



The Application of Blockchain Technology in E-CNY in China

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Abstract. Following the development of modern information and computer technology, different countries and industries are looking for innovative and groundbreaking technical breakthroughs. As a big country in the world, China is trying to use blockchain technology to revolutionize currency policy. This article introduces the origin of blockchain technology and how do Chinese government use it. The article focused on the new digital currency called e-CNY. Analysis of the applications, existing problems and challenges and advantages. Predict the future and make some suggestions for e-CNY. Though the Chinese government has put a great deal of effort into e-CNY, this digital currency needs to improve in many different areas. E-CNY is facing challenges from electronic payment platforms since e-CNY is not as convenient as them. The technology is not perfect yet and is hard to publish a more general policy to cover all areas of daily life. Those problems, the Chinese government can find solutions for them. E-CNY is a large-scale application of blockchain technology in the second-largest economy. This is of great significance to the development and application of information technology around the world.

Keywords: E-CNY, blockchain technology, digital currency, payment service

1 Introduction

1.1 Background information on blockchain technology and relevant applications in China

With the development of modern information and computer technology, blockchain technology is become more and more applicable and gradually recognized and accepted by many countries, it is getting popularity and growing fast [1]. Many countries and industries are trying to use blockchain technology to improve financial technology. Nowadays, blockchain technology is widely used in various industries such as banking, health care, insurance, and so on [2].

With the outbreak of COVID-19 in 2020, technology giants promote many kinds of financial services, blockchain is one kind of them [3]. Important economies in the world like China started to devote themselves to relevant research and make attempts in a lot

of different fields. Early in 2016, the Chinese government conducted a pilot policy in Chancheng District (an administrative region in Foshan, Guangdong Province, China) which is located in Guangdong-Hong Kong-Macao Greater Bay Area [4]. This is the first government service platform based on blockchain technology [4]. Individual data right will be well protected by the properties of blockchain technology. It is impossible for any other person or organization to inquire about privacy data without getting permission from someone. It will bring convenience to the users because they can use this platform to deal with many daily problems. Users can query personal utilities and traffic violations on the platform.

Blockchain technology has been used in identity authentication and food safety and obtaining Chancheng people's satisfaction. With the successful attempt at blockchain technology application, the Chinese government is trying to use the technology in more ways and benefit from it. E-CNY is another experiment of a larger attempt.

1.2 Related Research and Significance of e-CNY

China has been leading the development of blockchain technology in the area of monetary policy all over the world since early 2014 [5]. The related research is to analyze how digital currency affects the financial system of the country. Those papers analyze the developments, and implications and also compare them with the digital currency of other countries. They interpret and analyze the new digital currency from the perspective of the country and industry, some papers predict the e-CNY and give some suggestions for future development.

The paper points out some problem and make some suggestions, starting from the needs in people's daily life. It is direct to show how is beneficial to people, for example why people have to use e-CNY but no other mobile payment platform. Much research gives the answer in the view of the country, reasons like China needs macro-control of economy, diversification of economic structure, and promotion of RMB internationalization. This paper not only considers the view of the country but also thinks about convenience in daily life. The user experience of the public is also the most intuitive feedback to the policy. Identifying problems and fixing them, and listening to the people is the best way to promote policy. This paper may give a new way of considering the policy of people's livelihood.

2 Definition and development of blockchain technology

Blockchain is a distributed ledger of Bitcoin transactions when it was the first time that it was known to the public in 2008 [6]. At that time the concept of blockchain was not developed yet, bitcoin is a type of cryptocurrency based on blockchain technology. In 2009, with the development of the practical application, the concept of blockchain was formally proposed. The blockchain is the chain formed by a series of blocks and the chain is kept in all the servers. The main idea of blockchain is that the data are kept in that distributed ledger so the advantage of blockchain technology is its safety. Different

from traditional database systems, the data of blockchain is stored in each of the ledgers. Then the data will be safe when any one of those ledgers works.

In 2014, blockchain was getting attention from many different industries. People found Bitcoin could have many applications not only in the industry of cryptocurrency but also in finance, stocks, and health care. People started to invest in it. Blockchain was developed at a faster rate through the help of the pouring of capital. In the same year, Ethereum is developed. The Ethereum network was born in 2015. Ethereum is an advanced blockchain because it had solved some original problems. On every user's blockchain, they are able to connect distributed applications. This is how Ethereum works [7]. Ethereum has several characteristics, such as smart contracts and distributed apps. A smart contract is an application stored on the blockchain. Ethereum can be used to create a decentralized program that can reduce operating costs [7]. With distributed ledgers and smart contracts, Ethereum is developed deeper and deeper until nowadays.

