

A Case Study of China's Mission-oriented Innovation Policies

Based on the investigation of the development of blockchain

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Abstract

China has proposed that national scientific and technological expansions should be oriented toward the international field and global economy. The principal needs of the country as well as the public's quality of life and health are the primary focus of China's mission-oriented innovation policies (MOIPs). MOIPs should not only consider social challenges but should also concentrate on innovative and developmental policies. For more than a decade, the Chinese government has adhered to the regulation of virtual currency and has promoted the development of legal digital currency. Using consortium blockchain technology and interacting with blockchain-related industries has been a gradual progression. The application of blockchain technology in the financial industry has, however, accelerated every day. Currently, the international situation is experiencing a complex and profound transformation. Based on "four orientations", the Chinese government needs to explore the innovative policies and mission facing the new developmental stage under the MOIPs. Moreover, in the blockchain field, the following inquiries should be made considering these four aspects: the governance mode based on endogenous order; the application direction of blockchain; the methods of government participation in the blockchain system; and the pluralistic governance structure.

Keywords: Chinese; blockchain; MOIPs

Introduction

Mission-oriented innovation policies (MOIPs) can be defined as systemic public policies that draw on innovative growth policies to achieve specific goals and develop 'major scientific solutions to overcome challenges' [1].

The European Union (EU) and the Organization for Economic Cooperation and Development (OECD) are the most active researchers and practitioners of mission-oriented innovation policies globally. For example, the European Commission, DG Research and Innovation authorized a study on "Mission-

oriented Research and Innovation. The inventory and characterization of past initiatives were to collect evidence, via global mapping exercises and case studies. These initiatives were based on current and past mission-oriented research and innovation (R&I) initiatives in the European Union, its Member States, and its main trade partners [2].

This study identified 137 ongoing mission-oriented R&I initiatives in 32 countries. The OECD Committee for Scientific and Technological Policy (CSTP) was launched in 2019 and was a two-year project that focused on the design, funding and implementation of MOIP's initiatives to address societal challenges[3].

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The project classifies the MOIPs types for each country into several categories according to different priorities such as strategic direction, policy coordination, and policy implementation which comprehensively organizes the relevant policy initiatives of different countries globally.

Throughout the practice of prominent countries in the world, the rationality of MOIPs mainly derives from solving and transforming the failure of certain issues, including directional failure, demand expression failure, policy coordination failure, and reflexive failure [4]. The main methods include shaping the common vision of the goals and directing the process of transformation including; shaping and creating the market, alleviating the failure of horizontal policy coordination, vertical policy coordination, paying attention to social conditions, and having enough ability to monitor, predict and urge participants to execute the governance of these policies [5].

In recent years, China put forward that scientific and technological developments should confront global scientific and technological initiatives to address the main challenges of the economy, the major needs of the country, and people's life and health. There have been significant questions regarding China's scientific and technological innovative policies in the new development stage, such as what direction to strive for and what goals to develop. This is the best practice for implementing MOIPs.

A specific case of China's mission-oriented promotion of blockchain development

Since Satoshi Nakamoto published "Bitcoin: A Peer-to-Peer Electronic Cash System" in 2008, blockchain technology has been evolving for more than 10 years. China has invariably attached great importance to the evolution of blockchain technology and regards it as a strategic means of competition in the digital economy. In the past decade, new developments of the scientific, technological, and industrial revolution have not yet achieved a breakthrough, and the global economic and governance system has considerably

affected the state of multilateral trade.

As a bridging technology of economic and social reform, blockchain is gradually developing in a new context and has received considerably more attention. Blockchain is involved in the strategic "reconstruction of new production relations" which will gradually evolve to be an essential technology and an important information infrastructure to promote economic and social changes. At present, all countries in the world are actively deploying this technology in related fields, and some countries have raised the development of blockchain to a higher level. It is more important to correctly grasp the key issues that need to be solved to promote the development of blockchain. This paper draws lessons from Mazzucato's market construction theory [6] and combines this with investigation and analysis strategies to elaborate the MOIPs in the development of blockchain in China.

2.1 Mission direction: Chinese Government promotes the development of blockchain technology and industry through top-level design:

We understand these missions as emerging governance mechanisms that are designed to support the engagement of a wide spectrum of stakeholders, which revolve around a mobilizing goal of social relevance, intending to activate and/or catalyze (Hekkert et al, 2020)[7]. After years of development, China has built a good policy system framework in the field of blockchain technology and industry. In May 2018, blockchain technology was listed as one of the five new-generation information technologies to be pursued. It is self-evident that blockchain technology plays an important role in building the best value technology on the internet.

