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**Developing decentralized business within highly  
institutionally centralized environment: the case of  
blockchain-based business in China**

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**ABSTRACT:**

Blockchain-based business and therefore cryptocurrency-related activities are spreading globally developing the newly emerging crypto economy. However, regulatory responses to the crypto economy and businesses within it were very diverse in different countries. Given the above, the main research aim was to investigate how blockchain-based business (BBB) with idea of opposing the institutional regulations can be developed in the regulatory adverse institutional environment. More specifically, this thesis investigated, how BBB are developed within the ultimate institutional constraints in the environment, such as China, where crypto-related activities are banned. The research question for the thesis was how to develop decentralized BBB in highly centralized institutional environment of China? The research objectives were to assess blockchain technology's impact on Chinese companies; to explore the situation of BBB in China; and to explore how companies in BBB in China cope with the institutional environment.

The case study approach was undertaken for this research. Qualitative semi-structured interviews were conducted with six interviews, leaders of successful BBB in China. To support primary data, secondary data was collected to deeper learn about the BBB cases investigated.

The findings suggest that strict institutional environment for BBB in China has a significant impact on BBB innovation and growth in several diverse ways. On the one hand, the Chinese government is promoting blockchain technology and innovations related to it. On the other hand, the cryptocurrency, as one of the most prominent blockchain technology application, is a contentious issue that the Chinese government opposes. As a result, the Chinese government considers BBB regulation to be necessary and essential. Firms that are operating in Chinese market do not necessarily need to stop their operations and development of the BBB. However, they need to make various adjustments to balance out the requirements of the regulatory regime.

The thesis contributes to the literature by showcasing how innovative decentralized businesses, such as BBB can remain active within adverse and regulatory pressing institutional environment.

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**KEYWORDS:** Institutional environment, blockchain based business, China, regulation

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# 1 Introduction

## 1.1 Purpose of study: Disruptive blockchain business

The growing level of interest in blockchain, defined as disruptive innovation for the traditional industry, has created a variety of scenarios with predictions of a range of uses across industry sectors including finance and supply chains in a range of industries including food, medical and others (Cai et al, 2021; Hsu & Green, 2021; Schar, 2021; Garrod, 2016). Blockchain is regarded as a platform which enables the decentralized digital transition of data between stakeholders and supports increased levels of improvement in areas such as information transparency, audit trails, knowledge sharing and immutability (Mahmoud et al, 2019; Subic et al, 2018; Treleaven et al, 2017; Eyal, 2017; Chiu & Koepl, 2017).

In addition to these improved information and transaction flows, it is suggested that blockchain can provide a method for cost reduction and shorter transaction times leading to greater efficiencies across a range of industry and government sectors (Subic et al, 2018). Despite these advantages, there are still a number of rising issues in relation to blockchain, issues include how these technologies can be developed at a large scale and how these technologies can address issues such as cybersecurity and data privacy (Cai et al, 2021; Hsu & Green, 2021). These issues of cybersecurity include blockchain and cryptocurrencies, both of which have been largely unregulated and have led to concerns about financial risk and losses being borne by individuals and the level of asymmetrical information regarding these (Cong & He, 2019; Wang et al, 2019).

However, one of the most significant challenges that remains when utilizing blockchain for business development is the institutional environment constrains (Deloitte, 2021). The regulatory environment varies from country to country; however, the general environment is quite conservative for blockchain based business. In addition, blockchain is a relatively young technology associated with multiple side-effects, it is also constantly

evolving and adapting accordingly to the market and the environment. The main research purpose is to investigate how blockchain based business with the idea of opposing the institutional environment can be developed, what is the role of governmental regulation in this industry. More specifically, this thesis will investigate, how blockchain based business can be developed within the ultimate institutional constraints in the environment such as China, where crypto is banned and the business environment is highly regulated. How Chinese blockchain based business involved and adapted to the regulated environment over the years, and how blockchain based business in China would develop in the future.

## **1.2 Significance of study**

To investigate the challenges that firms need to overcome when developing decentralized business in highly centralized business environment, this thesis investigates a unique environment China. It is known that crypto is banned in China, and blockchain based business is a quite sensitive topic and is highly regulated in China. The context of China is based upon high levels of centralization and state ownership of industries such as the finance and banking sector and the drive for economic growth including becoming a technological innovation leader (Cai et al, 2021; Hsu & Green, 2021). Thus, the significance of this study is concerned with the impact of blockchain in China which includes a focus on the tensions between the political context and the impetus for the decentralization of finance. Given this context, this thesis will first investigate institutional constraints for blockchain-based business (BBB), then, will shed light on ultimate environment in China, and finally, will shed light on how BBB can strategically navigate under the ultimate institutional constraints.

## **1.3 Research aim, objectives, and questions**

The main research aim is to investigate how business with idea opposing the institutional environment can be developed. More specifically, this thesis will investigate, how



blockchain based business can be developed within the ultimate institutional constraints in the environment such as China, where crypto is banned. ,

The research questions to support this research aim are:

- Research question 1: How to develop decentralized blockchain based business in highly centralized institutional environment of China?

The research objectives are:

- Research objective 1: To evaluate the impact of blockchain technology on Chinese companies.
- Research objective 2: To explore the situation of blockchain based business in China.
- Research objective 3: To explore how companies in blockchain based business cope with the institutional environment.

## **2 Literature review**

As a disruptive innovation, blockchain technology based innovation such as decentralized finance (DeFi) is aiming to disrupt the traditional financial industry. One of the most vital aspects and implementations of the blockchain technology is related to decentralization of financial services. The rise of decentralized finance comes from the big gap in the finance industry with billions of unprivileged unable to access financial service even though the traditional finance system keeps generating wealth for decades. Traditional financial services are not accessible for many customers who are willing to participate in the financial sector due to geographical barrier, education backgrounds and lacking infrastructures. The current financial system lacks this accessibility. Hence, blockchain aims to fill this gap by powering a decentralized finance system (Chen & Bellavitis, 2020).

### **2.1 Institutions and their impact on companies' strategies**

As this paper discussed the institutional environment in China for blockchain based business. It is found out that institutions have a major influence on the strategies and behavior of businesses. The institutional factors significantly affect the firms' strategies (Bruton, Lau & Oboj, 2014). For example, Bruton, Lau and Oboj (2014) contrasted the impact of institutional environment on high-tech companies in three different environments. The authors analyzed the influence of institutions on the major aspects of the firm based on three countries – China, Poland, and Russia. The results identify that distinct institutional context come from various growth trajectories, resulting in different strategic mindsets and strategic behaviors. This comes from different paths each country followed and the differences in the institutional environment.

Furthermore, the anonymity of blockchain is not compatible with the key principles of the financial system, which means that integration of the real-world identity information with blockchain is required (Harwick & Caton, 2020). According to Harwick and Caton (2020), applications of blockchain technology to finance are limited by the institutional environment and difficult incentive problems. The authors studied applicability of the

technology to the financial industry and financial intermediation. This means that the institutions have a serious impact of the development and the future of blockchain-based decentralized finance.

Frolov (2020) argues that blockchain is a technology that reduces transaction costs, and a modern institutional economics supports its institutionalization. The analysis with the transaction value theory indicates that blockchain is expected to not only reduce transaction but also improve the quality of financial services offered by intermediaries (Frolov, 2020). That is, the quality of intermediation in the market is likely to improve as technology advances. In addition, Frolov (2020) also argues that there is a possibility of creating the blockchain-based system of institutions that rely on decentralization, transparency, and openness.

However, the decentralized financial system that is based on the blockchain technologies is sensitive to regulatory system. Yeoh (2017) analyzed the key regulatory challenges of the blockchain and innovative distributed technologies. The study reveals that the smart regulatory approach implemented in the US and the EU positively impacts blockchain applicability and innovativeness in the financial industry. This indicates that the soft regulatory approach could be more beneficial to effective technology adoption in the finance industry (Yeoh, 2017). As stated by Brophy (2020), the future of blockchain applications depends on the regulatory acceptance of the technology. To be specific, the institutional environment directly affects the blockchain adoption in the financial industry. The authors reviewed application of blockchain from commercial and regulatory approaches in the insurance industry. The review finds that from a commercial standpoint, the technology is attractive for adoption (Brophy, 2020). Moreover, the regulatory approach also indicates the process toward regulation of blockchain and related technologies.

An institutional theory is not a solid foundation on which to build a strategy theory (Carney, Gedajilovic & Yang, 2009). However, there is a possibility to apply the theory to analyse the impact of institutions on a firm strategy. The authors analysed the application

of the Variance of Capitalism (VoC) model in Asia. The analysis shows that filling institutional voids, delaying institutional innovation, and deploying institutional escape are all ways that strategy can shape institutions. (Carney, Gedajilovic & Yang, 2009). The authors suggest that this relationship holds for Asian countries. The financial system relies heavily on institutions. Park and Shen (2001) suggest that decentralization can improve efficiency due to more efficient use of local information. However, it can also lead to more agency problems. The authors used the data from a survey of rural financial institutions in China to study the division of lending authority. The authors find that concerns over agency problems lead to more centralization. A weak institutional environment and a failure to embrace local information have a negative impact on the efficiency of financial intermediation (Park & Shen, 2001). This means that the institutional environment affects efficiency of the financial system and impacts adoption of blockchain technologies.

The blockchain technologies have disruptive power and affect the financial regulation in the industry. Cryptocurrencies, fin-tech and different applications powered by blockchain such as P2P (Peer to Peer) lending create new challenges for regulators. Sa, Verschoore and Monticelli (2021) studied how institutional voids in bitcoin as a cryptocurrency. The rise of cryptos is a social phenomenon as the authors suggest. A qualitative approach and institutional theory are used in the study. The results show that bitcoin cannot be considered as currency since it does not fulfil three requirements of the money (Sa, Verschoore & Monticelli, 2021). However, the cryptocurrency gets more legitimacy, which leads to its eventual institutionalization. Hence, the authors suggest that the process of institutionalizing bitcoin is still in its infancy.

To gain more legitimacy among customers, the technology and key market players associated with blockchain adoption need solid and positive reputations. This is because, The future of blockchain in the financial industry is heavily reliant on reputation. (Gao et al, 2017). Gao et al. (2017) studied how firms in the countries with weak institutional environment have survived over time. The authors define reputation as a combination of

perceived, quality, prominence, and resilience. This means that blockchain adoption needs to rely on the quality to survive in the highly competitive financial industry. Zachariadis, Hileman and Scott (2019) argue that blockchain development and growth distributed ledger applications raises concerns that deal with governance of the new technologies. The authors reviewed major governance practices using a translational process. The review suggests that blockchain application are similar to existing systems such as SWIFT (Society of Worldwide Interbank Financial Telecommunication) to some extent, but there are more issues with pseudo-anonymity, openness and scalability (Zachariadis, Hileman & Scott, 2019).

The institutions directly affect the firm's strategy and the environment. Meyer et al. (2009) applied the institution-based view of strategy to analyze the impact of institutions on firms' strategies in emerging economies. The findings show that the in a weaker institutional framework, the risks are higher, which leads to higher importance of joint ventures (Meyer et al., 2009). Funk, Trevino and Oriaifo (2021) studied the role of the resource, and its relationship between institutions and the firm's internationalization. The authors focused on the emerging countries. The results find that the firm internationalization has a positive impact on the country's development (Fun, Trevino & Oriaifo, 2021). In addition, the authors find co-evolution of firm internationalization and the country's institutions. Banalieva, Cuervo-Cazzura and Sarathy (2018) analysed pro-market institutions affect firm performance. The study is based on the evidence from emerging countries. The sample includes 1092 firms from 34 emerging countries over the period 1998-2011. The results find that institutions have a significant impact on firm strategies and firm performance (Banalieva, Cuervo-Cazzura & Sarathy, 2018). Furthermore, the authors argue that more efficient firms are more secure to the institutional influence.

## **2.2 China's institutional environment and its influence on companies' strategies**

China's institutional environment is the focus for this paper and for the research question. The relationship between institutional environment and cooperates are highly related in multiple ways. The country's institutional environment impacts innovation and strategies of businesses. The regulatory policy and taxation policy affects firms' strategies and behaviors. Hitt and Xu (2016) argue that China has undergone a radical transformation since the 1980s from the centrally planned economy to a market-based economy. Furthermore, the country's institutional environment has also changed over the period. The institutional transition helps private firms and foreign companies to operate in a more desired institutional setting (Hitt & Xu, 2016).

Zhou, Wang and Du (2021) find the inverted U-shaped relationship between the country's institutions and its green growth. Hence, the institutional environment can promote growth but then inhibits if nothing is changed. In addition, the authors also mention an important role of the cultural dimension of the institutional environment. This means that the public support toward sustainable developments is more likely to induce a positive change in the sector. Regarding blockchain adoption and decentralized finance, the cultural dimension of the institutional environment also can fuel positive development in the area.

Luo and Chong (2016) suggest that unproductive entrepreneurial efforts are highly connected with the quality of the institutional environment. This means that more effective institutional environment positively affects firm performance. The evidence from China indicates that establishment of more rigorous control and monitoring systems increased the quality of entrepreneurial behavior.

Hitt & Xu, 2015, who examined the China's institutional environment by emphasizing the rule of law and authority of the country's institutions, identify two important findings. First, the rule of law remains a problem in China with inconsistent enforcement (Hitt & Xu, 2015). This indicates that the country is still in the relative early stage of growth.

Secondly, the authors suggest that formal institutions in China are weak, which leads to a higher role of informal institutions in regulating the firms' behaviors. According to Kumar and Worm (2011), the regulatory environment has a strong impact on firms in China. The authors considered the institutional environment in China has regulatory, normative, and cognitive dimensions. The reform and open-up policy starting from the late 1970s contributed to the rapid industrialization of the country and transformation in its institutional environment (Kumar & Worm, 2011). The China's institutional environment became more pro-trade and pro-growth.

Gao (2008) finds four available strategies for international companies to use in the country's environment – Guanxi strategy, competitive strategy, commitment strategy and leverage strategy. Guanxi and commitment strategies imply collaboration with the government and NGOs. Competitive strategies are useful when the firms have high bargaining power to deal with Chinese government (Gao, 2008). Leverage strategies are used when there is an opportunity to benefit from conflicts between different institutions. The key finding from the research is the high influence of the Chinese government, which is important for blockchain adoption in the country's financial system.

China is characterized by a significant role of state in the economy and business. According to Chen (2005), the current corporatization of the country's state-owned enterprises failed to improve corporate governance and there are significant agency problems in the corporate sector. Chen (2005) argues that China needs to create its own institutional environment to aid in the achievement of good corporate governance. According to Guluzade (2019), the China's economic transformation has not affected the SOEs (state-owned enterprise), which still account for a significant share of the economy. The country has many businesses but only about 15% of them are private companies. In addition, Guluzade (2019) mentions that Chinese SOEs are overleveraged and have poor efficiency compared to private rivals. The SOEs often abuse the market through preferred access to loan and favorable regulation. However, Guluzade (2019) also suggests that the private sector is the primary source of economic growth in China. This is especially evident from the technological sector, which is characterized by Huawei and its 5G network. The

country's technological sector reflects the ambition to become the globally leading force. According to Soh and Yu (2010), regulatory systems and markets are interrelated. The authors developed a methodology for evaluating the influence of institutions and markets on business strategies in transition economies. The study focuses on the strategy in China's 3G development over the period between 1987 and 2007. The analysis shows that regulatory environment and market conditions affect the technological market greatly (Soh & Yu, 2010). The China's case suggests that the government follows a framework to prioritise development of technologies through private companies.

