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Explain the definition, commercial uses and legal implications of Blockchain on the music and entertainment industries.

Blockchain has evolved to be a popular technology nowadays and continues to be with great potential among the top organizations. The adoption rates of blockchain technology are increasing in different industries, not only among financial organizations but also to the government or other commercial uses.

To explain Blockchain in a nutshell, this is a distributed digital database that can store data of any kind. The data/transaction is then shared among the different nodes of a computer network which means rather than holding all the information in one central location, information is stored in multiple computers across a network, and each "node" got an identical copies blockchain database. With this, the data is stored immutably in chains, making tampering with documents difficult.

Blockchain technology was introduced back in 1991 when scientists, Stuart Haber & W. Scott Stornetta mentioned a system using a chain of blocks to store time-stamped documents to prevent documents from being tampered with. (Software Testing help, 2022)

Satoshi Nakamoto first discussed the first decentralized Blockchain in 2008, which has improved the design by using a Hashcash-like method to time-stamp blocks without requiring them to be signed by a trusted party. (Wikipedia, 2022)

What makes a blockchain database different from a typical database is how the data is structured and stored. A blockchain collects information into groups, named as blocks. Each

block contains a cryptographic hash of its previous block and transaction data. When information is filled in each block, it is closed and linked to the previously filled block by using the previous hash, forming a chain from which the name of Blockchain is coming. When the data in the blocks is filled, and blocks are linked together, an exact time stamp is given, and it will be irreversible. Besides, the information inside the Blockchain is difficult to modify, which is also called immutable since the data in any given block, once recorded, is difficult to alter without changing the information of all subsequent blocks.

Another feature of the Blockchain is the decentralized nature, where the peer-to-peer network, on one hand, creates redundancy, but it maintains the fidelity of the data stored. If a bad actor would like to alter a record at one instance of the database, the other nodes in the network can cross-reference with each other since they also maintain an exact copy in their database; therefore, it will easily pinpoint the node with the incorrect information. This system helps establish an exact and transparent order of events, and no single node within the network can alter information held within it.

Despite all the complexity of using Blockchain, the advantages of Blockchain are not only to be seen as just using it as a decentralized digital database. It also enhances greater user privacy, higher security & transparency, lower cost etc., to name a few. However, there are also disadvantages to using Blockchain.

Benefits of using Blockchains

1. Accuracy & security

Due to the decentralized nature of the Blockchain, all the transactions are needed to be verified by a network of thousands of computers. This can remove most of the human

involvement, thus reducing human error and enhancing accurate information records. This can also minimize the tampering with information since the changes can only be made to one copy of the Blockchain, which can be easily pinpointed from other computers and would not be compromised.

2. No need for intermediaries, thus reducing cost

The direct transaction between two parties when using Blockchain eliminates the use of third-party to verify the authenticity of the transaction, thus saving time & cost.

"It has the ability to bring greater efficiency to all digital commerce, to increase financial empowerment to the unbanked or underbanked populations of the world and to power a new generation of internet applications as a result," says Sarah Shtylman, fintech and blockchain counsel with Perkins Coie. (Rodeck, Schmidt, 2022)

3. Efficient transaction

Blockchains operate 24 hours a day, 7 days a week & 365 days a year, implying transactions can be completed in a more timely & efficient manner. This is particularly important for works that need to be conducted in different time zones, which usually take a long time.

4. Transparency

In the case of Bitcoin's Blockchain, its decentralized nature, each node has its own copy of the chain information, which means all transactions can be viewed by anyone who has a personal node or through the use of blockchain explorer. As a result, the records stored in Bitcoin Blockchain can preserve transparency.

Drawbacks of Blockchains

1. High Technology cost

During the transaction validation processes in Blockchain, it consumes more electricity because of the power needed for each computer. This makes the blockchain-based transaction more expensive, and it also creates significant carbon emission, which is hazardous to the environment.

2. Limitation on speed

Since Blockchain relies on a more extensive network to approve the transactions, its transaction speed will be limited, making Blockchain's scalability a challenge.

3. Illegal activity

While confidentiality on the Blockchain network protects the user and adds more to privacy, it also makes it more attractive to criminals whose transactions are harder to track.