In October 2019, General Secretary Xi Jinping once again emphasized that the integrated application of blockchain technology plays an important role in new technological innovation and industrial transformation. It is, therefore, necessary to regard blockchain as an important motivation for the independent innovation of financial technologies to clarify directional strategies, increase investment, and focus on overcoming several key core technologies

to accelerate the innovation and development of the blockchain technology industry. In March 2021, "the Outline of the 14th Five-Year Plan for National Economic and Social Development of People's Republic of China" and "the Long-term Goals in 2035" listed blockchain as one of the seven key industries of the digital economy. They proposed to promote blockchain technology innovation such as intelligent contracts, consensus algorithms, encryption algorithms, and distributed systems. This focuses on consortium blockchain to develop blockchain service platforms and application schemes in financial technology, supply chain management, government services, and other fields.

In June 2021, the Ministry of Industry and Information Technology and the Office of the Central Network Security and Information Commission issued the Guiding Opinions on Accelerating the Application and Industrial Development of Blockchain Technology. This focused on improving the basic capabilities of the blockchain industry from the aspects of the standard system, technology platform, quality brand, network security, and intellectual property rights. Furthermore, the focus is defining the important tasks of empowering the real economy, improving public services, consolidating the industrial foundation,

building a modern industrial chain, and promoting financial development. This is the first time that China has formulated a clear development roadmap and timetable for the development of blockchain, and it also marks the further improvement of the policy design of blockchain technology and industrial development in China.

According to preliminary statistics, in recent years, the number of policies of various types and blockchain technologies issued by the central government departments in China has gradually increased (see Figure 1). The fields involved include government services, finance, intelligent manufacturing, transportation, and many other aspects (see Figure 2).

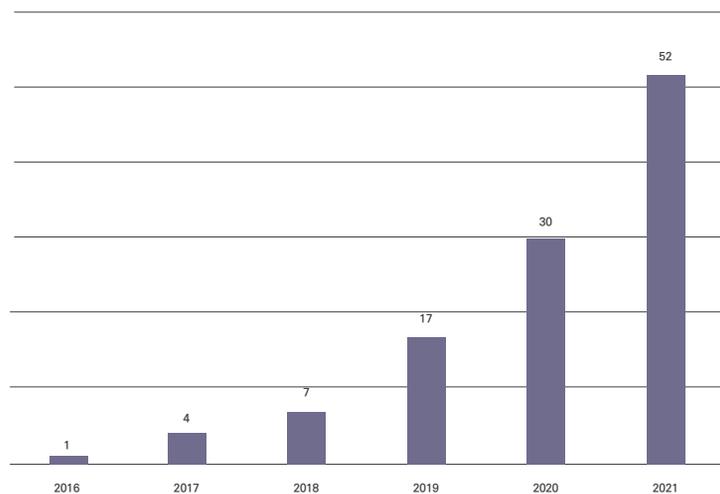
Source: China Center For Information Industry Development.

Figure 1 Number of policies related to blockchain development at the central level in China in recent years (unit: pieces)

Source: China Center For Information Industry Development.

