Blockchain Adoption in China's Banking Industry

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Table of Contents

Introduction *3*

Overview of Blockchain Application within the Banking Industry Worldwide *6*

China's Unique Blockchain Landscape *8*

Applications in China's Banking Industry *13*

Success Criteria *22*

1) **Strategic Goal** 22
2) **Market Response** 24
3) **Technology Level** 25
4) **Team Credibility** 26
5) **Low Regulatory Barriers** 27

Conclusion *29*

Introduction

Blockchain. It's not the most thundering word in the world, but many believe blockchain to be the next generation of the internet. Today, we rely entirely on big intermediaries, middlemen like banks, government, social media companies, credit card companies, etc. to establish trust in our economy. These intermediaries perform all kinds of business and transaction in commerce from authentication and identification of people to clearing, settling and record-keeping. However, the distrust of those intermediaries from the 2008 Financial Crisis sparked the fuse on blockchain development and consequently nudged the world to the concept and appealing nature of dis-intermediation[1].

Blockchain is a decentralized database, which allows users to store value in a digital format. Blockchain's prominence mainly comes in three aspects: immutability, equal access, and transparency. Those traits have become the focal points contributing to not just dis-intermediation, but increased automation, security, and trust, among other things[2].

Continued anticipation of blockchain technology doesn't free blockchain from its generally uncontrolled environment and the risks involved. Although blockchain exploits a set of well-established principles such as cryptography and peer-to-peer networking, blockchain technology is nonetheless a novel innovation[3]. Not only is there a lack of standardization, but protocols regarding its implementation are difficult to integrate into the confines of modern economy[4]. Endorsement of blockchain technology by the global community is proof of its prosperity, but questions regarding the maturity of the software code, trustworthiness of blockchain developers, and implementation of data privacy legislation remain unanswered.

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[1] The Bitcoin Boom, The New Yorker, Maria Bustillos, Retrieved from URL: https://www.newyorker.com/tech/annals-of-technology/the-bitcoin-boom

[2] The Top Advantages Of Blockchain For Businesses, SmartDataCollective, Ankit Patel, Retrieved from URL: https://www.smartdatacollective.com/top-advantages-blockchain-for-businesses/

[3] 10 Blockchain Implementation Risks in International Development, ICT Works, Wayan Vota, Retrieved from URL: https://www.ictworks.org/blockchain-implementation-risks/#.XjaO9mgzY2w

[4] Blockchain Risks Every CIO Should Know, 101 Blockchains, Nitish Singh, Retrieved from URL: https://101blockchains.com/blockchain-risks/

China is such a mystery because within such a controlled economy and government, a fundamentally self-sovereign and decentralized technology such as blockchain is thriving on a global and borderless stage. The clashing characteristics of the Chinese government and blockchain technology begs the question: why is China so engaged in blockchain technology and has it been working out? A possible answer lies in the view of Charles Chang, one of Financial Technology industry's most prominent forerunners.

"Pursuant to President Xi's October 2019 proclamation that China shall develop Blockchain as a national core competency, we are seeing renewed efforts by the finance industry to solve their old-world challenges with fintech solutions. China is committed to a hybrid-chain approach that simultaneously provides for appropriate regulation/monitoring at the national level and adopts the transparency, efficiency, and information sharing central to blockchains. In this new, fertile environment for development, it is financial institutions proper – not just start-ups and "tech" firms – that are racing to adopt. Whether in its Central Bank Digital Currency, financial services, or digital asset capital markets, China is aiming to take a leadership role in changing fintech from a wave of the future to the reality of today's modern financial systems."

– Charles Chang, Director of the Fintech Research Center at Fanhai International School of Finance, Fudan University

Like mentioned before, with the race towards blockchain adoption intensifying, the banking system, most notably, has a huge opportunity here to either go out of business or reinvent their system and create a new era of banking. Especially China, a country well-positioned to take advantage of the payment system thanks to the existing infrastructure and companies such as Alibaba and WeChat Pay, could be at the forefronts of harnessing blockchain technology and its benefits[5].

In this research paper, we explore the unique characteristics of blockchain's application in China's banking industry. We also identify different attributes that define either the successful or unsuccessful utilization of blockchain technology. While we are aware that the onset of blockchain technology is new in itself and that our measurement of success requires the consideration of numerous complexities, we're reassured by the fact that our material is a

[5] "Can China and blockchain work?" (Eric Ervin, CEO of Blockforce Capital and Reality Shares), MarketWatch, Retrieved from URL: https://www.marketwatch.com/story/reality-shares-ceo-talks-blockchain-etf-and-the-technologys-massive-innovation-2018-02-08-10465858

culmination of the latest information gathered from both public sources and industry experts.

As with all systematic reviews and meta-analyses we are limited to abstracting the data reported in the primary studies. It is difficult to account for the potential bias of publishing cases that favor successful applications and for enrolling participants most likely to be successful. Bias, if any, would likely favor reporting successful utilizations and enrolling participants with the greatest potential to yield the benefits of blockchain technology. However, if one assumes that the tendency to enrol subjects likely to be successful is evenly distributed across all intervention types, then the application comparison analyses would be appropriate. Despite the limitations, this systematic review provides a set of results that represents a set of tangible grading criterion for blockchain applications in China that is meaningful to financial practitioners.

Overview of Blockchain Application within the Banking Industry Worldwide

The traditional banking industry, however, has had growing problems. To begin, the "middlemen" are centralized, meaning they can be hacked and increasingly are. JP Morgan, US Federal Government, and others have found that out the hard way[6]. "Middlemen" exclude billions of people from the economy: for example, people who don't have enough money to have a bank account[7]. They slow things down. While it may take seconds for an email to be sent from one side of the globe to the other, it may take days for money to be transferred over the same distance through the banking system[8]. That system, whilst dawdling in the payment transfer process, also takes a big piece of the action. By capturing our data, they take from the users the opportunity to privately monetize and utilize their own information. Last, not only is our privacy being undermined, but they've also appropriated the largess of the digital age asymmetrically[9]. With technology advancement, big corporations have the means to collect and interpret consumer data using data analysis and artificial intelligence. Why shouldn't the general public, the rightful owners of such private information, exploit such demand by deciding themselves whether to sell that data?

