



To what extent has blockchain technology facilitated the growth of cryptocurrencies in the sports industry and what are the implications of this for the digital economy and the future of society?

Karsh Sarna
Student
The Sanskriti School

Abstract

In recent years, the blockchain has greatly come into the limelight with cryptocurrency, a system of digital payment based on the blockchain, and NFTs, a form of digital art, particularly gaining a lot of popularity. This paper discusses in detail, what the blockchain is and its uses in different industries. The main focus is on the use of cryptocurrency in the sports industry with the discussion focusing on the game of football. The paper discusses how many footballers have started to take a part of their salary in crypto, an example being Messi (a widely known football superstar) and fan tokens (a form of digital assets based on the blockchain) which have been created by various teams. The paper concludes by discussing the future of crypto and its implications for the future of society.

Introduction

Cryptocurrencies have been the “talk of the town” as their popularity has increased drastically over the past few years. But the question is, what really are Cryptocurrencies? To answer that we would first require to understand what a blockchain is. A blockchain is a database that stores information electronically in a digital format. One key difference between a database and a blockchain is the way in which the data is stored. Blockchain collects information together in groups, known as blocks. By inherent design, the data on a blockchain cannot be modified, it guarantees the fidelity and security of a record of data and generates trust without the need for a trusted third party (Hayes, 2022).

Cryptocurrency is decentralised digital money based on the blockchain. Like the Indian Rupee and US Dollar, there is no centralised authority that manages and maintains the value of a cryptocurrency. Cryptocurrency can be used to buy regular goods and services, although most people invest in them as they would in other assets, like stock or precious metals (Ashford, 2020). According to Investopedia, there are more than 8,000 cryptocurrencies in existence as of January 2022, the most famous one being Bitcoin. Bitcoin was the very first cryptocurrency that came into existence in 2008 (Frankenfield, 2022). Satoshi Nakamoto (founder) described it as “an electronic payment system based on cryptographic proof instead of trust” (Nakamoto, 2008).

Over the years, many industries have started to acknowledge the benefits of adopting blockchain technology and cryptocurrencies. One such industry is the sports industry - especially football clubs. Some clubs, like Manchester City, for example, have started selling digital collectables known as NFTs i.e. digital assets where unique data is added to the files to represent ownership. To date, across the five major European leagues, 24 different clubs have launched or are considering fan tokens. These tokens are club-specific crypto-currency, virtual coins that can be bought and sold. According to BBC, more than £262m (\$350m) has been spent on these fan tokens (Tidy and Lane, 2021).

Though the use of blockchain technology and cryptocurrency is increasing and many people credit it for representing advances in the traditional economy, there are also many critics who are considering the future implications of the aforementioned. In light of the above, the research question of this paper is **To what extent has blockchain technology facilitated the growth of cryptocurrencies in the sports industry and what are the implications of this for the digital economy and the future of society?**

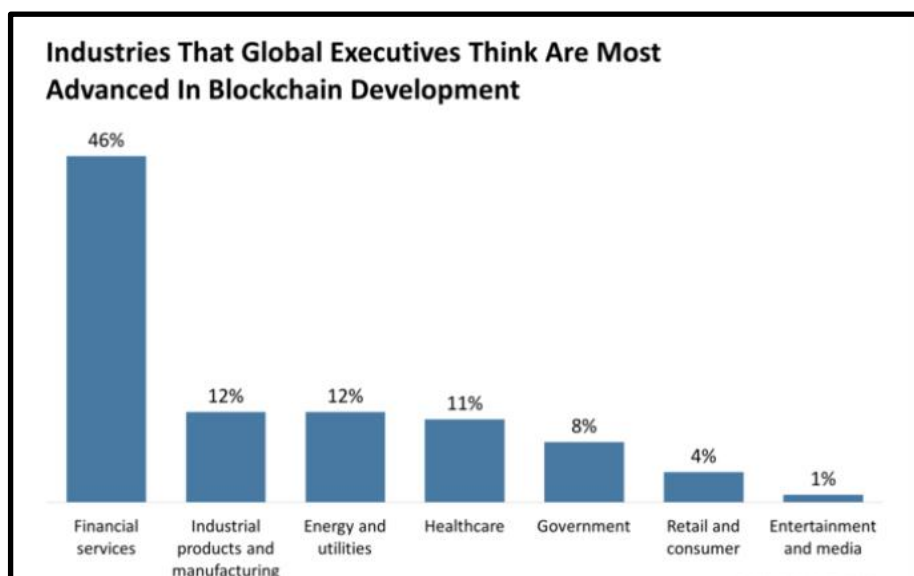
What is blockchain technology?

