Blockchain technology applications in retail and insurance sectors: cases from Suning and PingAn

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***Abstract*—Blockchain is a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. As a novel technology, blockchain has a broad impact on various business practices. China is leading blockchain technology development all over the world. This paper studies the blockchain technology applications in the retail and insurance sectors in China. Specifically, we compared the similarities and differences of blockchain implementations between two typical cases-Suning and Ping An. Our research results provide meaningful implications and insights for blockchain practitioners who are keen in leveraging blockchain technologies in their businesses.**

Keywords-Blockchain application; Suning; Ping An

Introduction

Since the immense success of cryptocurrencies (e.g., bitcoin) [1] and the incrementally mature technology development in various industries, blockchain mania has been at its apex in recent years. According to Singh and Kim [2], the standard features of blockchain intriguing to companies are higher security, higher transparency and higher reliability. In particular, data stored with blockchain technology are impossible to modify, tamper or rebuild. Every "block" has a copy of all communication data, so any error or flaw can be easily found by the network members. The aforementioned benefits of blockchain technology in business are derived from its unique characteristics, such as decentralization so that the third party of the central trusted agency is no longer needed; persistency through which valid and invalid transactions will be recorded and discovered; anonymity which makes the real identity of the users concealed; and suitability by which transactions can be verified and tracked [3].

From Casino, Dasaklis and Patsakis [3], the current prevalent areas of study in blockchain technology include:

- Supply chain and energy section
- Data management and data distribution
- Cryptocurrency and prediction marketplace
- Intellectual property, insurance and counterfeit
- Identity management, e-voting, public administration, notary and law, proof of the existence
- IoT e-business, distributed device management
- Electronic medical record
- Reputation and certification management
- Anonymization and secure storage

Though studies are starting to investigate how blockchain can be adopted from multiple perspectives in the abovementioned areas, research in management and application perspectives is still in paucity. Therefore, with a focus on the retail and insurance industries, this study investigates how blockchain technology has been used in these two industries in a more comprehensive and intensive way. Our research questions are:

1. How are Suning holdings Group and PingAn insurance adopting and providing blockchain technologies in their businesses?
2. Are there any similarities and differences between both companies in terms of blockchain development and implementations?

I. BLOCKCHAIN TECHNOLOGY

The blockchain construction is subsumed with proof-of-work, practical Byzantine fault tolerance algorithm to tolerate Byzantine faults, proof-of-stake, transactions, blocks, nodes, mining and majority consensus [4]. The data structure in the blockchain is distributed, replicated and shared to all members in the specific network. The "block" is like a cryptographic hash, managing the process of data and outputting the fixed length, which can preclude attempts to decrypt the input [5]. The "chain" is like a bridge connecting every two blocks with nodes, and the node is limited in the access order. Meanwhile, each node in the network must calculate a hash value of the block header equal to or smaller than a given value to verify whether the block contains valid transactions and references to the correct and corresponding previous block in the specific chain. This process, proof of work, is an essential algorithm for consensus approach and decentralization. In common practice, the block is back-linking so that users with a public key can exchange and read data on the network block by block.

Meanwhile, users can use the private key to sign their transactions [6]. Another two new consensus algorithms are Ripple and Tendermint. The former uses collectively-trusted

subnetworks in the network and divide the nodes into two groups as "server" for participating consensus process and "client" for transferring funds [3]. The latter is a byzantine consensus algorithm to select a more efficient proposer to broadcast an unconfirmed block through three steps: 1) asking if the validator pre-votes the proposed block; 2) determining if broadcast a pre-commit for such block if the node has received more than 2/3 votes; 3) validate the block and broadcast the commit for the block. In the following paragraphs, we will focus on the retail and insurance industries and discuss their applications of blockchain technology. Suning and Ping An were selected as typical cases in their specific sectors. Both are large companies rooted in China and have had various pioneer activities in blockchain implementation in the past years. We believe they are typical enough to represent some new trends in today's blockchain market.

