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CHINA

BLOCKCHAIN REPORT

Blockchain Is Not China's Future — It's The Present

2019-2020

Photo credit: Annie Spratt

Table of Contents

Chapter 1: Government

Chapter 2: Enterprise

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INTRODUCTION

Blockchain Is Not China's Future — It's The Present

Enterprises are adopting the tech while the government makes it a priority. It's essential to keep pace with China's rapid adoption

In an Oct. 24 address to the Communist Party of China (CPC) Central Committee, President Xi Jinping stressed the importance of blockchain technology as a pillar to the country's next decade of industrial development. While domestic businesses were familiar with the technology and many were already using it, efforts must accelerate for China to play a leading role in the creation of international blockchain standards. Days after Xi's address, China Center for International Economic Exchanges Executive Vice President Huang Qifan said at the China Finance 40 Forum that the People's Bank of China was in the final stages of preparing to launch its digital currency now formally known as digital currency electronic payment (DCEP). At this rate, China is on track to be the first country to launch a central bank digital currency, though other central banks are now making progress in this field.

These swift developments underscore the importance of understanding China's blockchain space. Despite the country's nominally free market, it is well understood that the state has a firm hand in steering initiatives. This ranges from Deng Xiaoping's first reforms and opening up of the economy, to Jiang Zemin's guiding of these reforms into a free market global economy, to Hu Jintao's cementing China's position as the world's second-largest economy by navigating the country through a turbulent decade marked by the global financial crisis all the while tripling the country's purchasing power.

Gartner believes blockchain technology has potential, but it's not here yet. It seems Gartner didn't look to China. Blockchain is already a rapidly maturing technology in the country and has real-world, practical use cases that are far beyond the experimental stage.

Xi inherits a different era: an economy that's slowing as it grows, and a society losing faith in a free market that is unfettered and lacks expected supervision. Poisoned food and adulterated medicines are products of an economy where growth took priority over supervision and regulation.

If China's economy is to mature, the term "Made in China" needs to lose its status as a pejorative. China's leadership knows this: It needs to build confidence in its products both for domestic consumption and export. Blockchain may be part of this generation of industrial reform. Just as Beijing directed reform to open up the economy in the 1980s and shepherded it through the financial crisis of the late 2000s, China has identified technologies like blockchain as potential pathways to economic maturation of the 2020s.

Blockchain is already playing a large role across China's economy, and it will only continue. Efforts might seem nebulous to an outsider, but among Chinese enterprises, blockchain is becoming ubiquitous. Enterprise deployment is not the future in China — it is the present.

U.S. technology research and advisory firm Gartner publishes its annual Hype Cycle, a branded chart that illustrates the maturity and application of specific technologies. Most technologies or concepts that have become part of household vocabulary — like cloud computing, podcasting, bluetooth or VR — have had a place on this chart. On the most recent Hype Cycle published in early October 2019, blockchain was

in the "trough of disillusionment": "Interest [in the technology] wanes as experiments and implementations fail to deliver. Producers of the technology shake out or fail."

This means that Gartner believes blockchain technology has potential, but it's not here yet — and won't be for nearly a decade.

"Blockchain technologies have not yet lived up to the hype and most enterprise blockchain projects are stuck in experimentation mode," said analyst Avivah Litan, Gartner's research vice president. "Blockchain is not yet enabling a digital business revolution across business ecosystems and may not until at least 2028, when Gartner expects blockchain to become fully scalable technically and operationally."

It seems Gartner didn't look to China.

China is a study in contrast to the disillusionment Gartner believes hangs over the blockchain industry.

According to a 2018 Deloitte survey of enterprises[1], 49% of respondents in China said blockchain technology was already used in their organizations, compared to only 14% in the U.S. Similarly, in the same survey for 2019, 73% of respondents in China viewed blockchain as a top-five strategic priority, compared to 56% in the U.S.[2]

Blockchain is a national priority for China's central government: Blockchain technology, AI, machine learning and IoT are named as technological development priorities to drive growth for the next decade.

As this Forkast.Insights China Blockchain Report demonstrates, blockchain technology is integrated in both enterprise and government clients in the country. Blockchain is already a rapidly maturing technology in the country and has real-world, practical use cases that are far beyond the experimental stage.

In this report, we explore these use cases and provide the reader with an in-depth understanding of how blockchain has developed in the country. As with any technology, there's room for improvement; but in China, it's part of the software framework that is already widely in use — no waiting until 2028 required.

Gartner's Phases of Technology Development

[1] (2018) Breaking Blockchain Open: Deloitte's 2018 Blockchain Survey www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-2018-global-blockchain-survey-report.pdf

[2] (2019) Deloitte's 2019 Global Blockchain Survey www2.deloitte.com/content/dam/Deloitte/se/Documents/risk/DI_2019-global-blockchain-survey.pdf

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Joseph Lubin, founder of ConsenSys and cofounder of Ethereum

Edith Yeung, partner at Proof of Capital

Yuval Rooz, CEO of Digital Asset

Caroline Malcolm, Head of OECD Blockchain Policy Center

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CHAPTER 1: GOVERNMENT

Outlining China's Blockchain Vision

Budget (2017)

Revenue: $2.55 trillion USD

Expenditures: $3.01 trillion USD

Budget Balance
-4.3% of GDP

World Rank By % Surplus: 151

Taxes and Other Revenues
21.7% of GDP (2017 est.)

Public and private sectors work hand-in-hand to develop technology

The Chinese government has identified blockchain technology development as an issue of national importance, along with other emerging technologies such as AI, deep learning and IoT. President Xi Jinping has outlined the importance of blockchain technology to China's industrial maturity, urging continued development so China can lead the way in defining international standards.[1]

Beijing sees blockchain as a tool for disintermediation and finding efficiencies in industries with outdated, archaic processes. In contrast with the libertarian attitude on blockchain and cryptocurrency that is popular in the West, firms in China are seen as stakeholders in the economy with generally good relations with the state; the Cyberspace Administration of China (CAC) issues regulations for the sector, and firms tend to be compliant. The public and private sector alike enthusiastically embrace the concept of "Blockchain with Chinese Characteristics."

Foreign companies are not excluded from participating in the sector: IBM is a major player in China's blockchain market. The U.S. computer hardware company is collaborating with the Bank of China on blockchain research, with Walmart and JD.com on supply chain tracking for food safety, and with Sichuan Hejia on chemical supply chain tracking for pharmaceuticals. But if there is low participation from foreign companies, do they even have an advantage in China given local capabilities?

Unlike the U.S., whose only national blockchain policy pertains to tokens being viewed as securities, China's comprehensive blockchain strategy involves both the public and private sectors. The second chapter of this report addresses the latter.

In contrast with the libertarian attitude on blockchain and cryptocurrency that is popular in the West, firms in China are seen as stakeholders in the economy with generally good relations with the state. The public and private sector alike enthusiastically embrace the concept of "Blockchain with Chinese Characteristics."

[1] Xinhua (2019) Xi stresses development, application of blockchain technology www.xinhuanet.com/english/2019-10/25/c_138503254.htm

HONG KONG

HKEX Holds As Buffer Between East and West

Photo credit: Hong Kong FinTech Week

Hong Kong Exchange chief Charles Li says city is a springboard for opportunities in China's emerging technologies

As protests continue to rock Hong Kong and China's economy slows, concerns are rising about the Special Administrative Region's future as Asia's premier financial hub. Some $15.6 billion USD reportedly left the city from July to August — the biggest outflow since the Hong Kong Monetary Authority started publishing the data in 1997[1].

Singapore is, in many ways, Hong Kong's competitor, given the similarities in the two cities' economies and legal structures. And the Southeast Asian city-state has so far been a winner in this situation, with $4 billion moving into the Lion City from Hong Kong — nearly doubling foreign-currency deposits by non-bank customers to $12.8 billion SGD ($9.4 billion USD[2]).

In an era of capital outflow, is the Hong Kong Exchange still indispensable in an increasingly polarized global market?

Definitely, says Charles Li, the HKEX's CEO and executive director.

China's financial system is vastly different from the rest of the world. Hong Kong, with its familiar legal system, serves as a bridge.

"America and China, the two economic powers of the new era, are increasingly going separate ways," Li said in a fireside chat at Hong Kong Fintech Week in November. "Our role in Hong Kong, in particular in financial services, is to try and see whether we can control this polarization.

"We can't control this divorce. But we can be the strong link … to a center of gravity and essentially play the role of connecting them either by system, by people or by technology."

While Hong Kong is a city of only 7.3 million, Li added, it serves a market of 70 million within the Greater Bay Area of Hong Kong, Guangdong and Macau by virtue of its geography. Singapore doesn't have this geographical advantage.

This proximity means Hong Kong can be a springboard to capture opportunities within China, particularly in emerging technologies like blockchain. The future Shanghai-Shenzhen-Hong Kong stock market interconnection's underlying technology is blockchain, an implementation made possible by the development talent from the mainland and the financial and regulatory expertise in Hong Kong.

On the topic of blockchain, Li said China has a significant advantage as the state can direct the economy in a way that's not possible in purely free-market states. This firm guiding hand is useful when promoting the implementation of new technology.

> "America and China, the two economic powers of the new era, are increasingly going separate ways. Our role in Hong Kong ... is to try and see whether we can control this polarization."

"Blockchain is very difficult to be implemented in an established, mature economy to replace the incumbent system, because there's just too much resistance and so much vested interest, and there is no real fundamental need," Li said. "But in China, it's slightly different. The government is very powerful [and] has tremendous influence over the economic decisions of all the economic players in the country."

As China's relevance rises in the blockchain industry, the HKEX's role will be crucial in spreading the mainland's distributed ledger revolution to the world.

[1] Yeung, K; Leng S (2019) Capital outflows amid Hong Kong's protests could have caused record drop in forex reserves, analysts say www.scmp.com/economy/global-economy/article/3026554/capital-outflows-amid-hong-kongs-protests-could-have-caused *South China Morning Post*

[2] Monetary Authority of Singapore Monthly Statistics secure.mas.gov.sg/msb-xml/Report.aspx?tableSetID=I&tableID=I.4

Global Timeline of Blockchain Development

1994

Nick Szabo, an American computer scientist, proposes the concept of smart contracts. In his white paper, Szabo defined smart contracts as computerized transaction protocols that execute the terms of a contract. He wanted to extend the functionality of electronic transaction methods, such as POS (point of sale), to the digital realm.

2003

The gross issuance of mortgage-backed securities, which packages mortgages into tradable securities, reaches $2.1 trillion USD.

2008

Ballooning subprime mortgage debt and the failure of mortgage-backed securities hit the U.S. economy hard, fueling a Great Recession with catastrophic global effects. Mortgage giants Fannie Mae and Freddie Mac buckled under the subprime crisis in August 2008, and one month later, the Dow Jones Industrial Average experienced the largest one-day drop in its history. In October, Congress announced a $700 billion USD bank bailout to separate banks from their troubled assets.

Meanwhile, in August, an entity known as Satoshi Nakamoto publishes "Bitcoin: A Peer-to-Peer Electronic Cash System," which outlines a vision that a "purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution." The concepts described in the white paper such as proof of work, nodes, hashing and transactions would be the foundation of the Bitcoin blockchain and future blockchains such as Ethereum.

2009

January: Satoshi Nakamoto mines Bitcoin's inaugural Genesis Block and makes the first Bitcoin transaction by sending 10 BTC to software engineer Hal Finney.

February: U.S. Congress passes the American Recovery and Reinvestment Act, a $787 billion plan designed to stimulate economic growth to eventually end the recession. Critics argued that while it provided the capital to help alleviate the pain of the recession, it didn't do enough to structurally reform the system to stop such an event from recurring.

2010

February: Bitcoin Market launches as the first public Bitcoin exchange. Its first published trade, in March, was valued at 1,000 BTC for 0.03 USD/1 BTC ($30 USD).

May: The infamous Pizza-for-Bitcoin exchange occurs when Laszlo Hanyecz pays 10,000 BTC for two Papa John's pizzas. The pizzas were worth $25 — but nearly $82 million USD based on Bitcoin's October 2019 price.

July: Magic The Gathering Online eXchange, which started as a trading hub for Magic playing cards, opens a Bitcoin trading room.

2011

February: The price of Bitcoin crosses the $1 USD threshold.

Meanwhile, Silk Road launches as the first online darknet market, operating exclusively on the dark web via Tor to encrypt all traffic. Patrons could buy and sell illegal goods including drugs, fake IDs and hacking services. At its peak, Silk Road is estimated to have closed commissions of over $1 billion USD.

October: The first altcoin, Litecoin, launches as a fork of the Bitcoin code. Litecoin aimed to bring efficiencies through improvements to the existing Bitcoin code base. For instance, the Litecoin Network aims to process a block every 2.5 minutes, versus Bitcoin's 10 minutes. This allows Litecoin to confirm transactions much faster than Bitcoin.

2012

The price of Bitcoin crosses the $100 USD mark in a year of massive price spikes.

The Bitcoin Foundation launches with the mission to "accelerate the global growth of bitcoin through standardization, protection, and promotion of the open source protocol."

November: The first "halving" event occurs, signifying that over 50% of all Bitcoin had been mined and would be substantially more difficult to mine. The halving is a process built into Bitcoin's code that occurs once for every 210,000 blocks mined, roughly every four years. The process affects the amount miners receive for validating one new block of transactions on the blockchain. The reward for mining started at 50 BTC per block until the first halving, which cut the reward to 25 BTC.

2013

Bitcoin's price fluctuates widely throughout the year and breaks the $1,000 USD mark.

April: Bitcoin exchange Mt. Gox handles over 70% of the world's Bitcoin trade as the largest Bitcoin intermediary and the world's leading exchange for the token.

October: Darknet market Silk Road is shut down and its founder, Ross Ulbricht, is arrested. Immediately upon news that the market was shuttered, the BTC-USD exchange rate plummeted to a low of $109.76, before recovering to $124 USD. The price of BTC would stabilize around this rate for the rest of the year.

Late 2013: Bitcoin Magazine publishes the white paper for Ethereum.

December: The People's Bank of China (PBOC) makes its first step in regulating Bitcoin by prohibiting financial institutions from handling Bitcoin transactions.

2014

January: Ethereum's white paper is presented at the North American Bitcoin Conference in Miami.

2014

February: Mt. Gox halts all Bitcoin withdrawals, claiming technical problems. On Feb. 24, the exchange suspended all trading on the platform and began to remove all traces of itself from the web. A leaked alleged internal crisis management document claimed the company was insolvent after it lost 744,408 BTC in a theft that went undetected for years. The USD-BTC index dropped 36% amid the news.

March: Mt. Gox enters bankruptcy protection.

June: NewEgg and Dell begin accepting Bitcoin.

July – August: Ethereum's founders launch a crowdfunding campaign for its development, raising $18 million USD. Patrons exchanged BTC for ETH tokens — a model that would later be used for initial coin offerings (ICOs).

