



# Analysis on Potential Blockchain Applications in Finance, Sports, and Supply Chain Management

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## ABSTRACT

The concept of a blockchain and its applications within the business world has been a popular and widespread topic ever since the emergence of Bitcoin as a form of cryptocurrency. Properties of a blockchain such as information security, decentralization, and distributed ledger provide limitless opportunities for incorporation of blockchain technologies within various industries. This article seeks to demonstrate current applications of blockchain technologies in finance, sports, and supply chain management, while also exploring potential future applications. The findings from this paper show that blockchain applications have great potential to revolutionize current business models across various sectors by improving aspects such as security, efficiency, and transparency while also reducing costs.

**Keywords:** *Blockchain, Cryptocurrency, Fintech, Supply Chain Management.*

## 1. INTRODUCTION

Blockchain can be defined as an information technology that stores data within nodes of a computer network. A blockchain creates a distributed database that stores data electronically and maintains a secure and decentralized record of transactions. Some key characteristics of a blockchain are that it offers information security, decentralization, and creates a network of trust [1].

Information stored in a blockchain is safe because it is extremely difficult to tamper the data within a distributed database. As information is stored in groups of blocks chained together chronologically via cryptography, the database updates itself whenever new blocks are added to the blockchain and also broadcasts to all the existing nodes within the network. If someone attempts to alter the information stored within one node, all of the other nodes would be able to cross-reference with one another and figure out that the particular node has been altered and does not match with the others. Because of the information fidelity offered, there is a sense of transparency and trust that is fostered by using blockchain.

With these properties in mind, it is inevitable that the emergence of blockchains has led to a wave of interest in incorporating blockchain technologies with current business models across various sectors. In this paper, the

author will explore current and potential future applications of blockchain technologies within the industries of finance, sports, and supply chain management. Specifically, the author will discuss the trading of cryptocurrencies, business blockchains, the use of smart contracts in sporting ticket management, and general blockchain applications within supply chain management. This paper can serve as a general overview of current blockchain applications and an explanation for the emergence of blockchain as a potential solution for current business problems.

## 2. BLOCKCHAIN APPLICATIONS IN FINANCE(FINTECH)

### 2.1 A Brief Overview of FinTech

Fintech has been defined as an interdisciplinary practice that combines finance, technology, and management. According to recent statistics, the overall fintech global market is expected to have a compound annual growth rate of 20% for the next four years, potentially reaching a staggering total market value of \$305 billion by 2025 [2]. In this section, the author seeks to explore how blockchain technology has been applied to create business value.

For the purpose of this article, financial technologies(FinTech) can be generalized as the use of technologies and innovations in competing with or

revolutionizing traditional financial services, often establishing new business models. In Leong and Sung's paper "Fintech: What is it and how to use technologies to create value the Fintech way", they describe the company Uber as a real-world application of fintech. Uber can be considered as a Fintech business as they "provide non-traditional (innovative ideas) transportation services by using technology (mobile apps) to improve ordering (financial services) taxi services" [3].

The first major trend that came with FinTech is the rise of cashless payments and transactions, which gives rise to more opportunities of managing digital data using a blockchain. Even without using a blockchain, many companies have developed cashless payment systems for their customers. Companies such as Paypal, Square, Google, Apple, and Amazon have long been using cashless payments in order to provide better efficiency and convenience for their customers. There had also been an increasing demand for cashless and contactless payments due to the effects of Covid-19. According to a report by Global Market Insights, the mobile wallet market is "expected to grow by a compound annual growth rate (CAGR) of 16% from 2020 to 2026, reaching \$350 billion" [4]. Some countries have even come close to becoming a cashless society, as Chinese residents have long been reliant on cashless payments through Wechat Pay by Tencent and Alipay by Alibaba. These two payment systems together make up about 94% of the total market share of all payment systems in China [5]. On top of this, there has been an alleged plan that China will release a digital currency known as e-yuan, and two banks in China recently announced that they would completely end services involving banknotes or coins.

## **2.2 FinTech Applications with Blockchain**

In terms of blockchain applications, there are currently two major applications of blockchain within finance. One that involves the trading of cryptocurrencies such as bitcoins, another for managing transactions related to trade and commerce, known as business blockchains.