First proposed as a research project in 1991, a blockchain is a shared, immutable ledger of transactions maintained by a network of computers in a way that makes it difficult to alter. This technology offers a secure way for individuals to deal directly with each other, without an intermediary like a government, bank or other third parties. Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved.

A blockchain structures its data into chunks(blocks) that are strung together forming a chain. When a block is filled, it automatically becomes a part of this chain. Each block in the chain is given an exact timestamp of when it is added (Hayes, 2022). Each block has three basic elements. First, is the data in the block. Second, a 32-bit whole number is called a nonce. The nonce is randomly generated when a block is created, which then generates a block header hash. Third, is the hash which is a 256-bit number wedded to the nonce. When the first block of a chain is created, a nonce generates the cryptographic hash. Every block contains some data, its own hash and the hash of

the previous block in the chain. When you change something in the block, it results in the hash changing itself. This is useful when you want to track changes in data and it is one of the reasons which makes the blockchain so secure. Since the blocks are chained with each block containing the hash of the previous block, any change done in the block will result in its hash changing which makes the next block invalid since it no longer contains the correct hash - this is a chain reaction, resulting in the rest of the blocks becoming invalid as well (BuiltIn, 2022). There are other ways through which the blockchain guarantees the security of your information. Let's say that a hacker wants to alter the blockchain and steal cryptocurrency (a form of currency based on the blockchain) from everyone. Since everyone with access to the blockchain has their own copy. If the hacker was to alter his own copy it would no longer align with everyone else's copy and the hacker's version of the chain would be cast away as illegitimate. For such an attack to be successful the hacker would require access to 51% of the copies of the blockchain, which is near impossible.

Companies like Walmart, Pfizer, Siemens and IBM have already incorporated the use of blockchain. For example, IBM has created a Food Trust blockchain to trace the journey of their food products. This gives the brand the ability to track a food product's journey from its origin to the endpoint. If a food product happens to be contaminated this system gives the brand an easy way to see at which part of the product's journey did the contamination happen. Other advantages of blockchain extend into industries such as healthcare - patient records can be stored on the blockchain. These records can then only be accessed with a private key which is only known by the patient. This provides the patient with proof and confidence that the record cannot be changed. Another growing use is Smart Contracts which are built into the blockchain to facilitate or negotiate a contract agreement. If we take an example of a landlord and a tenant, both parties send their agreed portions of the deal to the smart contract and the exchange/transaction is only made when the contract receives both portions. If one fails to fulfil their part of the deal, the portion sent by the other person is refunded. This ensures a quick and secure deal.



Graph showing the percentage of use of blockchain in different industries

While blockchains have several advantages, there are disadvantages too. One of the major drawbacks is the technology cost. The Pow network, which cryptocurrencies like Bitcoin use, requires a large amount of computational power. Another drawback is the potential for illegal activity. While confidentiality on the blockchain network protects users from hacks and preserves privacy, it also allows for illegal trading and activity on the blockchain network. An example of this would be the Silk Road, which was an online dark web illegal drug and money laundering marketplace (Hayes, 2022).

Blockchain technology in finance - an introduction to cryptocurrency and other forms of digital financial assets

Now, that we have understood what a blockchain is and how it works, in this section, we will be discussing the use of blockchain in the finance sector. While blockchain has many uses, its most prominent and popular use is in the finance sector in the form of cryptocurrencies. Cryptocurrency (like money) is a medium of exchange, created and stored electronically on the blockchain. It is a peer-to-peer system that can enable anyone anywhere to send and receive payments (Kaspersky, 2019). Crypto received its name because it uses encryption to verify transactions. The first cryptocurrency was Blockchain, which was founded in 2009 - it remains the most widely known crypto to date. Bitcoin is also the most valuable crypto, with a value of INR 32 lakhs (42 thousand dollars) at the time of writing this paper. According to Investopedia, there are more than 10,000 cryptocurrencies (Hayes, 2022a).

