**International Research Journal of Management, IT & Social Sciences**
Available online at https://sloap.org/journals/index.php/irjmis/
Vol. 9 No. 6, November 2022, pages: 766-776
ISSN: 2395-7492
https://doi.org/10.21744/irjmis.v9n6.2187

# Blockchain Applications in Business and Financial Activities in Vietnam: Situation, Trends, Opportunities and Challenges

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***Article history:***

Submitted: 09 July 2022
Revised: 27 August 2022
Accepted: 18 September 2022

***Keywords:***

*banking;*
*blockchain technology;*
*business;*
*digital transformation;*
*finance;*

**Abstract**

The emergence and rapid development of blockchain technology is an important milestone in the development of every country across the world. In Vietnam, blockchain is applied in many aspects of life, such as finance, banking, business, commerce, e-commerce, tourism, education, and healthcare. Previously, blockchain was known as the origin of cryptocurrencies. However, in recent years, blockchain technology and its applications have gone far beyond cryptocurrencies. This study aimed to assess the current situation, development trends, opportunities, and challenges in applying blockchain in business and financial activities. The research analyzed the Vietnamese government's policies related to blockchain technology. In addition, the study updates the development trends of blockchain technology in business and financial activities through international scientific conferences, books, newspapers, and magazines. The study's findings indicate that Vietnam is a high potential market for developing blockchain technology. Also, Vietnam faces many opportunities and challenges in catching up with this trend, especially when Vietnam is implementing many policies to develop the digital economy. Therefore, thanks to assessing the current situation, development trends, opportunities, and challenges in Vietnam, the study helps to suggest some solutions for the difficulties in applying blockchain technology, especially the thirst for human resources in the blockchain industry.

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## 1 Introduction

The Fourth Industrial Revolution brought many enormous benefits to countries across the world, including Vietnam. In addition to the rapid growth of scientific and technological achievements such as Cloud Computing, the Internet of Things, Big Data, or 3D Printing; the emergence of blockchain technology in 2008 is considered as a digital ledger that stores all transaction information and ensures its integrity. It is also the core value of Bitcoin transactions (Nakamoto, 2008). James Evangelidis (author and professional services consultant) stated that in the Fourth Industrial Revolution, blockchain applications could be as significant as Internet applications. Evangelidis believed that in the finance sector, blockchain technology helps to reduce the risks of errors or reduce the workload for employees. The advent of blockchain also marks a milepost in the development of the finance and banking sector. Blockchain helps to reduce steps in traditional operations and procedures, improve employees' skills and cultivate their professions to meet its new requirements (Le Thi Oanh, 2019).

In recent years, Blockchain has grown strongly in countries having friendly attitudes towards it such as Singapore, Malta, and Dubai. In contrast, many countries are wary of this new technology (VTV News, 2018). In Vietnam, thanks to its advantages, blockchain is considered a future technology that plays an essential role in the innovative start-up ecosystem. In this situation, more and more businesses in Vietnam provide blockchain platforms such as FPT, BIDV, MB Bank, and Vietcombank. In addition, some enterprises apply this technology in businesses such as Masan Group, and AIA (Nguyen Nham, 2022). Aside from its advantages, blockchain also has some drawbacks. The Report on Blockchain Market on Social Media in 2021 in Vietnam indicated that 2021 marked the volatility of the blockchain and cryptocurrency market; GameFi's outstanding trends of flourishment, and warnings against scams on Pi Network and Coolcat exchange (Reputa, 2021). Thanks to the great achievements brought by blockchain, Vietnam attracts many domestic and foreign investors.

When it comes to banking and finance businesses, blockchain has many valuable functions such as smart contracts that help banks or financial companies to save costs, save time and reduce the financial risks in the customers' payment process without the need for a third party (WincoLaw, 2021). However, in Vietnam, there are shortcomings in evaluating blockchain thoroughly. This study aimed to assess the situation and trends of blockchain applications in business and financial activities in Vietnam. The structure of the research paper consists of four parts: Introduction, Literature review, Research Results, and Conclusion. The study results, therefore, help to provide a clearer perspective on blockchain applications in banking and finance sectors, as well as contribute to training high-quality human resources working in these sectors (Ahluwalia et al., 2020; Aithal, 2016; Solomon, 2021).