To tackle the aforementioned challenges, a vast, global, and distributed ledger running in millions of computers and available to everybody that could store, move, transact, exchange, and manage every kind of asset all without powerful intermediaries was created[10].

Blockchain technology is a decentralized database that stores a registry of assets and transactions across a peer-to-peer network. It's basically a public registry of who owns what and who transacts what. Those transactions are secured through cryptography and over time, the transaction history gets

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[6] These Are the Worst Corporate Hacks of All Time (2019), Bloomberg, Benedikt Kammel, Retrieved from URL: https://www.bloomberg.com/graphics/corporate-hacks-cyber-attacks/

[7] Defining Financial Exclusion: why we need to focus on the problem, not just the solution, S3IDF, Lexi Doolittle, Retrieved from URL: https://medium.com/s3idf/defining-financial-exclusion-why-we-need-to-focus-on-the-problem-not-just-the-solution-37117b8f6507

[8] Banks delay same-day money transfers, The Guardian, Tony Levene, Retrieved from URL: https://www.theguardian.com/business/2007/aug/15/money.banking

[9] *Blockchain Revolution* (2016), Don Tapscott, Retrieved from book

[10] *Blockchain Revolution* (2016), Don Tapscott, Retrieved from book

locked in blocks of data that are then cryptographically linked together and secured. This creates an immutable and unforgeable record of all transaction records across this network. Then, this record is replicated on every device that uses the network. The transparency behind the chain of commands involved in blockchain technology is a testament to how its lower uncertainty promises to transform the modern economic systems in radical ways.

The vast scope of benefits that blockchain technology can offer is reforming the erstwhile traditional financial industry. Among the diverse blockchain applications in finance, five services stand out in gaining traction: Cross-border Transactions, Trade Finance Platforms, Clearing and Settlements, Digital Identity Verification, and Credit Reporting[11]. Individually, these financial services may seem distant, but they are much more familiar concepts than one might assume.

Take for an example, in purchasing a house, the type of complex transactions involved could capture all five of those aspects. Buying an overseas real estate property will require international payment processes on a verified transaction platform that properly supports the payee and payer's information, from credit checks to identity authentication. The complexities of dealing with abovementioned steps could be significantly reduced thanks to Smart Contracts. Incorporating core elements of blockchain technology, Smart Contracts use lines of code that are stored on a blockchain platform that automatically execute when predetermined terms and conditions are met. By automating a previously convoluted process, Smart Contracts' arms of influence reached not just B2C services but B2B collaborations, and even on a larger scale, government infrastructures.

Those five aspects are also bringing spotlight to peer-to-peer (P2P) lending practices. Blockchain technology could allow SMEs to sidestep the financial institutions, as the decentralized nature of blockchain circumvents the need for an intermediary, an attribute which could help revive P2P lending practices in China. While it might be true that China has clamped down on P2P lending in the last few years due to pyramid-scheme scandals and absent bosses, the full transparency blockchain technology provides with an immutable ledger could once again legitimize the practice by solving the pain points the central government once faced. This can provide SMEs with alternative financing, enabling them to seize opportunities which had previously been closed to them.

[11] 5 Most Common Blockchain Applications in Financial Services, Hydrogen, Retrieved from URL: hydrogenplatform.com/blog/5-common-blockchain-applications-in-financial-services

China's Unique Blockchain Landscape

"The integrated application of blockchain technology plays an important role in new technological innovation and industrial transformation. We must regard blockchain as an important breakthrough for independent innovation of core technologies, clarify the main dimension of use, increase investment, focus on a number of key core technologies, and accelerate the development of blockchain technology and industrial innovation."

– **Xi Jinping, President of the People's Republic of China, at the 18th collective study of the Political Bureau of the Central Committee in October 2019**

From the number of blockchain patents filed in recent years to its initiative in establishing some form of regulatory oversight, China has shown its desire to become the world leader in the implementation of blockchain technology. This section identifies the unique characteristics of China's blockchain landscape which set the stage for its accelerated development.

National Focus and Policy Guidance

In 2016, the State Council of China released its 13th Five-Year Plan[12], which outlines the central government blueprint for China's long-term social and economic policies. Describing the importance of information and communication technology to building a prosperous society, the National Informatization Plan[13], as part of the 13th Five-Year Plan, highlighted blockchain technology as a critical "strategic frontier technology." That made China one of the first countries in the world to openly support and accept the technology into its official policy. Since then, the number of blockchain start-ups and financing of blockchain-related projects has been increasing rapidly

[12] The State Council of the People's Republic of China. (2016). *Official 13th Five-Year Plan.* Beijing, China. Retrieved from URL: http://www.gov.cn/xinwen/2016-03/17/content_5054992.htm

[13] The State Council of the People's Republic of China. (2016). *National Informatization Plan*. Beijing, China. Retrieved from URL: http://www.gov.cn/zhengce/content/2016-12/27/content_5153411.htm

year-on-year. Today, there are more than 700 blockchain enterprises in the nation[14].

More recently, speaking at the 18th Collective Study of the Political Bureau of the Central Committee in October 2019, Xi Jinping, the President of the People's Republic of China, publicly espoused the merits of blockchain technology for the first time. Xi called for the acceleration of the development of blockchain technology and its integration with the economy and society, highlighting its applicability in areas ranging from business financing to mass transit and poverty alleviation[15].

