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ABSTRACT

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Abstract

As blockchain technology continues to evoke interest and engagement across companies, organizations, industries, and governments, the desire to integrate the technology is evident. The discussion around blockchain often implies promises of decentralization, transparency, and disruption. The music industry specifically has been noted to potentially gain from the implementation of blockchain, making it a great context for exploration: the industry is constructed of multiple stakeholders with complicated and often dysfunctional connections. This research aims to understand how blockchain is utilized in the context of music industry. It distinctively tries to understand the technical structure of the applied blockchain, the implications to business logic and structures, and lastly the long-term intersection of blockchain and the music industry.

This research was conducted as a qualitative multiple-case study. With an inductive and intensive approach, the objective was to explore the use of blockchain in a holistic nature from the perspective of each case. The empirical data was collected from secondary whitepapers published by each case company. Each whitepaper detailed the technical and the business structure as it pertains to blockchain. The data revealed how blockchain governs engagement and the positioning of each stakeholder in the ecosystem and in relation to each other in the presence, or lack thereof, of blockchain.

It was concluded that blockchain can be utilized in varying ways and to varying degrees. The consequential effects can be observed in the governance, structure, and business logic of each case, which this research showcases in detail. While this research was able to provide differing possibilities for use, it could not provide evidence of blockchain being mature enough for mass adoption, supporting arguments presented in previous research and theory.

Key words	Blockchain, music industry, tokenization, token economic model, DAO
Further information	

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Tiivistelmä

Blockchain-teknologian noustessa yhä tunnetummaksi, monen yrityksen ja tahon tavoitteena on tutkia tämän teknologian hyödyntämistä. Musiikkiteollisuus on erityisesti mainittu sopivan kyseiseen integroimiseen: musiikkiteollisuudessa on monia sidosryhmiä, joiden välillä on monimutkaisia ja usein ongelmallisia suhteita. Tämän tutkimuksen tavoitteena on ymmärtää blockchain-teknologian käyttö musiikkiteollisuudessa. Ymmärrys ulottuu tekniseen hyödyntämiseen, liiketoiminnallisiin seuraamuksiin ja musiikkiteollisuuden ja teknologian pitkäaikaiseen risteytymään.

Tutkimus suoritettiin laadullisena monitapaustutkimuksena, jonka tarkoituksena oli kerätä kokonaisvaltainen ymmärrys blockchain-teknologian käytöstä jokaisen tapauksen näkökulmasta. Empiirinen data kerättiin sekundääriaineistosta, josta tuli ilmi jokaisen tapauksen tekninen ja liiketoiminnallinen malli. Aineistoa lähestyttiin induktiivisesti ja analysoitiin intensiivisesti. Tulokset paljastivat kuinka blockchain-teknologia ohjasi kanssakäymistä ja miten eri sidosryhmät asennoituivat teknologiaan ja toisiinsa nähden.

Teknologiaa hyödynnettiin eri tavoilla ja eri laajuudella. Teknologian seurauksena jokaisessa tapauksessa ilmestyi huomattavia eroja tapausten hallinnoinnissa, rakenteissa ja liiketoiminnan logiikassa. Tämä tutkimus erittelee tarkasti jokaisen tapauksen tekniset yksityiskohdat ja niistä seuraavat edellämainitut erot. Johtopäätöksenä kuitenkin todetaan, että tutkimuksessa esiintyvät tapaukset ovat vielä kehittymisvaiheessa, eivätkä voi näin puoltaa teknologian olevan valmiina täysmittaiseen adoptioon. Tämä osaltaan tukee teoriassa esiin tuotuja väitteitä teknologian epäkypsyydestä.

Asiasanat	Blockchain, music industry, tokenization, token economic model, DAO
Muita tietoja	

UNIVERSITY
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Economics

CONCEPTUALIZING BLOCKCHAIN IN THE MUSIC INDUSTRY

Master´s Thesis
in International Business

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1 INTRODUCTION

Blockchain is perceived as one of the top polarizing technologies in the recent years. While the technology is straight-forward, there are a lot of discussions about its potential to disrupt industries. While these claims are future-oriented, the race to implement this technology is evident in the practical world. (see O'Dair, Beaven, Neilson, Osborne & Pacifico, 2016, 6-8.) In order to gain an understanding of how blockchain can be implemented, this study will research how blockchain is used in the music industry, what kind of effects it imports, and what the future outlook of blockchain and music is.

This chapter introduces the thesis by explaining the background of the study and creating an introduction to the theoretical and empirical data. First, the main concept of this thesis, blockchain, will be introduced. Sub-chapter 1.2 follows by defining the purpose of this study and presenting the sub-questions.

1.1 First impressions of Blockchain

Blockchain is a distributed ledger system created in 2008 by Satoshi Nakamoto. It introduces a core idea where people can interact peer-to-peer and perform transactions that are documented on a blockchain. The entries become permanent and are verified collectively by other participants. The ledger maintains itself independent of any organisation or entity. The information is transparent, pseudo anonymous, and permanent which adds certain characteristics that are novel compared to traditional ledger systems. (Nakamoto, 2008.)