## 2 Materials and Methods

*Definition of blockchain technology*

Blockchain technology was first introduced by Satoshi Nakamoto in 2008 to prevent an issue with digital currency (Nakamoto, 2008). Over the past decade, blockchain technology has been one of the most widely acclaimed technologies (Arndt, 2018; Pereira et al., 2019; Polvara et al., 2020). Blockchain is defined as a distributed ledger that can record transactions between two parties without a third party; in other words, blockchain is a digital decentralized ledger of all transactions across a peer-to-peer network, and thanks to this technology, participants can confirm transactions without a central authority (Woodside et al., 2017; Chatterjee & Chatterjee, 2017; Zheng et al., 2017; Arndt, 2018; Komalavalli et al., 2020). To simplify the definition for those who are unfamiliar with the concept, Kramer (2019) describes blockchain as a huge database that stores every transaction, either private or public. Every transaction is chained from the beginning to the previous transaction; then transactions are grouped in blocks; hence the name, blockchain.

*The applications of blockchain technology*

Blockchain technology emerged in 2008; and within the next year, Nakamoto introduced its first implementation- a cryptocurrency named Bitcoin (Vujičić et al., 2018; Vokerla et al., 2019). On January 4, 2009, the first Bitcoin was "mined"; and on January 11, 2009, the first payment using Bitcoin was made (Kramer, 2019). Bitcoin is a peer-to-peer electronic cash system using digital signatures that serve as a timestamp for each transaction (Nakamoto, 2008).

Initially, it was widely believed that Bitcoin is a blockchain (Sheth & Dattani, 2019). However, even though Bitcoin is one of the most common applications of blockchain (Yli-Huumo et al., 2016), it is crucial to distinguish these concepts (Galen et al., 2018). Blockchain and its applications are far beyond cryptocurrencies (Arndt, 2018). In reality, blockchain technology has transformed many perceptions in various areas such as business, healthcare, banking, government, supply-chain management, education, and so on (Navadkar, 2018; Komalavalli et al., 2020).

One of the most remarkable uses of blockchain is Ethereum, which focuses on smart contracts (Vujičić et al., 2018). It is an automated exchange protocol executing the terms of agreements. Besides, it is possible to take the form of any kind of contract (such as employment, financial, real estate…) under a blockchain network (Vokerla et al., 2019). In healthcare services, blockchain is used to decentralize patients' records and monitor their treatment progress (Marr, 2018). Zhang et al. (2018), have indicated blockchain technology's potential in creating a secure and effective healthcare ecosystem. Thanks to blockchain, it is possible to create a system to exchange patients' electronic health records. Similarly, in education, students' records can also be stored by using blockchain (Navadkar, 2018).

Blockchain and its applications are also widely used in government services across the world (Vokerla et al., 2019). Many countries such as the United Kingdom, South Korea (Vokerla et al., 2019), Denmark, Australia, and Singapore…are looking into the potential of blockchain technology (Alketbi et al., 2018). In China, the E-government was launched in 2016 and has been indicated to have some advantages such as improving the quality of government services, developing the individual credit system, strengthening the government's credibility, and promoting the integration of resources (Hou, 2017). Blockchain is used to ensure transparency in product supply chains, from origin to the customers. In addition, payments using Bitcoin or other cryptocurrencies can be used (Provenance, 2015). Besides, in the manufacturing progress, blockchain can also be used to ensure the standards and environmental impacts are acceptable (Vokerla et al., 2019). Blockchain technology is also useful in common situations such as voting in elections, trading, or information sharing. It proves that blockchain is on its way to being one of the most essential administrations (Navadkar, 2018).

*Types of Blockchain technology*

Based on usage and attributes, there are multiple types of blockchain; however, there are generally three types of the blockchain (Bhutta et al., 2021; Zheng et al., 2017; Sheth & Dattani, 2019; Komalavalli et al., 2020), Public Blockchain/ Permissionless, Private Blockchain/ Permissioned, and Consortium Blockchain. In Permissionless or Public Blockchain, records are visible to everyone (Arndt, 2018), participants can take part in the network without permission (Ali et al., 2018), and any participants can access or validate new blocks (Xie et al., 2019). A significant example of a public blockchain is Bitcoin. Anyone can use it, run nodes, and mine it as long as they follow the rules of the blockchain (Sheth & Dattani, 2019).