According to Yu, Liu and Chen (2020), the institutional environment is closely linked to the technological change. The authors developed a framework after studying the data from the China's flat panel display industry that links institutional development to industrial development. The results find three stages in the industry include: Basic, moderate, and advanced inventive capability building. The market strategies of corporations are affected by institutional development. (Yu, Liu & Chen, 2020). As a result, China's institutional environment had a strong impact on the growth of the flat panel display industry. According to Ahlstrom and Bruton (2002), culture plays an especially crucial role in the China's institutional environment. The authors reviewed the high-technology businesses in China to find a hostile institutional environment and significant cultural differences from the West. The authors suggest that these cultural differences affect managers' behavior to successfully operate in the country's hostile institutional environment.

However, there are also barriers that complicate innovation in small and medium-sized enterprises (SMEs). Zhu, Wittmann and Peng (2012) studied the innovative performance of SMEs in China and institutional barriers that they face. The authors collected the data from interviews with 82 top managers and owners of 41 SMEs from China. The results indicate that there are five institution-based obstacles in the country – fairness of competition, access to financing, tax burden, laws and regulation and support systems (Zhu, Wittmann & Peng, 2012). This suggests that there are significant institution barriers in China that can hamper innovation and technological development among smaller firms. The country aims to lead the world in innovation and technological development. This



implies significant investments in technologies and high state ownership, which is a key characteristic in China's institutional environment. However, this often can lead to lower efficiency. Zhou, Gao and Zhao (2017) assessed if state ownership is advantageous, or it impedes innovation performance of manufacturing firms. The study relies on two longitudinal panel datasets of Chinese manufacturing firms. The results reveal that state ownership allows firms to access financing, which is positive for the firms, but the results also show poor efficiency of state-controlled firms (Zhou, Gao & Zhao, 2017). The authors confirm that state ownership is detrimental to effective innovation. Furthermore, minority state ownership is more effective for boosting innovation performance of the firms (Zhou, Gao & Zhao, 2017). The authors also suggest that competition level is important and can reduce the decreasing innovation due to state ownership.

In addition, Choi, Lee and Williams (2011) studied the influence of ownership on firm innovation in China to examine whether state ownership benefits or impedes firm innovation, which is crucial for blockchain adoption. The authors used the data from 548 Chinese firms and used the patent registrations as a proxy for innovation performance. The results suggest a significantly positive effect of foreign ownership of the firm while state and institutional ownership has a slightly positive but lagged impact on the firm's innovative performance (Choi, Lee & Williams, 2011). Generally, the results support a positive role of foreign ownership for innovation in China. The form of ownership has a significant impact on the innovation-strategy connection. Jiang, Waller and Cai (2013) analyzed the process through which ownership type, as an institutional element, moderates the influence of innovation strategies on a company's innovation performance. The authors used the data of 303 China's hi-tech firms. The findings show that the kind of ownership has an impact on the beneficial relationship between internal R&D, external partnerships, and university partnerships, as well as innovation performance. (Jiang, Waller & Cai, 2013). In addition, ownership type negative affects the relationship between external contracting and innovative performance. The results confirm that the institutional environment matters in China. According to Chen and Yang (2019), R&D tax credits affect innovative performance of China's firms. The authors analyzed the data from Chinese companies over the period 2010-2012 to examine whether the distribution

of R&D tax credit is facilitated by local institutional contexts such as government transparency, market development, and industrial regulations. According to the findings, the R&D tax credit has a considerable and favorable influence on the businesses' creative input and output. (Chen & Yang, 2019).

Development of the blockchain has vital implications for the country's institutional development. Ahl et al. (2019) studied the contribution of the technology to the energy system and suggest that gradual institutional change and development of regulatory sandbox approach will help to close the gap between the technology and institutional readiness. The blockchain technology can help in the climate change actions and regulation. Zhang et al. (2018) explored the use of the technology in the law enforcement in the green finance and regulation. Their study suggests that a friendly regulatory environment is the preferred option that leads to effective development of blockchain (Zhang et al., 2018). A friendly regulatory environment supplemented with appropriate institutional framework can contribute to sustainable development.

### **2.3 Blockchain as radical innovation**

This chapter mainly discuss and explain the blockchain technology and blockchain based business. Blockchain is known as a distributed ledger technology. According to Mahmoud, Lescisin and AlTaei (2019), the technology allows for decentralization as seen from bitcoin and other cryptocurrencies. However, blockchain allows for recording of other data than cryptocurrencies, which means that it is applicable to many different fields. According to Treleaven, Brown and Yang (2017), blockchain technology was initially perceived as the basis for cryptocurrencies but it has significant potential that goes well beyond cryptocurrencies.

The two most important elements of blockchain technology are distributed-ledger technology (DLT) and smart contracts. As mentioned by Treleaven, Brown and Yang (2017), the DLT provides an effective way for recording information through a decentralized and

synchronized system. At the same time, smart contracts present a set of rules for effective functioning of DLT. This helps to improve efficiency of recording and governance (Treleaven, Brown & Young, 2017).

Blockchain creates a decentralized system and enhances contracting system through smart contracts. Cong and He (2019) analyzed decentralization and its relation to consensus quality and how the key features of blockchain technologies affect the competition landscape. The authors mention that blockchain aims to create a decentralized system in an individual manner when all parties contribute and have control over the system. The analysis finds that smart contracts help to mitigate information asymmetry improving welfare and consumer surplus (Cong & He, 2019). The authors argue that blockchain creates market equilibria through a few economic outcomes. This is important for anti-trust legislation and regulation of the blockchain.

Blockchain is becoming increasingly popular due to its disruptive elements of peer-to-peer communication and smart contracts which has seen it become a new paradigm of building trustworthy distributed systems through the provision of reliable data services (Cai et al, 2021). As a trustworthy distributed system, blockchain has a number of advantages including immutability, transparency, auditability, and being resistant to tampering or forgery (Cai et al, 2021; Hsu & Green, 2021; Zheng et al, 2018). The unique characteristics of Blockchain mean it has the potential to restore public confidence by providing reliable information in areas such as supply chains (Cai et al, 2021). Blockchain also provides new methods for economic cooperation and developing social and economic infrastructure to provide credible information and data services for governments, businesses, and society (Cai et al, 2021).

The world is experiencing the fourth industrial revolution that is characterized by massive disruption of industries by new technologies. According to Subic et al. (2018), Industry 4.0 comes from enhanced connectivity and interaction among humans, machines, and parts, which is expected to create efficiency gains that will lead to increased productivity. Industry 4.0 relies on blockchain as one of the most fundamental drivers of the

transformation. Subic et al. (2018) define blockchain as the platform that enables decentralized digital transition of data. The decentralized digital transactions lead to elimination of intermediaries. This disintermediation is one of the key aspects for the financial services industry.

Blockchain transforms the financial system and fuels Industry 4.0 through increased transparency and innovation (Subic et al., 2018). As a result, a financial system is likely to transform into the new environment with lesser role of traditional intermediaries. According to Gomber et al. (2018), the financial industry is coming through a transformative change through the emergence of new technologies. This leads to the emergence of new business models as more start-ups and incumbent firms look for new and alternative business models in the evolving environment. The authors analyzed how blockchain and fin-tech innovation affects the industry by considering operations management in the industry, the innovations associated with blockchain, cryptocurrencies and cross-border payments, innovations affecting lending such as Peer-to-Peer (P2P) and the issues with financial markets and regulation in the industry. The findings indicate that emerging technology will cause disruption in the industry by boosting innovation and enhancing competition in the industry (Gomber et al., 2018). As a result, new business models will emerge.

The technology is linked to the concept of decentralized finance, which means an alternative financial infrastructure based on smart contracts (Schar, 2021). According to Liao (2021), this is an emerging opportunity for small businesses in developing countries. The decentralized finance is built on the Ethereum blockchain to boost transparency and accelerate financial services.

The growth of the decentralized finance rests on the blockchain technologies and has a potential to improve access to financing for small businesses (Liao, 2021). According to Schar (2021), decentralized finance may positively contribute to the financial system by improving transparency and efficiency. However, there are still many risks associated

with the blockchain and a new system. The key risks are smart contract execution, operational security, dependencies, external data, and illicit activity (Schar, 2021).

Wang, Lin and Luo (2019) developed a theoretical model to analyze the credit pattern for small businesses. Wang, Lin and Luo (2019) find that blockchain contributes to alleviation of information asymmetry and credit rationing issues. Also that involvement of government and banks will further enhance the decentralized finance system.

This means that blockchain affects the financial industry through record processing and decentralization, which can be helpful for financial transactions. Eyal (2017) explored how blockchain and financial technologies can close the gaps in the industry. The study suggests that blockchain protocol and DLT have potential for digital transformation of the banking industry. However, there are still many issues regarding privacy and security of the blockchain technologies. Chiu and Koepl (2017) studied how cryptocurrencies can support bilateral trade. The authors used bitcoin and assessed whether blockchain helps improve processing using cryptocurrencies by employing a quantitative study. The results show that bitcoin generates a loss of 1.4% of consumption (Chiu & Koepl, 2017). However, the loss can be reduced to 0.08% by optimizing design of the cryptocurrency. In addition, the authors argue that blockchain can potentially challenge retail transaction payments.

### **2.3.1 Disadvantages of blockchain technology**

Many negative voices have been associated with the blockchain technology, which is one of the reasons why the institutional environment globally for blockchain based business is regulated. According to Albeshr and Nobanee (2020), blockchain is known as the technology for storing data in a public database. It is known as a tool that allowed for development of cryptocurrencies and bitcoin, particularly. The technology is used in cryptocurrencies to ensure security of transactions. In the same way, blockchain can be implemented in the banking industry. The technology can completely transform the industry

by improving transparency, decentralization, and higher efficiency (Albeshr & Nobanee, 2020). Therefore, blockchain is a game changer for the banking industry.

However, there are some issues involved in the adoption of the technology and its use. According to Albeshr and Nobanee, (2020), major limitations of the blockchain in banking include lack of understanding, high energy use, the increased cyber-security risk and irreversibility of transactions. The first issue with the technology relates to its functionality and the newness for the industry. This is a new technology for banking, which complicates the blockchain adoption by banks and other financial companies. In addition, this is quite costly for incumbent firms in the industry.

Blockchain is an energy-consuming technology, which means additional costs associated with energy use and higher pollution. According to Rowlatt (2021), the blockchain technology is built into energy use, which leads to significant energy consumption of more than 300 terawatt hours. What is even more important is that the level of pollution related to the blockchain. In addition, Rowlatt (2021) suggests that energy consumption will continue to grow as the technology becomes more popular and widely used. According to Carter (2021), the pollution associated with energy consumption of bitcoin and other cryptocurrencies matters the most. However, it is difficult to estimate. Sedlmeir et al. (2020) suggest that there are only general estimates on energy consumption of blockchain and the technologies it fuels. It is difficult to gauge the impact of energy consumption with knowing the associated energy mix. Carter (2021) argues that renewable energy accounts for 39% to 73% of total bitcoin's energy consumption, but the estimates are not accurate. Nevertheless, energy consumption remains a significant challenge to adoption of blockchain.

In addition, the technology implies irreversible transactions, and this is a big limitation to its use (Albeshr & Nobanee, 2020; Bohme et al., 2015). Irreversibility can be negative for the financial system. However, this is also one of blockchain's advantages over the traditional finance. Because centralized finance data system is controlled by certain authorities, users can access to view the data but unable verify it. Furthermore, data could

be modified or even erased since it is controlled by authorities. Transparency and irreversibility in blockchain could help in building a decentralized finance system which would disrupt and change the traditional finance industry. This is also a major concern for blockchain in many countries in the world (Albeshr & Nobanee, 2020).

Another limitation relates to the limited security of blockchain. As mentioned by Albeshr and Nobanee (2020), the technology is exposed to the risk of hacking. As a public database, blockchain has massive cybersecurity risk, because potential costs could be enormous. In addition, Iansiti and Lakhani (2017) mention technical complexity of blockchain adoption as a significant barrier. Executives need to be aware of the expertise required to effectively implement the technology in the financial industry. In the financial services industry, blockchain adoption is already on the way, but each firm needs to decide individually weighing all costs and benefits (Iansiti & Lakhani, 2017). Starting small will be a preferred option for financial firms.

### **2.3.2 Benefits of blockchain adoption**

However, the applications of blockchain technology have approved its value and potential. The usages and adoptions of blockchain are increasing substantially over the years. Blockchain is used mostly to facilitate virtual currency (Niranjanamurthy et al, 2019). Bohme et al. (2015) analyzed the bitcoin as a potential disruptor of the financial system. The authors mention that bitcoin leads to decentralization and guards against concentration of power. It is designed to allow for irrevocable transactions and a predetermined path for money creation (Bohme et al., 2015). This differentiates virtual currency from fiat money. Bohme et al. (2015) suggest that all the rules underlying bitcoin and other cryptocurrencies allow for creation of the system that is more flexible and private.

The adoption of blockchain is believed to boost efficiency of the banking system by reducing transaction costs. Cong, Li and Wang (2021) analyzed the role of blockchain and tokenisation in transaction through digital transforms. The authors developed a dynamic

asset pricing model for cryptocurrencies that allow users to conduct P2P lending. The results find a positive impact of the technology through lower transaction costs as the network develops (Cong, Li & Wang, 2021). This means that blockchain contributes to a more efficient financial system through P2P lending.

According to Di Gregorio (2017), blockchain is capable of improving financial system through substantial costs savings. The technology can improve operating efficiency in the industry as well as improve data processing. The estimates suggest that blockchain can save about \$15-\$20 billion per year by 2022 (Di Gregorio, 2017). This means that the technology can significantly reduce IT costs and boost efficiency in the industry. Henten and Windekilde (2020) studied the impact of blockchain on transaction costs. The authors broke down transaction costs on the operational costs of contracting from searching and communication and contracting costs resulting from enforcing contracts. The results indicate that blockchain technologies firstly deal with the costs of enforcement reducing the expenses and contributing to lower transaction costs (Henten & Windekilde, 2020). Hence, the authors confirm the positive impact of blockchain on transaction costs.

Blockchain is characterized with decentralization and offers many applications that can reduce transaction costs. Sun et al. (2020) studied the impact of blockchain on transaction and agency costs in the financial industry. The authors focused on the P2P applied to the insurance companies. The results suggest that blockchain positively contributes to the industry through smart contracts that enhance efficiency and reduce transaction costs (Sun et al., 2020). In addition, the authors suggest that the technology does not eliminate transaction costs but change the role of third parties thereby creating a more efficient economic entity.

