a different hash, which indicates the occurrence of a manipulation in the data or record.

• Decentralization of the blockchain network by the distributed ledger: Another important feature of the blockchain network is the decentralized structure and the presence of distributed ledgers in the network, which eliminates the need for centralized management and integrated control in the network. In other words, in blockchain networks, all nodes have a copy of the transactions made and stored in the ledger, and with each new transaction, network nodes are required to send a copy of the new changes to all neighboring nodes. This distribution of ledgers has disadvantages such as data overload, network traffic overhead and processing overhead, but as mentioned, it causes blockchain networks to be decentralized.

Types of blockchain

According to Mogayar (2016), the definition of blockchain is a technology that permanently records transactions in a way that cannot be deleted and can only be continuously updated. In other words, maintaining a historical and inexhaustible chain of data blocks. Therefore, in his opinion, blockchain technology is a meta-technology that combines several technologies to create a set (Mougayar, 2016).

Therefore, it can be concluded that immutability is a characteristic of all blockchains and it exists in every blockchain, but the rest of the attributes exist in blockchains with variable degrees, and different blockchain-based networks have diverse attributes and different levels of control. (Pilkington, 2015). The key attributes of blockchain technology are distributed ledger, cryptography, consensus mechanism, and peer-to-peer transfer of blocks and each blockchain is an

independent database, with different levels of access and control, based on 3 types Private, public and consortium are divided (Lindman et al., 2017):

Public blockchain

As its name suggests, it is a platform that is designed for public use and it is possible for all people to access it, and every user has the ability to view or make a copy of all the information stored in it, and unconditionally in available to every internet user (Pilkington, 2015). In this type of blockchain, no one is responsible for the network and everyone can participate in the processes of reading, writing (creating blocks) and monitoring it. The consensus process is done by a decentralized consensus mechanism. Two consensus mechanisms based on proof of work and proof of stake are among the most common consensus mechanisms in this type of networks.

In fact, public blockchain has 3 main characteristics:

a) Public blockchain software is freely available to everyone so that people can download it and install it on their computers or devices, and it allows them to verify network transactions and Participate in the consensus mechanism.

b) Everyone can be a part of transactions in a network.

c) Everyone can access and read the transactions using the block explorer. In other words, all transactions are transparent, but at the same time anonymous.

What can be concluded from the set of these features is that the use of blockchain will lead to the agility of business models through the reduction of intermediaries, and the use of this type of blockchain will reduce the costs of data processing and maintenance. Because there is no need to have centralized servers and system administrators.

Private Blockchain

In contrast to the public blockchain, the private blockchain is a platform that is designed for a specific organization or organization, and only that organization has the ability to enter the platform and store the relevant classified information, and in fact, entering it depends on having permission and access to it is controlled and managed by a central authority. The most obvious difference between public and private blockchain is that in private blockchain it must be specified who can access the blocks and who can participate in a transaction and its verification, in other words only the nodes of Pre-determined have the right to access this type of blockchain and these nodes are determined by the recipients of that blockchain. Private block chains are mostly used for database management and monitoring, and their use is limited to companies, organizations and organizations. One of the most important advantages of private block chains is reducing transaction costs and reducing data redundancy. The set of these features transforms the private blockchain into a centralized structure where all nodes:

A) They are not capable of becoming a versatile node.

b) They cannot make transactions.

c) They cannot access or monitor the contents of the blocks through the blockchain explorer.

Insurance Blockchain is an example of a private blockchain that participating insurance companies and brokers have access to. Between the two modes of public and private blockchain, there is also a set of other permissioned blockchain networks, such as hybrid or partially decentralized (Pilkington, 2015).

Blockchain consortium

This type of blockchain is a combination of the above 2 modes where some nodes monitor the consensus process and others may be involved in making transactions. In other words, this type of blockchain is used by organizations that intend to share their organizational blockchain, but have policies to restrict access to the network in their agenda, that is, they do not want the network in be available to the public.

In Blockchain Consortium, we face 2 types of users:

a) Users who are allowed to control the network and decide who can access it.

b) Users who only have access to the network.

In such a blockchain network members or nodes can participate in creating transactions and search the blocks through the blockchain explorer.

Blockchain applications

Next, we will examine the applications of blockchain in the field of cryptocurrencies, transactions, letters of credit, elections and voting, insurance, stock exchange, real estate, information sharing in banking networks and financial systems.