Although the Blockchain concept emerged as a foundation for the cryptocurrency bitcoin, there are many other cryptocurrency systems nowadays running on Blockchain. Blockchain technology, which can now transfer value digitally without any middleman or risk of duplication because ownership is immutable and provable, is being applied in new ways every day. Industries including financial services, retail, legal system, healthcare, government, supply chain etc., are undergone a transformation, hoping to reshape their existing business models and create entirely new economic and social systems.

In this instance, what is the impact of blockchain technology on the music industry? There are a lot of stakeholders in the music industry, including songwriters, recording artists,

producers, record labels, streaming services providers, etc. They all face different challenges when dealing with varying stages in the music industry's value chain.

With the flourishing growth of the internet nowadays, which music can be streamed and downloaded in just a few seconds, the payment of the song is not as quick as the download speed, and it is also not transparent.

The major challenge for creatives - such as songwriters, producers and musicians in the music industry is that they always get the least information about their track. They often do not know if they are being paid fairly due to the unclear royalty calculation, the payment to them is slow partly due to the existence of a middleman, and they even might not get paid at all. Besides, artists do not get access to data about where and how their songs are being used. They also do not know if their digital files have been tampered with by others who would like to get rid of the royalty payment. Moreover, the fans do not have the incentive to promote their favourite artists due to the lack of transparency between them & the artists.

With the help of blockchain technology, it now offers transparency through the value chain. Musicians and managers will know and track precisely how much royalties they should be paid. Significant funds or royalty will then be paid to the correct party and not end up in a "black box" The technology could help locate and identify a real copyright holder and help the copyright holder track derivative works through the value chain.

Blockchain can locate the copyright holder & track any tampered work. With the use of a smart contract, it further allows the music royalties to be paid in a fast and frictionless way without the interference or the existence of a middleman. Revenue, no matter it is from a

stream or download, could now be distributed automatically between rights holders, according to the contract, as soon as the track is downloaded or streamed, thus simplifying the overall music business. This would create a peer-to-peer ecosystem for artists that enable them to control their fate and receive fair compensation for the value they create.

Another problem in the music industry now is that there is no global database of music works, thus limiting the tracing of copyright information. Blockchain has the ability to provide a quicker and seamless experience for anyone involved with creating or interacting with music. By embedding information like the contact details of the copyright holders, terms of use, etc., it can be pretty easy to locate the music owner and obtain the license of using it, which ultimately leads to the creation of a networked, comprehensive copyright database.

The low transaction costs of cryptocurrencies make micropayments feasible. This is specifically useful in the streaming business, given the small size of typical payments.

Last but not least, Blockchain allows musicians to tap into another kind of artist revenue. ANote Music, a blockchain company, allows users to invest in music royalties by buying or selling royalty shares on a secondary market. Ujo allows users to sell digital badges that support the artist and act as "collectable" items.

Nowadays, many new blockchain companies exist that can effectively reward both musicians and music fans while cutting out the time and cost held and spent by traditional high-cut middlemen. Some top music blockchain companies in the world in 2022 include :

1. Audius

2. Opus
3. Mycelia
4. Ujo Music
5. eMusic
6. OnChain Music
7. Inmusik
8. MediaChain
9. Musicoin
10. Blokur

(Daley, 2022) (Brown, 2021)

Audius (<https://audius.co/>) was founded in 2018 and had 7 million monthly active users, making it the most significant consumer blockchain app. Audius is also a fully decentralized streaming platform owned and operated by a community of artists, fans, listeners, developers, and API worldwide.

Audius listens to what artists and fans want, gives artists the power to share new music and monetize streams directly. After artists upload their content onto the company's platform, it will then generate time-stamped records to ensure that all work is correctly recorded. Audius eliminates the need for third-party platforms by connecting artists directly with consumers, and it uses Blockchain to ensure that artists get paid fairly and immediately via smart contracts.

In August, 2021, Audius was the first Digital Streaming Platform to launch with Tik Tok Sound Kit. With this implemented, tracks can then be played behind their own videos and chosen by the entire Tik Tok community. (Groove Cartel, 2021)

OPUS (<https://opus.audio/>), founded in 2018, is a decentralized music-sharing platform using peer-to-peer networks under blockchain technology to guarantee fair compensation for artists, transparent and reliable payment rules, and extensive music content stored by the community. OPUS leverages the Ethereum network as a payment layer. It pays the artist directly upon the purchase or stream of a song through smart contracts. While many popular streaming platforms provide artists with less than 20% of the streaming revenue, which must then be further divided between the artist's team, the expected income on OPUS revenue is 90% and above. (Jia, Xu, Mach, 2018)

Besides, the platform is based on the Ethereum blockchain with tracks stored on the Interplanetary File System (IFPS), a P2P network for file sharing and storage where users of the network also act as servers to reduce server costs drastically.