There is a lot of research on blockchain, its origins and applications in the financial services industry and beyond. As mentioned by Holbrook (2020), blockchain is an enabler for cryptocurrencies. Its primary solutions relate to transparency as the technology allows for improved ledger distribution of trust. According to Fanning and Centers (2016), blockchain is a distributed database that allows recording of the data, which is great for



transaction processing. The technology relies on the continuous process as each new item gets added to the existing system to create a chain. This means that blockchain represents a public ledger of all transactions (Fanning & Centers, 2016).

Blockchain has been applied in equity financing, cryptocurrency, and corporate governance. Yu, Lin & Tang (2018) studied how the technology can be used in the financial industry. The authors suggest that there are problems associated with the technology such as data processing capacity limitations, information confidentiality concerns, and regulatory concerns. However, blockchain can be effectively used to improve corporate disclosures and reduce errors in earnings management (Yu, Lin & Tang, 2018). In addition, the distributed ledger technology can provide a platform for enhanced data storage that will contribute to a higher reporting quality.

One of the major benefits associated with blockchain application relates to transparency. Chen and Bellavitis (2019) analysed the role of blockchain in the financial industry. The authors suggest that the technology can lead to lower transaction costs and contribute to decentralization in the industry. Blockchain allows for development of new business models thereby fuelling new decentralized financial services (Chen & Bellavitis, 2019). This, in turn, leads to more inclusion in the financial system and more innovation in the industry. Generally, the technology can enhance competition in the industry.

### **2.3.3 Opportunities and challenges in blockchain-based business industry**

The opportunities and challenges in blockchain based business can be seen in various aspects. Blockchain is changing multiple industries. It is affecting accounting, auditing, and data analysis processes. It is also building up its own finance system: decentralized finance and its infrastructures. However, it has encountered multiple problems on the way, which also result in the regulated institutional environment.

For example, financial accounting and auditing will be affected by blockchain technologies. One of its applications deals with accounting and auditing of financial data. Tan &

Low (2019) examined whether blockchain will transform accounting due to its superior transaction recording. The authors considered the technology and its link to the Accounting Information System (AIS). The results find that the application of blockchain reduces the error and costs to trace the data (Tan & Low, 2019). However, the technology alone does not guarantee that the accounting information is completely fair and relevant. The authors also argue that the blockchain discourages fraudulent behaviour and improves audit quality. Schmitz and Leoni (2019) studied the impact of blockchain technologies on accounting and auditing industry. The authors analyzed previous publications on the technology using a systematic review methodology. The authors used both academic literature and professional reports that cover the effects of blockchain on accounting and auditing. The results find four main themes in the literature – governance and transparency, continuous auditing, smart contracts, and accountants' and auditors' evolving roles (Schmitz & Leoni, 2019). The authors argue that one of the major advantage of blockchain is higher efficiency of recording and reconciliation of accounting data. In addition, Schmitz and Leoni (2019) confirm the positive impact of technologies on transaction costs. However, regarding the transparency effects, the blockchain has limited capacity to deal with fraud in financial statements. Additionally, the blockchain is unlike accounting and auditing as professions. The technology will partially change the roles of accountants and auditors increasing the role of technology and lower labor-intensiveness and increase productivity in the industry.

The global financial system has many problems with high transaction costs, redundant operations, and privacy issues as well as exposure to fraud. Tapscott and Tapscott (2017) argue that the financial services industry's challenges may be solved via blockchain. The authors mention five principles underlying the technology that can be helpful for the industry. They include distributed database, peer-to-peer (P2P) transaction, enhanced transparency, irreversibility, and the digital nature of the technology (Tapscott & Tapscott, 2017). Blockchain allows incumbents to improve operations thereby reducing costs and increasing returns. According to Chen and Bellavitis (2020), blockchain technology can spur growth of the decentralized finance. The technology allows for cost reduction, improvements in transparency through distribution and empower decentralization. This

means that blockchain has capacity to positively contribute to the economy and the financial system by increasing financial inclusion and boost innovation in the industry (Chen & Bellavitis, 2020). The authors accessed benefits of the disruptive technologies fueled by blockchain. The financial system is expected to be more decentralized and more innovative (Chen & Bellavitis, 2020), Therefore, blockchain technology will reshape the industry creating new opportunities and challenges. However, effective adoption of the technology will be positive for different stakeholders. To fully realize benefits of more decentralization and transparency, regulators must develop an effective system to handle frauds and privacy as well as accountability risks.

Osmani et al. (2021) studied application of blockchain technologies in the financial sector focusing on its benefits, opportunities, and challenges. The authors examined academic literature using research databases to identify benefits, and risks as well as costs associate with blockchain and its application in the industry. The results show a limited applicability of blockchain in the financial sector (Osmani et al., 2021). On the one hand, blockchain contributes to the industry through cost reductions eliminating the need for intermediaries. On the other hand, the technology faces the challenge from higher energy and data storage costs. This will eventually lead to higher transactions costs for the industry (Osmani et al., 2021). In addition, the authors mention that scalability and security risks negatively affect application of blockchain in the banking and financial sector.

Blockchain technology affects data analysis and processing. Zhang et al. (2020) analyzed the blockchain technology and its application in the financial industry. The authors identified both challenges and opportunities of the technology focusing on potential solutions that will help to effectively facilitate blockchain. The technology will help to improve assessment of customer credit conditions thereby improving efficiency in the banking industry (Zhang et al., 2020). The authors also argue that blockchain threatens development of the industry. Blockchain technology is effectively applied to cryptocurrencies. In this venue, the technology reflects benefits from data processing, as a ledger of accounts and transparency. Joo, Nishikawa & Dandapani (2020) reviewed existing literature and examined application of blockchain in the financial industry. The authors

reviewed blockchain technology and cryptocurrency to evaluate behavior of cryptocurrency prices. The results suggest that cryptocurrencies were a successful application of the blockchain technology. The technology can boost transparency, efficiency, and accuracy of financial data processing (Joo, Nishikawa & Dandapani, 2020). The authors also suggest that blockchain is a revolutionary technology and its usage will depend on regulatory changes and the number of usage cases.

Financial system lacks efficiency despite many intermediaries. This means that there are issues in intermediation. According to Ozili (2019), blockchain has the ability to enhance financial intermediation in the industry. However, there are also some issues. Ozili (2019) considered both benefits and risks from a regulatory perspective. Financial regulators want full control over the rule-code processing and enforcement. According to Ozili (2019), blockchain does not provide control to regulators, which makes it difficult to incorporate in the current financial system. The lack of regulation is favorable for fraudulent behavior associated with new technologies. Blockchain technology is applicable to supply chain finance. There are a few articles that studied the benefits of the technology in this field. According to Du et al. (2020), supply chain finance represents a financial model that links firms to banks. Financial institutions provide upstream and downstream financial products to enterprises. Fraud is a significant problem in traditional supply chain finance. In this case, blockchain appears to be a potential solution for fraud problems in supply chain finance (Du et al., 2020). The authors argue that the technology improves efficiency and transparency. As a result, blockchain provides better services to all parties involved in supply chain finance. Choi (2020) considered applicability of blockchain to supply chain finance. The author analyzed whether cryptocurrencies can be used in transaction between the agents using the mean-risk theory. The results suggest that cryptocurrencies can be used efficiently for all supply-chain agents. Hence, blockchain is applicable to this field and provides positive value to all agents involved.

Blockchain can contribute to trading finance through transparency. Kowalski, Lee and Chan (2021) analyzed the impact of blockchain on trust relationships among trading part-

ners. The authors conducted in-depth interview with industry experts to find that blockchain positively contributes to trading finance. The results show that the technology improves data security, facilitates benevolence, boosts efficiency, and reduces uncertainty in the industry (Kowalski, Lee & Chan, 2021). This means that blockchain adoption leads to higher transparency and more predictability of trading partners. As a result, blockchain is found to improve trading finance. Blockchain technology can positively affect supply chain management (Saber et al., 2019). The authors investigated whether the technology features such as enhanced transparency, traceability and security improve supply chain management. The results confirm that the blockchain is highly applicable to the supply chains. The technology can boost efficiency and transparency thereby enhancing supply chain management.

#### **2.3.4 Blockchain based business in finance industry**

One of the most commonly blockchain adoption case is in banking and finance sector, which is also one of the reasons why the institutional environment is highly regulated since it is challenging and disrupting the traditional finance industry. For countries like China with highly centralized finance industry and planned economy, the impact and governmental reaction would be even stronger, which can be told from crypto bans in China over the years.

There are many studies on the applicability of blockchain technologies in the banking and financial sector. Yoo (2017), Cucari et al (2021), and Dai et al (2017) studied the use of blockchain in the financial sector, the findings all show that blockchain help to enhanced data transparency, more visibility, faster execution, and improved transaction processing. However, Hassani, Huang & Silva, 2018 identify the key challenges that hinder the adoption of blockchain include high costs of adoption and regulatory uncertainty. Knowledge hiding is an important barrier to blockchain adoption in banking. Competi-

tion is one of the key motivations for the market players to adopt blockchain. It is a significant threat to industry, but it also brings innovations that can help to improve competitiveness of existing financial firms (Chang et al., 2020).

The application of blockchain is a revolutionary change that the industry needs. Banking industry faces the urgent transformation in China, which is desirable for financial institutions (Guo & Liang, 2016). Guo and Liang (2016) argue that banks need to adopt blockchain as it brings more competitiveness and reduces the need for intermediation thereby changing business models in the industry. In addition, the authors suggest that regulatory transformation remains the main challenge in China, and the industry needs the regulatory sandbox to properly adapt to the technological change.

Blockchain brings a strategic change to the banking industry. Harris and Wonglimpiyarat (2019) suggest that banks will compete in the future industry in their own blockchain banking system. In addition, the banking industry will transform to offer a full spectrum of payments and value exchanges. Blockchain can boost competitiveness through digital platforms (Harris & Wonglimpiyarat, 2019). In addition, blockchain and related financial innovations spur competition within the payment segment as it is evidenced by cryptocurrencies (Gandal and Halaburda, 2014).

Blockchain can contribute to the massive transformation in the financial system as cryptocurrencies threaten to replace fiat money. Ostbye (2017) analyzed competition policy from a perspective of cryptocurrencies suggesting that the current approach can be inadequate. The existing competition policy instruments such as anti-trust legislation and regulation are inadequate to effectively respond to the challenge from cryptocurrencies and the blockchain. However, the results suggest that participation of central banks with digital currencies is likely to be an adequate response to the challenge. Therefore, the blockchain is expected to trigger public involvement to complement regulation of the market (Ostbye, 2017).

## 2.4 Blockchain adoption by Chinese companies

The institutional environment for blockchain is highly regulated in China. The hostile relationship started in 2013, when China imposed its first crypto ban to prevent banks from dealing with bitcoin transactions. In 2017, ICOs (initial coin offerings) were on trend, entrepreneurs can generate funding for their projects by issuing and selling tokens. The Chinese government deemed ICOs as illegal fundraising tool, thus all ICOs related fundraising and token issuing are prohibited. Then another instruction from Chinese authorities requires crypto exchanges to shut operations voluntarily by September 15. In 2021, the biggest crypto ban in China deemed all crypto transactions as illegal. Chinese citizen engaged in working for foreign crypto exchanges will face legal charges, and crypto mining is also banned (Okorie & Lin, 2020).

Blockchain technology is being seen as a technology that industry and governments have adopted it to give a solution for safeguarding and simplifying processes in a variety of industries. (Hsu & Green, 2021; Cai et al, 2021). China has become a developer and adopter of blockchain in areas including finance, energy, medicine and supply chains and the government's support of blockchain has boosted the use of this tech whilst also improving security and transaction speeds for customers, all of which helps to improve and advance China's competitiveness in the global market. China is therefore a key player in blockchain technology, and this includes the implementation of legal frameworks, regulations and other government initiatives. China has directed a significant level of resources to blockchain and has made progress in assessing the potential of this technology within its industries (Hsu & Green, 2021).

According to Wang, Chen and Xu (2016), blockchain technology can improve the financial industry. The authors suggest that its main financial applications include Internet finance, insurance, and private securities. China has a unique institutional environment, so it is reasonable to consider how the technology is applied by Chinese firms. Hasan et al. (2020) evaluated the effects of blockchain application on Chinese companies. The authors used a panel data for blockchain-based companies from China's stock exchanges in

Shanghai, Shenzhen and Hong Kong using the ordinary least squares methodology. The results find that blockchain adoption improves the firm's operating efficiency (Hasan et al., 2020). Furthermore, smaller firms are found to benefit more from the technology application than larger firms. Therefore, the results confirm the positive impact of blockchain on the firm's efficiency. Wang, Su and Li (2020) analyzed the development of China's blockchain innovations and technology adoption. The authors used a bibliometric analysis to assess blockchain literature over 2013-2019 period. The study finds that China experiences a rapid growth in blockchain research (Wang, Su & Li, 2020). Furthermore, the scope is expanding thereby indicating more interest in the technology.

Blockchain can be applied in supply chain which would help in supply chain management. Kshetri and Loukoianova (2019) analyzed applicability of blockchain in Asia. The authors mentioned that Toyota had problems with supply chain management that costed the firm about \$2 billion. The problems related to visibility and traceability of supplies. The blockchain technology helps to deal with this challenge by effective recording of all transactions and important information (Kshetri & Loukoianova, 2019). The authors suggest that this leads to more reliable distribution of information among all parties and reduces costs in the supply chain. Vadgama and Tasca (2021) studied the blockchain adoption in supply chains. The authors used the data from 271 blockchain projects in different sectors. The authors used the data from different sources to identify four types of organizations that are responsible for the blockchain adoption – public companies, private companies, consortia and government projects. The study finds that blockchain is used in the financial sector for transaction payments, smart contracts, and supplier reconciliation. The results find that blockchain adoption shifts from private and public companies to consortia that invest more heavily in the technology (Vadgama & Tasca, 2021).

Blockchain technology is also widely used in energy sector with positive impact. Zhu et al. (2020) studied how blockchain can be implemented in the energy sector. The results find that the country impedes adoption of blockchain, but the development of renewable energy creates more opportunities for the technology applications in the industry (Zhu et al., 2020). The authors find that regulatory policy is the main obstacle for the



blockchain. The results mean that the technology and its application in the financial sector rests on the policymakers and their willingness to adopt the technology. Hou, Wang and Luo (2020) analyzed how blockchain is applied to the distributed energy resources in China. The authors used the data for China and applied Porter's five forces model to investigate the distributed energy resources in the country. The results find that blockchain fits with the distributed energy system and leads to more decentralization in the system (Hou, Wang & Luo, 2020). The authors claim that the technology can enhance competitiveness of distributed energy resources. Hence, the authors suggest that blockchain is effective for energy system. The same results are likely to be true for the financial system. Hou (2017) discussed how to adopt blockchain in the China's e-government system. The adoption provides many benefits through increased transparency and efficiency. However, information security, reliability and costs are major problems of the blockchain in e-government (Hou, 2017). The institutional development is among key forces that can accelerate or slow down the adoption.