Bitcoin and cryptocurrencies

One of the topics that has been paid attention to with the expansion of virtual and international technologies is the phenomenon of virtual currencies and related mechanisms. One of the most important and well-known manifestations of blockchain technology is Bitcoin, which is a cryptocurrency based on the blockchain network. The Bitcoin blockchain network consists of many nodes that are connected to each other using the blockchain protocol with reinforcing information. According to BJerg (2016), the Bitcoin blockchain network is a peer-to-peer network that has no hierarchy, centrality, and master node. Nodes compete with each other to create a new block, since Bitcoin protocols allow complete nodes to share their knowledge of transactions with their neighboring nodes, hence, with each new transaction, the list previous transactions recorded in the ledger are verified, preventing respending on the Bitcoin network (Bjerg, 2016).

Each new valid block contains new bitcoins that belong to its creator. The block creator receives an amount as a transaction fee for

collecting the transactions stored in that block.

Narayanan et al. (2016), in describing the operation of the blockchain network, are of the opinion that before creating a new block, a miner must find a solution to a mathematical puzzle that is also difficult to solve. This effort is called the reason for the work because solving this puzzle requires a lot of computing power. For this reason, creating a new block in the Bitcoin blockchain network takes nine minutes on average. Other miners then check and verify the correctness of the new block and append it to the longest chain. Identifying and expanding the longest valid chain is another important component of the consensus mechanism.

Also, Sai et al. (2016), state that since blockchain protocols are implemented sequentially, regardless of how much computer power increases, it is difficult for this technology to meet the needs of the financial system. Because due to its peer-to-peer feature that each node must act as both a client and a server, the blockchain network is inherently slow (Tsai et al., 2016). It should also be noted that in cases where the blockchain-based network includes various countries in which there are also various judicial systems, a single regulatory framework should be developed for the implementation of the network so that the asset verification process is possible.

2- Record keeping: Record keeping is the correct and accurate keeping of information over time in a way that meets the needs of the interested parties (Witte, 2016), which is exactly what blockchain technology does with its unique design and is able to do. Is to keep records well (DuPont & Maurer, 2015). Today, financial institutions maintain records in various databases while in the blockchain ledger, there is a central repository that all participating financial institutions have access to. Guo and Liang state that many of the financial sector's problems stem from the poor quality of records for validation and the inability to share those (Guo & Liang, 2016).

According to Moyano and Ross (2017), recognizing customers based on existing records costs an average of 500 million dollars for each bank (Moyano & Ross, 2017). Also, financial institutions must cooperate with each other and shareholders in order to create record keeping systems in the blockchain network. Blockchain networks allow financial institutions (stock exchanges, insurance companies, central banks and other banks) to strengthen their controllability and trust by maintaining efficient and perfect records in the financial value chain. De Meijer (2015). However, to achieve this desirable perspective, financial institutions need to agree on issues such as what records to share, how to share the costs of creating and maintaining this network, and how to manage access control (de Meijer, 2015).

It should be noted that a record stored in the blockchain ledger becomes more accurate over time. Therefore, blockchain technology, due to its immutable feature and consensus mechanism, can be an important source in providing correct records and ultimately a reliable platform (Mori, 2016).

The sum of these capabilities makes it possible to use blockchain technology in an organization like the stock exchange,

because it allows perfect and transparent review of dividend payment records, user ownership details, conditions for dividing the ownership of each share, recognizing the time of stock transactions and computational reports (Rechtman, 2017). Also, blockchain technology is a reliable infrastructure for auditing that financial institutions always want (Workie & Jain, 2017).

But since blockchain data is immutable and irreversible, the financial system must find new solutions to deal with issues caused by human error or input error at the data registration stage (de Meijer, 2015). Also, for computer resources dedicated to record keeping, it is necessary to consider a scalable blockchain-based ledger stored on multiple nodes. However, this does not matter because, according to Moore's Law, computer memory and central processing units (CPUs) are always getting cheaper and faster, and this lower cost makes it possible to maintain, store, and retrieve records faster.

Also, in transactions where there is a computer instead of a person on both sides of the transaction, with the move towards the Internet of Things, the current blockchain techniques undergo changes that cannot be done in the current paradigm, so a solution must be thought of for them.