Last but not least, the platform encourages music discovery even further by allowing users to receive a share of royalties for creating playlists that help spread music throughout the platform. (Madeira, 2020)

Mycelia (<http://myceliaformusic.org/#about>) is a research and development hub for music makers and also a collective of artists, musicians and music lovers looking to empower creatives in the music industry.

Mycelia primarily wants to run an entire database on Blockchain to ensure that artists are paid fairly and acknowledged fully & quickly. Through the company's Creative Passport, a digital database to contain complete information about a song, including IDs, acknowledgements, business partners, and payment mechanisms, to make sure all contributors are linked and treated fairly.

Ujo Music (<https://blog.ujomusic.com/>), founded in 2015, is a New York-based company created by Jesse Grushack. It lets artists create, publish, license and distribute music and get compensated for it under the Ethereum network. The platform allows the artists to upload their works and earn 100% of their sales and tips with a fee and automatically split payments with collaborators of each project.

The decentralized platform can detect music ownership easily and pay the artist in time through smart contracts and cryptocurrencies.

Last but not least, Ujo allows users to sell digital badges that support the artist and act as "collectable" items, which has become one of the most popular applications for non-fungible tokens.

With the emergence of more and more Blockchain companies, Blockchain technology has grown in importance and has made significant progress in its adoption in different industries in recent years. According to Deloitte's 2021 Global blockchain development Survey, almost 76% of executives surveyed said they expect digital assets will be a solid alternative to fiat currencies for global finance in the next 5–10 years. (European Business Review, 2021)

It also implies the world needs to get prepared for a step change/revolution in both financial & social sectors in ways of how we process the transaction, deliver services or manage data. The popularity of using Blockchain technology affects the music industry in several aspects. It **increases the incentive** of the artists when they are planning to create their own works or even their own business. Through the use of Blockchain, artists now do not need to rely heavily on record labels or intermediaries. They can better track their works, obtain quicker & fairer payment, have more transparency etc. All of these incentivize the artists to create different kinds of music.

Besides, Blockchain helps **promote remix culture**. This technology, especially in the application of NFTs, facilitates the combining or editing of content to produce new, derivative content, which record labels will never embrace in the past.

Moreover, blockchain technology also "**reinvents**" **the music collection**. An example is a company like Ujo, which allows users to sell digital badges that support the artists and act as "collectable" items.

However, in order to be successful, Blockchain still needs to overcome a lot of barriers before it can have wide adoption.

One of the questions will be about its extent of protecting the copyright. Is Blockchain really, as it said, able to capture all the illegal use of copyright and pay the artists in return?

Actually, with the current technology, Blockchain is still not able to capture images used in media like YouTube videos or materials shared on social networks (which are encrypted).

Therefore, it will provide an illusion to the artist about complete copyright protection.

Besides, people are still sceptical about the stability of cryptocurrencies, and their inefficient technological design imposes another barrier to broader adoption. Gwyneth, a software engineer, in her article about the top 10 Blockchain adoption, pointed out that coding flaw or loophole is still one of the significant drawbacks in cryptocurrency design. (Iredale, 2021)

Another reason for blocking the future of Blockchain is the lack of knowledgebase. Although it is being implemented in more and more different industries, the majority of the public is still not aware of its existence and potential use.

Not until after wide education or a good marketing campaign, people will not have enough knowledge to understand, not even to think of using it. It is further aggregated by the fact that, in the music industry, Blockchain cannot get those "majors" on board or involve big music companies, thus affecting its scalability.

It is clear that Blockchain has enormous potential to grow in different industries even though it currently remains a niche technology. Sarah Shtylman, fintech and blockchain counsel with Perkins Coie, comments on Blockchain as the "early stages of the internet". *"It took about 15 years of having the internet before we saw the first version of Google and over 20 for Facebook. It's hard to predict where blockchain technology will be in another 10 or 15 years, but much like the internet, it will significantly transform the ways we transact and interact with each other in the future."* (Radeck, Schmidt, 2022)

Let's keep our eyes open to see the evolution of Blockchain and hope it can successfully give power back to the creators and their listeners. (2733 words)

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