Late 2014: The People's Bank of China begins work on its own digital currency.

2015

July: The first version of Ethereum, "Frontier," is launched. The platform immediately drew interest and attention for its capacity to incorporate smart contracts directly onto the blockchain. This, in addition to the ability to execute code on the blockchain, would lead to the creation of an app ecosystem.

Barclays, Credit Suisse, Goldman Sachs, JP Morgan and RBS create a blockchain consortium called R3. NASDAQ begins a blockchain pilot to improve speed and efficiency and lower costs of its trading systems.

The world's biggest open-source nonprofit, The Linux Foundation, launches Hyperledger, a set of tools to help people create blockchain projects.

The PBOC begins a devaluation of the RMB to boost exports while also stepping up enforcement of capital controls. Demand for BTC-RMB trade spiked as the currency pair climbed the ranks in fiat-crypto trade volume.

2016

Initial coin offerings (ICOs) grow in popularity as entrepreneurs seek to raise capital with this new method of fundraising. The year's most prominent ICO was the Decentralized Autonomous Organization (DAO), which was designed to be an autonomous, user-directed venture capital fund that allowed users to vote on projects via smart contracts. In June 2016, a hacker or group of hackers allegedly stole $70 million USD of the DAO Foundation's $160 million.

In the wake of this theft, a divide emerged among Ethereum stakeholders. While some wanted to push a soft fork out to all nodes that would reverse the transactions that took DAO's funds, others said this would create a slippery slope that would tarnish the blockchain's strength – its immutable, trustworthy transaction history.

IBM starts offering BaaS (blockchain-as-a-service) to businesses.

July 9, 2016: The second Bitcoin "halving" occurs, cutting the mining reward to 12.5 BTC. This did little to deter miners.

2017

Bitcoin is recognized as legal currency in Japan.

The ICO bubble continues, putting upward pressure on the price of cryptocurrencies. The biggest ICO of 2017, Filecoin, raised $257 million USD. This heightened public interest raised the attention of regulators.

April: Tencent launches its BaaS platform, TrustSQL.

Mid-2017: China bans local companies from raising capital via ICOs, and regulators begin auditing and investigating local cryptocurrency exchanges and ICO trading platforms.

September: China orders local cryptocurrency exchanges to shut down. In response, the price of BTC dropped by 10% and demand for the BTC-RMB currency pair effectively evaporated overnight. However, it remained legal to own cryptocurrency.

Dec. 17: The price of Bitcoin hits an all-time high of $19,783.06 USD as ICOs continue to boost demand for cryptocurrency.

Dec. 22: Bitcoin loses one-third of its value overnight, with the price dipping below $14,000 USD.

2018

The yearlong ICO for the EOS blockchain raises a record-high $4.1 billion USD.

A survey of 600 executives from 15 territories by PwC reveals that 84% say their organizations have at least some involvement with blockchain technology, while 30% believe China is a blockchain leader. A similar survey by Deloitte found that 49% of respondents in China said blockchain technology was already used in their organizations, compared to only 14% in the U.S.

May: Consensus, the world's biggest annual blockchain conference, reaches 4,000 attendees.

July: IBM launches a research center with Columbia University that aims to boost blockchain application development and education initiatives.

October: An EY study analyzing the top ICOs that represented the majority of funding in 2017 found that only 29% of the "Class of 2017" ICOs had working products or prototypes as of the study's publication, while 30% had lost substantially all value.

2019

Regulators worldwide announce security token offering (STO) laws, providing legal frameworks to raise capital via blockchain tokens.

May: According to Deloitte's Global Blockchain Survey, 73% of respondents in China view blockchain as a top-five strategic priority, compared to 56% in the US.

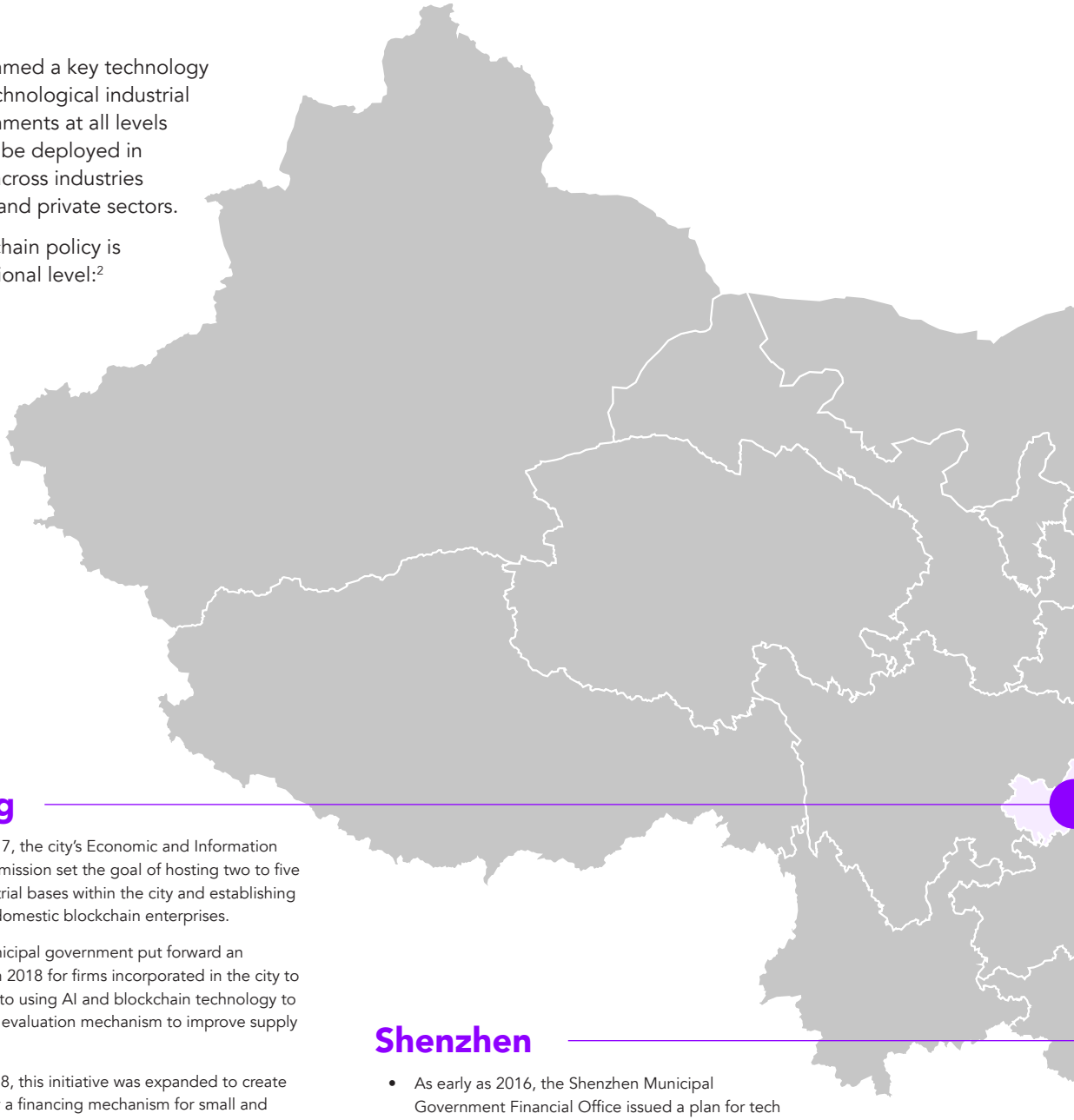
June: Facebook announces the Libra project, a permissioned blockchain digital currency.

Mid-2019: The PBOC announces it is accelerating development of its digital currency.

Regional Blockchain Initiatives

With blockchain named a key technology for China's next technological industrial revolution[1], governments at all levels have directed it to be deployed in various use cases across industries in both the public and private sectors.

Here is how blockchain policy is enacted at the regional level:[2]



Chongqing

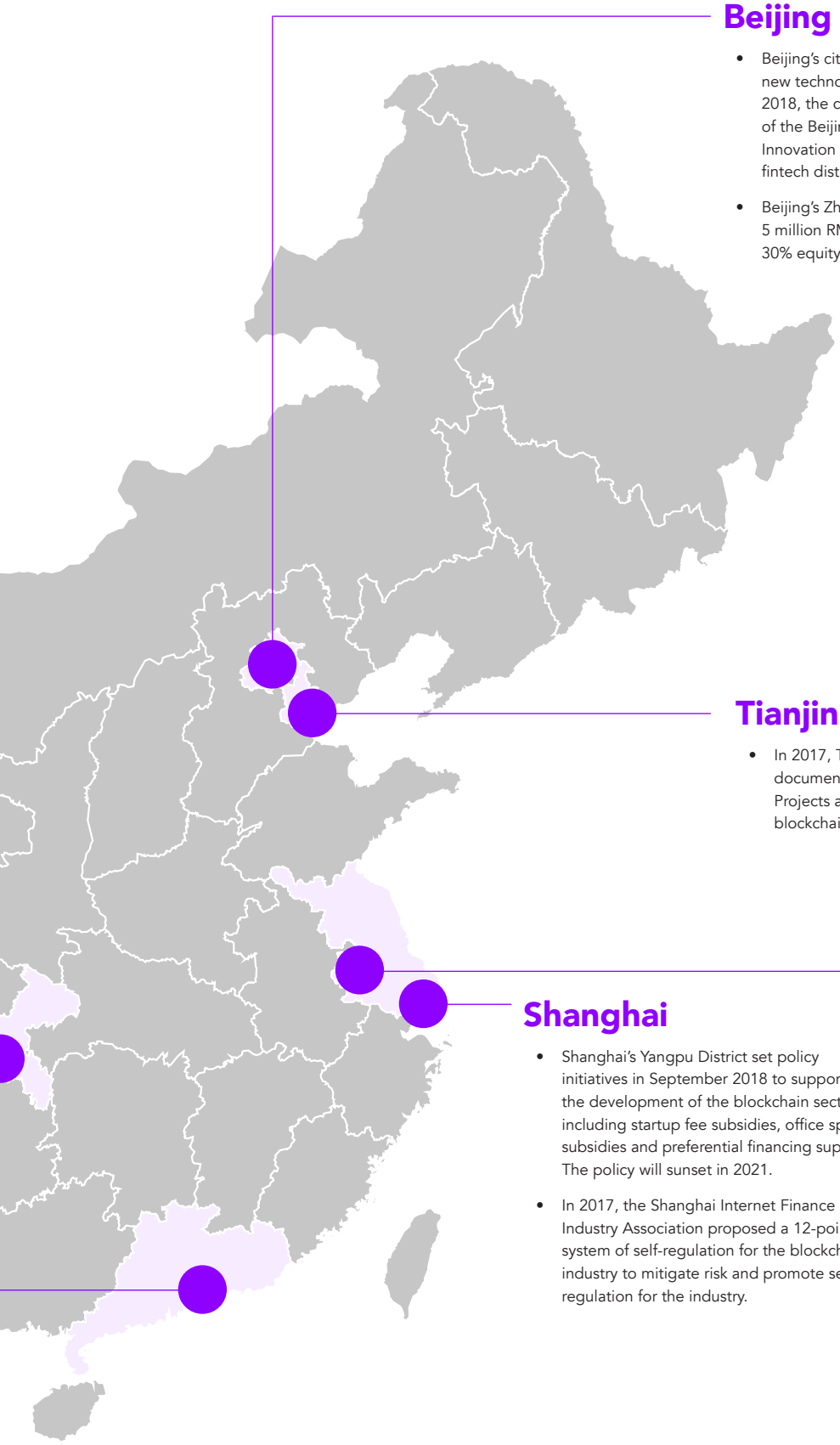
- In November 2017, the city's Economic and Information Technology Commission set the goal of hosting two to five blockchain industrial bases within the city and establishing over 50 leading domestic blockchain enterprises.
- Chongqing's municipal government put forward an initiative in March 2018 for firms incorporated in the city to begin research into using AI and blockchain technology to establish a credit evaluation mechanism to improve supply chain financing.
- In December 2018, this initiative was expanded to create a pilot project for a financing mechanism for small and medium-sized enterprises incorporated in the city.

Shenzhen

- As early as 2016, the Shenzhen Municipal Government Financial Office issued a plan for tech and finance companies incorporated within the city to strengthen research and exploration of emerging technologies such as blockchain and digital currency.
- The municipal government expanded this initiative in 2017 with a 6 million RMB award system for outstanding research in the sector.
- In March 2018, the Shenzhen Municipal Commission of Economy, Trade and Information Technology created a program for blockchain startups to invest up to 2 million RMB for up to 30% equity.

[1] Xinhua (2018) www.xinhuanet.com/politics/2018-05/28/c_1122901308.htm

[2] Social Sciences Academic Press, Beijing Blockchain Application Association (2018) *Report on The Development of China's Blockchain*



Beijing

- Beijing's city government is a big proponent of developing new technology such as AI, IoT and blockchain. In December 2018, the city's Xicheng District promoted the construction of the Beijing Financial Technology and Professional Services Innovation Demonstration Zone, better known as Beijing's fintech district, via a 10 million RMB grant.
- Beijing's Zhongguancun District, a fintech center, provides up to 5 million RMB in financial support for projects in exchange for 30% equity.

Tianjin

- In 2017, Tianjin's municipal finance bureau put forward the policy document "Measures on Supply Chain System Construction Projects and Funds Management," which promotes the use of blockchain for things like supply chain management.

Shanghai

- Shanghai's Yangpu District set policy initiatives in September 2018 to support the development of the blockchain sector including startup fee subsidies, office space subsidies and preferential financing support. The policy will sunset in 2021.
- In 2017, the Shanghai Internet Finance Industry Association proposed a 12-point system of self-regulation for the blockchain industry to mitigate risk and promote self-regulation for the industry.

Nanjing

- The Nanjing municipal government's "Internet + Government Services + Inclusive Finance Project" incorporates blockchain into the government's accounts payable and accounts receivable reconciliations across its various bank accounts and financial institutions.
- In September 2018, the Nanjing Municipal Committee of the Communist Party of China and Nanjing Municipal People's Government unveiled an initiative to create a blockchain-based credit platform as part of the existing "My Nanjing" municipal app platform.

Photo credit: Unsplash

CENTRAL BANK

Inside China's Vision To Globalize Its Currency

The People's Bank of China is racing to launch a digital token to challenge the U.S. dollar

The People's Bank of China (PBOC) has digital currency ambitions, but all signs point to it being a cryptocurrency on the surface and a fiat currency by another name.