Regarding financial disputes, in Ritchman's opinion, considering that the participants in financial transactions based on the blockchain keep each transaction records independently, but if there is a discrepancy in the accounting and review of the stored documents, the network protocol Blockchain gives the upper hand to the financial unit that has more transaction history (Rechtman, 2017).

3- Confidentiality: The confidentiality of data is one of the basic aspects of transactions because people always attach great importance to the confidentiality of data and institutions must also take this into consideration and comply with the relevant regulations in this field. The cases that are raised in the discussion of confidentiality are the data related to assets in transactions on the one hand and the identity data related to people in the blockchain network on the other hand, both of which are important to pay attention to.

Also, the two principles of secrecy and transparency are two desirable features but sometimes they are in conflict with each other. While some people pay more attention to confidentiality than transparency, the majority pay more attention to transparency.

Blockchain technology can paradoxically and flexibly move within a platform between a high degree of transparency (decentralization of the blockchain ledger and making data available) and a high level of confidentiality (using user pseudonyms). Slow In general, the level of confidentiality and transparency of data in the blockchain depends on its type, which is a private network, public or a combination of these two situations.

There may also be concerns about the use of Bitcoin and similar block chains due to the anonymity of users in illegal activities. However, as detailed by Narayanan et al., the Bitcoin blockchain is pseudonymous, meaning that the identities in the network

can be traced back to real-world identities, and due to the immutability of data and their permanent existence, which They never disappear, greatly reducing the possibility of criminal activities. But at the same time, the lack of clear legal requirements in terms of confidentiality and transparency and their compliance creates uncertainty for financial institutions in the evaluation of blockchain technology. Because a blockchain network can cross the border of different jurisdictions, institutions should think about how to implement the legal provisions related to confidentiality and transparency in these different jurisdictions. Also, law makers and regulations are still understanding the implications of blockchain technology (Kiviat, 2015).

4- Reduction of transaction costs: Technological advances are one of the effective factors in the formation of competition in financial systems. The financial sector, like other sectors, must continuously innovate in order to be able to respond to the increasing demands and reduce transaction costs. Therefore, blockchain technology as an engine of innovation, in the field of financial affairs such as transactions, payment systems, operational risks. And insurance has been considered.

Currently, interbank payments are often made through clearing houses, which is complicated, time-consuming and expensive. According to De Meijer (2015), blockchain can reduce transaction costs in the field of inter-sectoral payments (financial institutions), securities organization in the stock exchange and banks and increase the speed of doing things (de Meijer, 2015).

Of course, those in charge of applying this technology in financial fields use gradual implementation methods instead of applying fundamental changes in order to minimize the negative effects of one-time decentralization, because although blockchain technology reduces costs in the long run, in the short term, due to the creation of blockchain-based infrastructure, it also involves costs.

In 2013 and 2014, in the payment sector, which is a prime candidate for innovation through blockchain technology, infrastructure has been transformed and new business models have been created, which in turn have led to greater value creation and cost savings. In such a way that it can be said that 4.5 billion dollars have been invested in Fin-Tech financial innovation (Kiviat, 2015). Also, according to the report of the World Economic Forum, in 2016, the investment in searching and finding financial applications of blockchain technology exceeded 1.5 billion dollars, although this number is expected to increase even more now (Workie & Jain, 2017).

Blockchain technology, in addition to the payment sector, also reduces information costs in credit cards (Guo & Liang, 2016) and significantly reduces settlement time, and therefore due to the network-based consensus mechanism. , enables immediate settlement, which itself saves a lot of time (Tapscott & Tapscott, 2016). Also, blockchain technology can automate transaction administrative operations and reduce transaction costs by making it

transparent for participating parties (de Meijer, 2015).
McKinsey estimates that blockchain technology can:

a) Reduce the cost of cross-border transactions from $26 to $15.

b) Reduce operational costs by 15 billion dollars annually.

c) Reduce the annual cost of risk by 15 billion dollars (Guo & Liang, 2016).

Of course, some researchers believe that resorting to blockchain technology alone does not lead to a significant reduction in transaction costs. For example, Murray states that 80% of the challenges in the financial system depend on processes and business models, and only 20% of the challenges can be attributed to technological barriers. This means that in order to achieve the desired results in addition to using blockchain technology, these efforts must be accompanied by fundamental changes in business models and current processes (Mori, 2016). Sai et al. suggest the best way to create a blockchain-based system in a separate and separated manner, where each part is responsible for a specific application such as accounting or transaction (Tsai et al., 2016). Also, the position of centralization should be carefully examined.