### **2.2.1 The Trading of Cryptocurrencies**

Applying blockchain technologies, cryptocurrencies such as Bitcoin and Ethereum have been widely discussed as new FinTech approaches. Due to the distributive ledger aspect of blockchains, transactions of cryptocurrencies via blockchain networks are considered as secure and transparent. In addition, blockchain transactions also help facilitate a sense of trust and eliminate the potential need for a trusted third party, which improves the transaction efficiency and thus decreasing data transaction costs. As Kowalski, Lee, and Chan explained in their paper "Blockchain technology and trust in trade finance", "trade finance processes

require repeated verification, checks, and confirmation of paper documents as well as mutual trust among parties", whereas "blockchain technology has the capability of addressing trust issues in economic transactions and freeing trading partners from the necessity of implementing mechanisms that signal and convey trust" [3].

### **2.2.2 Business Blockchains**

Different from public blockchains that allow people to trade cryptocurrencies such as Bitcoin and Ether, businesses are also creating their own private blockchains to improve and enhance the efficiency of their operations. Without the use of any digital currency, businesses can gain extraordinary value from simply deploying blockchains for transaction record keeping. As blockchain data management is automated, this process would not only be low-cost but also more accurate and secure than previous data management methods. In addition, businesses can also make use of the smart contract feature of blockchains. Smart contracts are automated programs that perform a previously stored exchange when the agreed preconditions are met by both parties. Since smart contracts are stored within blockchains, trades completed through smart contracts are deemed as transparent, immutable, traceable, and irreversible. There have also been suggestions for applications of smart contracts for trading bonds and derivatives, since the terms of these trades are often extremely complex and thus the computerized smart contracts appear as an appropriate solution.

## **2.3 Drawbacks and Limitations of FinTech**

There are however, drawbacks and limitations to applying blockchain technologies for FinTech. In the paper "What's holding back blockchain finance? On the possibility of Decentralized Autonomous Finance", Harwick and Caton argue that "since identities on the blockchain are obscured by pseudonymity and ease of exit, it may be the case that cryptocurrencies will be unable to compete with national currencies beyond the scale at which finance becomes necessary"[6]. Harwick and Caton are particularly worried about blockchain applications in the credit market concerning the borrowing and lending of funds. Since there always exists a "counterparty risk" when a lender lends money, the anonymous factor of blockchains actually limits its ability and potential to compete with current financial systems of borrowing and lending. Harwick and Caton made the conclusion in the end that "there will be high hurdles impeding the establishment of cryptocurrency denominated credit markets".

### **3. BLOCKCHAIN APPLICATIONS IN SPORTS**

In addition to the more commonly known cryptocurrency and FinTech applications, blockchain technologies also have the potential to revolutionize the sports industry.

#### ***3.1 The Use of Cryptocurrencies as Potential Financing Options***

In the article “The Possibility of Sports Industry Business Model Innovation Based on Blockchain Technology”, Lv, Wang, and Jin analyzed over 200 companies within the sports industry in order to assess how blockchain technologies can be incorporated innovatively with the future development of the sports industry [7]. From their research they concluded that the implementation of blockchain technologies improves the innovation efficiency of the companies that they studied, as blockchain provides a solution to some problems with the current business model of the sports industry. For example, one problem with the current sporting industry is that there are often many intermediaries and middlemen between two parties of interest, which often leads to inefficient use of resources and high transaction costs. Blockchains can serve as a new solution as the implementation of smart contracts can reduce unnecessary traffic and lower transaction costs. In addition, some sports teams are exploring the possibility of using cryptocurrencies as potential financing options. A realistic problem that many teams face within the sports industry is the high financing costs of activities such as building or renovating a stadium. As these activities require high construction costs, constant cash flow, and long pay back periods, all of which place a heavy burden on the sports team. Issuing fan tokens which serve as a type of cryptocurrency then becomes a possible solution. Fan tokens would give die hard fans of the sports team an opportunity to become more involved and connected with the team. A potential perk for token holders is the potential voting right on team decisions such as transfers, making the fans more than just passionate followers of the team but also part of the sports ecosystem itself [8]. Unlike traditional non-fungible tokens (NFTs), fan tokens are completely fungible and tradable. An example is the fan token for the soccer team Paris Saint Germain (PSG). When seven-time Ballon d’Or winner Lionel Messi joined the team in the summer of 2021, the value of PSG’s fan token rose exponentially. Fan tokens had become extremely popular over the past few years, as globally reputable soccer teams Barcelona, AC Milan, Manchester City, and NBA team Cleveland Cavaliers all created their own fan token platforms. Other sports such as gaming (eSports), Motorsports, and even Mixed Martial Arts (MMA) have also hopped on this fan token bandwagon.