On the other hand, Permissoned Blockchain, or Private Blockchain is restricted to authenticated users of the network. Blocks are encrypted and can not be interpreted by anyone unless they are permitted (Komalavalli et al., 2020). Smart contracts like Ethereum are an example of permission blockchains. It is considered more secure than the public one. The combination of both Public and Private blockchains is named Consortium Blockchain (Bhutta et al., 2021; Komalavalli et al., 2020). It is a private blockchain for multiple organizations; hence, only invited participants can take part in the network (Bhutta et al., 2021). In other words, only a selected group of users can participate in the network, not all users that belong to the same organization (Arndt, 2018).

*The evolution of blockchain technology*

Since the creation of Bitcoin in 2009, blockchain has proliferated. Efanov & Roschin (2018), has identified three stages or generations of blockchain. Similarly, Bhutta et al. (2021), also divided the evolution of blockchain into three phases, including Blockchain 1.0 as digital currency, Blockchain 2.0 as the digital economy, and Blockchain 3.0 as a digital society (Burgess & Colangelo, 2015; Swan, 2015; Zhao et al., 2016). The first stage of Blockchain evolution is Blockchain 1.0. It refers to the technology platform, protocol, and digital currency (Efanov & Roschin, 2018). Blockchain 1.0 is considered a solution to the long-existed problem of spending both digital cash and processing digital transactions. Bitcoin reduces transaction fees and offers greater anonymity than credit cards; therefore, it encourages users to use it for their transactions.

Efanov & Roschin (2018), presented that Blockchain 2.0 refers to a wide range of economic and financial applications of blockchain. It goes beyond simple payments, transfers, or transactions. The most significant application in stage 2 must be the Smart Contract. The Smart Contract is a computer program that can automatically execute a

contract. In 2015, Visa and DocuSign presented smart contracts for leasing cars without having to fill in forms (Sharples & Domingue, 2016). Bhutta et al. (2021), termed this phrase as the Smart-Contract stage that blockchain has helped to decentralize and transfer almost every kind of asset such as stocks, bonds, mortgages, loans, derivatives, or properties.

Blockchain applications in phrase 2 have given birth to Blockchain 3.0. This stage can be referred as the Digital Society or the Smart World (Efanov & Roschin, 2018; Bhutta et al., 2021). In phrase 3, blockchain applications are distributed beyond the finance sector and to areas such as art, education, governance, healthcare, culture, and so on (Swan, 2015; Sharples & Domingue, 2016). Sharples and Domingue also indicated many promising applications of blockchain in this phrase such as smart cities, smart governance, smart mobility, IoT, or Machine-to-machine. Together with other technologies such as artificial intelligence, cloud computing, big data, IoT, and blockchain can create a boundless society in the future (Jimoh et al., 2019).

## 3 Results and Discussions

*The situation and trends of Blockchain application in business and financial activities in Vietnam*
*The situation of Blockchain application in business and financial activities in Vietnam*
*Business activities based on Blockchain technology in Vietnam*

Up to 2021, there are around 3.800 start-up projects in the Vietnam blockchain market, of which 11 are valued at over 100 million USD. Moreover, there are more than 200 investment funds, business promotion, and incubation organizations operating in Vietnam. It indicates that Vietnam's blockchain ecosystem has made a breakthrough and achieved the third rank in Southeast Asia (Digital Asset Management Center, 2022). In 2021, Vietnam's innovative start-up ecosystem recorded 88 investment deals with a total value of more than 1.3 billion USD (Ministry of Science and Technology, 2021). Of which, many promising sectors suit the development trends; thereby, attracting huge capital investment. These sectors include financial technology, games, education, healthcare, e-commerce, etc.

In a survey of 42.000 people across 27 countries by Finder (Bourgi, 2021), Vietnam is currently the leading country in terms of crypto asset adoption index, surpassing other markets such as the UK, the US, India, etc. In the group of 41% of people who have used digital assets, up to 20% of them responded that they have made Bitcoin transactions. In addition to the results of Finder, Chainalysis' survey across 154 countries also highly appreciated the Vietnamese market as Vietnam takes the lead in three indicators, including the value of on-chain cryptocurrencies received, minor transaction value transfer on-chain, and volume of Per to Per (P2P) transactions (Figure 1).