Not Decentralization But "De-intermediarization"

Blockchain technology in China takes on its own characteristics. While the lack of central control has long been hailed as a core tenet of blockchain technology, the Chinese authorities have made sure that blockchain technology does not run afoul of its political system. As clarified by Chinese official Xu Hao on China Central Television, "Blockchain in China is not about decentralization but 'de-intermediarization.' There is no way to get rid of the centre."[16] This perspective is highlighted in the requirement for blockchain companies to register with the Cyberspace Administration of China (CAC) within ten working days from the date of providing any blockchain-related services[17].

In his speech, Xi mentioned that it would be "necessary to implement the rule of law network" into existing and future blockchain systems. In establishing a top-down approach, the Ministry of Industry and Information Technology (MIIT) and several ministries recently set up a National Blockchain and

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[14] China Center for Information Industry Development. (2019). *CCID Data: Over 700 Blockchain Enterprises in China.* Beijing. Retrieved from URL: https://www.ccidgroup.com/sdgc/14855.htm

[15] The Political Bureau of the Central Committee of the People's Republic of China. (2019). *18th collective study of the Political Bureau of the Central Committee*. Beijing, China. Retrieved from URL: http://www.xinhuanet.com/politics/leaders/2019-10/25/c_1125153665.htm

[16] Xu, H. (2018, June 3). *《对话》- 把脉区块链*. (CCTV Finance, Interviewer). Retrieved from URL: https://www.youtube.com/watch?v=PeCTHcAQ_ho

[17] Cyberspace Administration of China. (2019). *Blockchain Information Service Management Regulations.* Beijing, China. Retrieved from URL: http://www.cac.gov.cn/2019-01/10/c_1123971164.htm

Distributed Accounting Technology Standardization Technical Committee to develop national standards for the local blockchain industry[18].

Collaboration between the Government and the Private Sector

The Chinese central government has leveraged on this comprehensive, pro-growth framework to provide the necessary resources and infrastructure to both domestic and international blockchain players. This is evidenced by the launch of China's first blockchain pilot zone in the Hainan Free Trade Zone in October 2018. The pilot zone accommodates more than 100 blockchain organizations and companies, and is one of the fastest-growing blockchain clusters across the country. Under an action plan titled "Secure, Sharing, Compliance+" (SSC+), the blockchain pilot zone is also partnering with international players such as the Dubai Blockchain Center to realize secure and trusted data sharing and digital governance[19].

Local governments in China are also aggressively launching blockchain-related funds. In October 2019, the local Guangzhou government announced that it will dedicate 10 billion RMB in funding to a blockchain subsidy, which will be used to sponsor two blockchain projects each year. This follows the steps of the governments of Hangzhou[20] and Shenzhen[21], which launched blockchain funds of 10 billion RMB and 500 million RMB respectively with local venture capital funds in 2018.

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[18] Standardization Administration of China (SAC). (2019). *National Blockchain and Distributed Accounting Technology Standardization Technical Committee.* Beijing, China. Retrieved from URL: http://www.sac.gov.cn/xw/bzhdt/201911/t20191120_343876.htm

[19] Xinhua. (2019). *China's Hainan unveils measures to foster blockchain industry*. Beijing, China. Retrieved from URL: http://www.xinhuanet.com/english/2019-12/05/c_138605932.htm

[20] Tunlan Capital. (2018). "链未来，雄伟岸"丨2018 雄岸全球区块链百亿创新基金成立，引领创新发展. Hangzhou, China. Retrieved from URL: http://www.tunlan.cc/index.php?news/info/15/34/0/110

[21] Sohu. (2018). 深圳市区块链创投基金正式成立. Beijing, China. Retrieved from URL: http://www.sohu.com/a/229068392_115060

'No' to Cryptocurrencies, 'Yes' to Digital RMB

However, China's direct oversight of blockchain development within the country also implies the omission of cryptocurrencies from its vision for blockchain. In tackling widespread scams and mindless speculation amidst the worldwide cryptocurrency boom, an official notice titled "Announcement on Preventing Financial Risks from Initial Coin Offerings (ICOs)" was issued by the People's Bank of China (PBOC) in September 2017[22], effectively rendering ICOs and any form of cryptocurrency activity in China illegal.

Despite cracking down on privately-issued cryptocurrencies, the PBOC has, in fact, been working on a blockchain-based digital renminbi (RMB) since 2014. The project has already generated more than 60 patents and has initiated a trial operation for an interbank digital check and billing platform. The main motivation of the digital currency is to bypass commercial banks and regain control of currency creation/supply end to end, thereby structurally centralizing the PBOC's power in policymaking. The traceability of the digital RMB would also help battle problems such as money laundering, illegal gambling and terrorist financing[23].

Enterprise Blockchain

As President Xi Jinping calls on his countrymen to seize opportunities in distributed ledger technology, China's industry heavyweights have already been leading hundreds of enterprise blockchain projects. In 2019, the CAC endorsed 506 such projects - 197 in March[24] and 309 in October[25]. Within these two lists are some of the largest Chinese state-owned banks and commercial tech conglomerates such as Industrial and Commercial Bank of China (ICBC), Ping An Bank, Baidu, Alibaba and Tencent. These enterprises contribute to the bulk of China's record-breaking number of blockchain-related

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[22] The People's Bank of China. (2017). *Announcement on Preventing Financial Risks from Initial Coin Offerings (ICOs).* Beijing, China. Retrieved from URL: http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/3374222/index.html

[23] Xinhua. (2019). *央行数字人民币即将推出 具有哪些突破性意义？* Beijing, China. Retrieved from URL: http://www.xinhuanet.com/fortune/2019-08/14/c_1124872062.htm

[24] Cyberspace Administration of China. (2019). *First Batch of Domestic Blockchain Information Service Providers.* Beijing, China. Retrieved from URL: http://www.cac.gov.cn/2019-03/30/c_1124305122.htm

[25] Cyberspace Administration of China. (2019). *Second Batch of Domestic Blockchain Information Service Providers.* Beijing, China. Retrieved from URL: http://www.cac.gov.cn/2019-10/18/c_1572931934637684.htm

patents, where it accounted for nearly 70% of the world's global blockchain patent applications in the first half of 2019 alone.