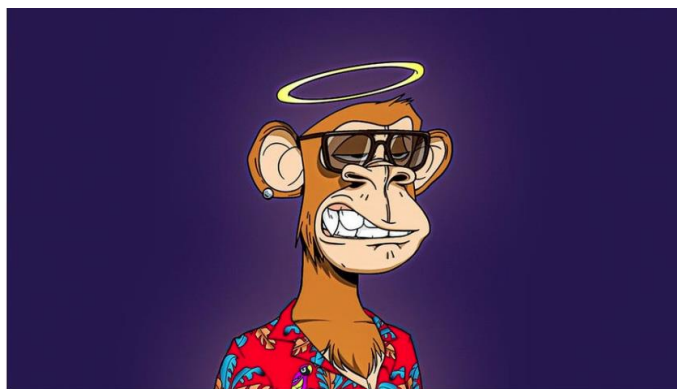


Image showing the different types of cryptocurrencies

The boom of cryptocurrencies is due to its several advantages. The advantages of cryptocurrency also include the advantages of blockchain explained in the previous section. Cryptocurrencies have additional advantages too like Proof of Work and Proof of Stake. Proof of Work and Proof of Stake are two different validation techniques used to verify transactions before they're added to a blockchain that rewards verifiers with more cryptocurrency. In Proof

of Work, each participating computer, often referred to as a “miner”, solves a mathematical puzzle that helps verify a group of blocks (transactions) and then adds them to the blockchain ledger. The first miner to do so is awarded with a small amount of cryptocurrency for his efforts. Some cryptocurrencies also make use of the Proof of Stake method in which the number of transactions each person can verify is limited by the amount of cryptocurrency they’re willing to stake. Each person who stakes crypto is eligible to verify transactions, but the chance you are chosen increases with the amount one stakes (Frankenfield, 2021).

Recently, cryptocurrencies and the blockchain have been used to create NFTs. NFTs are unique cryptographic tokens that exist on a blockchain and cannot be replicated. NFTs stand for non fungible tokens, where “non-fungible” means that it cannot be replaced with something else. This is unlike cryptocurrencies which are “fungible” which means they can be traded or exchanged. NFTs shift the crypto paradigm by making each token unique and irreplaceable. Most NFTs are a part of the Ethereum blockchain. Ethereum is a cryptocurrency but its blockchain also supports these NFTs. NFTs can be purchased only using ether. NFTs can be anything digital (such as drawings, music, and handwritten poems). Most of the current market for NFTs is centred around collectables, such as digital artworks, sportscards and rarities. The most famous form is the NBA top shot, which is a place to collect NBA moments in a digital card form (Sharma, 2021). The most famous use case can date back to 2017 when cryptokitties - digital representations of cats with unique identifications on the blockchain - racked up a fanbase which spent \$20 million worth of ether to purchase them. Most recently the BORED APE YACHT CLUB has received controversial attention for its high prices (base price is 110 ether which is about 3,265\$), celebrity following and thefts of some of its 10,000 NFTs.



This is an example of the BORED APE YACHT CLUB NFT which is the largest NFT avatar by market capitalization.

One of the biggest advantages of NFTs is their market efficiency. NFTs representing digital art remove the need for agents and allow artists to connect directly with their audiences. NFTs are also excellent for identity management. This can currently be seen in a real-life private island called Satoshi Island which is dedicated to the crypto community. It is being developed into a real-world crypto economy and blockchain-based democracy. The citizenship for this island is given in the form of an NFT (Gutierrez, 2022).

Football Section

The use of cryptocurrencies and NFTs has been prominent in the sports industry too - mostly in sports such as Basketball and Football. In this section, we will be talking about the use of cryptocurrencies and NFTs in the football industry. Football teams have dived into the NFT space. Many of them have issued official NFTs with some spending tens of thousands on them. Football players have recently started accepting payments in the form of cryptocurrencies. We can prove this using the example of Ex-Real Madrid forward David Barral who was the first footballer to be signed with Bitcoin used as payment. Some cryptocurrency firms have also begun to sponsor football teams. We can see this in the example of Watford, which is a team in the Premier League (one of the most renowned football leagues) that displays the Dogecoin logo on its jersey. The reason for investing in these teams could be due to the high popularity of football. A Premier League (a famous football championship) football game gets around 500,000 views on average. This provides these cryptocurrency firms with a platform to advertise their cryptocurrency and gives them a chance to earn money and get a good return on their investment.



Image showing the Dogecoin logo on the Watford jersey

Cryptocurrency is also being used to buy clubs. Rimini FC sold 25% of their stake using a cryptocurrency called Quantacoin (euronews, 2021). Recently, many football teams have started issuing fan tokens. These are digital tokens which have been produced in collaboration with a set of small blockchain startup firms. Most of these clubs issuing fan tokens have signed up with a company called Socios that organises the sale of these tokens. Fans buy the tokens using the company's own cryptocurrency called 'chiliz'. According to the BBC, Socios has sold \$270m-\$300m worth of tokens (Tidy and Lane, 2021). Currently, strategies for repurposing these digital tokens into digital health passes to allow fans to attend matches are also growing in the context of the current pandemic. Some football teams are also using their own fan tokens to make payments to the players. When Paris Saint Germain signed Lionel Messi, a part of his payment (around 1.15 Million) was made in PSG fan tokens (Campbell, Linsi and Christiano, 2021).