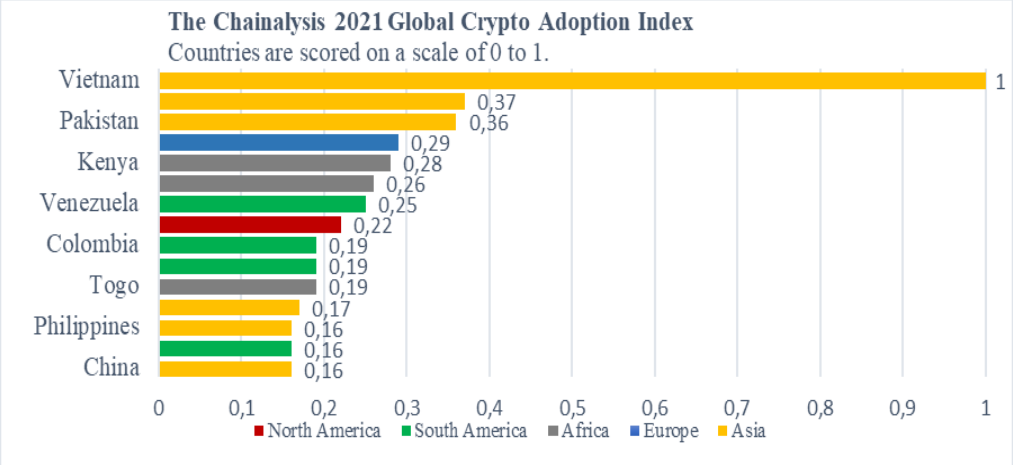


Figure 1. Chainalysis survey results
Source: Vietnam Blockchain Market Report (2021)

In the context of the development of Blockchain, the business of making money based on playing games in virtual space is increasingly popular, especially GameFi projects. GameFi is understood as a Game combined with Finance.

GameFi has a financial system (Finance) nature that here involve tokens and NFTs. GameFi began to assert its position since the global pandemic appeared, the cryptocurrency market rose and the Play to Earn model became increasingly popular. With the great arrival of GameFi in 2021, many blockchain game services have been launched, facilitating huge capital inflows in the industry (Farrier, 2022). According to statistics of Newszoo (2021), there are nearly 3 billion gamers across the world. Compared to 2020, this number increased by 5.3%. Meanwhile, statistics of App Annie Intelligence indicated that Vietnam ranked the second position (22%) in Southeast Asia in terms of market share of game downloads on mobile applications (including iOS and Google Play); ranked after Indonesia (38%) (Digital Asset Management Center, 2022).

When it comes to the GameFi sector, after the success of Axie Infinity in mid-2021, it can be considered a successful year for GameFi projects as a series of projects have been launched in 2021. Axie Infinity is also the most prominent project for the Vietnam GameFi community in 2021. It helps CEO Nguyen Thanh Trung get into the Top 10 of the most influential figures in the crypto world. Besides, GameFi projects of the role-playing genre such as Parallel, Elemon, and Decentraland also won second, third, and fourth place due to their nice graphics and the transparency about "earning money" on the game online (Figure 2).