Bitcoin and Ethereum are the same type of blockchain, they are called public or permissionless blockchains. As its name, it is open to the public. There are some advantages to them. Firstly, any data on the blockchain is unchangeable which makes those data safe. All transactions are easy to track. Secondly, anyone is free to join this blockchain. This is convenient and everyone will remain anonymous. Thirdly, the most important advantage is that this type of blockchain is totally decentralized, the system and transactions are safe. On the opposite side, the disadvantages of public blockchain are very obvious. The transactions are very slow because of a huge group of users, this will reduce the efficiency of blockchain trading. One big problem is this way of transactions will quickly consume a lot of resources, such as electric power and storage. It also needs strong computational ability for the computer, which is relatively expensive compared with traditional transactions. Public blockchains are the most popular blockchains and lead the development of the industry.

Many countries are also starting to implement blockchain technology. Though Bitcoin is banned in China for country safety reasons, its basic technology, which is blockchain technology, is widely used in China nowadays.

3 The application of blockchain technology in e-CNY

With the development of blockchain technology in modern society, blockchain now is widely used in many different industries. They are finance, physical distribution, public service, insurance, and many other industries. The usage of blockchain technology covered almost every area in daily life, including government service, expressage business, physical health and so on. In the following parts.

3.1 The Background Information of E-CNY

One of the most important applications of blockchain technology is digital currency. Blockchain technology is the most important and basic technology of digital currency. As the world's second-largest economy, China is also making attempts and explorations in the area of digital currency. E-CNY (or E-RMB) was first developed by the

People's Bank of China in 2017, which is the central bank of China. E-CNY is a digital currency based on centralized blockchain technology, it will not exist counterfeiting bank notes.

According to the introduction given by the Chinese government in 2021, the most important thing about e-CNY is its positioning [8]. E-CNY is a service of payment, which means that it would be managed in the same way as paper CNY. In the future development trend, e-CNY will replace most of the paper CNY. E-CNY and paper CNY have equal legal status and economic value. E-CNY is used in the same way as electronic payment. This will offer an extra way of payment and make our life to be more convenient.

Since 2020, some internal tests are taken in some developed cities in China, such as Shenzhen, Suzhou, and so on. E-CNY is gradually coming into people's daily life. Beijing and Zhangjiakou are the second patches of pilot cities. In 2022, third patches cities like Guangzhou, Chongqing, and Ningbo formally introduced the e-CNY into those cities [8].

3.2 Application of E-CNY to Chinese People's daily life

E-CNY has the function of protecting the wealth of the people and the country. E-CNY can prevent the occurrence of telecom fraud. The government can track the e-CNY throughout its whole transaction. Each transaction of money that is defrauded can be traced, this measure can curb the occurrence of telecom fraud because of increasing its risk. The power of tracking economic information can be more beneficial to China. Corruption has long been a concern for the Chinese government, though they have been trying hard to solve this problem and actually make a lot of achievements, how to root out the corruption is still a big challenge to the government. E-CNY may provide a new way of dealing with corruption. China is pushing for civil servants to be paid in e-CNY and plans to develop it further in the future [5].

E-CNY has the advantage in the level of legal. Although China has its own circumstance and will lead to a different way of developing digital currency. Electronic payment has already been widely used in China for many years. Traditional electronic payment such as WeChat Pay and Alipay has long been acceptable in almost every aspect of society. Considering about mode of payment, there is no big difference between traditional electronic payment and e-CNY. The main difference is that e-CNY is equivalent to paper CNY in legal status. This means that refusing to receive e-CNY is illegal. Both payers and receivers are able to use e-CNY offline, which is similar to paper CNY.

The Chinese government is pushing hard for e-CNY. It becomes the third-largest electronic payment platform. After Beijing Winter Olympics, e-CNY is being used more widely in many different cities and areas. Many first-tier cities such as Shanghai, Guangzhou and Shenzhen are supporting e-CNY. In Guangzhou, e-CNY is available to pay for subway tickets. It is also allowed to use in the developed business districts of Shanghai. This set up an example for more cities of promoting this series of relevant policies. As a technology that can record transactions and digital assets, blockchain plays an important role in e-CNY [9]. E-CNY can become a strong power in international trade [10].

4 Existing problems and challenges of blockchain technology in E-CNY

4.1 Compete with existing electronic payment platform

There are two major mobile payment platforms in China today, WeChat Pay and Alipay. Alipay was founded in 2004 and WeChat Pay was founded in 2013. They have captured most of the market share and become an indispensable part of people's daily life. WeChat is one of the most popular messaging software in almost every area of China. For this reason, people are used to paying by WeChat. The first challenge of e-CNY is convenience. As the previously mentioned example: The ticket for the subway in Guangzhou. When you are using WeChat Pay, you just need to be at the entrance gate of the subway and open the WeChat app, then show the QR code of “Yang cheng tong” and then pass the gate. “Yang cheng tong” is the official mini-program of public transport in Guangzhou. People can use it to pay for their public transport tickets such as subway and bus. When a user is using e-CNY, he has to go to the self-service ticket machines to use e-CNY to buy a ticket then you are able to get in the entrance gate. The little differences caused by those wasted few minutes could be a serious obstacle to its development.