Football club	Price/\$	Market capitalisation/\$million
Paris Saint-Germain	14.35	44.5
Manchester City	9.6	36.5
Athletico Madrid	5.31	25
Inter Milan	6.97	20.7
Barcelona	6.28	18.5
Juventus	6.22	16.8
Galatasaray	2.83	10
Arsenal	2.3	9.33
AC Milan	4.15	8.28
Trabzonspor	3.91	8.03

Source: CoinGecko 1 Feb 2022

Image displaying top football clubs for fan tokens

But the question is, why are these clubs so keen to enter the crypto space? This is so because the COVID-19-induced lockdown led to these clubs losing revenue streams. According to UEFA, the European football governing body, the cryptocurrency sector has helped the clubs to partly fill the lost revenue streams-estimated at around 9 Billion Euros (Michael, 2022).

The socio-economic implications of cryptocurrency

After studying in detail about the blockchain, cryptocurrency and NFTs we can now assess the implications of the following in the Digital Economy. Earlier, monetary transactions were made through central banks. Now, with the evolution of cryptocurrency, the scenario has changed. The power that was vested in the central banks is now in the hands of the masses. This transfer of power is due to the various advantages offered by cryptocurrencies. Whilst these have been discussed previously, one of the most important is that all network participants have access to the information stored in the blockchain system, thus providing full transparency (Dave, 2021). Also, given cryptocurrencies offer zero transaction cost, this makes them more attractive to use than traditional money. With the growth of these digital currencies, economic power can be challenged by the people. Thus, Cryptocurrencies have led to the emergence of a new market.

But while there are many advantages there are a few disadvantages to this technology too. It requires an immense amount of energy to mine cryptocurrencies off the blockchain. For example, it takes approximately 1544 kWh of power to mine 1 bitcoin - this is the power consumed by an average US household in 53 days! (Gonzalez, 2021). This brings us to another disadvantage which is the high cost required to use this kind of energy - mining one bitcoin costs approximately \$7778 (Tandan, n.d.). Additionally, in a blockchain, data is immutable. This can be considered a disadvantage since if there is a faulty entry, it cannot be deleted or modified. Another drawback is the inefficiency of using a blockchain. This is so because several networkers would be trying to mine cryptocurrency while only one of them will get rewarded. The other users would have basically wasted a lot of energy to try and mine a coin. In this way, the blockchain is inefficient (Lumb, 2016).

Conclusion

In recent times, blockchain technology has advanced greatly and come into the limelight. The blockchain forms the basis of cryptocurrency and various other financial instruments such as NFTs. But the use of the blockchain is far more than just in the finance industry. One of the other industries it's popularly being used in is the sports industry. In this paper, we look into the example of football, which helps us understand the future implications of cryptocurrency on the digital economy and society.

Most simply put, blockchain is a shared immutable ledger in which data is stored in the form of blocks. As evidenced, one of the biggest uses of blockchain is in the financial sector with cryptocurrency being the most prominent. Whilst a few of the famous cryptocurrencies are Bitcoin, Ethereum and Binance coins, this paper particularly elaborated and discussed Bitcoin and Ethereum. For example, the Ethereum blockchain is being used to make NFTs, which are unique cryptographic tokens that exist on the blockchain and cannot be replicated. The discussion in this paper also focuses greatly on the use of cryptocurrency in the football industry. Examples of how players have started to take part of their payments in cryptocurrency and how the top football teams have created fan tokens were analysed.

On the basis of all research presented, it can be concluded that blockchain technology has facilitated the growth of cryptocurrencies to a great extent as we have seen crypto now being widely used in mostly all industries. Furthermore, it is quite evident that the world is now shifting towards a digital economy and transactions in the future are likely to be made mainly using cryptocurrencies. This of course has several implications such as zero bank commissions, more security of data etc. However, potential drawbacks do also exist in the form of the heavy cost of the energy required to mine cryptocurrency which then harms the environment as a whole.

On the whole, even though the future of the economy seems to be these digital currencies, something still has to be done about the environmental and sustainability issues regarding the mining of crypto.

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