II. BLOCKCHAIN IN SUNING HOLDINGS GROUP

Suning Holdings Group (hereafter Suning) is the second-largest civilian-run enterprise in Mainland China in 2020 [7], cardinally covering e-commerce and retail, financial investment management, real estate and sports industries. Suning takes blockchain technology seriously and has long considered embedding blockchain to align with the organizational strategy. Since 2017, Suning has launched its blockchain domestic letter of credit transmission system, blockchain financial blacklist data service system, blockchain + Internet of Things (IoT) movable property pledge financing system platform, blockchain forfaiting systems, blockchain product traceability system, and blockchain asset securitization service system [8]. In July 2018, Suning published its Suning blockchain white paper, officially announcing the organizational plan and development path regarding the application of blockchain technology in different business sectors of the organization, as well as elucidating the benefits of blockchain technology in retail, logistics, technology, finance, and even cultural and creative industries [9][10]. Meanwhile, at the end of 2019, Suning has launched Suning's Blockchain as a Service (BaaS) cloud infrastructure platform to provide developers and users with the blockchain ecological environment and related support services for creating and managing the blockchain applications [11].

A. Blockchain in retail and e-commerce application

Suning has preemptively deployed the international online blockchain commodity traceability and anti-counterfeiting system in August 2018, by which all users can benefit from its distributed ledger technology in terms of easily gleaning the trustful information about a product, including its production, processing, transportation, circulation, retail and other links of the product [12]. This system is flexible to integrate all links of the industrial chain in the form of nodes. For instance, Suning has cooperated with Suzhou Yangcheng Lake Hairy Crab Industry Association to ensure a valid track production and processing, specifications and quality of hairy crabs from the source, and avoid loss or replacement of goods [13]. This system supports the online product on the e-commerce platform and has been widely used in offline retail stores. The president of Suning mentioned that blockchain technology is conducive to enhancing data sharing, collection and integration. All members in the supply chain can realize the dynamic matching of supply and demand, significantly optimize the coordination of production capacity resources, and empower the upper and downward members in the supply chain to accelerate the digitalization of the ecological chain transformation of the retail industry [14].

B. Blockchain in the Supply Chain and Trade finance application

The blockchain + Internet of Things movable property pledge system financing platform with the unique characteristic of amalgamating the entity flow, information flow and capital flow, was developed by Suning to check the real-time warehouse records of bulk goods and support the development of moveable property pledge financing and other business via the platform [15]. In particular, such a system can solve some current knotty issues in the industry, such as determining and validating the claims of receivable accounts and receivable orders, preventing some SMEs from making false order contracts or creditor claims, and declining the duplicate financing risk. Apart from it, Suning concurrently focuses on another three scenarios of the blockchain technology's applications in supply chain and trade finance, including (1) inventory pledge/warehouse financing (obtaining funds from a bank or financial institution by using the inventory as collateral with a certain value), (2) account payable (providing funds for procurement or directed payment where enterprise's line of credit is according to the upstream and downstream orders), and finally (3) establishing domestic letter of credit alliance at bank-level [16]. By taking funder, asset side and special purpose vehicle (SPV) as the nodes in such alliance chain, authorizing the sharing books with the private key to striking a balance between protecting related parties' confidential information and jointly safeguarding the data transparency and authenticity is no longer unachievable. For instance, Suning's blockchain asset securitization service system can ensure the immutability and traceability of the asset data in financial enterprises and reduce the threshold and issuance cost of assets backed securitization [11]. In addition, Suning has launched the blockchain financial blacklist data service system by which the blacklist sharing is carried out to protect the clients' private information such as ID numbers and names through decentralized data sharing storage scheme and encryption technology [17]. Thus, financial institutions can connect (nodes) through smart contracts to solve the convention problems of non-public data, high access costs and insular information in the industry [15].

C. Blockchain in culture and creativity application

Suning has well-implemented blockchain technology on copyright protection in the cultural and creative industry. Focusing on the creation time and the time stamp production which cannot be changed on the chain, users can easily

compare the similarity and corroborate the originality of the works [18]. In addition, once the infringement is confirmed, the violator will be introduced to the blacklist. Therefore, blockchain technology enables creators and consumers to conduct the transactions from point to point much more accessible and encourage creators to create more innovative works [18].

D. *Blockchain in smart home IoT application*

Suning advocates that blockchain technology can better maximize the effectiveness and efficiency of the application of the smart home system in terms of the censoring perception, calculation, control and feedback capabilities [19]. Integrating all nodes of a smart home into a private chain and store the pertinent data separately can effectively avoid the risk of being destroyed by hackers. Blockchain technology can further extend to the smart buildings and smart communities and better manage the whole life cycle chain of houses [18].