In the next section, we will explore how blockchain can be applied in the banking industry in China.

Applications in China's Banking Industry

In this section, we will explore the different applications of blockchain technology within China's banking industry. This is done by first identifying the existing pain points within the industry, before delving into possible blockchain-based solutions and then into real-time applications that are currently being launched or developed in China.

There are three major pain points in China's banking industry today:

1) **Traditional banks are seeing increased competition from tech companies in the SME market**

In China, small and medium-sized enterprises (SMEs) account for more than 60% of the country's GDP and up to 80% of its jobs. However, out of over 11 million formal SMEs in China, 58% of them are financially constrained[26]. In general, traditional banks have been reluctant to lend beyond large corporations due to the stigma that SMEs have poor credit, bad operations, and a short corporate life cycle. The Chinese central government has also been implementing stricter credit control within the economy to clamp down on its shadow banking system and massive debt problem, which currently stands at more than 300% of its GDP[27]. As a result, despite the vast potential value of the SME market, many traditional banks have forsaken this revenue stream, leaving many SMEs facing either insufficient or expensive financing.

However, as new customer propositions and better service models enabled by technology create opportunities for much more lucrative returns, big tech companies are entering the market. They are offering innovative service models that provide not just traditional banking products, but also many other business services such as invoicing, payroll, tax preparation, and inventory management[28]. These offerings typically target SMEs' fundamental needs in a

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[26] Chataing, Marie-Sarah & Kushnir, Khrystyna. (2018). How Is Ant Financial Closing the SME Finance Gap in China? Retrieved from URL: https://www.smefinanceforum.org/post/how-is-ant-financial-closing-the-sme-finance-gap-in-china

[27] Mahmood, Kdadija & Tiftik, Emre. (2019). IIF Global Debt Monitor Slide Deck. Retrieved from URL: https://www.iif.com/Portals/0/Files/content/GDM_July2019_vf3.pdf

[28] McKinsey & Company. (2019). Beyond banking: How banks can use ecosystems to win in the SME market. Retrieved from URL: https://www.mckinsey.com/industries/financial-services/our-insights/how-banks-can-use-ecosystems-to-win-in-the-sme-market

single easy-to-use service, allowing these tech companies to enjoy both cost reduction and revenue enhancement.

To understand how traditional banks could make use to blockchain to regain an edge over tech companies, we must first drill down on the numerous sub-reasons why traditional banks may be reluctant to lend to SMEs. They generally point to lower returns at higher risks as compared to lending to large corporations, and two main factors are highlighted below:

(a) Irregular cash flows translate into perception of poor credit

Firstly, due to the nature and size of SMEs, it could take a while for SMEs, especially those in the export trade and wholesale industries, to receive payments from their clients. Non-payment from clients could result in SMEs being unable to repay their own debts. As such, erratic cash flow signals suboptimal credit quality to banks.

This is a major pain point for China's key agricultural sector, which is characterized by long production cycle, low return on investment and vulnerability to natural factors. The nature of the business cycle means that rural farmers have poor rural credit infrastructure as banks regard them as unsafe customers with insufficient collateral and high risk of default.

(b) Traditional methods used to assess SMEs' credit risk are weak and ineffective

Banks typically either apply to SMEs the traditional credit scoring templates used for large corporations, or take the owner's personal credit score as a marker of credit risk. But neither of these adequately show the actual creditworthiness of the business.

From the point of view of banks and financial institutions, the major disadvantage of traditional KYC systems is that each organization authenticates individuals independently and each check takes time and money. This manual process also increases risk as each attestation requires the transfer of personal data from the client server to an external server, where it may be intercepted and hacked.

Although the PBOC has established a relatively complete credit investigation system for Chinese enterprises and individuals, and has provided banks with a large amount of credit data, it is still difficult and operationally inefficient for

banks to conduct credit evaluation for more complicated loan varieties[29]. This is because more complicated loans may involve many different parties, but the exchange of data still happens at a one-to-one level. In addition, within both the PBOC and individual banks, there may be incongruous information across departments.

Solution:
The immutable and auditable nature of blockchain technology validates the idea of a nationwide information-sharing system for credit investigation. By working with the other service providers of SMEs, e.g. utility companies, suppliers, payment service provider, etc., banks can obtain all the relevant credit qualification documents of their loan applicants almost instantly. These documents are then uploaded onto a single secure platform accessible to all authorized parties. A holistic evaluation of the SMEs' credit health can then easily be made before banks come up with tailor-made financing plans.

On one hand, this solves the problems of credit authentication and information asymmetry, allowing for trust-building and a more accurate control of credit risk. On the other hand, this reduces the length and cost of communication between banks and SMEs, making it easy and cost-effective for banks to lend to SMEs.

Application:
WeIdentity[30] is an open source solution developed by China's first digital bank WeBank. Built on top of an Open Consortium Chain – an ecosystem of public and private chains designed to improve coordination efficiency between institutions, WeIdentity is a universal solution for decentralized identity management and data cooperation to address problems such as siloed data and data misuse. It allows institutions to share personal data in a trusted and compliant manner, reducing the need for duplicative credit assessment work.