Blockchain is a revolutionary innovation that can change the financial industry. Wu and Lian (2017) analyzed how the technology was adopted in the China's financial industry. The authors suggest that the technology had been employed in a wide range of experimental applications and interbank applications. The results find that blockchain adoption helps to boost the quality of transaction processing and achieve cost savings. In addition, blockchain can be applied to equity crowdfunding and the raise of equity capital. Zhu and Zhou (2016) analyzed the application of the technology to equity crowdfunding in China. The authors analyzed characteristics of the blockchain technology and explored its application in the financial industry. The results reveal that blockchain can be an efficient and low-cost solution for equity crowdfunding (Zhu & Zhou, 2016). In addition, the results find a positive contribution of the technology to effectiveness of crowdfunding as it facilitates the transactions. The authors also mention that blockchain can help to solve regulatory problems and benefits investors with P2P funding. Blockchain is widely used in China's banking industry. According to Wang and Stuckert (2021), blockchain is a decentralized database that originated from 2008 financial crisis and the lack of trust in

the financial system. The authors suggest that China pays a lot of attention to development of the technology. The blockchain adoption in the banking industry will lead to disintermediation rather than decentralization (Wang & Stuckert, 2021). The net technologies will help to cope with some challenges through more transparency and lower transaction costs. In addition, the authors mention that blockchain application to the banking industry mostly relates to supply chain finance, payment settlement and cross-border payments.

In conclusion, blockchain is not only applied in various of industries and sectors in China, but also brings positive impact to the society even under this regulatory environment. Despite of all the crypto bans from the Chinese government over the years, blockchain based business in China is still growing and involving. China now has the most blockchain patents and most of the top crypto exchanges are developed by Chinese. China was the biggest bitcoin mining country before the 2021 crypto ban and 20% of the worldwide bitcoin network remains in mainland China (Cai et al, 2021). This paper is aimed to find out how to develop blockchain based business in highly centralized institutional environment of China, which includes the evolution of the impact of blockchain technology in Chinese companies, how Chinese entrepreneurs and developers cope with the institutional environment, how do they adjust and adapt to the rules and regulation, what is the current and future situation of blockchain based business in China.

### 3 Methodology

#### 3.1 Aim of the methodology

The aim of the methodology is to identify the most appropriate process through which the research aimed objectives can be explored and required information can be gathered (Saunders et al, 2019; Bryman & Bell, 2015). The methodology needs to evaluate the appropriateness of a range of issues including the research paradigm, the researcher's held assumptions, the data collection and analysis methods, reliability and validity and research ethics. It is important that all these need to be mutually supportive and justified within the context of this research and this also includes an acknowledgment of the limitations (Figure 1) (Creswell & Creswell, 2018).

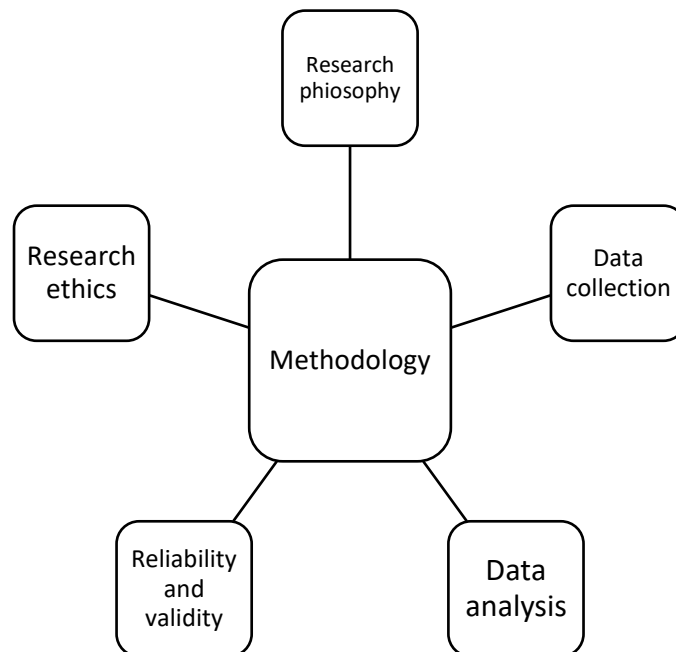


Figure 1. Aim of the methodology

#### 3.2 Research philosophy and paradigm

The selected research philosophy for this paper undertakes a pragmatist approach (Saunders et al, 2019; Creswell & Creswell, 2018). This approach has been selected as this enables a synthesis between theory and the practical application of this in the real

world (Bryman & Bell, 2015). The pragmatist approach is focused upon problem solving and is therefore appropriate for this research as there are several problems which are discussed and addressed during this process. The problems includes the issues surrounding blockchain technology and how blockchain based business can develop operations within this centralized environment in China. The research objectives were: to evaluate the impact of blockchain technology on Chinese companies; to explore the situation of blockchain based business in China; to explore how companies in blockchain based business cope with the institutional environment.

The pragmatist approach allows for the researcher to undertake a reiterative approach to the research, and this includes being open to new ideas as they occur and swapping between different contexts such as the macro environment of China and the micro environment of the interviewees (Saunders et al, 2019; Creswell & Creswell, 2018). Pragmatism is therefore focused upon the analysis of the specifics of the research including the range of contexts and experiences within this (Bryman & Bell, 2015).

### **3.3 Approach to theory development**

The approach to theory development in pragmatism is based upon abduction which allows for high levels of flexibility throughout the research process (Creswell & Creswell, 2018). Abduction is focused upon finding a solution to a problem and this allows for a synthesis between the theoretical and practical elements of the research which not produces data but also acknowledges the interdependencies between these elements (Saunders et al, 2019; Creswell & Creswell, 2018). This approach is not designed to develop a theory but is used to provide empirical data which both contributes to the current body of research in this area and provides future research areas (Easterby-Smith et al, 2018; Bryman & Bell, 2015).

### **3.4 Qualitative research**

Qualitative research is applied in this paper. Qualitative research is a sort of naturalistic inquiry that seeks to understand social phenomena in their natural setting. (Creswell & Creswell, 2018). The reason for choosing this research methodology is because it creates more meaningful insights including people's feelings, experiences and perception in testing or improving certain system or products. In addition, it generates new ideas from open ended responses (Creswell & Creswell, 2018). The research question itself is quite open-end and it falls to the category of knowledge and experience sharing. Thus, qualitative methodology is chosen for this research paper.

Eleven interview questions were designed beforehand based on the research question and research objectives. Semi-structured interviews were conducted with six selected interviews. All of them are blockchain based business entrepreneurs with their business running in China, and they are all physically located in China. The author gets their contacts mainly through networking and connections at work. The author acts as the interviewer to ask pre-designed questions. The interviews are conducted via Zoom. The interview transcripts are recorded automatically by Zoom recoding. All interviews were also filmed with consent but most of them prefer to stay anonymous. Most of the interviews last around one hour.

#### **3.4.1 Primary data and secondary data collection**

It is important for the researcher to collect an adequate volume of data from a range of sources to avoid the risk of researcher bias (Creswell & Creswell, 2018). Both primary and secondary data collection are applied in this paper.

The primary data collection included the use of semi-structured interviews which included a set of questions based upon the research aim and objectives (Saunders et al, 2019; Lindlof & Taylor, 2017). The advantage of semi-structured interviews includes the searcher being able to focus the interview upon the research themes whilst also allowing

a level of freedom and flexibility to ask additional probing questions if the interviewee brings up an interesting or pertinent subject (Creswell & Creswell, 2018; Bryman & Bell, 2015).

The primary data collection approach was employed for this research due to the access which the researcher had, for example connections with people with knowledge and experience in the blockchain based business industry in China. In addition, in-depth information can be obtained, interview sample can be controlled, bias in responses can be observed during interviews with the primary data collection method, which add more reliability to this paper. What's more, there are limited existing research and data regarding blockchain based business in China, thus, primary data collection is the chosen method for this paper.

The collection of secondary sources which includes the advantages of accessibility based upon the use of the Internet (Yin, 2018). It is important that the researcher acknowledges the context of these documents including the author and the audience for whom it was written as this can create bias (Creswell & Creswell, 2018; Easterby-Smith et al, 2018). To avoid the risk of bias, it is necessary to ensure that the research used a range of secondary data documents including industry and country reports to provide a range of perspectives (Yin, 2018).

This the primary data amount is limited, only six interviewees were conducted within a time limit. It is important for the researcher to collect an adequate volume of data from a range of sources to avoid the risk of researcher bias (Creswell & Creswell, 2018). Thus, secondary data from existing researchers are used to back up the reliability and validity of this paper.

### **3.4.2 Case study**

The case study approach was undertaken for this research. A case study is a comprehensive examination of a person, group, location, event, organization, or phenomenon,

which is frequently used in social, educational, and business research (Yin, 2018). This allows for a case study of the countries approach to blockchain which has undertaken a standalone perspective and does not compare China to other countries (Yin, 2018; Easterby-Smith et al, 2018). In addition to this the case study approach also allows for the examination of the experiences of the primary data participants which produced six separate case studies but also allowed for comparisons between these (Yin, 2018; Creswell & Creswell, 2018). These comparisons included the similarities and differences in the experiences of the primary data respondents which enable different perspectives to be addressed and for the development of a greater understanding of the issues facing the blockchain industry in China.

### 3.5 Sample

Given the context of the research topic it was essential that the sample for the primary data collection included participants with high levels of knowledge and experience within the blockchain based business in China. This therefore required a purposive sample which was reliant upon the researchers' contacts and the ability to negotiate the consent to these interviews (Saunders et al, 2019). A purposive sample provides a rich source of data due to the high levels of knowledge and experience and this research sample included individuals who worked within the blockchain industry in a variety of enterprises including international companies, research led enterprises and companies undertaking blockchain projects in China (Saunders et al, 2019; Creswell & Creswell, 2018).

No	Case firm	Interviewee's position	Company HQ	Interview length
1	Open Permission Blockchain	Director of Research	China	1:05
2	DeFi Application	Tech Developer	Singapore	57:08
3	Public Blockchain	Co-founder	China	49:26

4	Blockchain Ecosystem	Vice President for Global Business Development	USA	01:29:30
5	GameFi Project	Co-founder	BVI	01:04:54
6	Crypto Hardware Wallet	Founder	USA	49:01

**Table 1. Interview information**

Semi-structured interviews were conducted with six entrepreneurs. All of them were blockchain based business entrepreneurs with their business running in China, and they are all physically located in China. The interviews were conducted via Zoom. The interview transcripts were recorded automatically by Zoom recoding and later fixed by the researcher ensuring the transcription was accurate. The interviews on average lasted for around one hour.

### **3.6 Reliability and validity**

Reliability and validity are important within research, and these are dependent upon the selected research approach (Saunders et al, 2019; Bryman & Bell, 2015). Reliability is concerned with whether the research can be replicated at a later stage, and this can be challenging within the pragmatist approach due to issues such as differences overtime and the fact that this research is contextually based within an ever changing political and economic landscape (Creswell & Creswell, 2018). Research approaches which have higher levels of reliability include positivism based upon its testing of hypothesis (Easterby-Smith et al, 2018).

The interview candidates are the ones with high level of experiences and knowledge in blockchain based business. In addition, they all fit in the criteria of running blockchain based business in China. Furthermore, candidates were not connected to the author/interviewer personally. Most of the interviewees chose to stay anonymous when answering questions, thus the bias would be decreased to some extent. All the interviews were carried out in a fair and objective manner to ensure that the interviewees opinions are



heard rather than the researchers' opinions of the interview data (Kara, 2018). It is important for the researcher to collect an adequate volume of data from a range of sources to avoid the risk of researcher bias (Creswell & Creswell, 2018). Both primary data and secondary data from existing researcher were used to back up the reliability and validity of this paper.

## 4 Research analysis

### 4.1 Introduction to research analysis

The research question is how to develop blockchain based business in China. This chapter will present the data findings from the secondary and primary data. This will start with the findings from the secondary data which provides details on the context of blockchain in China and the current activities and strategies concerned with this. This data will then be followed by the six interviews all of which shares their knowledges and experiences in running blockchain based business in highly regulated institutional environment of China.

### 4.2 Environment for Blockchain-based business in China

#### 4.2.1 Overview of the Blockchain based business in China

The Chinese government's focus on developing an industrial blockchain ecosystem requires the involvement of several key stakeholders including authorities, industries and companies, technical service providers and universities and research institutions (figure ii) (Cai et al, 2021).

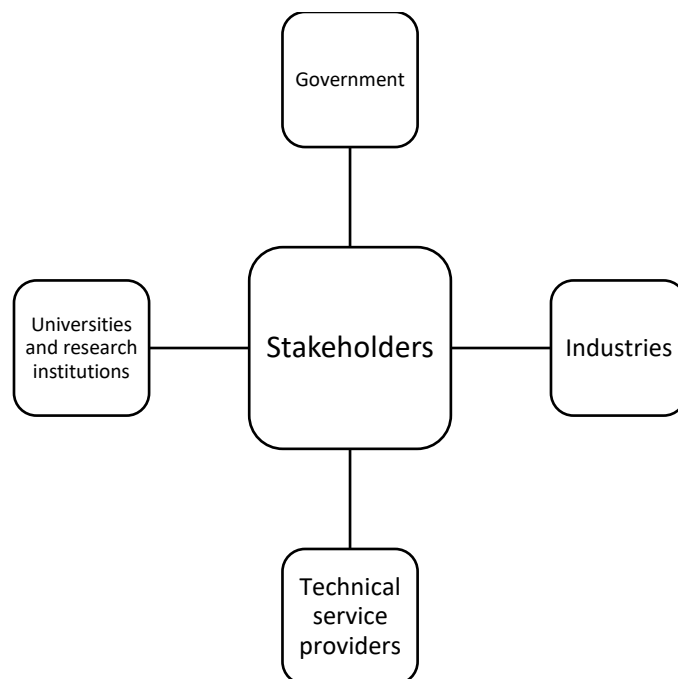


Figure 2. Stakeholders in China's blockchain industry

**Authorities.** The Chinese government lays up the framework for industrial strategy, including regulatory systems and application situations. China's central ministries and regional governments produced 217 blockchain-related policies, rules, and papers in 2020, this included public opinions collected by the supreme People's Court in relation to the rules and reinforcement all blockchain evidence along with the review of data authenticity. Local governments are paying closer attention to blockchain technology and have actively developed pilot areas for blockchain applications across a number of regions in China (Cai et al, 2021; Hsu & Green, 2021).

**Companies.** Blockchain technology companies have increased efforts to address the technological developments and support to assist industry improvements (Cai et al, 2021). The blockchain industry is growing and since 2019, 57% of the 1000 enterprises involved in the blockchain business are start-ups whilst only 23% of the 1000 enterprises are traditional IT companies (Cai et al, 2021). The technology companies represented by Qualian Technology provide the underlying Technical Support and application construction program support for the blockchain industry whilst Internet giants including Alibaba and Baidu are also actively developing blockchain technology and expanding its applications (Cai et al, 2021).

#### 4.2.2 China's International Vision in technology

China's 'Made in China 2025 plan' (2015) has stated the aim to make China a world leader in technology and manufacturing sectors by 2049 and this has included plans for Chinese innovation which will see it become a global innovation leader by 2030 (Chang, 2019 cited by Hsu & Green, 2021). The Chinese objectives for progressing its technology are based upon achieving two objectives: the first is to reduce the dependency on foreign investment and business and the second is to advance China's technological capabilities as a leader of innovation (McBride & Chatzky, 2019 cited by Hsu & Green, 2021).