The PBOC has extensively researched blockchain and digital currency for some time. Efforts began in 2014 under the watch of former Gov. Zhou Xiaochuan.[1] Since then, the PBOC has filed 63 patents related to blockchain[2] while over 10,000 blockchain-related patents have been filed in China overall, according to the China National Intellectual Property Administration (CNIPA)[3]. The PBOC has also taken efforts to educate the public about the potential of blockchain technology with the app De Dao (得到), made in conjunction with a prominent Chinese educational app developer.[4]

Although China is a hotbed for blockchain research, the country has banned cryptocurrency transactions in phases from 2013, when banks were prohibited from handling crypto-related transactions, to 2017, when authorities gave the order for crypto-exchanges to close[5]. The reason: fraud and capital flight[6]. (However, there is no prohibition on owning cryptocurrency.) The initial coin offering (ICO) bonanza hit China hard, with fly-by-night schemes in the hundreds parting unsophisticated investors from their RMB. Capital controls are a long-standing pillar of China's monetary policy, and cryptocurrency was just a new and efficient way to bypass them.

But the central bank's digital currency efforts, ironically, would give it more control over the economy. According to reports and the PBOC's statements, the digital currency would replace M0, or the money in circulation, of which central banks generally have the most control. For China, this is important considering how private companies are digitizing currency through popular mobile payment platforms WeChat Pay and Alipay. A substantial portion of the payments that drive the consumer

[1] China Daily (2019) Central bank unveils plan on digital currency www.chinadaily.com.cn/a/201907/09/WS-5d239217a3105895c2e7c56f.html

[2] China National Intellectual Property Administration (CNIPA)

[3] China National Intellectual Property Administration (CNIPA)

[4] www.igetget.com

[5] Bloomberg News (2019) China's PBOC Says Its Own Cryptocurrency Is 'Close' to Release. Bloomberg www.bloomberg.com/news/articles/2019-08-12/china-s-pboc-says-its-own-cryptocurrency-is-close-to-release

[6] Wildau, G. (2017) China probes bitcoin exchanges amid capital flight fears. Financial Times. www.ft.com/content/bad16a88-d6fd-11e6-944b-e7eb37a6aa8e

economy has shifted to these platforms, which means they have moved from M0 to M2, of which central banks have less control. While M2 includes M0 (in addition to M1, the amount of cash held in checking accounts), it largely refers to the funds and credit in commercial bank accounts — where WeChat Pay and Alipay currency is held.

Jingnan Wang, vice president of the Conflux Foundation, explained to Forkast.News in an interview: "The People's Bank of China is technology-agnostic … From the perspective of the PBOC, it's adaptable to any kind of technical route."

Wang said the model the PBOC envisions will be similar to Hong Kong's model of currency issuance controlled by the government but facilitated by private banks. "In order to ensure that this digital currency is not over-issued, the PBOC digital currency will remain the central bank's debt, which is guaranteed by the People's Bank of China's credit guarantee," he said. "That is to say, while the commercial entity is reporting to the PBOC to issue digital currency technical reports, it must pay 100% of the reserve to the PBOC to ensure the stability of the commercial subject of the cryptocurrency in commercial circulation."

China's M2 money supply has rocketed over the last decade[7], outpacing economic growth during the same period. While this is partly due to the rise in popularity of digitized currency via WeChat Pay and Alipay[8], it is also brought on by an overleveraged credit system that includes everything from commercial bank loans to consumer-oriented P2P lending and shadow banking. Given the amount of credit available, the PBOC is struggling to have a firm handle on the broader economic cycle.

Race Against Libra

Beijing is well aware the U.S.' hegemony over the world extends to currency. When a deal is done between two parties in Southeast Asia, for instance, it is likely settled in USD, not the local currency of the party or counterparty nor RMB[9].

This holds true for stablecoins[10], cryptocoins tied to fiat currencies like the USD, which are positioned as the future of international transaction settlement.

Libra has created a sense of urgency within the PBOC to get this digital currency operational, as effectively Libra — if it picks up and scales the way Facebook intends — would be one of the world's biggest currencies, but backed by the USD.

Essentially, stablecoins will be a next-generation version of SWIFT with faster settlements and lower fees. Being tied to the USD ensures stability in the price, which in turn boosts liquidity. While there are currently dozens of stablecoins on the market, Libra is probably the best-known given Facebook's scale and international target market — and it has the PBOC worried.

Thus, Libra has created a sense of urgency within the PBOC to get this digital currency operational, as effectively Libra — if it picks up and scales the way Facebook intends — would be one of the world's biggest currencies, but backed by the USD.

Wang Xin, director of the PBOC's research bureau, has voiced concern over Libra's potential to solidify the USD's grasp on yet another market[11]:

"If [Libra] is widely used for payments, cross-border payments in particular, would it be able to function like money and accordingly have a large influence on monetary policy, financial stability and the international monetary system?" he told the South China Morning Post in July. "If the digital currency is closely associated with the U.S. dollar, it could create a scenario under which sovereign currencies would coexist with U.S. dollar-centric digital currencies. But there would be in essence one boss, that is the U.S. dollar and the United States."

The PBOC isn't the only stakeholder watching Libra through a lens of currency competition. Binance, the world's largest cryptocurrency exchange, recently announced Venus[12], an initiative to create regional stablecoins tied to local currencies. Unlike Libra, Binance has signaled that it is working with different states to create these stablecoins as an international alternative to the USD for settlement.

"Binance welcomes additional government partners, companies and organizations with a strong interest and influence on a global scale to collaborate with us to build a new open alliance and sustainable community."

[7] Trading Economics (2019) China Money Supply M2 tradingeconomics.com/china/money-supply-m2

[8] Wan, Dovey (2019) Digital Renminbi: A Fiat Coin to Make M0 Great Again. CoinDesk www.coindesk.com/digital-renminbi-a-fiat-coin-to-make-m0-great-again

[9] Society for Worldwide Interbank Financial Telecommunications (2018) Worldwide Currency Usage and Trends Report www.swift.com/node/19186

[10] CB Insights (2019) What Are Stablecoins? CB Insights. www.cbinsights.com/research/report/what-are-stablecoins

[11] Tang, Frank (2019) Facebook's Libra forcing China to step up plans for its own cryptocurrency, says central bank official. SCMP. www.scmp.com/economy/china-economy/article/3017716/facebooks-libra-forcing-china-step-plans-its-own

[12] Binance (2019) www.binance.com/en/support/articles/360032604131

Too Big for Blockchain?

While digital currency is often said in the same breath as blockchain, digital currency doesn't necessarily need to be *on* the blockchain. In fact, given the scale of the Chinese market, there might be an issue of compatibility. Ethereum, for instance, is limited to approximately 15 transactions per second due to the bottleneck during verification by different nodes around the network. But the PBOC specifies that its digital currency system must handle 300,000 transactions per second.

So, it's likely that this system will have elements similar to blockchain technology, but will ultimately be centralized.

In an interview with Forkast.News, University of Chicago professor Zhigou He said: "It's a huge database using the hash function, chain technology. There's no distributed ledger portal. Every time I mention [it], my colleagues at UChicago will immediately tell me it's not blockchain. I actually agree."

One Belt, One RMB

While the PBOC has its reasons for digitization of the money supply to control M0, its other goal is to internationalize the RMB. Within China's sphere of influence in Asia, a number of countries use the USD as the quasi-official currency[13].

Countries like Cambodia and Myanmar use the USD alongside their own official currencies — and are also stakeholders within China's Belt and Road Initiative.

If China could provide an RMB-backed digital currency as a credible alternative to the USD, it would solidify its influence in the region by effectively becoming the de-facto reserve currency of these nations while helping to modernize the financial sector of these emerging markets. WeChat Pay and Alipay are big domestic success stories, but not so much abroad. As a payment platform, they are only used overseas when there's some nexus to China, such as at shopping malls frequented by Chinese tourists. They don't have the same usage as, say, PayPal, which is used in 200 countries and supports 20 currencies.

But should China make a concerted effort to begin de-dollarization of the world's emerging markets, it would certainly be noticed in the U.S. and further ramp up tensions between Washington and Beijing. Washington could hit back and insist on tying foreign aid to keeping the USD as a local reserve currency, but it might not have a lot of luck: Other central bankers prefer a world with multiple global reserve currencies and not just the USD. The Bank of England's Mark Carney has argued that countries stockpiling dollars is a barrier to global trade and the hoarding of dollars has resulted in 10 years of low inflation and ultra-low interest rates.

In a speech in Jackson Hole, Wyoming, during a meeting of central bankers, Carney said a new digital currency backed by nations "could dampen the domineering influence of the U.S. dollar on global trade" while "reducing the influence of the U.S. on the global financial cycle, this would help reduce the volatility of capital flows to emerging market economies."

China may prefer a scenario where a digital RMB was the preferred competitor to the greenback and a runner-up for reserves, and other countries' governments might even view holding a significant amount of crypto-yuan as an investment — and endorsement — in Beijing. Alternately, we may see an emergence of highly competitive regional digital currencies. Countries known for their neutrality and positive global perception could be big beneficiaries — Canada and Singapore are respective contenders. Crypto exchange Binance is already working on the first steps of this with what it calls Project Venus[14] — in collaboration with governments, it says — in an aim to create regional stablecoins collateralized by local fiat currency.

If Binance's claims of regulatory compliance and government collaboration hold up, it would be a remarkable contrast to the chilly reception received by Facebook's Libra. Perhaps, in the end, it will all come down to a name: Within the Greek mythology where both borrow their names, Venus is the ruling planet of Libra.[15]

Watch a video explainer of the app De Dao:

[13] Adkins, T (2015) Countries That Use The U.S. Dollar. Investopedia. www.investopedia.com/articles/forex/040915/countries-use-us-dollar.asp

[14] Binance (2019) Binance Announces Open Blockchain Project 'Venus' www.binance.com/en/support/articles/360032604131

[15] Wikipeida Planets in astrology en.wikipedia.org/wiki/Planets_in_astrology#Venus

Photo credit: Unsplash

TECH TALENT

A Small, Growing Blockchain Labor Force

Not enough talent and startups want to develop blockchain projects

The number of blockchain developers in China is still small compared to other countries, but it is growing. According to a Forkast.News study of LinkedIn profiles in China, there were 5,290 blockchain developers in the country in 2019, up from 3,780 in 2018.

The low number of blockchain developers in China, particularly compared to India, is a product of the relatively immature software development sector. According to a developer survey in 2017 by Alibaba, the industry as a whole is relatively inexperienced and young. A majority (56.7%) of developers in China have only 0-3 years of work experience. This suggests that China's developer community is less experienced than international peers (42% have 3-10 years of experience). They are also heavily focused on fields such as web development, computer vision, neuro-learning protocols and voice recognition.

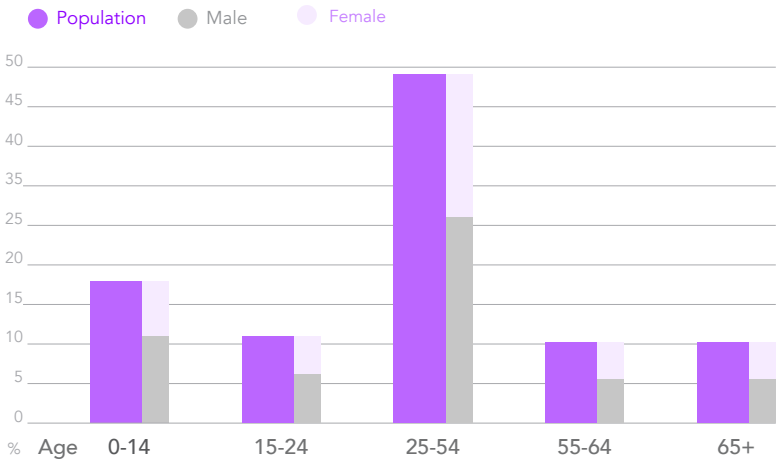
In addition, this does not cover developers who work primarily in another sector but may occasionally develop for blockchain applications.

India has a disproportionately high number of developers given its mature and extensive software outsourcing market (largely thanks to the lack of a language barrier with the West).

For China's blockchain market to mature, it needs to build up a professional corps of blockchain developers. It's not for a lack of developers — China has plenty — but they are employed by internet giants and other large enterprises. But not enough startups and young talent are as gung-ho about blockchain as they are about hotter categories such as such as AI, media or the sharing economy. Nonetheless, China's blockchain industry has its own market as an advantage: With aggressive government support and a population of 1.4 billion, the demand is there. The supply of labor needs to come next.

Age Structure

China's population by age range

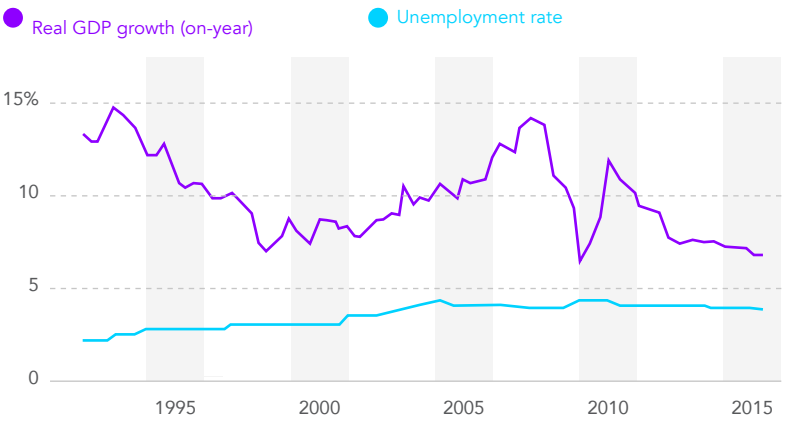


Expected Educational Attainment (primary to tertiary)

Number of years of education a child of school-entering age would receive during his or her lifetime with today's school enrollment rates, 2015

14

Official unemployment rate



Urbanization*

Urban Population:
57.9% of total (2017)

Urbanization Rate:
2.3% per year (2015-20 est.)

*Does not include Hong Kong or Macau

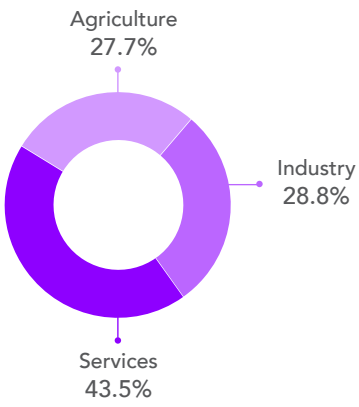
Labor Force
806.7 million (2017 est.)

World Rank: 1

Unemployment Rate
3.9% (2017)

Population Below Poverty Line
3.3% (2016 est.)

Labor Force By Sector (2016 est.)