As a decentralized, open source solution, WeIdentity provides universal access and ensures maximum technology transparency while reducing the risk of widespread data theft and loss. As it is built following the W3C DID[31]

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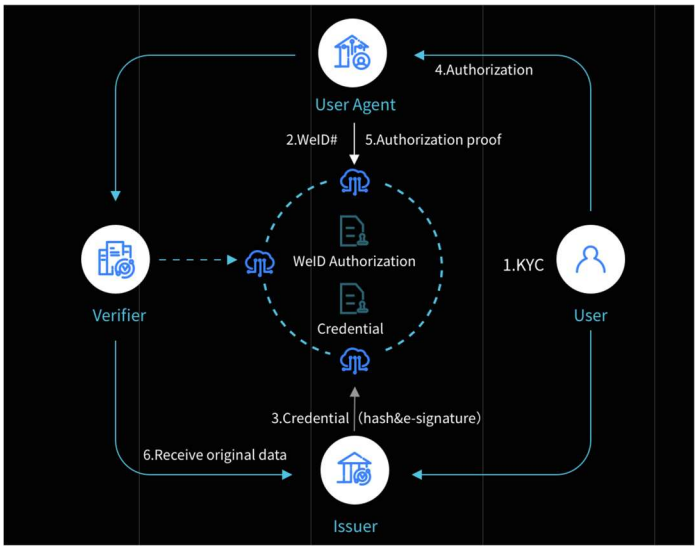
[29] Sina Finance. (2019). 巴曙松：区块链是化解征信市场难题一剂良方. Retrieved from URL: https://finance.sina.com.cn/blockchain/roll/2019-07-04/doc-ihytcerm1337138.shtml

[30] WeIdentity. (n.d.). Retrieved February 13, 2020, from URL: https://fintech.webank.com/en/weidentity/

[31] Developed by the World Wide Web Consortium (W3C), Decentralized identifiers (DIDs) are a new type of identifier to provide verifiable, decentralized digital identity. It relates a DID subject to a DID document allowing trustable interactions with that subject.

specifications, data stored on WeIdentity can easily be ported to most other mainstream blockchain infrastructure platforms. This provides ease for cross-chain and cross-platform operations, laying down the foundation for future integrations and collaborations between participating organizations.



Source: WeBank

Applied to the banking industry, WeIdentity provides secure and trusted user identity verification and data exchange services for business scenarios such as bank account opening and loan services.

2) Existing trade finance platforms have long transaction processing time, poor security, and low transparency

Since 2013, China has been the world's largest trading nation. As China's total merchandise trade in 2018 amounted to USD$4.6 trillion, or 12.4 percent of global trade[32], trade finance is naturally a focal point in the central government's drive to enhance economic efficiency.

Trade finance refers to financial transactions, both domestic and international, which relate to trade receivables finance and global trade. These trade finance transactions include lending, issuing letters of credit, factoring, export credit and insurance. These transactions make up an enormous portion of global trade – approximately 80 to 90 percent of world trade relies on trade finance.[33]

The main difficulty associated with trade finance is the large volume of paper documents that still makes up much of the information flow. As physical paperwork is shuffled back and forth between the importer, exporter, importer's bank, exporter's bank, shipping company, etc., multiple checks by intermediaries result in delays to payment and shipment of goods. Furthermore, since each party maintains the transaction documents using their respective databases on different platforms, propensity for fraud and duplicative billing is high. Hence, much time and cost is expended in each step of the process for each party to verify the accuracy of the documents.

Solution:
Banks are seeking to reduce costs and increase efficiency by replacing the flow of paper for trade finance with digital data flows. Blockchain technology is a natural solution as the creation of a digital ledger of transactions can allow each participant on the digital network to securely share on that ledger without the need for a central authority.

Because a blockchain is updated quickly by each participant on the network to reflect the most recent transaction, it removes the need for multiple copies of the same document of information stored on numerous databases across various entities. This means that all parties involved in a trade finance

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[32] UN Comtrade. (n.d.). Retrieved February 13, 2020, from URL: https://comtrade.un.org/db/dqBasicQueryResults.aspx?cc=TOTAL&px=S4&r=156&y=2018&so=1001

[33] World Trade Organisation. (n.d.). Retrieved February 13, 2020, from URL: https://www.wto.org/english/thewto_e/coher_e/tr_finance_e.htm

transaction do not have to maintain their own database nor constantly reconcile their databases against one another's, hence reducing the potential for fraud or double financing[34] as propagated by bills of lading in paper-form.

A key feature of the blockchain technology is the smart contract, which are electronic contracts housed on a blockchain that can be self-executed without human intervention, or only with multiple-party consensus. Instant process approval and real-time review shorten transaction settlement time from days to hours, which allows importers/exporters to track the location of their goods, and unlock capital that would otherwise be tied up waiting to be transferred between parties in the transaction.

Overall, blockchain technology allows for more efficient invoice processing, real-time validation of invoices, irreversible transactions, as well as easy and fast supplier on-boarding.

Application[35, 36]:
China's CITIC Bank, Bank of China, Minsheng Bank and Ping An Bank together launched a trade finance platform based on blockchain technology in 2019. The initiative focuses on forfaiting, which refers to the purchase of a future payment obligation without recourse. Banks would advance cash to an exporter against invoices which are guaranteed by the importer's bank.

While the legacy system of forfaiting requires a two-way effort from the participating banks, this blockchain-based solution provides automation, which reduces the need for phone and email communication. It also includes identity authentication, asset verification, and an intelligent credit rating system. The main aim of the initiative is to standardize transactions which may stabilize market prices and result in cost savings. The use of blockchain also provides strong security due to the use of cryptography, and the duplication of data on multiple nodes makes data tampering almost impossible.

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[34] Double financing refers to a common problem where the same invoice is financed more than once by different financial institutions.