To achieve these objectives, the Chinese government is promoting research and development into blockchain and has set up government committees and is developing regulatory frameworks (Hsu & Green, 2021; Cai et al, 2021). The use of Big Data by the Chinese government has been reported by China's Ministry of Industry and Information Technology (MIIT) which has included assigning Chinese citizens with a color code which indicates their health status in relation to COVID-19 (Gan and Culver, 2020 cited by Hsu & Green, 2021). This form of Big Data can be complemented with blockchain technology and has been used to ensure that this personal data has been kept secure and not been open to misuse (Xinhua, 2020 cited by Hsu & Green, 2021). In addition to this, evidence of China's commitment to DLT has included the launch in April 2020 of the National Blockchain and Distributed Accounting Technology Standardization Technical Committee (NBDATST) and this has been established to provide industry standards (Hsu & Green, 2021). Committee members include a range of stakeholders from major companies such as Huawei, university researchers and government officials (Dai and Xue, 2020 cited by Hsu & Green, 2021). This committee was established to support the vision for improving national and international standards for technology which is included in the China Standards 2035 strategy published in 2020 (Cai et al, 2021; Kharpal, 2020 cited by Hsu & Green, 2021).

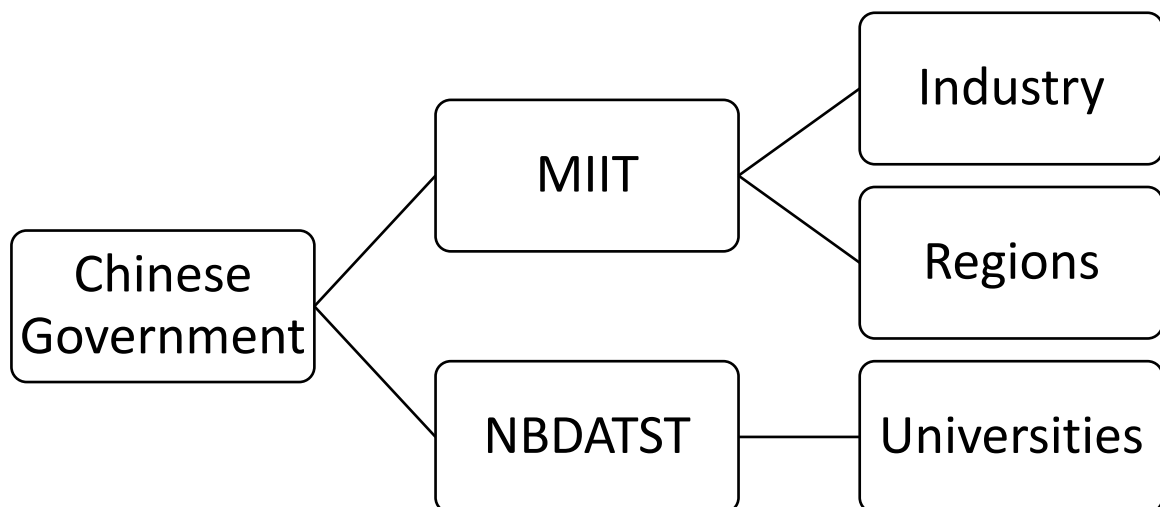


Figure 3. Chinese Government committees responsible for blockchain development

#### **4.2.3 China's Regulatory Framework for DLT**

China's perspective on blockchain therefore recognizes the importance of this in terms of delivering technological innovation and supporting industrial transformation but its perspective on blockchain differs from other countries (Cai et al, 2021). Whilst China supports the increased use of blockchain technology, it also wants to ensure that illegal financial activities relating to coin-offering fundraising and cryptocurrency trading is resisted and this included legislation in September 2017 which banned these activities (Cai et al, 2021; People's Bank of China, 2017 cited by Hsu & Green, 2021). However, regulatory activity in relation to cryptocurrency did not stop blockchain technology and the launching of the Trusted Blockchain Open Lab two weeks later signaled China's commitment to promoting the exploration of this technology (Cai et al, 2021).

#### **4.2.4 Recent regulatory measures undertaken by China on Cryptocurrency trading**

On 24<sup>th</sup> September 2021, the PBOC issued a regulatory document to control the speculative risks of cryptocurrency trading (Library of Congress, 2021). This regulatory document is jointly issued by the PBOC and nine other authorities which included the Supreme People's Court and the Ministry of Public Security (Library of Congress, 2021). The document which holds the title of 'Circular on Further Preventing and Disposing of Speculative Risks in Virtual Currency Trading' includes the legal status of cryptocurrencies, cryptocurrency transactions, foreign exchanges, and the legal risks of cryptocurrency investment (figure iv) (Library of Congress, 2021).

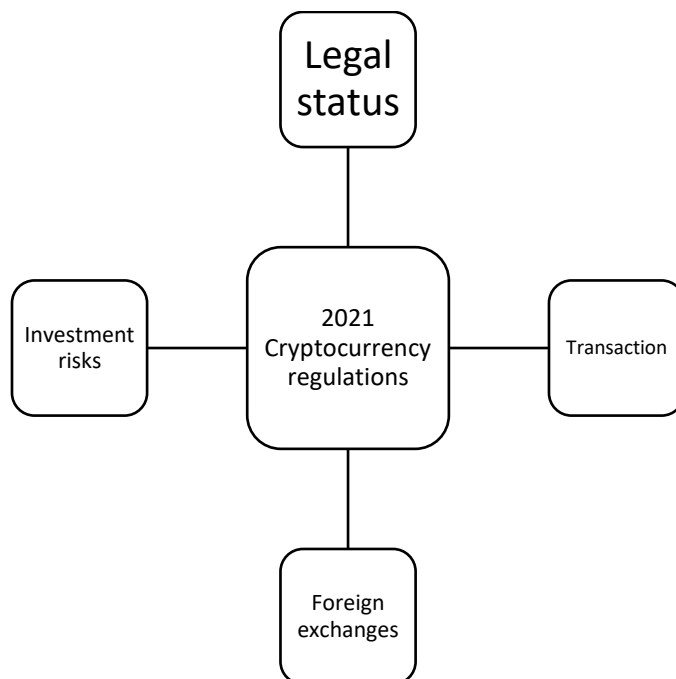


Figure 4. Elements of cryptocurrency regulations

**Legal Status of Cryptocurrencies.** This circular reiterates the fact that cryptocurrencies do have equal legal status with fiat currencies (Library of Congress, 2021). Cryptocurrencies including Bitcoin are not issued by China’s monetary authority and are therefore not mandatory accepted tender (Library of Congress, 2021). This means that cryptocurrencies cannot be circulated or used as currencies in the market (Library of Congress, 2021). This definition of the legal status of cryptocurrencies is consistent with the PBOC’s 2017 circular which banned initial coin offerings (ICOs) and imposed restrictions on cryptocurrency trading in China (Library of Congress, 2021).

**Cryptocurrency Transactions.** This PBOC circular states that all cryptocurrency transactions are illegal, and this includes cryptocurrency conversion, buying and selling cryptocurrencies as a central counterparty, providing matching services for cryptocurrency transactions, ICOs, cryptocurrency derivative transactions, and cryptocurrency transactions (Library of Congress, 2021). The circular also states that banks and other financial institutions are prohibited from providing cryptocurrency transaction services as these services constitute a crime (Library of Congress, 2021).

**Foreign exchanges.** The circular states that overseas cryptocurrency exchanges which provide services for Chinese citizens via the internet are considered illegal (Library of Congress, 2021). Employees in China, organizations and persons who provide services to these foreign exchanges will be held liable in the eyes of the law provided that they know or should understand that these exchanges are undertaking cryptocurrency transactions (Library of Congress, 2021).

**Legal Risks of Cryptocurrency Investment.** The legal risk of cryptocurrency investment states that if companies, organizations, and persons investing in cryptocurrencies violate public order and customs, the relevant civil legal actions will be invalid, and they will bear the losses (Library of Congress, 2021). This will also include Chinese authorities cooperating to develop an approach to cope with cryptocurrency trading's speculative dangers (Library of Congress, 2021). This includes the specific measures which central and local authorities will undertake such as the monitoring of online and offline cryptocurrency-related activities to prevent criminal activity such as money laundering and cross-border gambling (Library of Congress, 2021).

#### **4.2.5 Blockchain development and initiatives in China**

In 2019, China filed more patents in blockchain technology (58,990) than any other country indicating that DLT initiatives are an important part of China's technological development (Gurry, 2020). These DLT initiatives can be evaluated in terms of their location, status in China and the accompanying regulatory framework (Hsu & Green, 2021).

The location of DLT initiatives in China have been in the eastern coastal region of China and Sichuan and this includes four major blockchain hubs which are in Sichuan and Chongqing and are Guangdong in Shenzhen, Yangtze Delta in Hangzhou and Shanghai, Xiong'an New Area and Beijing (figure v) (Deloitte, 2019 cited by Hsu & Green, 2021). Sichuan and Chongqing have policies which favor innovation and low electricity costs

whilst Guangdong has high levels of innovation (Hsu & Green, 2021). The Yangtze Delta is an important driver of China's economic development whilst Beijing is the home of excellent universities which include reputable technology-based teaching and research (Xinhua, 2019). Other locations include the Guangdong-Hong Kong-Macao Greater Bay Area which are hosting the beginning of DLT projects including the People's Bank of China's (PBOC) pilot trade financing platform (Xinhua, 2019 cited by Hsu & Green, 2021). This area has previously been involved in a cooperative blockchain development when the Guangdong-Hong Kong Macao Greater Bay Blockchain Alliance was established in late 2018 (Wang, 2018 cited by Hsu & Green, 2021). Within the Greater Bay area, over 150 DLT initiatives have been developed and 18 of these have received funding of \$67.2 million from Hong Kong's Innovation and Technology Fund (Government of Hong Kong, 2019 cited by Hsu & Green, 2021).

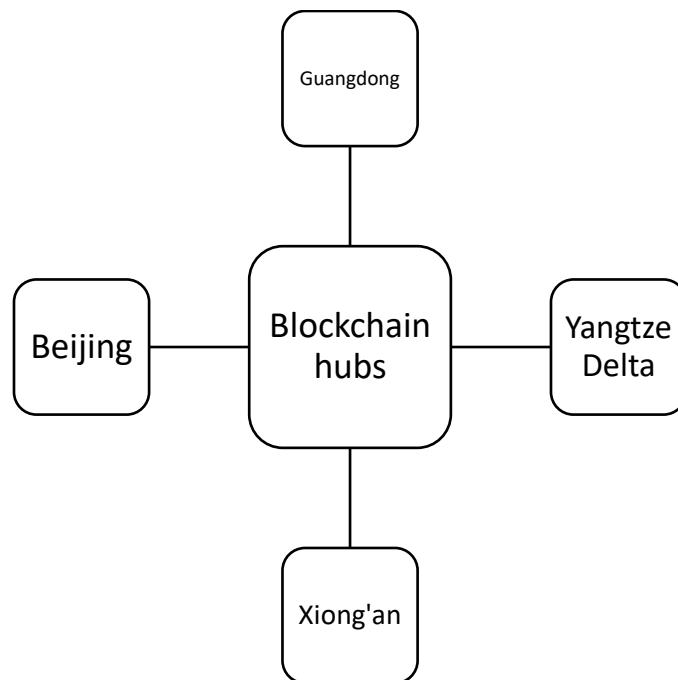


Figure 5. Main Blockchain innovation hubs in China

To further facilitate the development of DLT, the Chinese government has created a national Blockchain-Based Service Network which is a hosting platform for companies using DLT (Hsu & Green, 2021). Developments such as these reveal how China is seeking to



support opportunities for DLT initiatives by enabling these to access existing infrastructure (Hsu & Greene, 2021). These DLT initiatives are all obliged to register with the Cyberspace Administration of China which is the main government regulatory body amongst a host of bodies which also include the People's Bank of China [PBOC], The Ministry of Industry and Information Technology, the State Administration for Industry and Commerce and the China Banking Regulatory Commission (Hsu & Green, 2021).

Since late 2019, DLT innovation has also been undertaken in industry led and government backed research and development projects in a number of major cities across China including Shenzhen, Shanghai, Guangzhou, Suzhou, Chongqing, Hangzhou, Beijing, Chengdu, and Xiong'an New Area (Hsu & Green, 2021). These projects are designed to assist these cities in developing DLT in areas such as fintech to enable buyers, sellers, and intermediaries to undertake contactless digital transactions (Hsu & Green, 2021).

#### **4.2.6 Applications of Blockchain in China**

One of the largest applications of blockchain for China is in the financial technology (fintech) sector and this includes blockchain-backed projects being able to utilize cryptocurrencies such as Bitcoin, financing supply chains and transaction processing (Hsu & Green, 2021; Cai et al, 2021). Fintech is associated with companies developing blockchain technologies which both improve the current infrastructure and disrupt traditional financial services (Hsu & Green, 2021; Cai et al, 2021). A recent 2019 report by EY found that the adoption rate of fintech in China was high at 87% amongst the sample population (EY, 2019). Despite China banning initial coin offerings, the PBOC has restated China's commitment to developing its own digital and sovereign currency (Davidson, 2020 cited by Hsu & Green, 2021). This digital currency has already undergone testing in major cities prior to its launch and rollout by China's central bank to commercial banks which will then provide digital wallets or other similar applications for people to be able to receive and use the digital currency (Hsu & Green, 2021). This currency will be issued in partnership with physical Chinese currency, and this is based upon ensuring that there is a minimal amount of disruption to the economy (Hsu & Green, 2021).

There is an increased level of adoption of DLT across China's fintech and traditional financial sectors and this includes major fintech and e-commerce firms such as Baidu Finance which have been developing DLT platforms to support a range of financial purposes (Hsu & Green, 2021; Cai et al, 2021). This has also seen partnerships developing between Baidu and Shanghai Pudong Development Bank to use DLT for payment collection and for increased levels of information sharing and process transparency and the use of smart contracts for transactions and ensuring the security of information (ICBC, 2020 cited by Hsu & Green, 2021). Other businesses such as Tencent Cloud are using DLT to improve warehouse pledge financing which records the authenticity of the goods which are listed on warehouse receipts and addresses the problem of double financing of goods (Hsu & Green, 2021). Other examples of the use of fintech include partnership between JD Finance and UnionPay to prevent fraud and Chinese banks have also used DLT platforms to improve traditional operations and processes (Hsu & Green, 2021). These collaborations have seen Minsheng Bank work with China CITIC bank to create a letter of credit blockchain application and WeBank and Shanghai Huarui Bank establish an inter-account reconciliation which maintains business capital and transaction information using Blockchain with data being passed between the two banks to support data security and real time payment reconciliation (Le, 2016 cited by Hsu & Green, 2021). Another example of the use of a blockchain platform can be seen with FunChain Technology provision of an asset-backed securities project management platform for China Merchants Bank Credit Card Centre which is designed to increase transparency and financial data records which allow investors to view this process and to ensure asset credibility (Hsu & Green, 2021).