Blockchain Developers Around The World

	Country	Programming Background:	Blockchain + Python	Blockchain + C#	Blockchain + Ruby	Blockchain + Java	Blockchain + Solidity
	**U.S.**		7,752	23,542	2,168	9,784	3,641
	**Canada**		1,520	3,803	403	2,057	781
	**U.K.**		1465	4,736	393	2,215	1,010
	**Germany**		931	931	196	1,313	574
	**Ukraine**		399	1,356	99	522	403
	**Poland**		394	1,166	96	539	285
	**India**		5,377	16,870	519	8,364	2,561
	**China**		799	2,855	198	1,067	371
	**Phillippines**		149	729	47	359	125
	**Switzerland**		344	14,332	45	568	245
	Total	**87,279**	**30,736**	**94,283**	**6,641**	**46,581**	**18,706**

LinkedIn study by Forkast.News

Photo credit: Unsplash

EDUCATION

China's Blockchain Education Shortage

Post-secondary courses on blockchain are ripe for growth

Given Chinese firms' enthusiasm for blockchain technology, there is a bit of a mismatch with the dearth of post-secondary courses on the topic. While many of the country's top universities offer some sort of blockchain course or lab, the field has room for expansion.

That said, a lack of formal post-secondary courses on blockchain technology is not limited to China. This is also a problem in the West. Universities simply haven't caught on to the need for blockchain education as they grapple with teaching other emerging technologies, such as big data or AI. This may be because blockchain is such a rapidly developing field that universities feel that anything they teach now might be irrelevant in the years to come.

China's government understands the unlocked value of online education and has started its own efforts. The People's Bank of China is educating the public about the potential of blockchain technology with the app De Dao (得到), made in conjunction with a prominent Chinese educational app developer.[1] Another government app, called Xue Xi Qiang Guo (学习强国), is a repository of government educational materials in the social sciences with courses in Chinese art and film, in addition to classes in history and law.

For blockchain education, a better option might be massive open online courses (MOOCs) and bootcamps. A MOOC is an online course aimed at unlimited participation and open access via the web, and it is often offered by brand-name schools as an alternative method of delivery to distance education. Bootcamps are short, intensive courses designed to cover a specific topic in a limited amount of time.

MOOCs are not as popular in China as they are in the West, but they are quickly growing in popularity[2] with many top universities offering them. However, locals still have a preference for the more traditional structured university environment, and it might be some time before this takes off to the same extent as the West.

For blockchain education, a better option might be massive open online courses (MOOCs) and bootcamps. But locals still prefer the traditional structured university environment.

[1] www.igetget.com

[2] Xinhua (2019) Chinese gov't recommends online courses to boost MOOC www.xinhuanet.com/english/2019-01/23/c_137768203.htm

Blockchain University Courses in China

University	Blockchain Courses (Highlighted courses are blockchain labs)	Notes
Tsinghua University	Beyond the Cognitive Basis of Discipline	Related to distributed blockchain
	Cyber Intelligent Economy and Blockchain	Postgraduates only
	Blockchain and Cryptocurrency	Postgraduates only
	iCenter Blockchain Technology Development Open Class	Cooperated with Asia DACA Blockchain Association
	Blockchain Research Center	
Peking University	Blockchain@Guanghua School of Management	Offered by entrepreneurs in the blockchain industry
	Blockchain Lab	Founded by Guanghua School of Management
Fudan University	Blockchain Technology Lecture	Related to Chinese central bank's digital currency and exchanges
	Blockchain technology joint innovation center	In cooperation with IBM
Shanghai Jiao Tong University	Blockchain Investment and Application Practice International Course (short-term)	Research and study in Singapore and Shanghai
Zhejiang University	Blockchain and Digital Currency	Focus on Hyperledger
University of Science and Technology of China	N/A	No details are found
Nanjing University	Blockchain + Artificial Intelligence Fintech	
	Blockchain Artificial Intelligence Fintech Lab	
Wuhan University	Cryptography and blockchain technology lab	
Harbin Institute of Technology	Blockchain and Fintech	Course is held at its Shenzhen campus
Tongji University	A series of blockchain training courses	
	Artificial Intelligence & Blockchain Intelligence Lab	The courses are divided into 5 topics: Blockchain technology and industry development, Ethereum, Hyperledger, PoC Practice, Top blockchain company business tour

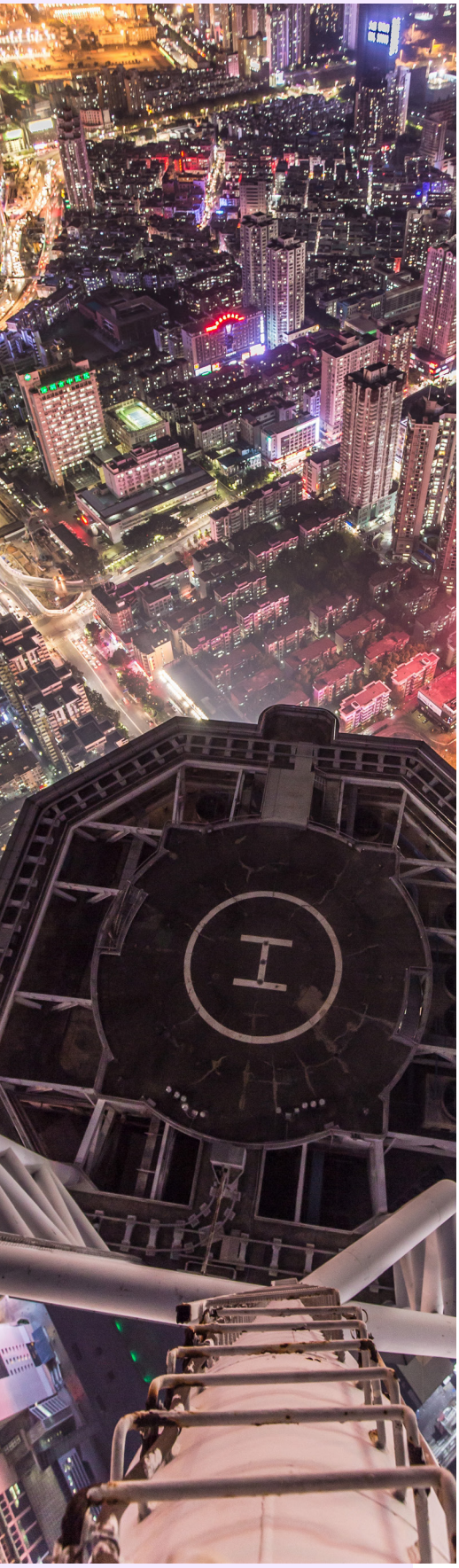


Photo credit: Unsplash

INTELLECTUAL PROPERTY

China Leads The Blockchain Patent Race

But a low ratio of patents approved may suggest a quality shortage

Companies like Huawei, Xiaomi, Alibaba, Tencent and DJI are proof that China is a world-class, highly competitive, technologically innovative country. Along with these companies' tech prowess comes a large number of patent applications.[1]

Since China joined the World Trade Organization in 2001, it has claimed to be making its best efforts to protect intellectual property. Foreign investors still bet on China when outsourcing their products, technology and operations, despite the country being notoriously accused of stealing U.S. and European intellectual property. That said, foreign investors exercise the diligence to mitigate the risk of infringement by protecting their intellectual property through filing the necessary patent and trademark applications.[2]

Protection of Intellectual Property Rights

For innovations and new developments like blockchain, patents are very important as they provide their owners the right to exclude others from exploiting the patented technology. For almost a decade, China has received the largest number of patent applications globally, and it has been increasing every year. The number's continued rise translates to a booming economy and increasing confidence from global investors despite the country's ongoing tensions with the U.S.[3] Intellectual property applications themselves are a revenue source for the government, which generated $35 billion in fees paid for using IP rights.[4]

To increase IP support, the government announced in September 2019 the draft of its intellectual property law that pledged higher penalties for IP infringement, stricter protection of foreign intellectual property and prohibition of forced technology transfer.[5] While Beijing is unlikely to admit concession to Washington, strengthening IP law — especially protection of the IP of foreign companies — was one of the U.S.' top requests[6]. For U.S. firms, this would build confidence that their claims would be considered fairly in a dispute with a local firm.

[1] World Intellectual Property Indicators: Filings for Patents, Trademarks, Industrial Designs Reach New Records on Strength in China. WIPO. December 3, 2018. www.wipo.int/pressroom/en/articles/2018/article_0012.html#targetText=China's%20IP%20office%20received%20the,application%20fees%20have%20been%20paid

[2] Zhou, L. (2019) Foreign companies file record number of patent applications in China. SCMP. www.scmp.com/news/china/diplomacy/article/2181519/foreign-companies-file-record-number-patent-applications-china

[3] China Power Team. "Are patents indicative of Chinese innovation?" China Power. February 15, 2016. Updated April 19, 2019. chinapower.csis.org/patents/

[4] Zhou, L. (2019) Foreign companies file record number of patent applications in China. SCMP. www.scmp.com/news/china/diplomacy/article/2181519/foreign-companies-file-record-number-patent-applications-china

[5] Perkowski, J. (2012) Protecting Intellectual Property Rights In China. Forbes. www.forbes.com/sites/jackperkowski/2012/04/18/protecting-intellectual-property-rights-in-china/#759b2e213458

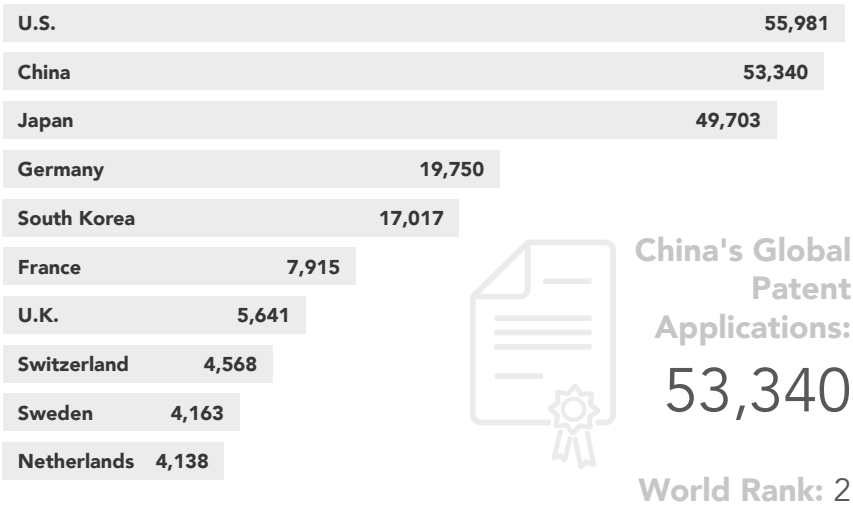
[6] Zhou, L. (2019) China tags top court to tackle intellectual property rights as US trade war rages. SCMP. www.scmp.com/news/china/diplomacy/article/2169880/china-tags-top-court-tackle-intellectual-property-rights-us

Blockchain-Related Patent Applications

Blockchain technology adoption by both startups and big firms has been popular in China since 2017. According to online patent search engine Innojoy, over 10,000 blockchain-related patents have been filed with the China National Intellectual Property Administration (CNIPA). Leading the pack is Alibaba Group with 543 patents, followed by state-owned telecom company China Unicom with 214 patents. In contrast, as of 2019, U.S. companies IBM and Bank of America filed just 174 and 69 blockchain-related patents, respectively, with the U.S. Patent and Trademark Office.[7] Interestingly, U.S. firms have filed a substantial number of blockchain patents in China.

Company	Patent-Related Industry	No. of Patents
Alibaba Group (Hangzhou)	Finance, IT	543
China Unicom	Mobile communication	214
Hangzhou FUZAMEI Technology Co., Ltd.	Blockchain supply	199
Ping An Technology (Shenzhen) Co., Ltd.	Finance	186
LAUNCH (Shenzhen)	Automotive products and services	166
Baidu (Beijing)	IT	148
Shenzhen OneConnectSmart Technology Co., Ltd.	Finance	140
ZhongAn Information Technology Service Co., Ltd.	Insurance, medical care, finance	136
Shenzhen Tencent Technology Co., Ltd.	Finance, IT, insurance	127
Shenzhen One Thing Tech Co., Ltd.	IT, cloud storage	119

Source: Innojoy



China's Global Patent Applications:

53,340

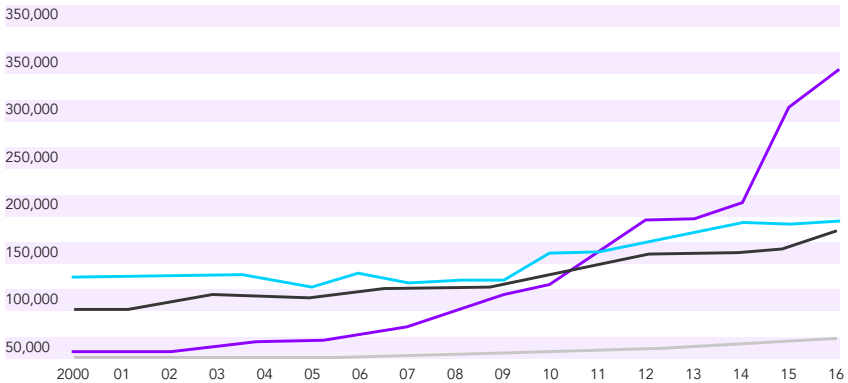
World Rank: 2

Trends in Patent Applications

- Chinese International Applications
- U.S. International Applications
- Chinese Domestic Applications
- U.S. Domestic Applications

The surge in Chinese patent applications is primarily for domestic patents.

International Chinese patents have yet to take off in the same way.



Source: World Intellectual Property Organization

[7] Berman, B. (2019) Only 1 In 10 U.S. Blockchain Patent Apps Have Been Issued; China Pct Filings Outpace The U.S. Almost 3 To 1. IP CloseUp. ipcloseup.com/2019/05/21/only-1-in-10-u-s-Blockchain-patent-apps-have-been-issued-china-pct-filings-outpace-the-u-s-almost-3-to-1

Patent Activity By City

By major city, Beijing leads the country with over 2,000 blockchain-related patents. The numbers mirror the local governments' support for the development of blockchain in these cities.

City	No. of Patents
Beijing	2,469
Shenzhen	2,027
Hangzhou	725
Shanghai	725
Guangzhou	416

Source: Innojoy

Foreign Firms' Patent Activity

Innojoy data also shows that most blockchain patent applications come from companies in business, finance, communication and data processing. Foreign companies that have filed blockchain-related patent applications are mostly from the U.S. and Japan like Microsoft, JP Morgan, Sony and Toyota.[8]

According to CNIPA, the requirements for patent application in China are similar to that of Europe in terms of novelty, inventive step and sufficiency. Chinese patent law also requires claims to be directed to technical solutions for technical problems, which is the same requirement in the European Patent Convention. This means that technical improvements or improvement in the blockchain system may be eligible for a patent. However, pure algorithms, which include mining methods, are prohibited under Article 25 of the country's Patent Law, which is classified under "rules and methods for intellectual activities."[9]

Country	No. of Patents	Representative Companies
Cayman Islands	546	Alibaba Group
U.S.	138	Microsoft, Sony Interactive Entertainment, JP Morgan, Boeing, Oracle
Antigua and Barbuda	50	Blockchain Holdings Ltd.
Japan	27	Sony, Fujitsu, Toyota
U.K.	21	Crossbill Ltd.
South Korea	19	SAMSUNG SDS CO., Ltd.