[35] Ledger Insights. (n.d.) Chinese Banks Launch Forfaiting Trade Finance Blockchain. Retrieved February 15, 2020, from URL: https://www.ledgerinsights.com/china-forfaiting-trade-finance-blockchain/

[36] Ledger Insights. (n.d.) Chinese Trade Finance Blockchain Processes $2.8 Billion. Retrieved February 15, 2020, from URL: https://www.ledgerinsights.com/china-blockchain-trade-finance-citic/

As of September 2019, the blockchain forfaiting transaction (BCFT) platform has processed 20 billion yuan ($2.82 billion) of trades, with over 30 banking institutions joining the platform.[37]

[37] Sina 新浪财经. (2019). 中信银行等四家银行升级区块链福费廷交易平台. Retrieved from URL: https://finance.sina.com.cn/money/bank/bank_hydt/2019-09-10/doc-iicezueu4675142.shtml

3) Renminbi (RMB)'s potential as a global currency is not fully realized

The remarkable rise of China in the global economy, its expanding role in international trade, and the inclusion of the renminbi in 2016 in the International Monetary Fund's Special Drawing Right (SDR) valuation basket, were once widely heralded as a turning point for the international financial system. However, the US dollar remains the dominant international currency today, accounting for around half of global foreign exchange transactions worth 6.6 trillion dollars per day[38].

While China long overtook the U.S. as the world's largest goods trader in 2014, the yuan (RMB) is currently only the fifth most used unit in international payments. This is illustrated by how RMB only makes up 2.01% of the global currency reserves in 2019Q3, as opposed to the USD's 61.78% and the Euro's 20.07%[39]. The reason for this is that RMB, in its current form, is not accessible and liquid on the international foreign exchange markets.

Solution:
A blockchain-based Central Bank Digital Currency (CBDC), backed by fiat reserves and having some transaction anonymity and extensive encryption services, could be China's answer to pushing the RMB to be a global currency.

With this new digital RMB that operates on blockchain technology, China will be able to offer cross-border payments at a lower cost and with increased speed. The automation features of smart contracts will also provide easier liquidity management and trading efficiency.

Unlike cryptocurrencies, the Chinese CBDC will be issued by an established financial authority, the PBOC, which means that a centralized management model with supervision is in place. This also means that the Chinese CBDC will not operate through an anonymous and untraceable peer-to-peer mechanism, and its transactions will be visible to the central bank and be subject to third-party oversight to prevent illegal financing. These features make the digital yuan an ideal global currency for cross-border transactions.

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[38] Bank for International Settlements. (2019). Triennial Central Bank Survey. Retrieved from URL: bis.org/statistics/rpfx19_fx.pdf

[39] Currency Composition of Official Foreign Exchange Reserves (COFER). (n.d.). Retrieved February 20, 2020, from URL: http://data.imf.org/?sk=E6A5F467-C14B-4AA8-9F6D-5A09EC4E62A4

Application:

Since 2014, the PBOC has been working on its digital currency/electronic payment (DC/EP) project. As of 4 August 2019, 74 patents had been filed by the Digital Currency Institute[40], the central bank's cryptocurrency research lab opened in 2017. According to Xinhua News Agency, it is in the phase of "closed-loop testing," meaning certain transaction scenarios are being simulated to test it in specific conditions.

Once implemented, the digital RMB could realize the long-intended role of China's Belt and Road Initiative (BRI) in transforming the country's currency into a global one. In 2019, despite China's trade with BRI countries surging to RMB 9.27 trillion[41], the majority of BRI projects were still dominated in US dollar. This resulted in China having to draw billions from its foreign exchange reserves to inject capital into state-owned policy banks, which in turn finance various BRI projects. With the increased efficiency, liquidity, and security of the digital RMB, the BRI would not only turn China into a high-income economic powerhouse, but also pave the way for RMB to become the world's next global currency.

[40] China's National Intellectual Property Administration (NIPA). (2019). Obtained from URL: http://english.sipo.gov.cn/

[41] Xinhua. (2020). China's trade with BRI countries booms in 2019. Obtained from URL: http://www.china.org.cn/business/2020-01/15/content_75614030.htm

Success Criteria

Many banks in China are delving into researching and developing blockchain-based applications, with the aim to either support existing internal operating systems or adapt to unprecedented business scenarios.[42] Having researched and analyzed numerous use cases of blockchain within China's banking industry, we conclude that a successful application must fulfil these five pivotal success criteria:

1. **Strategic Goal**
2. **Market Response**
3. **Technology**
4. **Team Credibility**
5. **Low Regulatory Barriers**

1) Strategic Goal

The 16th U.S. President, Abraham Lincoln, once wisely said, "Give me six hours to chop down a tree and I will spend the first four sharpening the axe." Much like the nature of most tasks, an application without a clear strategic goal quickly diminishes into a pointless project of little to no value. Successful blockchain-based applications must have a predetermined and far-reaching goal aimed to effectively solve the pain points of an industry. This foremost procedure of correctly pinpointing what drives a potential investment is often the very reason why blockchain technology was considered a possible solution in the first place and what the application can contribute to the society[43].

Since March 2019, over 500 enterprise blockchain projects have been registered with the Cyber Administration of China[44]. This reveals just how

[42] ICBC. (2020). 区块链金融应用发展白皮书. Retrieved from URL: https://n0.sinaimg.cn/finance/9b213f90/20200421/QuKuaiLianJinRongYingYongFaZhanBaiPiShu.pdf

[43] 如何评估一个区块链项目的价值与成熟度？Retrieved from URL:

https://steemit.com/cn/@ppho99/3xpzcq

[44] Coindesk. (2019). From Banking Giants to Tech Darlings, China Reveals Over 500 Enterprise Blockchain Projects. Retrieved from URL: https://www.coindesk.com/from-banking-giants-to-tech-darlings-china-reveals-over-500-enterprise-blockchain-projects

important business leaders feel the overarching goal of blockchain development is. Our analysis of the data narrowed down Blockchain application objectives into two main categories: 1. Demand Recognition and 2. Overall Performance Enhancement. By defining a clear goal, the bank can effectively find the target customer group and ensure there is an opportunity for profit. Blockchain application is not to be rashly meddled with, for it requires significant time and capital expenditure. Without consideration for profit, the costly project could dwindle down into an unsalvageable one. Performance enhancement can be specified into two facets: internal and external. Internally, use of blockchain can achieve higher efficiency and security. Externally, customers can enjoy a more convenient user experience through a simplified process, featuring upgraded transparency, traceability, and autonomy.