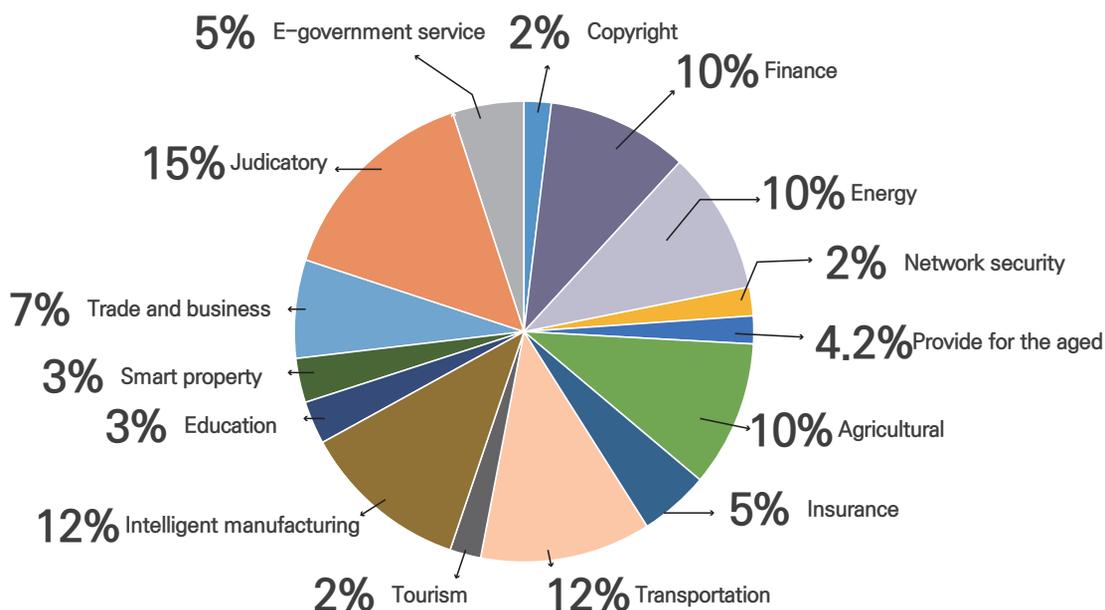
Figure 2 Distribution of main areas of policies related to blockchain development at the central level of China in recent years.

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2.2 Balance between all parties in the mission: forbid virtual currency:

We understand these mission policies as a process of dynamic configuration which evolves through the framework interaction and interdependence of mission goals. In 2017, a large number of financing activities were issued through tokens, including initial token issuance (ICO), which emerged in China. Though speculation prevailed and illegal financial activities were suspected, which seriously disrupted the economic and financial order. Promulgated by the People's Bank of China and other departments, the "Announcement on Preventing the Financing Risks of Token Issuance" proposed that we should accurately understand the essential attributes of token issuance financing activities, which refers to a "virtual currency" that the financing subject collects from investors through the illegal sale and circulation of tokens. In essence, it is an unauthorized illegal public financing behavior, which is suspected of illegally selling token coupons, illegal issuance of securities, illegal fund-raising, financial fraud, and

pyramid schemes amongst other illegal and criminal activities. Yet, tokens or "virtual currency" used in the financing of issuing tokens are not issued by monetary authorities. They also do not have monetary attributes such as legal compensation and compulsion, do not have the same legal status as a general currency, and cannot and should not be used as a legal currency in the contemporary market.

Since 2017, virtual currency has been under strict supervision in China. In 2021, the rise of speculation in virtual currency transactions has disrupted the economic and financial order, and increased illegal and criminal activities such as gambling, illegal fund-raising, fraud, pyramid selling, and money laundering. The People's Bank of China and other departments issued "the Notice on Further Preventing and Dealing with the Risk of Speculation in Virtual Currency Transactions", clarifying the essential attributes of virtual currency and related business activities, and emphasizing that virtual currency does not have the same legal status in the financial market.

In recent years, the main regulatory policies on virtual currency are shown in Table 1:

Table 1 The main regulatory policies on virtual currency at the central level in recent years

Publishing unit	Time	Policy
People's Bank of China, etc.	September 2017	Announcement on Preventing the Financing Risks of Token Issuance
China Banking and Insurance Regulatory Commission, etc.	August 2018	Risk Tips on Preventing Illegal Fund Raising in the Name of "Virtual Currency" and "Blockchain"
Supreme People's Court	October 2020	Opinions on Several Issues Concerning Handling Cross-border Gambling Crimes
People's Bank of China	April 2021	Measures for the Supervision and Administration of Anti-Money Laundering and Anti-Terrorist Financing of Financial Institutions
State Council	May 2021	Regulations on Prevention and Disposal of Illegal Fund Raising
China Internet Finance Association, etc.	May 2021	Notice on Preventing Bitcoin Risks
China Internet Finance Association, etc.	May 2021	Announcement on Preventing the Financing Risks of Token Issuance
People's Bank of China	June 2021	Anti-Money Laundering Law (revised draft for public comment)
People's Bank of China, etc.	September 2021	Notice on Further Preventing and Handling the Risk of Speculation in Virtual Currency Transactions
National Development and Reform Commission, etc.	September 2021	Notice on Remediation of "Mining" Activities of Virtual Currency

In the process of promoting the development of blockchain, the Chinese Government constantly measures the main body, task path, and task direction of accomplishing the mission. In the process of blockchain development, the idea of "forbid virtual currency" is adopted to promote the development of legal digital currency, consortium blockchain technology innovation, and blockchain-related industries". The application exploration of blockchain in financial and other fields is accelerating day by day.