DLT has also been used to trace cross-border payments and this has seen the Bank of China collaborating with UnionPay to produce a blockchain-based payment system (Hsu & Green, 2021). The Industrial and Commercial Bank of China has also developed a China-Europe e-Single Pass which has established a financial service eco-system for use by port companies, banks, regulatory agencies, customs, and other relevant agencies

and supports increased levels of traceability of payments and information flows (Hsu & Green, 2021).

#### **4.2.7 Research and development of Blockchain in China**

Research and development alliances have also been established to support blockchain technology and these include the Financial Blockchain Cooperation Alliance or Gold Chain Alliance with over 100 members from a range of business sectors including banking, insurance, and technology (Hsu & Green, 2021). There is also an alliance of over 100 businesses in Chongqing with the objective of developing DLT applications for the city (Shaun, 2020 cited by Hsu & Green, 2021). China has 1,309 blockchain service providers and more than 80 blockchain research institutions by the first half of 2020. (Cai et al, 2021). Academic research into blockchain has expanded a focus on digital currency to finance, business, government, and other areas and have seen the number of blockchain solution providers increasing in China (Cai et al, 2021).

Chinese research institutions and businesses have been working on decoupling the blockchain architecture to improve its performance and this has allowed different blockchain research and development institutions to join in designing the different layers, such as transactions, and reduces research and development costs for businesses (Cai et al, 2021). The development of this decoupling architecture also enables China to work towards establishing a unified and standardized system (Cai et al, 2021).

#### **4.2.8 Development of alliances in blockchain in China**

There are also alliances which have been established to improve banking processes (Hsu & Green, 2021). One such alliance is between the State Administration of Foreign Exchange and commercial banks which aims to establish a national cross-border blockchain platform which will include sharing customs clearance and verification information to allow banks to submit customs clearance financing applications (Xinhua, 2019 cited by Hsu & Green, 2021). Another alliance has seen the China Trade Finance Cross-Bank

Transaction Platform being established by the China Banking Association and a number of banks and this uses DLT to coordinate interbank transactions and information (Hsu & Green, 2021).

There have also been new alliances being formed with the objective of reducing the costs associated with DLT applications by providing access to an existing blockchain network (Hsu & Green, 2021). The national Blockchain-Based Service Network [BSN] includes government departments, bank and technology companies and allows Chinese participants to build their own DLT applications (Stockton, 2020 cited by Hsu & Green, 2021). The BSN substantially reduces costs for businesses in relation to building and operating from approximately US\$14,000 to less than US\$300 (Stockton, 2020). The BSN Alliance includes the State Information Centre and large organizations such as China Telecom is currently testing BSN in over 50 cities which include Singapore and Hong Kong and it is planned to extend this internationally (Zhao and Pan, 2020 cited by Hsu & Green, 2021). Another alliance is Ant Financial which has developed the Ant Blockchain Open Alliance to help to reduce the barriers to entry for small and medium enterprises [SMEs] by providing a DLT service on the Alibaba Cloud (Wood, 2020 cited by Hsu & Green, 2021).

#### **4.2.9 Integration of blockchain with other emerging innovative technologies in China**

Some Chinese enterprises are developing how blockchain and other emerging innovative technologies such as cloud computing, IoT, Artificial Intelligence (AI) and 5G can be integrated into key industries (Cai et al, 2021). This integration will assist in addressing core problems in these industries such as production efficiencies (Cai et al, 2021). Furthermore, the integration of blockchain with merging technologies will also support China's political and economic ambitions in its infrastructure development and developing new areas of economic growth in technology (Cai et al, 2021). The level of interest in this integration is shown by the high number of patent applications in China (Cai et al, 2021; Hsu & Green, 2021).

#### 4.2.10 Government-Sponsored Pilot Blockchain Projects in China

To support its policy, aim of being an innovation and technology leader, the Chinese government has promoted the use of DLT in a number of areas (Hsu & Green, 2021; Cai et al, 2021). This include the central bank using a DLT system which digitizes cheques and the Supreme People's Court is in support of the use of blockchain for the storage of physical evidence (Hsu & Green, 2021). Local governments are also incorporating the technology and over 30 provincial and city governments have developed over 40 policies designed to support DLT and other associated technologies (Hsu and Li, 2020). Cities including Guangzhou, Beijing, Shanghai, Suzhou and Xiong'an are prioritizing the development and incorporation of blockchain and DLT and this has seen the following activities (Hsu & Green, 2021; Cai et al, 2021; Coingeek, 2020 cited by Hsu & Green, 2021):

- The promotion of blockchain technology by the Zhongguancun Blockchain Alliance in Beijing.
- The creation of an incubation base in the Baoshan District in Shanghai.
- A training base to train DLT technicians in Suzhou.

Since 2017, the area of Xiong'an has seen a number of blockchain applications including the Xiong'an Land Requisition and Demolition Fund Management Blockchain Platform established in Xiong'an New District by the Industrial and Commercial Bank of China (ICBC) and created to track relocation, resettlement and other related payments (Hsu & Green, 2021). Xiong'an also uses the blockchain applications for non-tax bills, land transfer and management, judicial deposit, supply chain finance and other uses (Cai et al, 2021). In 2020, Xiong'an launched a city-level blockchain system for a range of applications including compensation payments and this system has helped to reduce the number of intermediaries and the risk of funds being diverted or misappropriated (Cai et al, 2021). This blockchain platform is also being used to pay for construction project and migrant workers (Cai et al, 2021).

#### 4.2.11 Blockchain and the Private Sector in China

In relation to the use of DLT outside of fintech, President Xi Jinping has stated that DLT has the potential for a large and varied range of uses in China and this can be seen in the expansion of DLT applications within the medical industry and across supply chains (figure vi) (Foxley, 2019 cited by Hsu & Green, 2021).

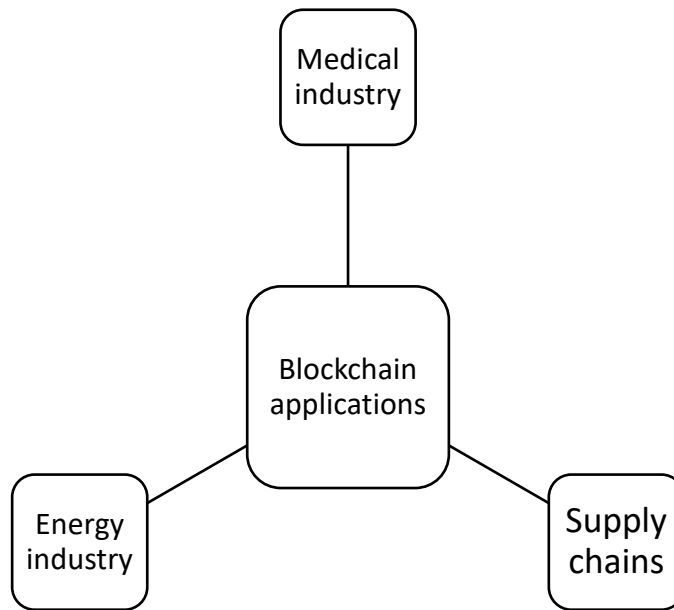


Figure 6. Applications of blockchain in the private sector in China

**Blockchain in the medical industry.** The COVID-19 pandemic exacerbated five major challenges in the medical supply chain namely variations in product requirements, payment credibility, supplier credibility, logistics tracking and custom certificates and verification (Degnarain, 2020 cited by Hsu & Green, 2021). A potential solution to these challenges is related to blockchain applications which can assist with streamlining medical processes and protecting personal data and this has already seen a variety of initiatives in China including the Alibaba blockchain project related to medical data security (Suberg, 2017 cited by Hsu & Green, 2021). Other blockchain applications in the medical industry include solutions being developed by Baidu and Tencent amongst others to enable med-

ical data to be shared (Forkast, 2020 cited by Hsu & Green, 2021). For example, in Chongqing, Baidu has developed an open-source blockchain platform which stores medical data such as diagnoses and treatments called XuperChain and this expected to be rolled out to other regions in the next few years (Forkast, 2020 cited by Hsu & Green, 2021). Another example of Chinese businesses using DLT to streamline medical functions and processes is the joint Ant Financial and Huashan Hospital pilot which since 2018 has tracked prescription in the supply chain to prevent tampering and prevent prescriptions being misused or refilled without authorization (Barley, 2018 cited by Hsu & Green, 2021).

***Blockchain in the Energy Sector.*** Energy Blockchain Labs. Inc. in Beijing has used IBM blockchain technology to develop a DLT platform and this is being used to trade carbon credits using smart contracts and promotes transparency as well as streamlining the current efforts being made to limit greenhouse gases as it allows for high- and low-emitters in compliance with the government-mandated Certified Emission Reduction quotas (IBM, 2020 cited by Hsu & Green, 2021). China's Hyperchain (Hangzhou Qulian Technology) is developing a blockchain solution for China's State Grid Corporation which will include use of the Internet of Things [IoT] (Wood, 2019 cited by Hsu & Green, 2021).

The application integration of blockchain technology in the financial, energy and other industries deep in the application of this (Cai et al, 2021). The finance sector was early adopter of blockchain in 2015 and in 2020 the Peoples Bank of China release the first standard specification for financial blockchain. Blockchain applications in trade finance and supply chain finance amongst others are increasing and its use has been adopted by various of leading platforms including the commercial Bank of China (Cai et al, 2021). In The energy industry, the Chinese state grid has proposed a blockchain service designed to serve renewable energy markets to promote a market for distributed electricity generation (Yang, 2020).

***Blockchain in the Supply Chain.*** The use of blockchain and DLT in the supply chain has the potential to improve data processing times and assist in the verification of products and this could involve international trade (Hsu & Green, 2021). One example of blockchain in the supply chain is related to the export of US soy to China which uses the Easy Trading Connect Platform which has substantially reduced the data processing times of these shipments (Hunt and Croft, 2018 cited by Hsu & Green, 2021). A similar use of blockchain technology has been used by Walmart China and VeChainThor blockchain to develop the Walmart China Blockchain Traceability Platform which is able to track food across the supply chain (Zmudzinski, 2019 cited by Hsu & Green, 2021). DLT is also being used for product verification in the supply chain and this has seen the development of the first of its kind in China by JD Digit's Blockchain Data Service (Wood, 2019). Users are able to scan bar codes via a mobile app which connects to the JD's Blockchain Anti-Counterfeiting platform and provides product information and tracking records for thousands of products (Wood, 2019 cited by Hsu & Green, 2021).

Based upon these examples, it can be seen that China is quickly adopting and developing blockchain across a range of industries including finance, energy, medicine and the supply chain and this has been facilitated by the political support for this (Hsu & Green, 2021; Cai et al, 2021). The increased use of this technology is helping to modernize the country, improving security and increasing transaction speeds (Hsu & Green, 2021; Cai et al, 2021).

#### **4.2.12 Typical Cases of Blockchain Applications in China**

There are amount of blockchain applications in China these tend to be concentrated on developing scenarios including finance, government services, smart cities and technological innovation and leadership (Cai et al, 2021). Examples of these applications include the trade finance blockchain platform and cross provincial housing provident fund platform (Cai et al, 2021).



The trade finance blockchain platform which was launched by the Digital Currency Institute of the Peoples Bank of China in September 2018 to address the financial, taxation, and regulatory perspectives of SMEs (Cai et al, 2021; CGTN, 2020). This blockchain platform currently runs five business applications and the applications of hundreds of branches of 50 commercial banks (Cai et al, 2021). In November 2020, the Trade Finance Blockchain Platform and the HKMA's eTradeConnect platform were interconnected enabling the first cross-border partnership between several trade finance blockchain systems. (Cai et al, 2021). This collaboration significantly impacts upon trade finance by enabling cross border trade finance transactions using the data exchange facility between these two platforms for the first time (Cai et al, 2021).

The cross provincial housing provident fund platform [HPF] is the largest public housing program in China and is powered by Hyperchain which is supported by Branches of China Construction Bank and the Ministry of Housing and Urban-Rural Development [MO-HURD] (Cai et al, 2021). This blockchain enables residents to withdraw their Housing Provident Fund [HPF] in 303 house fund management centers across China without the need for manual review. This platform has carried out over 480 million transactions and is running 19.98 million mortgage accounts in the HPF program (Cai et al, 2021; HPF 2019). The main advantage of using blockchain in this program is related to its ability to establish links between departments thus increasing the efficiency of cross functional collaboration. This has seen a shift from exchanging data held on different systems to operating a single system on a blockchain platform (Cai et al, 2021). Due to this data being held on a blockchain platform, this is immutable and ask for trustworthy for data users including the State Taxation Administration (Cai et al, 2021).

#### **4.2.13 The core technologies for blockchain development in China**

The development of a practical blockchain platform in China needs to have various characteristics and these include the ability to handle a large number of accounts and transactions; to provide an efficient and reliable storage model and network architecture; to optimize virtual contracts; to ensure network security and privacy and to support con-

nectivity between heterogeneous blockchains (Cai et al, 2021). Based upon these characteristics the following innovations are being addressed and progress has been made (Cai et al, 2021):

- Scalable and high-performance consensus protocols which are based on permissioned blockchains and can be classified into two categories: semi-synchronous and asynchronous protocols (Cai et al, 2021).
- Cooperative storage model which is required to both carry enormous amounts of data and to also reduce the storage overheads and improve security (Cai et al, 2021).
- Efficient and reliable network architecture which is required to boost the blockchain network scalability (Cai et al, 2021). Parallel block chain structures consisting of a system blockchain and several application blockchains are also being explored (Cai et al, 2021).
- Network security and privacy preservation which are essential to guarantee the access control within a blockchain network and to ensure that privacy is protected (Cai et al, 2021). The MSP mechanism is widely used in permissioned blockchains to both verify identity's and to manage the membership of the blockchain network (Cai et al, 2021).
- Connectivity among heterogeneous blockchains which is required to establish value and trust (Cai et al, 2021).
- Smart contract and virtual machine optimization to provide secure and trustworthy private transaction process is. Research into smart contract security is focused upon reducing the risks our vulnerabilities, attacks and problems associated with the construction of smart contracts (Cai et al, 2021).

#### **4.2.14 Blockchain development in China**

Technologies such as DLT have become more popular due to cryptocurrencies such as Bitcoin, but its uses go beyond replacing traditional currencies (Hsu & Green, 2021; Cai et al, 2021). This has seen China test DLT across a range of industries in addition to the

financial sector and establish regulatory frameworks, a government blockchain committee and a set of standards (Cai et al, 2021; Kharpal, 2020 cited by Hsu & Green, 2021). This commitment by the government also led to the BSN which increases the level of access to DLT and blockchain to SMEs thus increasing the opportunities for higher levels of participation in its strategy to build technological leadership (Hsu & Green, 2021).