Application of blockchain in the form of financial fields

The first field of application is the field of payments. Blockchain technology can reduce cross-border transaction costs, annual operating costs and annual risk costs. Also, in some countries that want to strengthen their currency portfolio with convertible currencies, currency codes have been widely accepted and welcomed. By creating new models in financial services through cryptocurrencies, the payment sector has made it possible for users to transact by exchanging their cryptocurrencies. It should be noted that the concern about the use of cryptocurrencies for unauthorized activities is also resolved by the ability to track pseudonyms by blockchain technology.
For example, MyClime is a mobile app that connects to the Bitcoin blockchain, then that person can send or receive money from anywhere in the world to someone else's account somewhere else. In fact, having MyClim is like having a global bank account. Of course, this issue can put a new legal burden on the legislators. Since the legislators have always dealt with banks, therefore they have placed the prohibition of activities such as money laundering on them. But when there is micliim, the legislators have to change their ways and look at transactions in a different way. The blockchain solution uses other validation instructions that are different from the traditional solutions that require a person to present an ID card. The new solution allows people to find out who received their identity information, or even precisely the serial number of the device with which the person's information was downloaded, or whose name is that device.
The second area is related to the discussion of immutability and the existence of a time

stamp on data in blockchain technology, which has always provided a suitable platform for tracking and confirming assets and conducting financial transactions with a high level of trust (Rechtman, 2017). Also, blockchain technology creates a suitable system for complying with legal regulations by providing audit services. Also, supporting chain financial transactions is another important possibility provided by blockchain technology (Kiviat, 2015).

The third area is identity management, which is a clear example of block chain's valuable ability in managing people's identity, its application in Georgia. Also, this technology enables "self-governing identity" by which users have more control over their identity and its content.

Using blockchain to eliminate fraud in letters of credit

The use of LC letters of credit is one of the well-known methods for payments, especially in the field of international trade, which is used to ensure the receipt of payments. To open a letter of credit, it is necessary to go through different steps.

The first stage is the stage of opening credit in the opening bank. For this, it is necessary for the parties to agree on a transaction first, and after the initial agreements are reached, the buyer requests the opening of credit from a bank in his country and communicates it to the seller.

There are problems and dilemmas in the issuance of opening letters of credit, among which we can point out the challenges of documentary and contractual flow. In the documentation department, the lack of automation in the LC process and doing unnecessary manual work are among the problems that ultimately lead to the time-consuming process of LC issuance and approval. This challenge can be costly for traders. In the contractual sector, the independence of the rules of the buyer and seller banks and the lack of transparency in the texts of the contracts are among the problems of this sector. Observations show that about 70% of the requests for opening letters of credit are returned to the bank in the first presentation.

Therefore, the use of blockchain technology can make the LC method as a smart contract between exchanges to increase efficiency and guarantee payment, because blockchain can be used when the value of exchanges is high and the number of actors is high and there is no trust.

In the method of using blockchain to open a letter of credit, a network of persons including the buyer, seller, guarantor banks, and other financial institutions involved in the transaction is formed and at the same time the activities are confirmed digitally. The evidence indicates that it is that the letter of credit method through Bela Kechin has greatly reduced the time needed to open and issue letters of credit compared to the opening of letters of credit by SWIFT, which is basically a bilateral and non-banking mechanism.

Sharing customer identity information between banks with a distributed ledger

In Iran, based on the laws of the central bank, in order to combat money laundering and terrorist financing, documenting information and managing various risks,

instructions on how to identify customers in financial institutions have been compiled. According to this directive, all banks and financial institutions consider themselves obliged to implement customer identification regulations. Currently, this process is done in person and through branches independently, which is very complicated, time-consuming, and expensive for individuals and banks. On the other hand, the centralized storage of information increases its volume and security risks such as defects, theft, and hacker attacks. But in recent years, with the emergence of the technology concept of Tuzi Ashda's ledger, many banks and service-oriented organizations are planning to use or implement this technology in human-related processes, especially in the field of identifying their customers. The experts in this field of technology have presented a new way to record and store the identity of a customer, which is registered as his property in the distributed ledger (Samadi 2018).