Source: Innojoy

As of the first quarter of 2019, China leads blockchain innovation with almost two-thirds of the world's blockchain projects.[10] However, patent applications have slowed since 2018: The high-tech arms race to acquire blockchain patents has fizzled out as companies start to apply and experiment with their registered patents.

[8] Zhou, L. (2019) Foreign companies file record number of patent applications in China. SCMP. www.scmp.com/news/china/diplomacy/article/2181519/foreign-companies-file-record-number-patent-applications-china

[9] Wang, J. (2019) How Europe and China handle Blockchain patents. IAM-Media. www.iam-media.com/law-policy/epo-and-china-Blockchain-patents

[10] China's Blockchain Dominance: Can the U.S. Catch Up? (2019) Knowledge@Wharton. knowledge.wharton.upenn.edu/article/can-u-s-catch-chinas-Blockchain-dominance

Patent Shakeout

Patent wars have existed for centuries. Before blockchain was the emergence of the internet, when related patents in the U.S. surged from 165 in 1995 to 2,193 in 1998.[11] However, not all patents would necessarily lead to useful products or proven use cases.

There are concerns that too many blockchain-related patents — which will be owned only by a small number of big firms — may slow down the technology's development. However, such concern may not hold water as legal experts claim that patents on an algorithm like blockchain, an abstract idea, is not patentable and may be rejected.

Furthermore, according to the American Bar Association, even if blockchain technology becomes patentable subject matter, showing the patent's novelty and non-obviousness is still required. The same patentability requirements are also present in China's patent law. Hence, the number of blockchain applications by the leading companies may still be reduced to only a handful.[12]

As of March 2019, China has the world's highest number of approved patents, according to data from the World Intellectual Property Organization. However, Alibaba, despite having the greatest number of patent applications, only ranked fifth among global institutions in approved patents.[13]

Only 26% of the applications filed by residents were granted in contrast to the approved 68% for non-residents. This may mean that patents filed by residents are less innovative, low quality and not on par with those of non-residents.

What This Means For China And The Global Market

The government support for IP through subsidies provided to patent applicants is driving the staggering number of blockchain patent applications. This incentive removes the financial burden, particularly for startups and early-stage companies. However, the number of applications does not necessarily translate into better, faster technology. Only 26% of the applications filed by residents were granted in contrast to the approved 68% for non-residents.[14] This may mean that patents filed by residents are less innovative, low quality and not on par with those of non-residents.

On a global scale, Chinese companies are also hesitant to file the counterpart patent applications in other countries. This may potentially limit these companies' growth to the domestic market. Arguably, this hesitation has caused China to reach only fifth place in the number of approved patents globally.

Based on the ratio of applications to approvals, it is not far-fetched to suspect a lack of quality in the large number of blockchain filings in China. But the stark contrast between approved patents of residents and non-residents could indicate an opportunity for global companies to file their patents in China as they may prove to be more competitive than domestic firms.

[11] Lindsay, J. (2000) Business Method Patents Online. Cyber Law Harvard.edu. cyber.harvard.edu/property00/patents/main.html

[12] Chaudhry, Inayat. (2018) The Patentability of Blockchain Technology and the Future of Innovation. ABA. https://www.americanbar.org/groups/intellectual_property_law/publications/landslide/2017-18/march-april/patentability-blockchain-technology-future-innovation/

[13] Gritsi, E. (2019) Briefing: China holds the highest number of Blockchain patents. TechNode. technode.com/2019/03/14/briefing-china-holds-the-highest-number-of-Blockchain-patents

[14] Finnie, P. (2019) Why China's impressive patent rates don't tell the whole story. NS Tech. -tech.newstatesman.com/guest-opinion/china-patent-rates

CHAPTER 2: ENTERPRISE

China's Enterprise Blockchain Policy

The private sector is quickly adopting the technology as the government hails it a pillar for growth

China's blockchain policy for enterprises is similar to that of the public sector: provide more efficiency and disintermediation. What's different about enterprise policy is the added element of competitiveness.

The domestic private blockchain industry is growing more mature by the year. According to industry tracker Blockdata[1], China leads the world in new blockchain projects initiated, with 263 projects in progress that form 25% of the global share as of late 2018.

This aligns with Beijing's goal to be a major power within the industry.

This momentum is seen in how quickly enterprises in China are adopting blockchain technology compared to their peers in the West. According to a 2018 Deloitte survey of enterprises[2], 49% of respondents in China said blockchain technology was already used in their organizations, compared to 14% in the U.S. Similarly, in Deloitte's 2019 survey, 73% of respondents in China view blockchain as a top-five strategic priority, compared to 56% in the U.S.[3]

Blockchain's primary use case is to maintain the integrity of data. In China, this is applied in many different ways. In the food industry, it's used to track food from farm-to-table, giving the consumer a glimpse of how the product reached store shelves — and what's been added along the way; in the automotive sector, it's used to verify data about mileage on used cars; for charities, donors can see exactly how every RMB is spent, from donation to execution; and within the medical field, it is used to secure patient data and track the supply chain of medicine. As this report details, blockchain's usage is becoming ubiquitous across all sectors of the economy.

[1] China Daily (2019). Nation Leads World in Blockchain Projects www.china.org.cn/business/2019-04/02/content_74636929.htm

[2] (2018) Breaking Blockchain Open: Deloitte's 2018 Blockchain Survey www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-2018-global-blockchain-survey-report.pdf

[3] (2019) Deloitte's 2019 Global Blockchain Survey www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-2018-global-blockchain-survey-report.pdf

Innovation

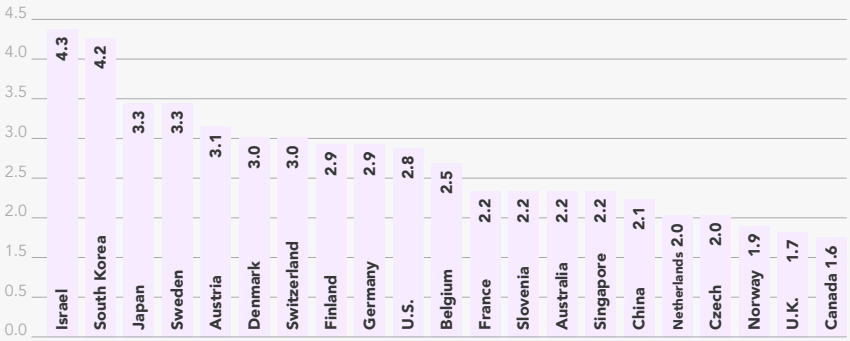
R&D Spending:

$451 billion

World Rank: 2

R&D Spending

(% of GDP; top 20 countries, 2015)



Sources: World Bank; UNESCO Institute of Statistics

Total E-Commerce Sales:

$740 billion

World Rank: 1

Global E-Commerce Growth

2018-2023 projected revenue

Country	2018	2023	5-year growth
China	$636.18	$1.086.18	**70.7%**
U.S.	$504.68	$735.48	**45.7%**
France	$49.48	$71.98	**45.6%**
Australia	$18.68	$26.98	**44.6%**
Russia	$17.28	$24.88	**44.2%**
Canada	$39.98	$55.48	**38.8%**
Germany	$70.38	$95.38	**35.6%**
U.K.	$86.58	$113.68	**31.3%**
Japan	$81.78	$103.68	**26.8%**
South Korea	$63.78	$80.28	**25.9%**

Internet Users:

802 million

World Rank: 1

Penetration Rate:

57.7%

Global Average:

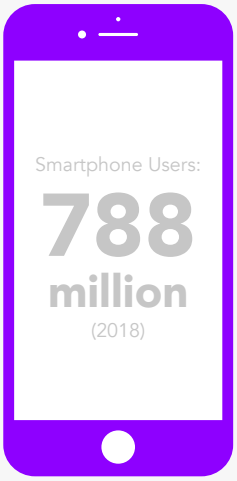
50.1%

Mobile Penetration Rate:

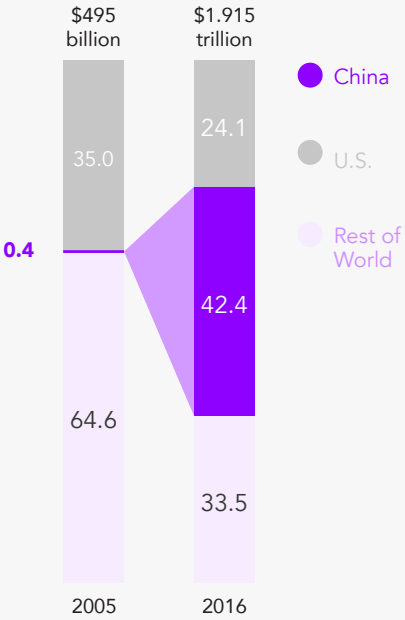
53%

Global Average:

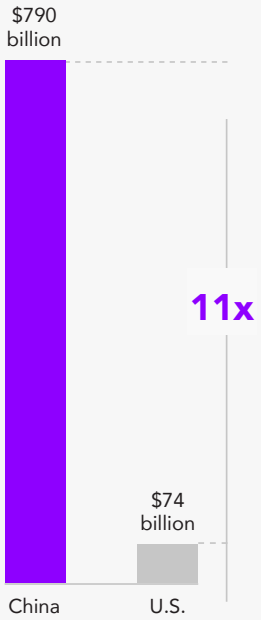
41.5%



Share of Retail E-Commerce Transaction Value



Mobile Payments
2016



INTERVIEW

Vitalik Buterin on Enterprise, Scaling and the Future of Blockchain in Asia

"People have been realizing that maybe using the existing public chains actually is the conservative thing. And, you know, it's been an interesting shift around that."

'People see the promise of blockchain, and they're excited': Ethereum creator discusses the tech's reawakening

Ethereum is no doubt one of the most important developments in blockchain aside from the Bitcoin white paper itself. Without Etherum, blockchain would unlikely be as integrated into the fabric of enterprise technology as it is today: There would be no Hyperledger, Postchain, Neo or Tron — and China wouldn't be the epicenter of blockchain development.

Ethereum creator Vitalik Buterin has been quite active in China, reportedly meeting with some of the biggest names in Chinese venture capital. Investors are bullish about the investment opportunities in the country, and capturing the value of this sentiment will be the topic of a future *Forkast.Insights* report.

Forkast.News spoke with Buterin in October in Hong Kong about excitement in China, public chains for enterprise and investor sentiment. Here is an excerpt of the interview, edited for clarity:

You were just in Shenzhen. What are the conversations you're having in China?

"Scaling is a problem we've been talking about for five years ... and a lot of the work is finally starting to come to fruition. For example, there is this platform called Optimistic Rollup. It's a scaling solution on Ethereum that's much simpler than Plasma or the Lightning Network or some of the other fancier things, but it gives you over 1,000 transactions a second and it's running now. On the technical side, there are a lot of things like that that are really starting to come out right now. On the business side, I think public chains are being perceived as much more legitimate than before, including in enterprise and everywhere.

"Looking at the kinds of applications that people are building, like Santander Bank launching bonds on the public Ethereum chain, and Ikea using some Ethereum blockchain-based token to pay for things — public chains in general have been going through a reawakening very recently.

"I think part of that is people see the promise of blockchain, and they are excited about it. At the beginning, people were more conservative and they said, 'We need semi-centralized permission chains.' But more recently, I'm seeing a lot of those projects not come to pass. And people have been realizing that maybe using the existing public chains actually is the conservative thing. And, you know, it's been an interesting shift around that."

How do you feel about the blockchain technology investment space in China?

"There's a lot of people who are interested in both cryptocurrencies and blockchain technology more generally. Asia is definitely a major hub of investment in blockchain projects of all kinds. And there are people in many places who are rapidly getting more money. From an investment standpoint, it's very significant and going to be even more significant.

"Also over the last couple of years, blockchain development here has been accelerating. About five years ago, there was very little — it was just miners and exchanges. But now, even here in Hong Kong, there are projects like Enuma, for example, which is doing layer-two scaling on top of Ethereum. There are projects doing things around hardware, security, centralized exchanges. So there are more and more things happening."

Watch the exclusive interview with on Forkast.News:

Photo credit: Unsplash

TELECOM

The Mobile Race To Blockchain

Telecom operators are embracing the tech for better roaming, ID verification and fraud detection

Three years ago, blockchain was something telecom companies didn't understand and had little interest in implementing. Fast forward to the Mobile World Congress in Shanghai in June 2019, and blockchain has become one of the hottest topics among telecom operators.[1]

There's a world of potential for the telecom industry to benefit from blockchain technology: It could reduce fraud, verify identities across different phone numbers, reduce costs and increase efficiency in handling roaming, billing, payments and data.[2]

Among the numerous use cases for blockchain in the telecom sector, these are by far the most notable practicable applications:

1. Digital identity management
2. More efficient roaming
3. Combating fraud

However, arguably the largest reason for jumping on this trend is to ensure that telecoms don't miss out on the monetization opportunities for this next-generation mobile internet like they did with the rise of the World Wide Web. While telecoms lament being relegated to the status of being a "dumb pipe" for the non-mobile internet, merely delivering over-the-top (OTT) content, through technology such as blockchain and IoT there are many more emerging monetization opportunities on the mobile web that giving the companies the flexibility to expand into new sectors. Effectively, telecoms will be able to serve as a platform to allow new enterprise-scale businesses to develop, using it as a base. Although blockchain technology has the potential to significantly combat fraud, P2P banking services will also be a big beneficiary of the technology, allowing an expansion of the market.

Identity Management

Blockchain's ultimate strength is the ability to assign a digital token or cryptographic hash to a customer to verify, with certainty, who they are and what they are doing on a network. Once this is determined, new doors are opened for things such as increasing efficiency in the roaming market and combating fraud. China Mobile, China Unicom and China Telecom have engaged in a pilot project to share data on

[1] WATCH: Why Blockchain is the Hot Topic at Asia's Leading Event for Next-Gen Technology (2019). Forkast.News. forkast.news/2019/07/23/watch-why-blockchain-is-the-hot-topic-at-asias-leading-event-for-next-gen-technology

[2] Michels, Dave. (2018) Blockchain and Telecoms. InterMEDIA. Vol 46. Issue 4. Pp 22-26. www.iicom.org/images/iic/intermedia/jan-2019/im2019-v46-i4-blockchain.pdf

the blockchain regarding Know-Your-Customer (KYC) procedures. This will allow customers to port their data between networks with ease and help the companies identify fraud in its early stages. As eSIMs grow in popularity and their physical counterparts are phased out, this technology will also allow for customers to easily share and manage their account over a variety of devices. For China Telecom, this also plays into its blockchain SIM project.

Efficiency in the Roaming Market

As people are traveling more than ever, roaming is an important must-have service for any telecom so their customers can stay connected. Telecoms can provide this service through their plethora of contracts with partner telecoms that allow their customers to connect to each other's networks.