DLT and Blockchain are also seen as ways for China to increase its competitiveness in the international market (The State Council of the People's Republic of China, 2015 cited by Hsu & Green, 2021). As this technology is developed, it can be seen to follow the five steps of adoption which are innovators, early adopters, early majority, late majority and laggards (Kotler and Armstrong, 2018). The advantage provided by a specific technology is dependent upon how early this technology is adopted by a country and how lucrative this is and China is an early adopter which provides it with a relative advantage over countries which do not or have an underdeveloped blockchain infrastructure (Hsu & Green, 2021; Cai et al, 2021). Whilst it is not yet established what China and other countries will do with these technologies, there are a number of possibilities including advancing medical care and the development of smart cities (Hsu & Green, 2021).

Due to blockchain being included in the 14<sup>th</sup> five-year plan of the Chinese government, that is clear evidence that the government is active in the promotion all the development of the blockchain industry and examples of this include but development of supportive standards and regulation policies and providing training (Xinhua, 2020). This provides new opportunities for the development of blockchain but there are also number of issues which need to be addressed and these include (Figure 7) (Cai et al, 2021).

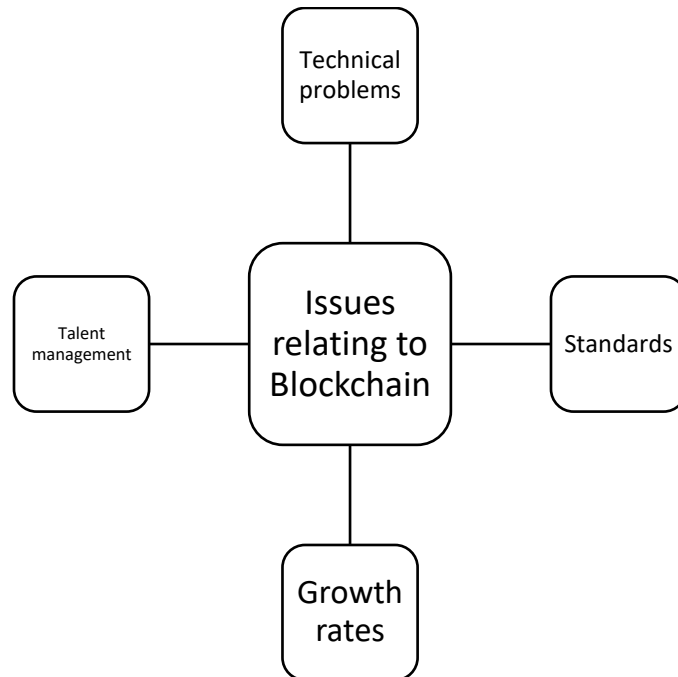


Figure 7. Issues relating to blockchain

The need to continuously resolve fundamental technical problems and Chinese blockchain technologies still need further development before they can be robust enough to be applied in different types of scenarios. To address this there is a need for key enterprises and research institutes to increase collaboration to support the continuous breakthrough in relation to core technologies including consensus protocols, distributed storage and peer to peer networks with the aim to further improve the scalability and interoperability of blockchain (Cai et al, 2021).

The formation of technical standards and systems needs to be ongoing in China (Cai et al, 2021). Currently the blockchain industry in China has a strong foundation to support its development and the national policy settings assist with this but will require further and rapid technical standards and systems to be developed (Cai et al, 2021). By 2020, China had issued three blockchain industry standards, 5 provincial and local standards, and 34 group standards and the Chinese government is currently drafting an additional 3 blockchain national standards to assist with application practices (Blue Book of China Blockchain Standards, 2020).

The barbaric growth of the tech sector in China which saw this sector being left to its own devices due to the absence of proper regulation has been curtailed (Cai et al, 2021). With the continuous development of blockchain regulation standardization the markets will need to pay more attention to the capabilities of core technologies, and this will lead to the gradual emergence of competitive block chain organizations (Cai et al, 2021). This will encourage companies to increase their investment in research and development, to investigate how blockchain and traditional economic processes may be combined. is and two evaluate the long-term role that blockchain can play in new business models and infrastructure (Cai et al, 2021).

Due to China cultivating blockchain talents, there has been a continuous influx of talented individuals with blockchain skills and knowledge (Cai et al, 2021). Currently more than 40 Chinese universities teaching blockchain or related courses and other regions have developed blockchain talent policies to support the acceleration and development of the blockchain industry (Cai et al, 2021). The development all this talent and the opportunities all this talent in the blockchain industry is beneficial in its development (Cai et al, 2021).

### **4.3 Interview analysis**

The primary data findings will start with a brief narrative provided by each of the six interviewees which was shaped by the interview questions. These narratives will then be compared to find areas of similarity and difference.

The first part of the data analysis will commence with a cross comparison between the six interviewees to show some of the similarities and the differences in their reported experiences and context. The second part of the data analysis will undertake a synthesis between the themes and concepts evaluated in the literature review and the findings from the primary and secondary data.

#### **4.3.1 Cross comparison of primary data collected from the six interviewees**

All the six interviewees had a high level of knowledge and experience within the blockchain sector in China. All six interviewees discussed their personal experience within the blockchain sector as the initial starting point for the interview, but this specific data was not included in the primary data chapter. As this would have identified the interviewees and all the interviewees requested that they wanted to remain anonymous.

The interviews produced a large volume of rich data, and this was edited to providing six narratives in the data chapter. There were several main areas discussed during the interview and this provides a point of comparison for the data analysis process.

#### **4.3.2 Role of institutions in blockchain based business in China**

All interviewees discussed the role of institutions in blockchain, and these institutions include governments, industries, and countries. The role of governments can be either proactive or reactive or a mix of these two. There was an acknowledgement from the interviewees that these roles are dependent upon the political context of the government and of the country. Within China, there is a higher level of control due to centralized government and one-party policy, whilst in other western democracies the role of government can be more decentralized. One of the roles of governments is to prevent social harm, but this can create a tension between societal needs and business responsibilities. One of the report examples of social harm, which can be created by the application of blockchain, is related to the high level of barbaric growth which has taken place in the blockchain industry, particularly in China. The government wants to stop this barbaric growth that has been enabled by lack of regulations and standards, which has led to a higher level of harm in terms of financial loss and risk being born by societal stakeholders including individuals and financial institutions. To address this barbaric growth, the Chinese government are the process of developing standards, policies and improving their regulatory framework to both support the development of technology in a productive manner and to protect citizens from harm, as mentioned by interviewee 3. However,

some of the interviewees reported that this increased level of intervention by the Chinese government does make it more challenging for the development of blockchain technologies. Some of these challenges discussed by the interviewees, such as the use of cryptocurrencies being banned in China, which was discussed from the range of perspectives held by the interviewer. This means that for some of the interviewees the context of their business was not just in China and had a global presence. This meant that the company could benefit from different regulatory frameworks including using cryptocurrency as part of the blockchain technology development.

### **4.3.3 Things to know for blockchain based business in China**

When asked about things need to know for running a blockchain based business in China. Every interviewee answered regulation and the law. This included ensuring that regulations are followed but these sometimes include a recognition that these are not always black and white, there are a number of grey areas which may allow for some activities to continue if the business keeps a low profile, such as ensuring that projects are small and cryptocurrency activities are kept out of China, as interviewee 2 said. And interview 6 stated to find the balance between what is allowed and what is not allowed which means the grey area would be essential for blockchain based business in China. This is also how blockchain based business evolved in China over the years due to the constant changing regulations and laws. Entrepreneurs learned to adapt to the institutional environment by finding the middle ground. Companies' strategies and behavior are shifting and changing according to government's actions.

### **4.3.4 Feelings regarding regulatory environment in China**

The majority of interviewees feel quite negative about the regulatory institutional environment of China. They believed it has negative impact on blockchain based business in China. The growth and innovation of blockchain technology will be heavily reduced under this hostile environment, said by interviewee 6. However, a very different opinion

by interviewee 4 and interviewee 5 is that the Chinese government is protecting its citizens by applying this heavy regulation on blockchain based business, since many of the blockchain projects nowadays focus too much on the token, many people lost their savings to those fraud projects. By applying strict laws and regulation, it regulates the blockchain based business to some extent. However, all interviewee mentioned that it is highly important for the government to find the balance between regulating the industry and encouraging the technology development. Many believes the Chinese government is learning as well by constantly changing the regulations since the technology part is highly encouraged and favored by the Chinese government.

#### **4.3.5 Impact of relationship with Chinese government**

Several interviewees such as interview 1,3 and 5 have very close relationship with the Chinese government including central banks and local government. They stated that having a good relationship with the Chinese government would have positive impact on blockchain based business, interviewee 1 mentioned it is because of the Guanxi culture in China. Interviewees stated that they had become used to these, but they still have to decide how not only execute the policies but to also ensure that the business is protected. Interviewee one stated that they have assisted the policymakers in developing a greater understanding of the blockchain industry in China, but there are often differences in the way these policies are executed regionally. This requires a careful analysis of situation including ensuring that the regulations are followed, and that the business can provide proof of this activity. This analysis and due diligence include consulting with lawyers and consultants which reassures potential and future business clients. But every single interviewee stated that when the central order come, it is applied for every single person and organizations in China no matter what kind of relationship you have with the Chinese government. Thus, it is shown that the central orders are the most powerful ones that every blockchain based business owners should look out for.



#### **4.3.6 Impact of recent crypto ban**

Every interviewee brought up the impact of their business due to the recent crypto ban. But the impact for every firm is different due to their expertise. Interview 1 mentioned about the shift of communication channel from Wechat to Telegram because of the crypto ban. However, the company overall strategy is not influenced at all since interview 1's company mainly focus on technology and open permission blockchain which is allowed and encouraged in China. However, interviewee 2 stated that the recent regulations in September did have an impact which was greater than expected, as it stated that 'companies could not handle any cryptocurrency'. Whilst interviewee two stated that cryptocurrency is not used in China, its use is carried out in national regions, but the latest regulations have stated that any there cannot be any assistance of crypto currency, and this meant that certain operational changes had to be undertaken. Given this scenario, it is acknowledged that software development only for defi project that do not involve cryptocurrency. However, interviewee 3 and 6 joked about this crypto ban since there are too many crypto ban in China over the years, they do not think legit business should be influenced at all by this ban, but it does clarify the position of the Chinese government this has provided, and this signaled to the market that the Chinese government were serious this time and businesses realized that they may face more restrictions if they did not comply with this or even the risk of these restrictions being applied in other countries

#### **4.3.7 Chinese Government's general attitude towards blockchain based business**

Despite the Chinese government's ban on cryptocurrency, interviewee two said that the Chinese government is pro blockchain, and one of the suggested reasons for this is concerned with the benefits blockchain provides in supporting higher levels of transparency and trust for government activities, such as vehicle titles and mortgage deeds which are currently paper based and involve different parties. This would create distributed and decentralized data, but this does not necessarily mean that the data will be made public. The Chinese government support for blockchain is also evidenced by the availability of

grants for blockchain innovations. However, interviewee two also stated that they believed that free market economics are the best way to inspire innovation as it creates wealth. While the Chinese government is anti-cryptocurrency, this may limit the amount of investment in this sector. In addition to this barrier, interviewee two stated that technical resources and qualified developers were of concern for blockchain businesses. Interview 4 has the same opinion; the Chinese government are keen to support blockchain as seen in the five-year plan. Generally, every interviewee believes that Chinese government is pro blockchain technology, but not the token part. But one of the biggest concerns of interviewee four is related to the level of control which the government will exert with this government attitude, since blockchain is decentralized and open source, but a high level of government control will centralize blockchain, and this would not be an ideal situation.

#### **4.3.8 Barriers to blockchain based business in China**

All six interviewees were asked to provide those opinions on the barriers to block chain in China. One of the main barriers was the regulatory framework particularly in terms of the banning of cryptocurrencies. Although interviewing six stated that cryptocurrencies were still allowed to be used in private transactions between individuals. For businesses, however the banning of cryptocurrency has created certain issues. Some of the blockchain businesses within which the interviewees are operating do issues token, but the interviewees stated that this could not be used within China without the likelihood of some form of legal redress. One interviewee stated that there was a way around the banning of cryptocurrency, and this involved Chinese citizens being able to switch their IP address to a different geographical location that did allow cryptocurrencies to be bought and sold. All the six interviewees commented on an uneven level of enforcement in relation to blockchain and cryptocurrency standards, stating that this was dependent upon the region within which the business was operating. However, the regulatory environment did have an impact and was seen as a potential barrier.

Since the regulation in China is one of the biggest obstacles to the blockchain business, interview 3 stated that it includes the three factors: policy, capital, and human resources. Without the support of policy, capital is reduced, and people see blockchain as something negative, so it is important that there is a cohesion between the three. It is important to attract the right people and capital into the industry, but the policies in relation to blockchain will lead people to question if they are breaking the law, and if the industry cannot attract the right people, then how will the organization provide a return on investment. These barriers also make it difficult for Chinese blockchain businesses to attract talented personnel

Another barrier was related to the number of individuals who had experience in blockchain in China. Most of the interviewees stated that they had gained their experience in blockchain through academic study, but there was still a lack of universities offering specific blockchain learning and research facilities. This indicates that there is a time lag which requires institutions including the government and universities to develop and teach blockchain technologies. China is currently developing the academic teaching of blockchain and other associated technologies in its top universities. However, there were concerns amongst the interviewees that talented individuals working in blockchain overseas may be reluctant to return to China due to the higher-level state control over blockchain and cryptocurrency development.

#### **4.3.9 Opportunities for blockchain in China**

In contrast to the barriers for blockchain in China, the interviewees also discussed the opportunities. These opportunities include the growing interest and support full blockchain within China. The first perspective is in terms of the potential opportunities for growth and business success in China, which is seeing a heavy promotion of blockchain technologies by the government who is also willing to support these such as government funding and grants as stated by interviewee2. This includes the application of blockchain technologies within a variety of industry sectors including finance, medical and supply chain and this was also reflected in the secondary data. The interviewees spoke of

growth opportunities within China and of the impact blockchain technology can have both upon industry and businesses within China and this is already seeing a growth in start-ups and increased level of innovations.

Interviewee 3 stated that opportunities in China is blockchain itself, that will be able to revolutionize the internet by providing access to all digital assets under one log-in instead of separate passwords for each website. In addition to this, there is the opportunity for people to provide access to the metaverse and speed up connections across a range of services.

Opportunities across a range of sectors which would require blockchain platforms to be developed for these industry sectors, thus providing opportunities for economic growth over a longer period of time. This concept of time and longevity in the growth of blockchain was discussed as being important as many have focused on immediate growth and wealth creation from blockchain. This short-term perspective of blockchain has arguably created the need for government intervention, as the economic risk of this has been high for individuals, and a longer-term impact of this profit chasing has been to reduce the level of trust in blockchain. Blockchain companies are able to develop their businesses in collaboration with the Chinese government, other business and academic institutions. This provides an opportunity to develop more robust blockchain chain platforms and to also address the issue of user trust and transparency within the technology, which is one of its fundamental characteristics,

#### **4.3.10 Advice for running a blockchain based business in China**

The advice from interviewee three in relation to an entrepreneur wanting to establish a blockchain business in China includes remaining anonymous by developing DeFi or NFT projects on a global level, or provide a service to a global audience, then bringing this concept to a larger enterprise and enabling them to use this to access their users and create traffic for your business. This allows for current areas of work to be exploited to create value and this will also attract people and other businesses to the sector.