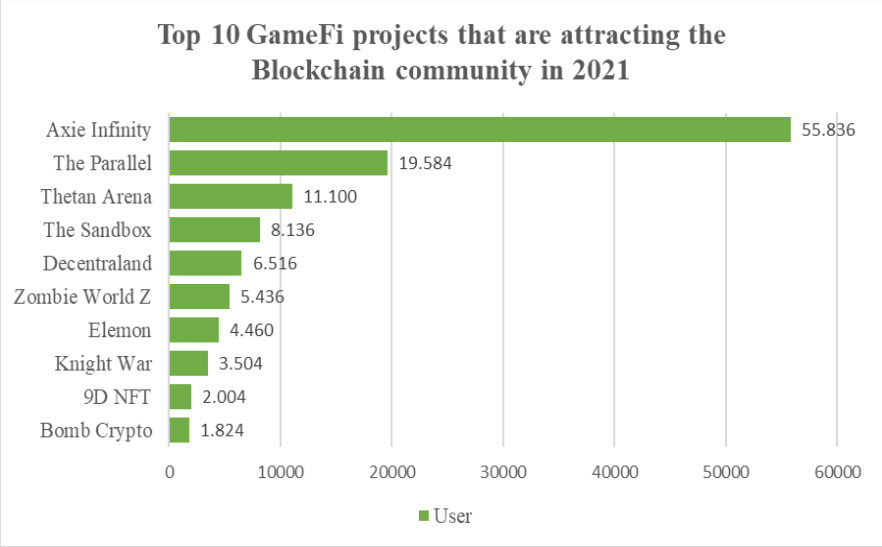


Figure 2. Attractive GameFi projects in 2021
Source: Reputa (2021)

When it comes to e-wallets and decentralized finance, Coin98 Wallet's market capital exceeds 1 billion USD. It is invested by the Alameda Research fund- the investor of FTX. Regarding NFT games, according to the statistics of Finder and Statista, Vietnam has the fifth rank worldly in terms of NFT game players. However, it is a fact that although Vietnam has a lot of potential start-up projects, many of them also collapse rapidly due to a lack of investors. In addition, because of the extremely rapid growth in Vietnam, the number of participants in the blockchain market has increased. However, these participants do not have enough experience or knowledge in this area. It leads to the results of scams or swindles, commonly known as "noobs scammers" or "investors traps".

*Blockchain application in Business and Financial activities in Vietnam*

In July 2018, NAPAS cooperated with three banks in Vietnam: VietinBank, VIB, and TPBank, to successfully test interbank money transfer using Blockchain technology after four weeks of implementation. Each bank acts as a network node in this transaction, connecting to a private cloud that computes infrastructure with NAPAS. When applying Blockchain, the regulator can still monitor the system, manage risks and control the system as usual. However, as it is only an experiment, the amount of money transferred using blockchain is very small. After this successful test, NAPAS will also use Blockchain in other applications. NAPAS considers Blockchain as a foundational technology, not to use it to replace current operations, and will focus on blockchain research for enterprise applications (DN, 2018). Applying Blockchain in letter of credit (L/C) transactions and international payments has removed many barriers and difficulties that have existed so far. According to Quang (2021), the first global payment in the Vietnam market using

Blockchain technology happened in 2019 with the first L/C transaction at HSBC through Voltron. As of February 2021, 5 Vietnamese commercial banks have tested the Blockchain application in 5 L/C transactions, including BIDV, HDBank, Vietinbank, MBBank, and Vietcombank.

Paul Vigna (2022), a journalist for The Wall Street Journal stated that

> "A survey of the Banking Strategy Institute of credit institutions on the level of interest and development orientation related to the Fourth Industrial Revolution indicated that most Vietnamese banks are oriented to invest, upgrade and develop their technology systems. In particular, some banks have shown their interest in modern technologies such as blockchain, cloud computing, big data, automated robots…".

*Development trends for the blockchain market in Vietnam*
*Legal frameworks for blockchain and digital technology in Vietnam*

It can be said that the Vietnamese government has made many efforts to create legal frameworks for digital technology in Vietnam in general and blockchain in particular. On August 8, 2018, the Prime Minister approved Decision No. 986/QD-TTg on approving the Strategy for the development of Vietnam's banking sector through 2025, with orientations toward 2030. On May 11, 2021, the Governor of the State Bank of Vietnam issued Decision No. 810/QD-NHNN on approving the Plan for the digital transformation of the banking sector by 2025, with an orientation toward 2030. On June 15, 2021, the Government promulgates Decision No. 942/QD-TTg on approving the e-Government development strategy towards the digital Government in the 2021- 2025 period, with a vision for 2030. Accordingly, key tasks in the strategy are: researching on, developing, and operating effectively digital technologies such as Cloud Computing, Big Data, Mobility, IoT, AI, blockchain, and social networks…On August 25, 2021, the Government gathered comments to develop the Law on Digital Technology Industry. On September 6, 2021, the Government promulgates Resolution No.100/NQ-CP on approving the proposal to develop a decree on a controlled trial mechanism of financial technology (fintech) activities in the banking sector. On October 28, 2021, the Government issues Decision 1813/QD-Ttg on approving the Scheme for the development of non-cash payments in Vietnam during 2021- 2025. On January 13, 2022, the Governor of the State Bank of Vietnam issued Directive No. 02/CT-NHNN on promoting digital transformation and ensuring information security and safety in banking activities (Ali et al., 2020; Garg et al., 2021; Morkunas et al., 2019).