But this leads to procedural overhead in maintaining these contracts and reconciliation to ensure that the partner telecom gets paid and the customer gets billed.

With blockchain, smart contracts will enable the telecoms to trigger the roaming agreements between subscribers whenever they switch networks. Additionally, it can help with transparency by tracking the transactions every subscriber makes. Further, payment between the two telecoms happens automatically as the service is used, reducing the need for reconciliation via settlement companies.

In 2018, China Mobile announced a pilot with Japanese telecom NTT DoCoMo and Korean telecom KT Corporation to automate international data roaming operations. Through smart contracts on the blockchain, the three companies calculate the payments owed in real time, rather than waiting for data to be confirmed by clearing companies.[3]

Fraud Management

Telecom fraud is on the rise in China[4], costing the public millions of RMB a year in losses. Telecom companies also lose out as these criminals engage in fraudulent billing practices to cover their tracks. To counter this, China Telecom is implementing blockchain solutions onto its network to assist with identifying fraudulent activity and blacklisting bad actors.[5]

Generally, telecom fraud in China involves the criminal spoofing the caller ID to make it look like the call is coming from a trusted source, such as a bank, government office or relative. They request money and cover their tracks by impersonating a third party on the network, sending the charges for the calls to their account.

Blockchain can combat this by assigning a token or cryptographic hash to every subscriber's Mobile Station International Subscriber Directory Number (MSISDN). The MSISDN is the unique number — separate from a phone number — that identifies the subscriber's account for billing purposes. When the fraudulent call goes through the authentication phase, the user is easily identified and flagged, as the token or hash doesn't match the one assigned to the user on the blockchain. Furthermore, phones that are found to frequently engage in fraud can have their International Mobile Equipment Identity (IMEI) number blacklisted on the blockchain.

Blockchain SIM Cards 'Key To The Decentralized World'

China Telecom, one of China's largest state-owned telecom providers, is looking to integrate blockchain into its network — and apply all the above-mentioned use cases — with its blockchain SIM card.

Director of China Telecom David Wei Liang, in an interview with Forkast. News, said the blockchain SIM card is a "key to the decentralized world." Liang added, "The key point here is to transform the digital economy from a data monarchy to a data democracy. That is to say, to give the right of the data to the data producer themselves." More than a medium that will allow cryptocurrency trading, the blockchain SIM is a means to make available to the masses the capability of managing data, data transparency and authentication, enabling a network of digital value transmission.[6]

The blockchain SIM card may become available in China in 2020 according to Liang. Should the project push through, China

There are many more emerging monetization opportunities on the mobile web, giving telcos the flexibility to expand into new sectors. Effectively, telecoms will have the ability to serve as a platform to allow new enterprise-scale businesses to develop, using it as a base.

[3] Zhao, Wolfie (2018) South Korean Telecoms Giant KT Has Built Its Own Blockchain. CoinDesk www.coindesk.com/south-korean-telecoms-giant-kt-has-built-its-own-blockchain

[4] Yan, Zhang (2018) Telecom fraud fight to intensify www.chinadaily.com.cn/a/201807/11/WS5b454e7fa3103349141e2019.html

[5] China Telecom 5G Blockchain Whitepaper (2019)

[6] Underwood, S. (2016). Blockchain beyond bitcoin. Communications of the ACM, 59(11), 15–17.

Telecom, which has tens of millions of users as the country's second-largest mobile operator, will establish one of the world's largest blockchain ecosystems.[7]

For China Telecom director David Wei Liang, blockchain will provide the new telecom paradigm for the Internet of Value — a more efficient and more secure way of exchanging any asset of value (i.e., money, stocks, votes, intellectual property, etc.) with another over the internet.

While blockchain proves to be an efficient method of doing away with the slow, expensive traditional processes and transactions, adoption across industries has lagged due to issues in its interoperability, scalability and usability.[8] Innovations like China Telecom's blockchain SIM card may prove to be the solution to these issues. As per Liang, China Telecom will design the blockchain SIM card to be a versatile key that can interact with various blockchains, and compatible with different platforms and protocols, overcoming the barriers relating to interoperability, scalability and usability that are hampering blockchain's implementation on a global scale. [9]

For consumers, there wouldn't be much of a change from their current roaming experience as the technology's strength would lie in the back end. Already, the roaming experience for the consumer is seamless: When landing in a foreign country, their phone switches over to the new network in a matter of moments. The beauty is not what's seen, but rather what's behind the scenes: Automated auctions via smart contracts are run in order to get the best deal for the telecom, while the user's identity is authenticated via a token on the blockchain to prevent fraud. It wouldn't matter if the different telecoms used competing blockchains, as China Telecom's cross-chain solution would authenticate the user and begin the process regardless.

The emergence of innovations such as the Internet of Things (IoT) and the development of 5G technology will pave the way to smarter homes, cities and nations. However, this will require an expensive and robust communication infrastructure, through wired or wireless channels, to transmit data. This is an opportunity for telecom operators to use blockchain as a lower-cost alternative instead of a centralized database in their communication infrastructure to reduce administrative and maintenance expenses.

Given blockchain's nature as an open ledger and payment mechanism, P2P mobile payments is a use case where the technology would shine, particularly in emerging markets where many rely on mobile payments instead of a formal bank account. As Ling Wu, chair of the Carrier Blockchain Study Group, explained to Forkast.News in a July 2019 interview, his firm completed a successful pilot the prior January with three telecoms in Asia. P2P mobile payments rely on a centralized clearing house whereas this system is decentralized. Trust between telecoms is built into this[10].

Moreover, the increasing speed of communication through 5G technology and integration of virtually all devices will require a more secure protocol to which blockchain technology may be applied.

Blockchain has a broad scope of applications, and is a fast-moving and versatile technology. This requires industries to keep abreast of the latest advances in the development and deployment of blockchain. Through the right strategy, partnerships and capabilities for their selected blockchain value proposition, telecom operators can position themselves as enablers of their region's digital ecosystem.

More than a medium that will allow cryptocurrency trading, the blockchain SIM is a means to make available to the masses the capability of managing data, data transparency and authentication, enabling a network of digital value transmission.[6]

[7] WATCH: China Telecom Introduces its Blockchain SIM Card Project. (2019). Forkast.News. forkast.news/2019/09/20/watch-china-telecom-introduces-its-blockchain-sim-card-project

[8] Beck, R., Avital, M., Rossi, M., & Thatcher, J. B. (2017). Blockchain technology in business and information systems research. Business & Information Systems Engineering, 59(6), pp 381–384.

[9] Aggarwal, Shubhani. (2019) Blockchain for smart communities: Applications, challenges and opportunities. Journal of Network and Computer Applications. Vol 144. Pp 13-48. www.elsevier.com/locate/jnca

[10] Forkast News (2019) Why Blockchain is the Hot Topic at Asia's Leading Event for Next-Gen Technology forkast.news/2019/07/23/watch-why-blockchain-is-the-hot-topic-at-asias-leading-event-for-next-gen-technology

Photo credit: Unsplash

FOOD

Can Blockchain Guarantee Food Safety In China?

Public trust is difficult to regain, but the government hopes tech will guarantee food quality

Having a high standard in food safety and security demands that the food is of good quality, free from disease or infection, and safe for consumption. Keeping up with this standard is a matter of international concern and the responsibility of food producers and governments. A significant part of upholding the standard in food safety lies in the management of its supply chain, not only to deliver food efficiently but also to preserve quality and safety.

In China, a top-five global exporter[1] and the second-largest importer of food,[2] the food industry is expected to implement the latest technology to ensure logistics efficiency and maintain product quality and safety. However, food safety is a recurring issue. Food scares appear almost regularly in the news, including reports of contaminated vegetables, expired meat, tainted baby formula, plastic rice and synthetic meat products.[3]

Despite the government's much-publicized regulatory efforts to prevent food hazards,[4] consumer confidence has been difficult to regain. This is evident with last year's Global Food Security Index, which ranked China No. 37 out of 113 countries in food quality and safety.

The Central Committee of the Communist Party of China and the State Council published "Opinions on Deepening Reform and Strengthening Food Safety Work" to set new guidelines on food safety standards. Key to the reform are the "Four Acts of Strictness" in ensuring food safety, which include setting rigorous standards, implementing strict supervision, applying severe sanctions and adhering to strict accountability measures.

[1] Which Countries Export The Most Food? World Atlas. www.worldatlas.com/articles/the-american-food-giant-the-largest-exporter-of-food-in-the-world.html

[2] IESE Business School. The U.S., China and Germany Named World's Most Attractive Food Export Markets. Forbes.com. www.forbes.com/sites/iese/2019/04/08/the-u-s-china-and-germany-named-worlds-most-attractive-food-export-markets/#3d47fd07307b

[3] China Issues New Guidelines on Food Safety Standards. S.J. Grand. May 29, 2019. www.sjgrand.cn/china-issues-new-food-safety-guidelines

[4] Zhang, Z. et al. (2018) Transformation of China's food safety standard setting system – Review of 50 years of change, opportunities and challenges ahead. Food Control. Vol 93. November 2018. Pp 106-111. doi.org/10.1016/j.foodcont.2018.05.047

To regain consumer trust and confidence, the Chinese government launched a reward system to encourage whistleblowers to expose food and drug safety problems. Furthermore, in May 2019, the Central Committee of the Communist Party of China and the State Council published "Opinions on Deepening Reform and Strengthening Food Safety Work" to set new guidelines on food safety standards.

Key to the reform are the "Four Acts of Strictness" in ensuring food safety, which include setting rigorous standards, implementing strict supervision, applying severe sanctions and adhering to strict accountability measures. The reform also calls for eliminating toxic pesticides in the next five years, upgrading the quality of formula milk, improving sanitary conditions in schools and canteens, establishing a standardized food distribution and supply system, using environmentally friendly packaging and increasing the threshold of quality and safety tests to 97% by 2020.[5]

Blockchain alone is not a one-stop solution to solve food safety issues overnight. But with the integration of IoT and other technologies, and consultation and collaboration with experts and service providers, blockchain is poised to offer solutions that could finally win back the trust and confidence of Chinese consumers.

Collaborative Solutions

Food safety is a continued concern for China, and blockchain technology has been proposed as a solution for tracking food from the farm to the kitchen table. In 2016, IBM and Walmart China, in collaboration with Tsinghua University, tested blockchain technology as a way to rapidly track the origin of pork, simulating the need to trace food back to its source in the event of food poisoning or outbreak of a communicable disease.[6]

The system was able to trace the pork served in a meal at a restaurant back through its entire supply chain to the farm in a matter of minutes.

In December 2017, IBM, JD.com, Walmart China and Tsinghua set up the first Blockchain Food Safety Alliance. The alliance relies on IBM's blockchain platform, which serves as a distributed ledger to provide an audit trail of data on the supply chain of food products. Information on the platform can be retrieved at various phases of the supply chain and shared with the parties involved to help them determine the safety of the food products.[7]

In an attempt to regain consumer confidence in food safety and quality management, Walmart China announced its partnership with PricewaterhouseCoopers (PwC) and VeChain in June 2019 to create the Walmart China Blockchain Traceability Platform. The platform is built on the public VeChain, a blockchain-as-a-service solution with integrated Internet of Things (IoT) and RFID-tracking technology. The platform is offered as a service for all the parties in the supply chain, including allowing consumers to use their mobile devices to scan the products and obtain supply chain and inspection reports prior to purchasing them from Walmart stores.[8]

Other companies have also begun to use QR codes to improve food safety in small-scale initiatives.[9]

While there is always the possibility of falsified records being injected into the network, fraudulent transactions will most likely be rejected by other parties on the network given the nature of blockchain technology's distributed network.[10] Hence, the proper selection of parties within the network coupled with regulation will be essential to the proper implementation of the technology.

In an interview with Forkast.News, VeChain COO Kevin Feng puts this in context: "Blockchain is a trust machine, or a protocol that's lowered the cost of collaboration."

With regard to the challenge of digitizing products, Feng explained that each product needs a corresponding unique, digital identity on the blockchain. To physically attach this identity to the product requires IoT, such as NFC or RFID chips. QR codes are the most cost-efficient for low-cost products.

[5] China Health Food Regulations in Present and Future. CIRS. June 20, 2018. www.cirs-reach.com/news-and-articles/China-Health-Food-Regulations-in-Present-and-Future.html

[6] Allison, I. (2019) World's Second-Largest Grocer Joins IBM Food Trust Blockchain. CoinDesk. www.coindesk.com/worlds-second-largest-grocer-joins-ibm-food-trust-Blockchain

[7] The Blockchain Food Safety Alliance. BitRates. www.bitrates.com/guides/platforms-and-projects/the-Blockchain-food-safety-alliance

[8] Jakobson, L. (2019) Walmart China turns to Blockchain to reassure consumers wary of food safety. Modern Consensus. modernconsensus.com/technology/walmart-china-turns-to-Blockchain-to-assure-consumers-wary-of-food-safety

[9] The Blockchain Food Safety Alliance. BitRates. www.bitrates.com/guides/platforms-and-projects/the-Blockchain-food-safety-alliance

[10] 12 Myths about Blockchain Technology. DataFloq. datafloq.com/read/12-myths-about-Blockchain-technology/3522

Blockchain's Potential For The Future Of Food

Blockchain experts' sentiments and concerns over the technology's limitations are based on the fact it is still a developing technology, with its full potential yet to be demonstrated. However, through its continuous development and the support it has received from both private and public entities in China, as well as its integration with other technologies such as AI and IoT, it has the potential to become a truly cost-efficient and effective technology in the years to come. Public blockchain platforms like VeChain are testament to this technology's rapid improvement.