Interviewee six also provided some advice on people looking to start blockchain businesses in China and this included understanding and owning cryptocurrency. The second piece of advice was knowing the regulatory changes in China and interviewee six suggested that China may not be the best place to start blockchain business. This was the reason why the interviewee's business operates in a global market, so that in the event of further bans, the business can continue in other countries, interview 3 has the exact same advice regarding this. Based upon this perspective, interviewee 3 and 6 did not recommend starting a blockchain business in China.

Other interviewees mentioned about cooperate with in the laws and regulations, which is the most important thing to know for blockchain based business in China. As mentioned by interviewee 4, there is also a need to develop technical skills which can be challenging as there is a lack of formal teaching coupled with a high demand for these skills, although there is an active online community which supports the learning process. There are also technological barriers to blockchain, and this requires problem solving which is focused upon taking small steps and testing these. This also requires a particular mindset and interviewee four ended the interview by discussing the problem of thinking big, especially in relation to building a new technology which could take years to do. For interviewee four, blockchain needs to be developed in an informed way or it could have the potential to be negative. This mindset also needs to address how blockchain can grow and find a fit in relation to regulatory frameworks. But this requires information sharing between businesses and governments which may be hampered by information asymmetries created by confidential business issues.

## **5 Discussion**

### **5.1 The role of institutions**

The goal of this thesis was to explore how to develop blockchain based business in centralized institutional environment, such as China. The literature review started with an overview of institutions and their impact on company strategies, and this included at institutions, such as governments, can have a significant impact on company strategies (Bruton et al, 2014). Further research undertaken by Harwich and Caton (2020) found that applications of blockchain technology to finance are limited by the institutional environment, despite Froloy's (2020) finding that blockchain reduced transaction costs which improves the quality of financial services (Park & Shen, 2001).

The regulatory frameworks of financial institutions can have a positive impact upon blockchain in the financial industry, but this has tended to favor the softer approach (Brophy, 2020; Yeoh, 2017). Whilst institutions play a role in strategic decisions, there is a need to develop different perspectives of this based upon the context and this has included the application of the VoC model (Carney, Gedajilovic & Yang, 2009). The regulatory context is being challenged by the disruptive nature of blockchain, and this has included how to deal with cryptocurrency, which is not considered as a legitimate form of money (Sa, Verschoore & Monticelli, 2021). To improve the legitimacy of cryptocurrency, there is a need to develop its reputation and to address governance issues (Zachariadis, Hileman & Scott, 2019; Gao et al, 2017). The impact of market-supporting institutions on business strategies found that this reduced the level of risk and had an impact on performance as there were clear parameters and higher levels of collaboration (Banalieva, Cuervo-Cazzura & Sarathy 2018; Meyer et al, 2009).

### **5.2 China's institutional environment and its influence on companies**

From the findings of the secondary data, it was found that China's institutional environment had a high influence on company strategies (Hsu & Green, 2021; Cai et al, 2021).

This institutional environment has evolved over time to become more supportive of trade and growth, and this has a strong impact on companies (Zhou et al, 2021; Hitt & Xu, 2016; Kumar & Worm, 2011; Gao, 2008). Research into the link between the institutional environment and entrepreneurial activities found that more rigorous control and monitoring increased the quality of entrepreneurial activities, and this is reflected by the growing level of innovation reported in the secondary data (Luo & Chong, 2016).

The primary and secondary data reported that blockchain has an important role in China's institutional development and this was reflected in the literature review (Ahl et al, 2019; Zhang et al, 2018). This institutional development in China is characterized by the significant economic role of the state and the high level of control of key industries despite growth being driven by the private sector (Guluzade, 2019; Soh & Yu, 2010; Chen, 2005; Ahlstrom & Bruton, 2002). Technological innovations are therefore being driven by the private sector but supported and influenced by the government (Cai et al, 2021; Hsu & Green, 2021; Yu et al, 2020).

In addition, as stated multiple times during the interviews, the majority of the interviewees believed that China's institutional environment has a huge impact to companies. The blockchain environment in China has improved and this has included a greater acceptance of blockchain technology and cryptocurrency but there are still concerns about the lack of control of this. This concern has led to government regulations which limits its usage. Another concern is related to the level of control which the government will exert. Blockchain is decentralized and open source, but a high level of government control will centralize blockchain, and this would not be an ideal situation. This regulatory challenge coupled with a low number of experienced individuals in China creates a barrier, and another barrier is concerned with a focus on the Chinese market which means that there would be a lower opportunity for internationalization.

Despite these synergies between the private sector and the Chinese institutions, there are barriers which restrict innovation in SMEs, and these include fairness of competition,

access to financing, tax burden, laws and regulation and support systems (Zhu, Wittmann & Peng, 2012). As found in the primary data, it is shown that strict institutional environment for blockchain based business in China has negative influence on the innovation and growth of blockchain based business.

### **5.3 Advantages and disadvantages of blockchain**

The advantages of blockchain include the use of cryptocurrencies which supports decentralization, allows a more flexible, inclusive and private system and reduces transaction costs (Cong et al, 2021; Henton & Windekilde, 2020; Holbrook, 2020; Chen & Bellavitis, 2019; Yun et al, 2020; Di Gregorio, 2017; Bohme et al, 2015). This creates a chain of activities which builds a database and can be applied across a range of industries (Cai et al, 2021; Yu et al, 2018; Fanning & Center, 2016). Currently these advantages include a high level of theory as there are still problems with the application of blockchain in a wide scale (Yu et al, 2018). While this is seen as a disadvantage in China due to the lack of control of cryptocurrency, the government do not favor the token part.

Whilst blockchain can be seen as a game changer in area such as transparency, auditing and efficiencies, there are some disadvantages, and these include its wide range of adoption and use (Albeshr & Nobanee, 2020). Additional disadvantages include a lack of understanding, the increased risk to cyber-security, technical complexity, and energy use and these were highlighted both in the literature review and in the secondary data (Cai et al, 2021; Hsu & Green, 2021; Rowlatt, 2021; Carter, 2021; Sedlmeir et al, 2020; Iansiti & Lakhani, 2017). Blockchain supports irreversible transactions, and this is seen as a disadvantage for the finance sector even though this is one of the advantages of blockchain (Bohme et al, 2015). Blockchain itself, that will be able to revolutionize the internet by providing access to all digital assets under one log-in instead of separate passwords for each website. In addition to this, there is the opportunity for people to provide access to the metaverse and speed up connections across a range of services.



These disadvantages imply that a careful and considered approach to blockchain would be appropriate and this includes pilot studies and schemes and a number of these were presented in the secondary data (Cai et al, 2021; Hsu & Green, 2021).

All in all, the technology part is encouraged by the Chinese government, it is also the part that would revolutionize the society as a disruptive innovation. However, crypto currency, as one major adoption of blockchain technology is the controversial part that the Chinese government do not favor. The main reason is because people misuse the technology and token part to do fraud projects. Thus, the Chinese government believes the regulation on blockchain based business is necessary and essential. Both secondary data and primary data are shown that the Chinese government encourage the advantages of blockchain, but the government is concerned about the negative impact on society. Thus, the current institutional environment for blockchain based business occurs. Over the years, the technology is involving greatly, along with the tighten regulations.

#### **5.4 Opportunities and challenges in blockchain based business in China**

Opportunities in blockchain based business can be seen from the secondary data of the blockchain technology application part such as in medical, supply chain. In addition, blockchain itself is a disruptive innovation that will be able to revolutionize the industry. The disruptive nature of blockchain has been presented as a methodology which can reshape traditional industries such as the finance industry (Zheng et al, 2020). One of these disruptions is related to the impact of decentralized blockchain platforms and its impact on costs and longer-term benefits which shifts from the perspective of short-term financial gains (Pereira et al, 2019). This focus in the long-term is reinforced in the secondary data with the emphasis upon the development of a robust blockchain infrastructure (Cai et al, 2021; Hsu & Green, 2021).

The secondary data provided evidence of blockchain being undertaken as a strategic objective by the Chinese government, but this strategic perspective can also be applied to

the banking and finance industry (Harris & Wonglimpiyarat, 2019). This research suggests that blockchain will enable the banking sector to become more competitive (Kazan et al, 2018). However, it is also worth noting that the banking sector in China is under state control and therefore has a monopoly (Cai et al, 2021). However, blockchains can create a monopoly without the losses which can be associated with this due to the improved efficiencies (Easley et al, 2019; Huberman et al, 2017).

The role of cryptocurrencies within blockchain will evolve as technology improves and the level of adoption of these increases (Easley et al, 2019). This competition amongst cryptocurrencies has also led to the suggestion that the current approach to how these currencies is regulated may be inadequate and requires additional levels of regulation in the market (Ostbye, 2016). This increased and evolving regulatory framework can be seen in the crypto bans in China over the years.

Opportunities across a range of sectors which would require blockchain platforms to be developed for these industry sectors, thus providing opportunities for economic growth over a longer period of time. This concept of time and longevity in the growth of blockchain was discussed as being important as many have focused on immediate growth and wealth creation from blockchain. This short-term perspective of blockchain has arguably created the need for government intervention, as the economic risk of this has been high for individuals, and a longer-term impact of this profit chasing has been to reduce the level of trust in blockchain. Blockchain companies are able to develop their businesses in collaboration with the Chinese government, other business and academic institutions. This provides an opportunity to develop more robust blockchain chain platforms and to also address the issue of user trust and transparency within the technology, which is one of its fundamental characteristics,

Thus, as mentioned in the primary data, it is highly important for the Chinese government to find the balance between encouraging this technology and regulate the block-

chain industry to protect its citizens from frauds. The regulation should be applied cautiously without harming the innovation and growth of blockchain technology and blockchain business that have positive influence on the world. The importance of institutional role is highlighted here again. Businesses are easily influenced by institutional environment in many aspects such as innovation, internationalization, and technological innovation. The institutional role of Chinese government is not only important for blockchain based business in China but also for the globe. Finding the balance in regulations would be a long way to learn not for the Chinese government. However, this is believed as a sign of society growth since all disruptive innovations in history would go through this and regulators are learning and adapting along the way.

## 6 Conclusion

The main research question aims to evaluate how to develop blockchain based business in China. The answer to the research question is know the regulations and laws clearly first and develop the business within the rules. Chinese government is pro blockchain technology but not encouraging the token part, thus, legit blockchain based business with only technological development should not be too concerned about the institutional environment in China. As for issuing and selling tokens, the cryptocurrency part, the situation varies. The government do not favor the token part, regulations in China are not always black and white, it has a number of grey areas which may allow for some activities to continue if the business keeps a low profile, such as ensuring that projects are small and cryptocurrency activities are kept out of China. In addition, sometimes the central rules and the local rules are slightly different. As analyzed in the interviews, the current situation in China is in limbo and this applied to some organizations which was supported by local government, but the central bank was applying pressure, and this was viewed from the perspective of China's classical tradition on new things with the tensions between old and new. This conflict between old and new is seen in the tensions between blockchain which are interdependent but have been separated by Chinese policymakers. This means that a middle ground between the two areas needs to be found. This is challenging and presents a grey area for the organization as there is a need to innovate, but there is also a level of uncertainty as to whether certain innovations will be allowed or whether these will need to be shifted abroad to be safe.

The future for blockchain based business is difficult to assess within China as there is currently a number of barriers which prevent this from happening (Cai et al, 2021; Hsu & Green, 2021). However, as blockchain technologies are developed and technological innovations continue to take shape, there may be a future possibility for the finance sector to have an increased level of private ownership or to be allowed to develop a form of decentralized finance. However, the future of blockchain business in China is based upon the level of acceptance of this by the Chinese authorities and as now, there is a

precautionary approach being undertaken which limits this (Cai et al, 2021; Hsu & Green, 2021).

The Chinese government's institutional role plays an important role in blockchain based business in China. Many aspects of business, such as innovation, internationalization, and technological innovation, are easily influenced by the institutional environment. The Chinese government's institutional role is critical not only for blockchain-based business in China, but also for the rest of the world. Finding the right balance in regulations would be a difficult task for the Chinese government, as well as the rest of the world. To protect its citizens from frauds, the governments must find a balance between encouraging the technology and regulating the barbaric growing blockchain industry. The regulation should be implemented with caution so as not to stifle innovation and growth in blockchain technology and blockchain businesses that benefit the society. However, because all disruptive innovations in history have gone through this, and governments are learning and adapting along the way, this is seen as a sign of society growth.

### **6.1 Limitations and directions for future research areas**

The study has several limitations, most of which relate to the accessibility of data in such regulatory constrained environment. The major limitation was to gather interview data. Since many people working in blockchain in China want to be low-profile or are currently working in stealth due to the regulatory environment, it was quite challenging to find interviewees. The six candidates being interviewed all chose to remain anonymous. In addition, time limitation would be another issue since every interview last one hour, many parts are not covered during the interviews, or candidates may rush due to the time limitation, thus the answers may not be very detailed or thorough

There was also a lack of access to individuals within the policymaker in China. Interviews with policymaker would have provided a deeper insight into the regulatory context and the opportunities and barriers within blockchain based business in China, as well as the

attitude towards blockchain based business in China. Thus, the future research could aim and explore the same questions with the wider group of informants.

The other suggested areas for future research include a deeper evaluation of the Chinese finance sector including the collection of primary data from policy makers involved in this, in order to get a deeper and more insightful first-hand information regarding the government attitudes towards blockchain based business in China.

Further studies could include how will the regulatory environment be like in China. Will cryptocurrencies be accepted or not, in what kind of ways. If so, will cryptocurrency be regulated by centralized institutions. Will there be a balance between decentralization and centralized in China and in the world when decentralized finance starts to disrupt the traditional finance sector.

Another future research area could be NFTs and metaverse, as mentioned by many interviewees. Since Web 3.0 and metaverse is very trendy right now. Many Web 2.0 tech giants such as Facebook, Snapchat and Microsoft are building their own metaverse to transfer into Web 3.0. All the old money and new money, different kinds of capitals are rushing into Web3.0. Highly educated talents used to work for Web2.0 tech giants are moving to Web3.0 industry. What will Web 3.0 look like, how will this new concept influence our lives and world.

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## Appendices

### Appendix 1. Interview Questions

1. Self-introduction: Could you tell about your professional background and your story at (company name)?
2. Could you tell us more about your project? when was it started? how has it developed? How business idea for XXX emerged? What opportunities and challenges have you seen when evaluating this business idea? What inspired you to engage in this business?
3. What business environment was like in China and internationally for the business like yours at the time of the start? How did it change over the time? How this environment looks today? What opportunities and threats business environment provided to your company?
4. What are the most important things to know when running a blockchain business in China?
5. How company's management feels about regulatory environment (in China, the EU/US, and globally) for blockchain-based businesses?
6. How does the relationship with the Chinese government would influence your business?
7. How does Chinese government's recent ban on crypto influence your company strategy? Way of working?
8. What do you think of Chinese government's attitude towards blockchain? How does this affect blockchain business development in China?

9. What are the 3 biggest obstacles/barriers in running a blockchain business in China, and in the world?

10. What do you think is the biggest opportunity in this industry in China, and in the world?

11. Could you give some advice to people who want to start a blockchain business in China?