2.3 Shaping the mission environment: multi-parties participate in governance:

From an innovative perspective, the initial research in the field of blockchain is aimed at improving the understanding of cryptography, so it has the characteristics of the Bohr quadrant. With the successful application of Bitcoin and other fields, blockchain scientific research has experienced a transformation from Bohr Quadrant to Pasteur Quadrant, and the technological approach has begun to shift around financial and other applications.

The blockchain field shows an extremely obvious feature of "the combining of application-oriented basic research and applied research with basic theoretical background". The development of blockchain technology is no longer just a simple

linear transformation process and is more complex than using basic research to transform technological and industrial sectors. The governance of blockchain technology should follow the development paradigm of science and technology policy based on the Pasteur Quadrant, forming a benign interactive relationship among enterprises, universities, research institutes, and the government based on "basic research and applied research"[8] and establish a multilateral governance network and hybrid organization.

The Chinese government has been committed to making use of multi-party governance means, and through close collaboration with enterprises, universities, research institutes, governments, and other innovative subjects. These aspects improve the speed of technological applications and it also aims to explore how to overcome the bottleneck of scientific problems in application practices and provides more technical resources for the development of blockchain. In recent years, various industrial platforms and alliance organizations in the blockchain field in China have been expanding.

In terms of open-source platforms, the international influence of BubiChain, BCOS, Zhizhen Chain, ChainSQL, and other platforms is gradually increasing. Shenzhen Qianhai Weizhong Bank Co., Ltd. has established an "enterprise-university" partnership,

which has been set up to teach content, curriculum system reform projects, and teacher training projects to direct blockchain initiatives. This has supported the talent cultivation and comprehensive professional reform of universities in China.

2.4 Evaluation of mission-oriented tasks: the application of blockchain technology continues to deepen:

At present, the application and exploration of blockchain technology in China are gradually accelerating. Among them, finance is one of the most important application directions of blockchain technology. At present, the Bank of China, China Merchants Bank, Ping An Insurance (Group) of China LTD, Weizhong Bank, Ant Financial Services Group, JD Finance, HKEx, etc. are all building platform systems based on blockchain technology. They are also at the core of financial businesses that are relevant to financial institutions such as payment, settlement, financing, and risk control, which will be expanded on this basis.

Currently, the most developed application scenario of blockchain in the financial field lies in the central bank digital currency. The introduction of digital currency (Digital RMB), by the central bank of China, is mainly based on the modernization of the domestic payment system. The goal of this system is to completely meet the daily payment needs of the public, further improve the efficiency of the retail payment system, and reduce the retail payment cost of the whole society.

The "two-layer operation" architecture is the best scheme to build an open digital RMB ecosystem. China is also exploring the concept that "money is the same as currency" in the digital age, and has sped up the standardization and construction of digital RMB systems, from the dimensions of information interaction, business processes, and technical specifications.

The exploration of the retail scene has become an important direction in the pilot process of digital RMB. As of December 31, 2021, the number of digital RMB pilot scenarios has exceeded 8,085,100, and a total of 261 million personal wallets have been

opened, with a transaction amount of 87.565 billion yuan.

Policy enlightenment and prospects

Presently, the international situation is experiencing a complex and deep transformation. China has encountered severe risks and challenges in the process of development. Such as how to find a scientific path to deal with major challenges is crucial. China is in a new stage of high-quality development. It needs to rely more on innovative and transformational policies to promote quality change, efficiency change, and power change, to strive to improve the quality and level of development in this industry.

From the point of view of grasping the information technology revolution, the world is in the latter half of the information technology revolution, and the leading sectors of information technology and industry have experienced the first stages of competitive market challenges. Their development is approaching the stage limit, the threshold of entering and using the ICT industry has been greatly lowered, and the gap between the developed countries and the developing countries has been significantly reduced.

Simultaneously, the field of co-integration innovation is a new and unknown phase. Productivity growth depends less on the accumulation of the last technological revolution and more on the speed and extent of the diffusion, or the uptake of information and communication technologies. It is the "window opportunity period" for the productive growth of developing countries which intend to catch up with the productivity growth of more developed countries [9]. Blockchain, as a bridging technology, is the key to grasping the current information technology revolution, and it is also one of the key areas for China to achieve high-quality development driven by innovative strategies.