However, in determining the precise purpose of an application, a blockchain-apt ecosystem is necessary. It's become apparent that in today's business world, leaders are so enthralled by the idea of blockchain technology that they're jumping onto the bandwagon without a truthful consideration of its implementation. It's easy to see that the benefits of blockchain technology are unequivocal, but that has prompted premature companies to harvest the gains without properly inspecting the business climate. The most fundamental question that needs to be considered for whether an application scenario is suitable to be solved with blockchain technology is whether blockchain technology is required in the first place and if there is strong government policy to support said-upcoming project.

Digital Bills and Supply Chain Finance Application

Our investigation of blockchain use cases in China also reveals that Blockchain technology can effectively solve the problem of financing difficulties for small and medium-sized enterprises (SME)[45]. Currently, supply chain finance is difficult for SMEs to benefit from in the upstream portion of the industry chain, due to a lack of direct trade with core companies. As a result, the financial institutions frequently have difficulty in assessing SMEs' credit qualifications. Blockchain technology can establish an alliance chain network that covers core companies, upstream and downstream suppliers, financial institutions, etc. Then, core companies can issue vouchers of account receivable to their suppliers. After the bills are digitalized on the

[45] Xinhua. (2019). 云上“背书” 链上“解渴”——中小企业融资新“解”. Obtained from URL: http://www.xinhuanet.com/fortune/2019-06/30/c_1124690167.htm

blockchain, they can be circulated among suppliers. Each level of suppliers can rely on digital bills to realize the corresponding amount of financing[46].

China's Merchant Bank and WeIdentity are two companies who sought for a well-defined goal after gaining clarity on what exactly they're diving into. China's Merchant bank successfully applied blockchain technology in improving the performance of institutional settlements and managing global cash circulation in cross-border payments. WeIdentity also successfully applied blockchain in cross-border payments, wealth management, and supply chain finance to alleviate issues as previously explained.

Our observations and analysis suggest that a common theme is present in goals of blockchain-based applications, being to increase coverage, availability, and convenience while decreasing the cost of financial services. Whether a blockchain application project set forth by a bank in China has a well-established intention is crucial in arbitrating its success.

2) Market Response

Customers' perceptibility to adopting blockchain solutions determines the potential of the project. The degree of satisfaction with the new business is the most obvious factor of whether an application outcome is booming. Naturally, a positive market response will lead to further expansion and wider use of the application. An otherwise less positive or negative market response can lead the team to reconsider and re-examine possible defects. However, as direct and easy is collecting customers' response, the task can not only be difficult to do, but also costly[47].

There is another market response that could have high correlation with customers' experiences. Blockchain and the world's anticipation of the technology is unmatched. Media outlets are bringing blockchain technology to the podium and so far, blockchain seems to be testing well to the increasing pressure. The "hype" of blockchain technology is bringing corresponding anticipation to China's digital currency as well. Considering President Xi's endorsement of blockchain technology alone caused a 10% increase in the value of Bitcoin, the impact of CBDC on the world can only be imagined. More

[46] CAC. (2019). 区块链技术的五大应用场景. Retrieved from URL: http://www.cac.gov.cn/2019-11/06/c_1574572443976601.htm

[47] I am a blockchain too: How does the market respond to companies' interest in blockchain?, Science Direct, Retrieved from URL: https://www.sciencedirect.com/science/article/abs/pii/S0378426620300078

interestingly, Mark Zuckerberg's Libra testimony to the U.S. congress was highlighted by his comment that "Libra will be backed mostly by dollars, and I believe it will extend America's financial leadership as well as our democratic values and oversight around the world." Otherwise, he added, "China will take the lead on digital payments." The media that was drawn to this ordeal was global and it was impressive for China's digital currency to receive the recognition of competition from the United States. For technology like CBDC, competitor response could potentially be an accurate indicator of consumer response, as it has not yet entered the market yet.

3) Technology Level

Blockchain technology in the last five years has made enormous achievements in improving its core offerings. Such progress was made possible from the development of functions such as: consensus algorithm, processing mechanism, organizational form, and privacy protection. In judging an outcome of an application, the technology's inherent ability to support and maintain the stability of the whole solution is an essential factor. The four aspects we examine in reliability of technology includes: [48]

- **Security** – security level of data base and cryptography technology
- **Stability** – ability to fight off malicious software or hackers
- **Efficiency** – speed and accuracy in dealing with data transaction
- **Scalability** – capacity of handling an increasing amount of workload[49]

An example of a successful application of blockchain from a technology standpoint can be the CBDC. The fact that it will not operate through an anonymous and untraceable peer-to-peer mechanism, its transactions will be visible to the central bank, and be the currency will be subject to third-party oversight to prevent illegal financing make digital yuan an ideal global currency. The security, stability, efficiency, and scalability components will later have to be re-examined, but with CBDC's inborn characteristics resembling a country-originated currency but embodying the benefits of blockchain technology is a great place to start.