Specifically, Prime Minister Pham Minh Chinh has approved Decision No.06/QD-TTg on approving the Scheme for developing the application of data on population, identification, and electronic authentication data for national digital transformation in the 2022- 2025 period, with a vision toward 2030. One of the important parts of the Scheme is that in 2023- 2025, 100% of citizens and businesses using the 4-level government services are identified and electronically authenticated in a unifying way on all information systems of local and state governments. 100% of citizens performing administrative procedures at the One-Stop-Shop of all levels are authenticated electronically on the electronic identification system of the Ministry of Public Security that is integrated with the National Public Service Portal. Citizens do not need to provide information that is available on the national database on population. Legal frameworks for blockchain in finance and banking sectors have yet to specifically mentioned applications and developments of blockchain technology in Vietnam. However, it is also a fact that Vietnam has been making effort to strengthen the legal and policy frameworks to promote digital transformation in many sectors such as commercial activities, intellectual properties, customs tax, digital infrastructure, non-cash payment, Fintech, logistics… The government also has a flexible approach to completing the frameworks, associating with commitments in the new FTA generations in some sectors, considering the multi sectors' perspectives, creating space for domestic and foreign enterprises, etc. The government also issued some policies to support innovative industries to promote the digital transformation process, even though the effectiveness has not met the requirements. In addition, there are some tasks related to the preparation and development of the Law on Electronic Transactions and the Digital Economy, the Law on Digital Government, and the Law on Digital Technology Industry (Upadhyay et al., 2021; Min, 2019; Mohanta et al., 2019).

*Blockchain human resources development trend in Vietnam*

Up to 2021, about 30 years after the emergence of the Internet, the Internet usage rate in Vietnam is 73%. This rate is much larger than in other developing countries. Surprisingly, Vietnam has the highest adoption index of cryptocurrencies and blockchain worldly, nearly 5 times more than the US. It presents that Vietnamese users are

sensitive to new technologies, which creates a great advantage in promoting new trends in Vietnam (Hawlitschek et al., 2018; Li, 2020; Hartley & Sawaya, 2019).
Due to its enormous potential, the demand for blockchain personnel in Vietnam has increased sharply in recent years. A recent report from the social network LinkedIn stated that the demand for blockchain programmers would be on an increase in the future. Data also showed that in 2020-2021, job posts including the keyword "blockchain" has increased by 395% compared to the same period in the US (Mai Anh, 2022). Positions such as "blockchain engineer", and "blockchain programmer" account for 15.64% of the total number of jobs recruited on LinkedIn. It proved that blockchain is an undeniable attraction in the job market.

In Vietnam, according to some reports on the labor market, sectors that relate to the blockchain, artificial intelligence (AI), etc… have strongly grown and had a very high demand for personnel (Digital Asset Management Center, 2022). When asked about Vietnam's prospects in the next 5-10 years under the impact of digital transformation, many leaders of Vietnam technology corporations said:

> "Within the next 5-10 years, we are going to witness Vietnam becoming a rapid digital transformation country. Digital transformation sneaks into every corner of life and changes every aspect of society. Also, in the next 10 years, Vietnam may be much different from it is now, as the digital life is going to go hand in with real life" (Hien Minh, 2022).