How to better integrate blockchain technology with manufacturing and service industries and return to the origin of landing applications is crucial. Missions

may be regarded as a narrative for challenge-oriented policies, as a rationale for directional policies, and as an instrument for coordinating distributed innovation efforts. While the attention for MOIPs is rising, there are still many questions regarding both the governance and the conduct of missions as well as the (adverse) effects they might have on innovation and societal challenges.

Missions are best understood as continuously interacting with the structures and interests of governments, markets, and society, aligning (1) problem-based governance, targeting societal challenges, and (2) innovation governance targeting novelty creation and deployment [10]. Therefore, the Chinese government needs to study the innovation policy mission facing the new development stage, explore the paradigm of mission-oriented innovation policy, and further improve the corresponding innovation policy system.

3.1 Explore the governance model based on endogenous order:

In the process of information technology development, standards or governance order are often not produced from top to bottom, but gradually formed by participants in the process of participation. For example, ARM's open architecture has won a lot of market space for it. Chip manufacturers design and manufacture according to the ARM architecture, and software vendors also design software according to ARM architecture. After years of development, a complete ecological chain has been gradually formed, and a 'de facto' standard has been established.

At present, the supervision of blockchain by the Chinese government departments is often based on the result data, which belongs to the category of post-event governance. As an important participant in the development of blockchain and/or an important node of the blockchain system, the government needs to participate in the governance process of blockchain, to obtain more process data and change from a management function to a service function role. This shift must be initiated to gradually form an open perspective to promote the development of blockchain.

3.2 Explore the application direction of blockchain, that is, trading:

Some examples have been cited in "Pasteur's Quadrant: Basic Science and Technological Innovation", which states that it takes many years for a new technology to find its most important commercial use. For example, when the steam engine was first seen as a device for pumping water from a mine, years later it was utilized as a motor for moving ships or wagons [11]. This is almost a common phenomenon in the development of emerging technologies.

Since the emergence of Bitcoin, the blockchain industry has a history of 14 years, and it is still evolving, and it needs to explore its application value in various fields in constant development. However, in terms of giving full play to the role of blockchain, it is necessary to explore the general development and direction related to these transactions. Therefore, if the blockchain industry is to truly emerge globally and securely, it needs to cross-check with transactions and implement several security policies. Thus, the government must find the right direction and adjust the organizational structure in the mission-oriented innovation policy design.

3.3 Explore the methods of government participation in the blockchain system:

The government departments in China should fully judge the technical rationality of blockchain technology applications at a national level, construct a logical self-consistent proof, and conduct a rationality certification. Projects that pass the rationality certification should continue to be developed to prevent the waste of national resources. The rationality of certification is mainly determined by the R&D and applications according to the proposed technical framework, which may result in exceptional outcomes, and change the approach to government participation in this industry. The government's supervision of the public blockchain can pursue the following logic; whether financial risks can be avoided, whether the credit system can be maintained, and whether there is a reasonable incentive mechanism, etc. The supervision of consortium blockchain pays more attention to the balance between privacy protection and supervision.

3.4 Explore a pluralistic governance structure:

Encourage universities and research institutes, think tanks, enterprises, etc. to establish cooperative networks, explore the application mode of blockchain in the construction of social credit systems, through scenario development methods, and use public participation to judge the value of blockchain in national economies and societies and use this to analyze effective decision-making processes. There must be an advocate for the introduction of humanities scholars in the process of technology research and development to promote dialogue, and exchange, and seek better ways to broaden the application range of technology.

Generally speaking, for more than a decade, the Chinese Government has forbidden virtual currency, supported legal digital currency and technological innovation of consortium blockchain, and vigorously developed blockchain technology and related industries. Blockchain technology is empowering all walks of life to improve the cooperation mechanism and operational efficiency of traditional formats. The organizational form based on blockchain technology is making business models and social governance mechanisms more open, shared, democratic and credible.

In the future, blockchain will be integrated with artificial intelligence, quantum information, 5G, the Internet of Things, and other technologies to collaborate and build a new generation of information technology infrastructure, which will accumulate energy for a new round of technological revolution and industrial transformation.

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