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[48] 赵刚：如何评判区块链项目的优劣？,Huoxing News, Retrieved from URL: https://news.huoxing24.com/20180725175253852067.html

[49] Research Paper: Towards a Framework for Evaluation of Blockchain Implementations Retrieved from URL: https://www.academia.edu/40479045/Towards_a_Framework_for_Evaluation_of_Blockchain_Implementations

4) Team Credibility

We define team credibility as the reputation and trustworthiness of the team. Reputation, in the sense of how able-bodied the team is. Trustworthiness, in the sense of "Is this powerful technology being developed in the right hands?"

The work experience and previous achievements of the project members are extended factors to consider, so as to judge whether the team and, thereby, the project are competent. Blockchain applications, as new as the field is, requires innovation to its core. Many measurements of a country's success and ranking in financial technology are dependent on the number of patent rollouts per year. Correspondingly, it's compulsory that a competent team should be put together with an emphasis on R&D talent. [50]Different areas of blockchain applications need to be simultaneously weighed. The technical, business, and economic considerations must be made with respective experts of those fields.[51] In order to have an efficient implementation, team structures must be designed for optimization.

In order to promote the research of central digital currency, on July 3rd, 2017, the Digital Currency Research Institute of the People's Bank of China (PBOC) was established. The team that was brought together for the sole purpose of this new digital currency was widely acclaimed for its competency, as the nation's forerunners of blockchain technology were all summoned. Yao Qian, former deputy director of the Science and Technology Department of the People's Bank of China, is now the director of the Digital Currency Research Institute. Di Gang, the former deputy director of the Department of Science and Technology and director of information technology of the Silk Road Fund, was also appointed.[52] PBOC was delicate in gathering the experts to support the development of digital currency. In fact, the lowest degree required to join the institute is Ph.D. in a related major. Consequently, in 2014, the PBOC began working on its digital currency and electronic payment project. As of August 4th, 2019, 74 patents had been filed by the Digital Currency Institute,

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[50] People's Bank of China kicks off digital currency trials, ZDNet, Retrieved from URL: https://www.zdnet.com/article/peoples-bank-of-china-kicks-off-digital-currency-trials/#:~:text=After%20years%20of%20research%2C%20the,in%20four%20cities%20across%20China.&text=A%20spokesperson%20for%20China's%20central,Chengdu%2C%20and%20Xiong'an

[51] TokenX 社区(2018): Sageledger 赛智区块链创始人：如何评判区块链项目的优劣？ Retrieved from URL: https://news.huoxing24.com/20180725175253852067.html

[52] 姚前、狄刚出任央行数字货币研究所所长、副所长, Chain News, Retrieved from URL: https://www.chainnews.com/articles/358230729353.htm

which is the central bank's cryptocurrency research lab opened in 2017. The unparallel number of patents was the fruition of newly appointed industry leaders. As was the case for the CBDC, one of the quantifying figures the media often referred to in its success was the academia hired and their qualifications.

5) Low Regulatory Barriers

Blockchain's novelty poses a challenge for regulatory authorities where they have yet to fully understand blockchain technology and struggle to pass laws to specifically and appropriately control the financial technology industry. With the rules of law that determine the industry's future still to be set-in-stone, the lack of relevant institutional norms and legal protection will simultaneously increase the risk of commercial banks applying blockchain technology and incentivize taking advantage of loopholes. However, that is clearly a double-edged sword.

Our analysis suggests that whether the banks can flexibly respond to a possible regulation may decide the reliability of the application. However successful a blockchain application may be, if that business is forced to shut down, there's no real window of opportunity nor incentive to pursue this technology adoption. The foundation of any technology or application is built on industry and technical standards.[53] In the case of blockchain, commercial banks should promote industry and technical standards that can better weave blockchain technology into today's business world. Just how low a regulatory barrier for a particular blockchain technology is could be a determinant of its success. Then, just how flexible the technology is in mercurial regulatory conditions could also be a determinant of its success.

The leader of blockchain technology in WeBank, said that the Chinese central government's talks of blockchain technology in 2019 is an affirmation and support of blockchain technology.[54] However, there is still regulatory compliance and legal problems in many scenarios. He hopes that the government will introduce a regulatory mechanism for the alliance chain technology. If so, under the premise of effective risk management, blockchain

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[53] 刘连舸：深刻把握新时代脉搏 大力推动区块链创新 , Bank of China, Retrieved from URL: https://www.boc.cn/aboutboc/ab8/202002/t20200211_17488396.html

[54] 微众区块链负责人范瑞彬：中心化平台在未来有可能被区块链技术替代, Fintech Webank, Retrieved from URL: https://fintech.webank.com/newsDetails/?id=5dd35acd98193a43abb76692

technology will be more encouraged and have found its balanced footing between financially stable innovation and financially risky innovation.[55]

[55] 微众银行区块链负责人：希望针对联盟链技术推出监管沙盒机制, Lianmenhu, Retrieved from URL: http://www.lianmenhu.com/blockchain-17270-1

Conclusion

Many of today's business leaders are so enthralled by the idea of blockchain technology that they're jumping onto the bandwagon without a truthful consideration of its implementation.

The initial thoughts of reaping the benefits are obvious. Blockchain technology does help reduce cost, lower fraud risk, and improve certainty, trust, accuracy, and efficiency. But these benefits can only be materialized if there's a specific context that this technology can be applied to. Fortunately, in China, the strong support by central and local governments has meant that both the public and private sectors are zeroing down on specific pain points within different industries where they are applying blockchain technology.

Within the banking industry in 2019, payment settlement (13), supply chain finance (7), and cross-border payment (6) are the three business areas with the largest number of blockchain patent applications. All in all, through our analysis of the most prominent cases of blockchain adoption in China's banking industry, we believe that the five defining success criteria of blockchain applications are: Strategic Goal, Market Response, Technology, Team Credibility and Low Regulatory Barriers. In carefully managing these five criterion, a meaningful assessment of a blockchain application can be obtained.