*Vietnam Blockchain opportunities and challenges*

Blockchain brings many promising opportunities to the financial and banking industry, including:

- *Efficiency:* The application of blockchain technology in the banking and finance sectors helps to promote the efficiency of transactions by eliminating the need for intermediaries or third parties. In the blockchain, data is automatically verified through the real-time consensus mechanism; thereby, it speeds up the transactions/payment process of parties as the agreement is automatically encrypted, stored in the form of a smart contract, and approved by other entities (individuals or organizations).
- *Decentralization:* Blockchain technology is a combination of many entities (computer systems) that connect to a network to create an endless chain of data. Every entity of the network can generate new blocks and confirm transactions. Moreover, it is also an "open source" model as there is no authority or a single party monitoring or authorizing any changes in the chain. Hence, it eliminates interference and power concentration in an authority. In the future, it can help to reduce the operating costs of authorities in the traditional systems.
- *Transparency:* When a new block is created and confirmed, it is permanent. Therefore, every participant of the network can easily view the block's content and its transactions in real-time. It helps to minimize (or even eliminate) the change of fraudulent activities.
- *Sustainability and High Security:* Blockchain technology is secured by many computers called nodes. These nodes ensure the confirmation of transactions so that no error can be used to destroy the system, even the most potentially risky financial systems.
- However, there are also challenges for blockchain applications in business and financial activities sectors, such as:
- *Legal regulations related to Blockchain:* It needs the time and cooperation of related parties to develop Blockchain-related conventions, regulations, and standards that are approved by countries and international organizations. Moreover, there is almost no standard or a center/ organization to/that monitor(s) and manage(s) blockchain applications.
- *Challenges for integrating Blockchain platforms with existing systems:* A problem of blockchain technology developing corporations is how to integrate and connect the blockchain technology with the existing banking and payment systems. It requires cooperation and agreement of related parties; and therefore, takes a lot of time.
- *Challenges for Scalability*: Mr. Chris Mager of BYNMelloon organization said it would likely take 7 to 10 years to develop, integrate all commercial payments and/or interbank payments and operate a blockchain-based payment system to ensure solve problems related to transaction speed and the verification process with data limitations.
- Last, at the international conference "Vietnam digital currency and blockchain-enabled applications in international trade", Professor Charla Griffy-Brown of Pepperdine University, US stated that blockchain would redefine the way we conduct economic transactions, currencies or hold assets, *"The estimated value of*

*blockchain market may be about 3.1 trillion USA in 2030. Besides, more and more international corporations are involved in the application of blockchain technology."* It indicates that to develop the country as well as keep up with the developing trends of the world, Vietnam needs a lot of efforts, initiatives, schemes, strategies, and plans to apply blockchain technology to life in general and Finance and Banking Industry in particular.

## 4 Conclusion

In general, in Vietnam, blockchain technology has been widely applied in all areas of the economy. Particularly, when it comes to business and financial activities, blockchain is considered to have great potential for development. It is shown through the growth of services applying blockchain technology such as international payment, letters of credit, interbank money transfers, smart contracts, GameFi, etc. In addition, the Vietnamese government has issued many decisions, circulars, decrees, and documents to promote the flourishment of business and financial activities in particular and the application of blockchain technology in business sectors in general. Also, Vietnam is in a transforming process into a digital economy. Therefore, blockchain can be considered a prominent development trend in Vietnam.

The application of blockchain technology in business and financial activities has created opportunities and challenges for businesses and the government. The lack of human resources for blockchain is considered a difficulty for the development of blockchain in Vietnam. Besides, it is a fact that Vietnam has many potential start-up projects. However, many of them collapsed quickly due to a lack of investors. Due to the extremely rapid development of blockchain in Vietnam, the number of participants in the blockchain market is on an increase (Hoang Giang, 2021). However, not all participants have enough experience or knowledge. As a result, participants can get into scams or hoaxes, often referred to as "stupid scammers" or "investor traps". Moreover, the legal framework on blockchain in business and finance has not specifically mentioned the applications and development of blockchain technology in Vietnam. Therefore, the Vietnamese government is making efforts to strengthen the legal and policy framework to promote digital transformation in many sectors such as commercial activities, intellectual property, customs tax, digital infrastructure, cashless payment, Fintech, logistics… The government also has a flexible approach to completing the framework, in association with commitments in the new FTA generations, from a multi-sectoral perspective to create a space for domestic and foreign businesses. In short, Vietnam needs to have an effective roadmap to further promote the development of blockchain technology in business and financial activities in the future. It also contributes to promoting the development of the digital economy as well as developing qualified and skilled human resources that meet the requirement of society.

*Conflict of interest statement*
The authors declared that they have no competing interests.

*Statement of authorship*
The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

*Acknowledgments*
We are grateful to two anonymous reviewers for their valuable comments on the earlier version of this paper.

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