Application of blockchain in the field of insurance

Another application of blockchain technology is its application in the insurance sector, such as two American insurance companies named Geico and All State, which show how blockchain technology can be used in checking and verifying assets, keeping records, maintaining data privacy, and reducing transaction costs. The description is below.

Nowadays, when people have an accident together, paper insurance policies prove that they are covered by insurance. If their insurance may have expired, blockchain makes it easy here, so that a piece of software is embedded in users' mobile applications to carry out this process. The two people who have been in an accident then touch their phones to access the insurance blockchain to verify insurance coverage. It is also possible to obtain information about the vehicles of licensed drivers and compare it with the insurance policy available on the blockchain network to determine the driver who does not have insurance coverage. Insurance blockchain is a private blockchain that is accessed by insurance holders and brokers. In this blockchain, the consensus mechanism checks its authorization. In fact, when two drivers touch their phones to each other, they gain temporary access to each other's information. Although the ledger is a distributed ledger between the parties, some data is hashed in such a way that the parties can only see what has already been agreed upon.

Application of blockchain in the stock exchange

The Australian Stock Exchange (ASX) is known as one of the first active organizations in this field in the world, which has decided to use distributed ledger technology or blockchain in the processes of buying and selling shares in order to increase efficiency. Stock exchange and seeks to replace it with the current system for processing stock transactions.

Since December 2017, this organization has been preparing the necessary infrastructure to transfer transactions to the blockchain platform and is aiming to introduce a new system as an alternative to the common electronic system of clearing funds in the country's stock exchange, so that it can carry out transactions. And provide faster transactions, with higher security and lower costs. For this purpose, it has released the first code for an alternative application based on blockchain technology in May 2019. The ASX has signed a tripartite memorandum of understanding (MoU) with the companies to collaborate on blockchain projects in Australia and New Zealand, as well as to jointly develop an application to replace its stock clearing and settlement system. This memorandum also includes support for the smart contract programming language called DAML.

The next feature is the use of cryptography and blockchain distributed ledger, which will create high trust and confidence by all the people involved in the network. Anyone who becomes a member of this network can monitor this transfer, but without having the private key, no one can rewrite the information. The last thing is the ability to use smart contracts, these contracts are another feature of the blockchain that can be used in the field of the Internet of Things and are provided by some blockchain networks such as Ethereum. You can use coding to create contracts that automatically execute when certain conditions are met, for example when a service is delivered when a payment is made. Currently, large companies such as IBM and Samsung are researching and developing the Internet of Things on the blockchain platform, these two large companies have created a decentralized system of the Internet of Things called Adept, which allows billions of devices to transfer data between their networks. . This system uses blockchain technology to verify the identity and transactions of these devices.

According to the preliminary article published by these companies, in the future, home appliances using Adept will be able to display operational problems and then restore themselves, and they can even update their software. Also, these devices can use Adept to communicate with nearby devices in their home network. According to this preliminary article, Samsung's next-generation washing machines will be designed to work with this system and will be able to purchase the required detergent from the store using smart contracts. This contract allows the device to pay for its order.

Conclusion

The impact of various digital currencies on the efficiency and cost-effectiveness of foreign exchange transactions varies based on factors such as technological advancements, financial sector efficiency, and regional disparities. Central bank digital currencies (CBDCs) are seen as a response to technological challenges and market failures related to privately issue digital money, potentially improving financial inclusion and reducing transaction costs. While digital finance has shown a slight improvement in the efficiency of the financial sector, there are significant

differences in its impact across regions, with the eastern region benefiting more than noneastern regions in China. Additionally, the rise of private digital currencies like Bitcoin has enabled 24/7 trading on computerized markets, potentially limiting governments' revenue from inflation and revolutionizing foreign exchange transactions.

The implementation of blockchain technology in traditional financial systems has the potential to significantly reduce exchange costs and enhance security. Blockchain's unique features like decentralization, reliability, and accessibility can transform the financial sector by fundamentally disrupting various finance industry use cases. By adopting blockchain, traditional financial institutions can reduce costs, introduce innovative solutions, and gain a competitive edge while increasing dependency on digital systems. Furthermore, blockchain technology enables the development of smart contracts, improving efficiency, transparency, and opening up new revenue opportunities in trade and finance systems. The immutable property of blockchain protects databases, making it a crucial asset for digital banking security and reducing exposure to cyber threats. Overall, blockchain's implementation can streamline processes, enhance security, and drive cost efficiencies in traditional financial systems.

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