The key milestones of the implementation process are summarized in Table I.

TABLE I. MILESTONES OF BLOCKCHAIN IMPLEMENTATION IN SUNING

Time	Milestones of implementation
2017	Suning launched blockchain credit transmission system, blockchain financial blacklist data service system
February 2018	Suning launched the Blockchain-Based Blacklist Sharing Platform System.
July 2018	Suning and SAP carry out technological innovation and industry practice, promote digital economy. Suning published its Suning blockchain white paper.
September 2018	Suning Bank successfully granted pledge credit to the coal of Taihe Port Services through a chattel pledge financing platform based on the blockchain and the IoT.
March 2019	Suning Finance "Blockchain + Internet of Things" Finance Platform was officially launched.
End of 2019	Suning launched Suning's Blockchain as a Service (BaaS) cloud infrastructure platform
Beginning of 2020	Suning Financial Technology launched a blockchain asset securitization service system.

III. BLOCKCHAIN IN PING AN INSURANCE

The blockchain market in China is growing at a rapid pace. According to Pistilli [24], nearly 27,500 new Chinese companies used blockchain in 2020, which is up 52 percent from 2018. Among all industries, the banking and insurance sector is the most active one in using enterprise blockchain. As the largest insurer in China, Ping An insurance company has a significant presence in the blockchain space, with 1,215 blockchain patents in 2020 [24]. Ping An was also the first Chinese company to join the R3 blockchain consortium in 2016 [23].

Being a traditional insurance and financial firm, today, Ping An wants to be valued more like a technology company that is good at using and providing cutting edge technologies at the same time. For the internal use of blockchain, there is always a perfect match between the insurance business and blockchain as a concept. In other words, insurance is one of the most tangible use cases for blockchain. Blockchain technologies are effective in fraud and risk prevention, claims management, reinsurance, property and casualty insurance, health and travel insurance [26]. The significant benefits of blockchain in the insurance industry include: (1) reducing operational cost as all past transactional records are easily traceable; (2) enhancing the efficiency of the claim management process, thus increase customer satisfaction; (3) expediting the insurance product development due to the openness of data sharing; (4) enhancing the self-elasticity of insurance products and improving the efficiency of capital allocation; and (5) identifying and preventing potential moral hazard [25].

Ping An has made remarkable achievements in providing Blockchain related services. Ping An owns the most significant number of blockchain patents in China. Its blockchain technology has been successfully applied in supply chain finance, trade finance and SME loans, which offers a new experience of empowerment to five significant ecosystems: finance, real estate, automobile, medical care and smart city [22].

A. *Blockchain in Finance*

First, Ping An's blockchain solutions developed by its subsidiary company - OneConnect, has been successfully rooted in the financial sector, including trade finance, asset-backed securities, supply chain finance and reinsurance [22]. For trade finance, it created several international and influential blockchain trade finance networks to eliminate frauds, financial risks and realizing cross-regional global interconnection. As to asset-backed securities, OneConnect launched the ALFA smart ABS platform to solve the problem of information asymmetry and realize credit penetration of assets. For supply chain finance, the company developed a blockchain-based product to empower SMEs and addressed the financing problems faced by upstream and downstream suppliers. OneConnect also built the Genesis reinsurance platform to record the life cycles of insurance assets. There are three successful cases in the financial industry. The first is that Hong Kong Monetary Authority used OneConnect's blockchain technology platform to establish an international trade finance network (eTradeConnect) to empower the Greater Bay Area. The first blockchain-powered trade finance platform (FiMAX) in Hong Kong has attracted 12 banks to participate. Second, in 2019, OneConnect established the Tianjin Port Blockchain-based verification pilot project, which helps the customs and all participants in cross-border trade. Third, OneConnect developed the Internet Finance Association of Small and Medium-sized Banks (IFAB) trade finance network to help small and medium-sized companies in the trade finance sector [27].