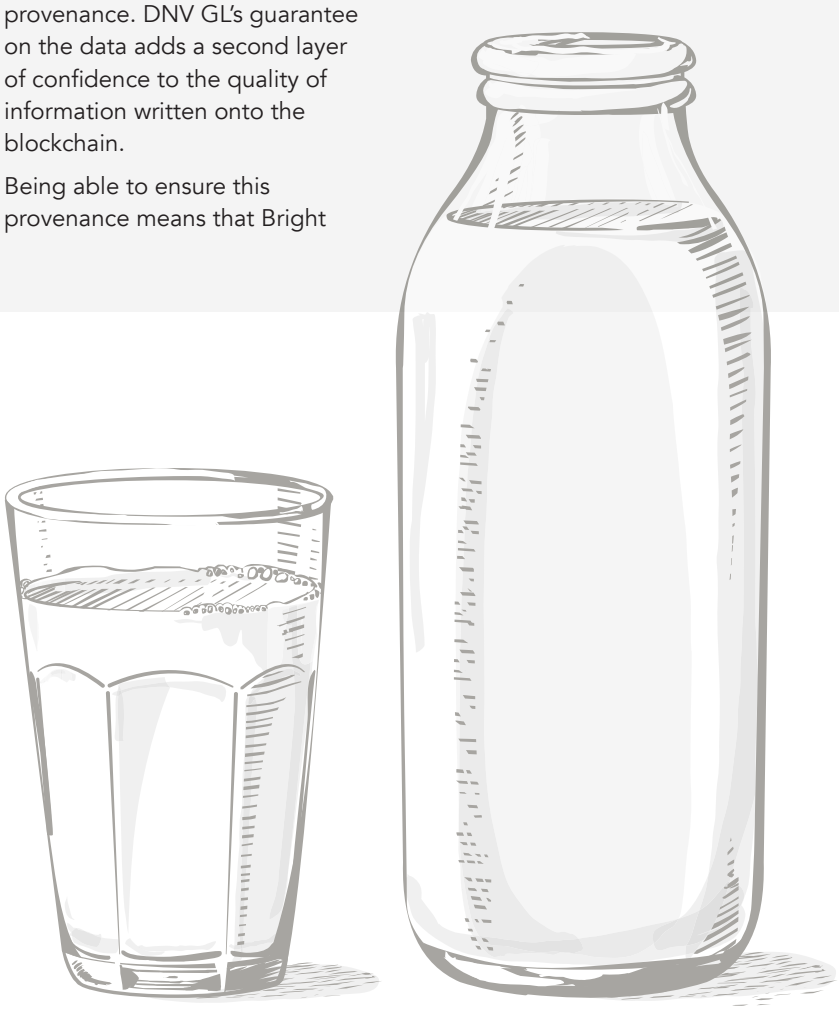
Blockchain alone is not a one-stop solution to solve food safety issues overnight. As Feng said, blockchain is still just a tool. But with the integration of IoT and other technologies, and consultation and collaboration with experts and service providers, blockchain is poised to offer solutions that could finally win back the trust and confidence of Chinese consumers.

Case Study: Bright Food's Cupids Farm Milk

A prominent use case of VeChain's technology is Shanghai-based food producer Bright Food. To build consumer confidence in the quality of its Cupids Farm milk, Bright Food has implemented a system powered by the VeChainThor blockchain to allow consumers to track the product from farm-to-table.

Throughout the entire supply chain of Bright Food's milk products, key data is measured via IoT-enabled sensors and certified by DNV GL — an international accreditation and registrar body. This data stream starts with data points about bovine health at the farm, and continues throughout the supply chain, tracking any additives injected into the milk as well as data on storage temperature and names of the distribution companies used. Affixed to each bottle of milk is a QR code allowing consumers — or local officials — to trace the product's provenance. DNV GL's guarantee on the data adds a second layer of confidence to the quality of information written onto the blockchain.

Being able to ensure this provenance means that Bright Food enjoys a premium price point: Chinese consumers are willing to pay an even higher sticker price than imported dairy products from Japan, highly regarded by Chinese consumers for their quality.



AUTOS

Used-Car Market Revs Into Blockchain Solutions

Amid a lack of trust in used-car deals, blockchain verification promises ripe market opportunities

Around the world, the used-car industry is notorious for being one of low trust and high incidences of fraud. That also makes it an industry ripe for innovation as it has not adopted effective enough technology to prevent fraud and contain costs.

Within China, a market is emerging for used cars. While customers historically have preferred to buy new cars given the lack of trust in the used-car market, the market for the latter is expanding in line with global trends. China's used-car market grew by 11.5% year-on-year to 13.8 million units sold in 2018 as the number of new cars sold in the country declined by 3.5% to 27.8 million in a slowing economy.

The growing used-car market presents new opportunities for auto vendors. But there is still the problem of trust, which makes it an ideal use case for blockchain acting as an honest ledger of car maintenance history. Without this source of truthful information, navigating the used-car market can be difficult.

There are several ways blockchain can be deployed in the used-car industry, including:

- Accurate determination of vehicles' resale value
- Determination of spare parts' authenticity
- Accurate and cost-efficient insurance-claim management
- Optimizing insurance operations
- Compliance monitoring with business partners
- Payment and enforcement of contractual relations with partners, stakeholders and customers
- Inventory management and forecasting
- Sustainable manufacturing and cleaner production

Blockchain is a transparent and secure technology capable of preserving the integrity of data, which addresses the common issue of inaccurate or missing information plaguing the automotive industry and adding to its costs. An estimated 30% of total warranty costs can be eliminated through the integration of blockchain in the management of warranties, according to a study by McKinsey & Company. Costs can be

reduced even further through using blockchain in operations.[1]

In China, Beijing Mercedes-Benz Sales Service Co. (BMBS) working on a blockchain pilot platform to accurately track used-car value.[2] The platform developed by PlatON can send a vehicle's data real-time to determine its history and real value to increase buyer confidence. This would create an authoritative directory of pricing that can be used by the buyer and seller to guide discussions, similar to the Kelley Blue Book.

In an interview with Forkast.News, PlatON's Chief Strategy Officer Ada Xiao explained the benefits of integrating blockchain: "We can trust the algorithm. We can have [a] perfect algorithm you can use — you can basically trust the machine that there will be correct input data."[3]

Tracking Vehicle Usage and Engine Health

The Internet of Things is one new key technology being implemented by Mercedes-Benz[5], and the PlatON pilot builds upon this by adding a blockchain layer. This technology complements blockchain by acting as a "black box" for the car; data from the car's sensors is recorded by the IoT device and written to the blockchain. The dark art of moving back a car's odometer and passing the vehicle off as lightly used versus heavily driven would be impossible as it would conflict with the car's blockchain data.

Further, adding an IoT layer to a vehicle would assist in monitoring the vehicle's engine health as well as emissions.

A More Efficient, Transparent Supply Chain

PlatON is just one notable case of an enterprise in China's automotive sector integrating blockchain to improve efficiency.

China Capital Logistics Co. Ltd. (CCL), one of the country's largest automotive logistics companies, teamed up with DBS Bank and Wanxiang Blockchain in 2018 to set up a platform that connects car manufacturers, exporters, logistics and dealers to improve efficiency and transparency in CCL's supply chain and to facilitate financing from DBS.[6][7]

Increasing Consumer Confidence and Product Value

China's automotive industry — the world's largest — is starting to address the weaknesses in the traditional business model of used-car dealerships by building greater confidence in their products. It is embracing innovative technology like blockchain to facilitate efficient, cost-effective business solutions.

The automotive industry is complex and involves multiple and connected transactions, so it is ideal to have an immutable database to record these transactions while allowing information to be shared and updated in a secure manner. This is achievable through blockchain's distributed ledger.

By using this technology to build up confidence in its products, the automotive industry will also

An estimated 30% of total warranty costs can be eliminated through the integration of blockchain in the management of warranties. Costs can be reduced even further through using blockchain in operations

Aside from increasing customer trust, the information generated by the platform can also be used to prevent fraud in warranty and insurance claims.

If the BMBS blockchain adaptation pushes through, the company will be one of many in China that is engaging in enterprise-level blockchain projects. According to research by Blockdata, there are 263 active enterprise-level blockchain projects in China, which make up about 25% of all such projects worldwide.[4]

If a vehicle is not regularly maintained, its tailpipe emissions would grow more toxic over time. Furthermore, lack of regular maintenance can damage the engine and other components within the vehicle and degrade its resale value. The IoT layer would alert the user to a vehicle's deteriorating engine health and note it on the blockchain so future prospective buyers have an accurate picture of what they are getting.

[1] McKinsey & Company (2016) Blockchain in Insurance – Opportunity or Threat?

[2] Chitkara, Hirsh (2019) Daimler will use a Blockchain platform to track the value of used cars in real time. Business Insider. www.businessinsider.com/daimler-to-use-blockchain-platform-for-valuing-used-cars-2019-9

[3] Ada Xiao, Forkast News interview 2019

[4] www.blockdata.tech/data

[5] Mercedes Benz www.mercedes-benz.com/en/next/connectivity

[6] DBS partners China Capital Logistic and Wanxiang to launch an end-to-end Blockchain trade platform for the automotive industry. (2018) DBS. www.dbs.com/newsroom/DBS_partners_China_Capital_Logistic_and_Wanxiang_to_launch_an_end_to_end_Blockchain_trade_platform_for_the_automotive_industry

[7] DBS Bank Launches Blockchain Platform for Automotive Logistics. (2018) Finews.asia. www.finews.asia/finance/27962-dbs-bank-Blockchain-platform-automotive-logistics

improve the efficiency of the car market at large. If people know there is an active market for used cars and vehicles maintain value longer, they'll feel more comfortable purchasing a preowned car as it can be quickly resold in a trusted market.

Implemented alone, blockchain already has many practical uses for improving efficiency and lowering costs. However, the industry can reap even greater benefits by integrating blockchain with other technologies such as artificial intelligence, IoT and big data.

With the rapid advances in blockchain technology, the automotive industry's current challenges and issues may well be solved by blockchain's implementation. It is expected that blockchain will be fully adopted across the automotive industry globally within five years.[8]

China's automotive industry — the world's largest — is starting to address the weaknesses in the traditional business model of used-car dealerships by building greater confidence in their products.

[8] Accelerating technology disruption in the automotive market. Deloitte. www2.deloitte.com/content/dam/Deloitte/cn/Documents/consumer-business/deloitte-cn-consumer-blockchain-in-the-automotive-industry-en-180809.pdf

Photo credit: Unsplash

HEALTH CARE

Web Giants Push to Disrupt Medical Sector

Regional health care initiatives roll out seamless, cost-efficient blockchain integrations to improve access and security

China hopes to provide affordable basic health care to all its citizens by 2020. It is a grand ambition. But now that the private sector has joined public initiatives, the country is starting to see medical care efficiencies thanks to blockchain implementation. Chinese web giants Baidu, Alibaba and Tencent have been working separately for the last two years on blockchain-based solutions to boost the efficiency of the country's medical infrastructure while keeping patients' data secure.

Baidu, China's biggest search engine provider, launched a blockchain medical solution in September 2019 to securely distribute and share medical data. The open-source platform, called XuperChain, aims to store health records, diagnoses, treatments and prescriptions. Once fully functional, XuperChain will not only serve as a place to store medical data but also facilitate the processing of insurance claims when it moves from a small regional pilot to a nationwide rollout. The blockchain solution, initially launched in Chongqing's Yuzhong District in collaboration with the local government, is set to roll out nationwide over the next few years.[1]

Alibaba was the first in China to launch a medical application of blockchain in 2017.[2] The e-commerce giant formed its own online health service, Alibaba Health Information Technology Ltd., in conjunction with Alipay.[3] The solution is offered as part of Alibaba's cloud software stack.[4] In 2018, the company partnered with Changzou City's local government to improve healthcare services and establish a trusted environment for medical transactions. Zhang Zhinhong, director of the Zhenglu Town Health Center in Changzou, said Ali Health's blockchain technology "connects information by using our current equipment and systems." In other words, integrating blockchain with the health center's existing operations should be seamless and cost efficient.

Tencent is collaborating with Waterdrop, a crowdfunded health insurance firm, to develop a medical

[1] China's Baidu launches health Blockchain. Ledger Insights. https://www.ledgerinsights.com/health-blockchain-baidu-medical/

[2] Suberg, W. (2017) Alibaba Deploys Blockchain to Secure Health Data in Chinese First. Cointelegraph. cointelegraph.com/news/alibaba-deploys-Blockchain-to-secure-health-data-in-chinese-first

[3] BRIEF-Alibaba Health Information Technology partners with Alipay. Reuters. (2017) www.reuters.com/article/brief-alibaba-health-information-technol/brief-alibaba-health-information-technology-partners-with-alipay-idUSFWN1M10LD

[4] Alibaba Cloud. www.alibabacloud.com/about?spm=a3c0i.8119595.1097638.dnavwhya2.4f60411dISOB9X

and insurance solution leveraging blockchain technology.[5] Tencent plans to integrate the solution into its WeChat messenger, which means more than 1 billion Chinese users who actively use the platform each month can access medical bills efficiently and securely. The solution will also benefit medical institutions and insurance firms by facilitating an efficient billing system as well as a platform for secure, auditable storage of medical information to prevent claims from fraudulent invoices.[6]

Baidu, Alibaba and Tencent have been working separately for the last two years on blockchain-based solutions to boost the efficiency of the country's healthcare infrastructure while keeping patients' data secure.

Applications Aim To Improve Access, Efficiency

Blockchain offerings from the three Chinese web giants address the different pain points in the domestic medical sector, namely around medical service access and efficiency. These solutions are gradually being applied in different provinces around the country.

To illustrate, Huadu District People's Hospital has opened the first in-house blockchain electronic bill in Guangdong Province. This resulted in more convenient health care service and a cost-effective medical insurance reimbursement process. While reading an electronic bill on his phone, a patient surnamed Wang at Huadu District People's Hospital in Guangzhou said, "I don't have to worry about losing the invoice in the future. Now I can use the mobile phone to scan a QR code to open an electronic invoice, and the reimbursement is more convenient!"

Moreover, there are simple but surprising uses of blockchain that revealed healthcare and pharmaceutical fraud.

A 2018 news article about Chuangchun Changsheng, the largest vaccine producer in China, revealed how it profited from selling defective products. However, the original article and reposted articles containing the same revelation later disappeared from the internet, hinting at a cover-up. But the information was later posted to the Ethereum blockchain, which made it public and virtually impossible to delete. [7]

Aside from promoting efficiency in medical services, blockchain is also being used to enhance drug safety by preserving the integrity of products within the drug supply chain, making the information public, accessible and secure.[8] IBM and

Chinese supply chain management firm Hejia did just that when they launched the Yijian Blockchain Technology Application System in 2017.[9] Aside from enabling drug tracking and transparency, it also was a cost-efficient solution to the previously paper-intensive process.

A New Model For Handling Medical Data

Consulting giant Deloitte says blockchain technology can provide a new model for health information exchanges (HIE) by making the creation and access of medical records more efficient and secure. "A blockchain-powered health information exchange could unlock the true value of interoperability while reducing or eliminating the friction and costs of current intermediaries." [10]

PwC, another global consulting firm, said, "Not all companies will benefit. Companies that are slow to change may lose out to ones that use the technology to cut costs and increase efficiencies." [11]

As companies worldwide come up with blockchain-powered innovations for the medical sector, the challenge now for China is to set the global standard for transparent, high-quality, affordable health care.