#### ***3.2 The Incorporation of Smart Contracts and RFID for Ticketing Management***

Another potential application of blockchain within the sports industry is the incorporation of smart contracts and radio frequency identification (RFID) for multi-sport event ticketing. In their paper “Improving multi-sport event ticketing accounting information system design through implementing RFID and blockchain technologies”, Nugraha, Daniel, and Utama proposed a new system of ticketing management incorporating blockchain technologies and RFID [9]. As Nubraha, Daniel, and Utama discussed in their article, there have been a few issues observed with the current ticketing system, especially at a multi-sport event. During the 2018 Asian games, there was a Japanese reporter who was found lost and could not find the correct venue for a skateboarding match. On another occasion, a couple of spectators were allowed entrance to an indoor volleyball game despite the fact that they had the wrong tickets due to an error to the barcode scanner. In the new proposed system, spectators and audiences will be handed RFID tagged tickets while blockchain serves as a transaction validator. At each event, attendees and spectators will only have to walk through RFID gate readers and have their RFID tags scanned automatically, the smart contracts stored within the blockchain would then verify the information and allow the spectator to watch the match if a valid purchase was made. Additionally, this system can also be adapted to accommodate post-Covid health protocols, as information regarding vaccines and even vaccine passports may also be stored within a blockchain that can be scanned together with the ticket. With this new system, sporting events have the potential to become more secure, effective, efficient, eco-friendly, and fraud-proof, benefitting all stakeholders involved.

### **4. BLOCKCHAIN APPLICATIONS IN SUPPLY CHAIN MANAGEMENT**

Blockchain technologies and applications also have the potential of revolutionizing and disrupting the current system of supply chain management. According to supply chain management (SCM) professionals, “supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities”[11]. In modern business, SCM is a significant component of many business models as it is crucial for any industries involving supply and demand management. Traditionally, business operations rely heavily on third party organizations such as banks to establish trust, the distributed ledger technology that comes with a blockchain “may deliver promising disruption to the current model of trust, which has long created operational pain points for centralized systems”.

In the paper “When Blockchain meets supply chain”, Chang and Chen explore the potential of blockchains to resolve the core issues of the current supply chain management system. As they explained, in the realm of supply chain management, block chain technologies “may provide a better foundation of trust as well as benefits resulting from the absence of a centralized authority and intermediation” [10]. Activities such as recording the ownership of assets, permissions, and activity logs can all be achieved efficiently by using a blockchain, while also “improving the traceability of information, cash, and process flows, providing a timely tracking of products and services”. Additionally, smart contracts can be deployed to facilitate data-driven processes to progress supply chain goals and objectives. As Chang and Chen explained, “latest changes recorded in the local database may in turn trigger the conditions prescribed in computer codes to execute related process flows or notifications”. This event-driven mechanism enabled by smart contracts of blockchains allows for a significant decrease in transactional costs and intermediary costs.

Some examples by which blockchains can massively improve the aspects of administration, cost reduction, transparency, efficiency, trust, and fraud management include its applications in transport systems, healthcare systems, agriculture, e-commerce industry, and the shipping and logistics systems [11]. Due to the authenticity and disintermediary nature of blockchains, there are limitless possibilities of future applications to be explored within SCM.

## 5. CONCLUSION

In conclusion, blockchain technologies allow for a great variety of innovations that are able to disrupt and revolutionize business models within many different industries. This paper focuses on exploring both the current and potential future applications of blockchain technologies within finance, sports, and supply chain management. In terms of FinTech, the author discussed the trading of cryptocurrencies such as Bitcoin and Ether based on public blockchains. In addition, businesses have also been developing their own private blockchains for record keeping and data management which improves their overall operation efficiency. In terms of sports, the author discussed the potential application of team-based cryptocurrencies known as fan tokens. Furthermore, there have been discussions about a new ticketing management system which combines blockchain technologies along with applying RFID chips. This new system also has the potential of better management for the post-Covid health protocols within not just the sports industry but virtually any events that have an audience. Lastly, the author discussed how blockchain applications within supply chain management can lead to better data

security, improved transparency, and more efficient operations.

As blockchain technologies are still in a stage of rapid development in itself, the applications discussed in this paper carry the risk of uncertainty in that they may change and evolve at any time, although blockchain technologies do seem like the prominent solution and the next step. In addition, the legal aspect of blockchain technologies and applications also requires further research and attention, as the set of laws in this corresponding area is still relatively ambiguous and evolving. Overall, the applications discussed within this paper have the potential to be researched in depth on a legal technicality, as blockchain applications are becoming more mature and gaining more public influence.

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