B. *Blockchain in real estate, automobile, medical care and smart city*

Ping An is one of China's largest property investors, with an annual budget of 50 billion yuan (US $7.7 billion) for new real assets [20]. Ping An blockchain can contribute to leasing transactions, investment thresholds of real estate and property registration. The distributed ledger enables key data

information such as timestamps, property rights, management rights, validity periods and transaction prices to be stored and synchronized in a distrusted manner to achieve data transparency and credibility. In the automobile industry, blockchain brings innovation to the traceability of automobile parts along the supply chain, automobile insurance, especially the behavioural pricing policy, and used car valuation to protect the interests of involved parties. Blockchain technology can help trace electronic medical records, drug anti-counterfeiting, and medical waste management in the medical care sector. Last, in developing the smart city, blockchain technology can be well integrated with energy consumption, personal record management, property rights notarization, election voting, academic accreditation, and others [27].

With solid support from the central government, Ping An's blockchain technology has a more prosperous application scenario. We see particularly successful trials in five extensive application areas, namely "blockchain + trading", "blockchain + finance", "blockchain + transportation", and "blockchain + poverty alleviation" [21].

The key milestones of the implementation process are summarized in Table II.

TABLE II. MILESTONES OF BLOCKCHAIN IMPLEMENTATION IN PING AN

Time	Milestones of implementation
May 2016	Ping An became the first Chinese financial services institution to join the R3 consortium.
October 2018	HKMA uses PingAn's FiMAX blockchain to establish eTradeConnect for 7 international banks in Hong Kong.
March 2019	Ping An OneConnect work with IFAB to establish a blockchain-based IFAB trade finance network for SMEs.
April 2019	Ping An OneConnect established the Tianjin Port Blockchain-based verification pilot project.
2020	Ping An Group filed the largest number of blockchain-related patents in 2020.
2020	Ping An OneConnect and China Merchants Port Group created a blockchain-based system with Shenzhen customs to serve the Guangdong-Hong Kong-Macao Greater Bay Area.

IV. SIMILARITIES AND DIFFERENCES BETWEEN THE TWO CASES

Through two case studies on Blockchain technology, we understood how Blockchain could transform a traditional industry like retailing and insurance. In the last session, we would like to summarize some similarities and differences.

First, though we discussed blockchain technologies across two different industries, there are still similarities in the use of blockchain. They are summarized in Table III.

TABLE III. SIMILARITIES OF THE TWO CASES

Similarity	
Scale of blockchain	Large scale in multiple areas
Application areas	Both heavily focus on finance, real estate, supply chain, trade, smart home or smart city, personal record management.
Government support	Both companies are firmly rooted in China and have got strong support from the Chinese government.
Blockchain service provider?	Yes, both companies provide BaaS services to other companies.
Develop rapidly in recent years?	Yes, both companies are pioneers in developing cutting-edge technologies and have grown fast in recent years.
Common benefits	• Improve data reliability • Reduce financial risk • Increase information transparency • Improve operation efficiency • Reduce audit and scrutiny cost • Improve security and accountability in transaction
Common challenges	• Solve the relations of production but not productivity itself • Optimize algorithmic capabilities to analyze data • Interoperability between blockchains • System performance • Ecosystem development

Second, the industry-related differences are also noticeable and summarized in Table IV.

TABLE IV. DIFFERENCES BETWEEN THE TWO CASES

Differences	
Application areas	Suning: focus more on the blockchain applications in retailing and retailing related services. Ping An: focus more on its own insurance business and becomes a more technology-focused blockchain service provider.
Vision	Suning: focus more on domestic e-commerce Ping An: more international vision
Strategic management	Suning: establish a strategic alliance Ping An: improve product innovation

V. CONCLUSIONS

For the last five years, China has led the Blockchain world. It filed 32,837 patent applications related to blockchain technology up to 2021, accounting for 59.8% of the total. This is followed by the United States and South Korea [28]. In some industries with high transparency, traceability and accountability requirements, blockchain technology can help redesign the physical and digital data traffic flow and the mutual trust levels among beneficiaries and stakeholders. In this study, we first introduced some basics of blockchain technologies, and then carefully investigated blockchain technology development of two Chinese giants in retailing and insurance industries – Suning and Ping An. We found that though these two companies are from different industries, they share some similarities, for example, both heavily focus on the areas of finance, real estate, supply chain, trade, smart home and city, and personal record management. The two companies also differentiate from each other in terms of vision and strategic management. Finally, we hope our study can bring meaningful insights on the practices of China's blockchain technology development.

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