China's healthcare sector has many challenges that blockchain alone cannot solve, such as inconsistent quality, unequal access, overcrowding and an aging population that will strain the system down the road. There are also a number of privacy concerns

[5] Suberg, W. (2019) China's Tencent to Develop Blockchain Medical Tools With Waterdrop After Investment. Cointelegraph. cointelegraph.com/news/chinas-tencent-to-develop-Blockchain-medical-tools-with-waterdrop-after-investment

[6] Wood, M. (2019) Chinese hospital adopts Blockchain for medical bills. Ledger Insights. www.ledgerinsights.com/chinese-hospital-Blockchain-medical-bills

[7] Lee, E. (2018) Chinese bet on Blockchain to counter vaccine scandal cover-up. Technode. technode.com/2018/07/23/vaccine-scandal-Blockchain

[8] Lee, A. (2018) Could Blockchain solve China's food and drug safety problems? South China Morning Post. https://www.scmp.com/business/china-business/article/2156722/could-blockchain-solve-chinas-food-and-drug-safety-problems

[9] Das, S. (2017) IBM Launches Blockchain Supply Chain for Chinese Pharma Retail. CCN. www.ccn.com/ibm-launches-Blockchain-supply-chain-chinese-pharma-retail/

[10] Deloitte (2016) Blockchain: Opportunities for Health Care

[11] Blockchain Beyond Finance: A look at the technology's implementation in healthcare. The News Asia. (2019). thenews.asia/Blockchain-beyond-finance-a-look-at-technologys-implementation-in-healthcare-1066/

over the treatment of patient data. While China has strong laws on the protection of healthcare data[12], concerns about mashing medical data with the troves of data China's tech giants have on their users has shaken the public's confidence and made data sanitation a critical issue[13]. Applying a blockchain layer to healthcare data management in China — at a scale only China can pull off — would be an impressive feat. But the country would need to solve many other serious problems lingering in the sector before its healthcare industry would be regarded at G7 standards.

[12] Sun, C; Chen, J; McDermott Will & Emery Law Firm; (2019) Health Care Data Compliance in China: FAQ. National Law Review. www.natlawreview.com/article/health-care-data-compliance-china-faq

[13] Cheng, E (2019) Data privacy issues may be capturing more attention in China. CNBC. www.cnbc.com/2018/12/05/data-privacy-issues-may-be-capturing-more-attention-in-china.html

Can Blockchain Mobilize And Secure Sensitive Health Data?

The most important part of the healthcare sector is data. To create a treatment plan for a condition, health care practitioners must have pertinent data points such as the patient's history, medications and allergies. A patient may not be able to remember all of this information, or they might be incapacitated, so it is important to store the data where the treatment team can retrieve it.

In parallel is the issue of drug traceability; drugs have a complex supply chain, and along with a treatment history, there needs to be a record of where each drug was sourced.

However, two problems emerge: centralization and data security. People are mobile by nature, so the data must be accessible wherever they are. Secondly, given the sensitive nature of this data, it must encrypted and secured. These challenges play to two of blockchain technology's key strengths: interoperability and security.

Photo credit: Unsplash

Solving Health Care's Pain Points

The healthcare system is becoming more patient-centric, with a focus on making services more affordable and accessible. However, delivering and maintaining high-quality medical services also requires compliance to lengthy regulatory processes and requirements. The integration of blockchain can not only provide efficient and secure storage of medical information, but also address the pains of the regulatory process by providing a transparent, simplified compliance system that is secure and conveniently accessible to regulators and stakeholders.

Furthermore, blockchain implementation can allow the entire medical supply chain — consisting of pharmaceutical manufacturers, packagers, distributors, wholesalers, dispensers and regulators — to seamlessly, securely share information in real time. Each stakeholder in the supply chain will be in control of one or several nodes. Each time a transaction is entered within the supply chain network, the same data is recorded and validated by each node in the blockchain. The result is a simplified method of transferring data and allowing product recipients to validate its genuineness and quality with greater certainty, as well as more efficient transaction reconciliation.

Blockchain also significantly improves the precision of data from clinical trials. Clinical trials produce huge volumes of information related to safety and quality reports, statistics, blood tests, surveys and medical imagery that involve several stakeholders, which makes information tracking and control difficult and susceptible to mistakes and fraud. With blockchain, the authenticity of information can be maintained and verified by the majority of nodes within the clinical trial blockchain network. It will also make it difficult for existing information to be modified without changing the records of the majority of computers on the network.

Tencent is collaborating with Waterdrop, a crowdfunded health insurance firm, to develop a medical and insurance solution leveraging blockchain technology. Tencent plans to integrate the solution into its WeChat messenger, which means more than 1 billion Chinese users who actively use the platform each month can access medical bills efficiently and securely.

Photo credit: Unsplash

PHILANTHROPY

Tech Is Making Charities More Transparent

China hopes to build trust in philanthropic agencies by enforcing transparency and accountability

The modern convenience of Alibaba enables rapid, on-demand consumerism that's worth tens of billions of dollars. Virtually any material good can be ordered by mobile phone in minutes, with the payment deducted in a frictionless manner from the customer's account. Alibaba's value doesn't come from the warehouses of goods in its possession, but rather the software layer that powers it all. So what if Alibaba — and its competitors — turned the technological might that it used to develop modern Chinese consumerism over to developing modern Chinese charity?

A charity's success is largely based on its transparency, accountability and availability to receive donations. Charitable institutions worldwide are no stranger to scandals, and potential donors are ever more skeptical about where their donations are ending up. The use of blockchain technology to facilitate the receipt and tracking of charitable contributions is emerging as a solution to this trust issue.[1]

For the charity and philanthropic sector, blockchain presents two primary opportunities:

1. Increased transparency of how donations are used
2. New donation channels through cryptocurrency payments

In China, blockchain's use case in the charity and philanthropic sector is almost entirely focused on the former.

Transaction Transparency

According to the CAF World Giving Index 2018, China has the third-largest number of donors in the world. The increasing number of charity organizations and volunteers has also attracted donations from wealthy individuals and corporations thanks to tax incentives.

Pushing donation tracking to the blockchain would also help charities save on overhead. Hiring a reputable accounting firm to do an annual audit is an expensive endeavor. By having all of this data already on the blockchain, the auditor's role would be greatly reduced to a mere formality for legal reasons.

The Chinese government, through the Ministry of Civil Affairs, has also

[1] Koksal, Ilker. (2019) How Blockchain Technology Can Re-invent Charity. Forbes. www.forbes.com/sites/ilkerkoksal/2019/07/12/how-blockchain-technology-can-re-invent-charity

The use of blockchain in philanthropy has created a community-based model of charity that encourages participation from social organizations, businesses and the government to collaborate in improving social welfare.

shown its support of the adoption of blockchain technology within the philanthropic sector to boost the public's confidence. According to its white paper published in September 2018, the ministry plans to "build a tamper-proof charity organization information query system and enhance the authority, transparency and public trust of information publishing and search services."

This is largely in response to public outcry over allegations that the Red Cross extensively misused funds in its response to the Sichuan earthquakes in 2008 and 2013[2]. The ministry's action plan for 2018–2022 aims to use blockchain and other technology to improve transparency of social services and tracking of donations for charity. [3]

A health care donation platform called Qingsongchou, for example, is using blockchain to create an autonomous and decentralized community of social entrepreneurs and organizations by licensing its digital fundraising platform for free to small social organizations. Social organizations use the platform to launch their fundraising campaigns independently, but access to the donations are restricted, and may only be received by their beneficiaries through peer-to-peer transactions. The platform has helped small organizations to improve their visibility and credibility to the public.

Private companies such as Binance, Alibaba and Tencent have also shown their support with regard to the use of blockchain for charity through the creation of their own charity platforms. In 2016, Ant Financial created a private blockchain to record charity donations linked to Alibaba's online payment platform, Alipay.[4] However, access to said platform was limited to Ant.[5] Three years later, in 2019, Alibaba and Ant Financial launched Charities on the Chain (CoC), offering a blockchain donation platform to charitable organizations for free.[6]

The goal of these companies in China is not to promote the use of cryptocurrency, but rather donation authentication and tracking through blockchain. In an interview with Caixin Global, Alibaba said it would use CoC to track donations and prevent the fraudulent inflation of the amount of donations by donors, as well as the manipulation of the amounts received by charities. Tencent, on the other hand, has yet to release any system similar to CoC, but has promised to regularly monitor and audit the donations made through its own charity platform.[7]

Trailblazing for Global Use Cases

In China, neither the government nor private entities seem averse to the potential risks of blockchain use. With the exception of cryptocurrency, China is embracing the technology and keeping itself a step ahead of the world with regard to practical uses of blockchain, and promotion of transparency and accountability in philanthropy.

Moreover, the use of blockchain in philanthropy has created a community-based model of charity that encourages participation from social organizations, businesses and the government to collaborate in improving social welfare.

Globally, firms from various industries are starting to adopt blockchain to optimize their operations and increase their profitability, but few are incorporating the technology for charitable endeavors. Netherlands-based Airbus, through its open-source project Heritage, is one of the few large companies outside of China to adopt a blockchain platform for philanthropy.[8]

China is starting to reap the benefits of blockchain in its philanthropic sector, but the technology is still immature and has yet to be widely adopted. While transparency in charity is essential to increasing the flow of donations, collaboration from all sectors is still crucial. The distributed ledger technology is a tool that can improve accountability, but monitoring the data would still require human participation and government regulation.

At present, Chinese companies remain at the forefront of this innovation. This gives China the opportunity to showcase the best use cases of the technology to encourage more firms globally to exploit its practical use as well as for the promotion of social good and the success of humanitarian efforts.

[2] BBC (2013) China's Red Cross fights to win back trust www.bbc.com/news/world-asia-china-22244339

[3] Zhao, Wolfie. Chinese Ministry Eyes Blockchain to Boost Trust in Charities. CoinDesk. www.coindesk.com/chinese-ministry-eyes-Blockchain-tech-to-boost-trust-in-charity-sector

[4] Mizrahi, Avi. (2016) Alibaba's Ant Financial Chooses Blockchain to Monitor Charities. Finance Magnates. www.financemagnates.com/cryptocurrency/innovation/alibabas-ant-financial-choses-Blockchain-to-monitor-charities

[5] Simpson, Anna. (2016) Signal of change / Charity donations to be recorded on Blockchain in China. www.thefuturescentre.org/signals-of-change/9023/charity-donations-be-recorded-blockchain-china

[6] Alibaba launches Blockchain for charities. Ledger Insights. https://www.ledgerinsights.com/alibaba-launches-blockchain-for-charities/

[7] Runhua, Zhao. (2019) Alibaba's Charity Extravaganza Gets Blockchain Backing. Caixin Global. www.caixinglobal.com/2019-09-06/alibabas-charity-extravaganza-gets-blockchain-backing-101459756.html

[8] Heritage. Airbus. www.airbus-sv.com/projects/8#targetText=Project%20Heritage%20is%20our%20first,for%20itself%20and%20charitable%20partners

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IN FOCUS

China's Community-Driven Blockchain

Leveraging blockchain security, Neo is developing protocols to serve businesses and consumers

Like Ethereum, Bitcoin and Tron, Neo is a blockchain — but one specifically designed to utilize smart contracts to decentralize commerce, while storing digital records of asset identification on the blockchain.

Since rebranding from Antshares in 2016, Neo has established itself as a leading blockchain platform with a strong presence both in and outside of China. The platform works with its international legion of developers to address blockchain's challenges, including development of its signature Delegated Byzantine Fault Tolerant (dBFT) algorithm to an interoperability protocol that aims to enable activity between chains.

Neo is laying the groundwork to power the future smart economy by helping to build the next-generation internet. A wide variety of assets can be stored on Neo, from company shares to real estate titles. Ownership of these assets is authenticated via an X.509 digital identity certificate, a widely accepted digital certificate issuance model. Essentially, with Neo, any asset of value can have a digital avatar to confirm proof of ownership, and this owned asset can be loaned, leased, subdivided or transferred via smart contracts.

Neo does not use a Proof-of-Work or Proof-of-Stake methodology, but rather the Delegated Byzantine Fault Tolerance (dBFT) algorithm. It is said to be more efficient than PoW and PoS, and immune to the double-spend attack thanks to its resistance to transaction reversal. This makes it ideal for use in regulated sectors like distribution of company shares or real estate titles as records cannot be reversed.

Cross-Platform Compatibility For All

Understanding the challenges facing blockchain technology, Neo is developing an interoperability protocol that will enable different chains to "talk" to one another, thus building the foundation for next-generation internet while overcoming current issues of scalability and integration. In addition, with support for .NET, and membership in the .NET Foundation, Neo supports virtually any web development language and has the full power of Microsoft's open-source evangelism efforts behind it.

By emphasizing interoperability, Neo is empowering not only users and applications, but also enterprises. Moreover, Neo's Distributed Networks Architecture (DNA), its underlying technology, can also be used in the B2B market via Onchain.

To support these efforts, Neo hired John deVadoss, a former .NET Foundation executive, to lead Neo's Seattle office, which is staffed by Microsoft alumni. Neo also has a sizable presence in Latin America, with partnerships with a number of high-profile universities in Brazil (two academic papers on the technology were accepted and presented at a recent IEEE conference focused on High Performance Computing in Brazil), as well as in Europe, where it has hosted many well-attended community meetups.

Neo founder Da Hongfei explained why he chose to join the .NET Foundation in an interview with Forkast.News (scan the QR code to watch):

"There are about 21 million professional developers in the world. Meanwhile, there are only about 10,000 blockchain developers in this industry. So 21 million [versus] 10,000? We need to attract those 21 million who are not [currently] developing for blockchain."

With developers and community at its core, Neo is also built to be enterprise-ready. Interoperability is key to its architecture, and this interoperability also means that it's as effective at B2B as it is at B2C. Through Neo's Distributed Networks Architecture (DNA), its underlying technology also can be used in the B2B market via Onchain. Onchain is a separate company from Neo, managed by Neo's founders and executives, but funded by Shanghai-based financial company Fosun. Onchain's mandate is to help enterprises and governments implement their own blockchain solutions on either a public or private chain. Because of the technical similarities between Neo and Onchain, code written for Neo can be used for Onchain and vice versa through NeoX — Neo's cross-platform compatibility protocol.

Neo 3.0 will launch in the second quarter of 2020, and will be a new blockchain network with further improvements to the platform. Neo already has momentum, and the new version of the platform will focus on the next key step: adoption.

Watch the exclusive interview with Da Hongfei on Forkast.News:

Chinese Base a Double-Edged Sword

Despite Neo's momentum, ultimately its roots in China might serve as an anchor to its adoption abroad. The U.S.' hesitation to adopt technology developed in China may slow adoption in the West. This could be a damper on the critical network effect Neo needs to become a defining standard.

For similar blockchain projects in the West, particularly those reliant on existing blockchains like Etherum, this provides a sizeable competitive advantage. However, Neo's cross-platform compatibility protocol, in addition to becoming the first blockchain organization to join the Microsoft-created .NET Foundation as a member, could entrench its positioning as an internationally developed protocol with a global footprint.

The U.S.' hesitation to adopt technology developed in China may slow adoption in the West. This could be a damper on the critical network effect Neo needs to become a defining standard.

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The China Blockchain Report 2019-2020 was made possible, in part, by support from Neo.

Thank you for contributing to our greater understanding and insights of emerging technology.