Another problem is that e-CNY is not widely used yet. It is hard to get people to give up something convenient to choose another substitute. Unless this substitute is more convenient, so improve the convenience of e-CNY is one of the biggest challenges for the government.

4.2 The difficulty of carrying out a more general policy

In the view of generality, the popularization of e-CNY is not enough. Most of the current trials are in top-tiered cities, there is still a long way for the government to advertise and promote e-CNY in small cities and rural areas, where lives the population of China. China must pay hard work into developing e-CNY to be equal to paper CNY.

Different from traditional mobile payment platforms, e-CNY has the responsibility of extending to poor areas. Since the government is promoted it, it should be the most secure way of mobile payment compared with others. Though the Chinese government has mentioned the importance of e-CNY. Most people still do not know why e-CNY is meaningful to their daily life. Perhaps it is important in the area of foreign currency, but most people do not care about that because they do not know how it would affect their life.

People also lack confidence in the e-CNY and afraid that it will become a total controlling tool of the government since its effectiveness is all depends on the government. How to win the trust of most people is the key to the policy of e-CNY.

5 Countermeasures and Suggestions for the Development of E-CNY

The first suggestion is to strengthen the pilot promotion and decrease the inconvenience. “According to the latest statistics, by the end of 2021, 260 million e-CNY personal wallets and 10 million public wallets have been opened, and the cumulative transaction amount of e-CNY is about 87.5 billion yuan.” E-CNY has been used on a large scale in China. This is proof that people will not refuse to use it. But the main idea is how to make it to be one of the first choices in their daily life. As the sample of the Guangzhou subway mentioned in previous sessions, office workers, the group who take the subway at a very high frequency, will not use e-CNY in their daily life because of its inconvenience. The suggestion is to improve the convenience first. One direction is to increase the form and function of using e-CNY. This means it can be used in more aspects of daily life. Strengthening the pilot promotion is important.

The next suggestion is to introduce and improve relevant laws. Government departments in different developed cities are experimenting with e-CNY payouts. This would be a good start to fully implement the e-CNY policy. At the same time, it is important to increase people’s confidence in e-CNY. As a newly introduced digital currency, it is important to earn the trust of people. People have data privacy concerns and are afraid that it will threaten democracy and human rights. The Chinese government should protect the relevant data privacy and make relevant laws to ensure that the relevant power will not be abused.

In addition, the government should explain clearly to the people why E-CNY is important. The government needs to increase people’s confidence in E-CNY. Government can explain clearly why they have to publish those policies in the view of the perspective of ensuring people’s livelihood. E-CNY is contributed to fighting corruption and preventing telecom fraud based on its blockchain technology. At the level of national trade, e-CNY is conducive to CNY’s internationalization. The main problem which may confuse Chinese people is how is this benefit to them, and why the internationalization of CNY is important to us. The government should explain the whole logic of this policy in a way that makes sense and can easily understand by most people so that the government can get support from people.

The last suggestion is on the technical point. The government should encourage academic members to strengthen relevant theoretical research. How does it affect currency policy, foreign exchange settlement, etc. The accurate prediction of the future of e-CNY needs a lot of research as theoretical support. Academic achievements are important basics of further improving the functions of e-CNY. This will enable China to better cope with future situations in the area of economics and foreign trade.

6 Conclusion

This paper points out some problems and gives some suggestions for e-CNY based on the existing pilot of e-CNY, because of the limitation of the pilots, the paper cannot give a perfect prediction of e-CNY. E-CNY is a policy that is vigorously pursued by

the Chinese government in the financial area. The policy is aiming to directly lead China into a global digital superpower. There exists a lot of applications in people's daily life. People's salaries and daily payments will be replaced by e-CNY partially. However, people still do not have enough confidence in the new digital currency, and some of them are afraid that e-CNY is not strictly limited to being a payment service. E-CNY is also not convenient as the existing mobile payment platform like WeChat Pay and Alipay. Whether people will adopt and use it on a large scale remains to be seen. The suggestion of continuing to deepen policy implementation is relevant to those problems, this needs the government to carry on and solve them.

E-CNY is a large-scale attempt in the financial area of a big country and is closely watched by other countries in the world. Whether it is successful or not, e-CNY will provide valuable experience in the application of blockchain technology. This article aims to inform the public about the impact of blockchain technology on daily life at the national policy level. Though it is limited by data and samples, the article tries to give a new way of thinking about the policy. In the future, with the development of e-CNY, researchers will then reach a more comprehensive conclusion. Big countries and digital superpowers will keep a close and constant observation of e-CNY so that they can gain experience from it. In the future, when the result of digital currency comes out, other countries can make judgments based on established facts. Researchers can strengthen the theoretical research and build mathematical models that are helpful for the development of e-CNY. Other countries can learn from the monetary policy system and inflection on people's daily life.

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