This system can be utilized in multiple industries and its first proof-of-concept is Bitcoin. Bitcoin is a cryptocurrency that is transacted peer-to-peer, powered by individual miners, and is not owned or controlled by a specific government, non-governmental organization (NGO) or financial institute. The attributes of blockchain make it ideal for exchanging ownership: people holding the cryptocurrency are holding equity of Bitcoin. In a more general perspective, people holding a token (equity) are holding partial ownership of the ledger system (asset). (Nakamoto, 2008, 1-8; Tapscott & Tapscott, 2016, 5.)

Following the creation of Bitcoin, Buterin (2014) introduced a newer generation multipurpose blockchain, Ethereum. In this version, users can create their own arbitrary smart contracts. A smart contract is a predefined contract with a set of rules that are effective immediately whenever parties transact and interact with each other. This has enabled a creative wave of alternative business models and ecosystems where actors engage based on their self-interest. These models include but are not limited to exchange of utility, ownership, services, and value. (Buterin, 2014, 13-15; Tapscott & Tapscott, 2016, 5-6.)

From inception, blockchain has been relatively provoking, evoking emotions ranging from excitement to fear. Some have been sceptical, scrutinizing the excitement and commotion. Many are taking on the task to not only understand the technology but to also bring it to their domain. Regulators and government bodies are also joining in the expedition. (PwC, 2015, 1-2; Silver, 2016, 56; Tapscott & Tapscott, 2016, 5, 18-19, 203-207; O'Dair et al., 2016, 19-22; Burton & Barnes, 2017, 6; Jackson, 2017; Litan, Groombridge, Healey & Leow, 2019, 2.)

As noted by Litan et al. (2019, 1) "Blockchain projects provide value when multiple entities in an ecosystem require a shared, single version of the truth and no single entity is in control". The value chain of recorded music is characterized as having many stakeholders with each having a relationship of varying complexity, and in some cases a lack of relationship. This has exposed inefficiencies in the external value chain. (Hosoi, Kim, Stainken & Caro, 2015, 2-3; O'Dair et al., 2016, 11; eMusic, 2019, 7.) As such, the music industry presents itself as an interesting context where the effects of blockchain can be observed.

After a brief preliminary literature review, it became evident that the music industry faces many difficulties related to data management and royalty payments. Many papers focus on solving these issues. This research focuses more on creative applications that bring something new to the fold. Furthermore, previous literature tends to skip the technical introduction of their cases. It is of the intent of this research to provide a detailed description of the technological application, therefore, deepening the technical understanding of the implementation of blockchains in the context of the music industry.

1.2 Research purpose

While the technology is straight-forward, the process of implementing blockchain is a creative exercise. An ideal environment for this technology is one where many parties are involved in a complex process of producing and delivering a digital product or service. As the core idea of blockchain is to enable independent parties to engage and transact in a safe and direct manner, blockchain could present interesting proposals for the music industry. Whether these proposals are alternatives to existing protocols or introductions of new ones, *the purpose of this research is to uncover how this technology integrates into the music industry*. Since the topic of this research is broad, the scope will be limited to creating a comprehensive overview based on three case studies.

The sub-questions are formulated as follows:

- How is blockchain currently used in the music industry?
- What attributes of blockchain are utilized in the music industry?

- What is the future trajectory of blockchain in the music industry?

The first question will give a general overview of the current state in the industry. The objective is to understand the technical structure of blockchain and conceptualize the practical implementation of the technology. As such, this thesis will have a technical foundation which will serve as a core focus throughout the research.

The second question aims to understand how the technological attributes interact and engage with the music industry. This will have a business and business model related focus. By extension, an understanding can be formed about how blockchain can be integrated to any given industry.

The final question helps understand how the industry has aligned itself with the technology and how it is seen to develop the industry further. This is a more holistic future-oriented perspective. As mentioned above, this research will have a technical and a business-related standpoint. By extension, legal and regulatory discussions fall outside of the scope.

2 BLOCKCHAIN – FROM INCEPTION TO BUSINESS

This chapter will outline the theoretical framework of the thesis. In order to understand the implementation of the technology, it is imperative to understand the underlying function. Thus, the theoretical framework will be technically dense. First, the origin of blockchain is addressed in the first sub-chapter (2.1.1). The mechanism will be explained in greater detail in the second sub-chapter (2.1.2). Third, the understanding of the mechanism is developed, and a deeper dive will be taken into how the mechanism translates into attributes. This is done in sub-chapter 2.2: relevant attributes are presented, and their implications are discussed.

Sub-chapter 2.3 will have a larger business standpoint. It will explain a developed blockchain, Ethereum, and how it is applied from a business model and a business logic perspective. While many blockchains exist, with each being a variant and having its own characteristics, for the purpose of this research only Bitcoin and Ethereum will be expounded on.

2.1 Code is law

As commerce over the internet with unknown parties requires trust, third parties such as financial institutions have been instrumental in establishing trust and mediating payments. A core function of the mediating central authorities is to facilitate accountability and verify each payment, eliminating the possibility of double spending. Double spending is the notion that a specific amount has been used in multiple transactions resulting in fraud. (Nakamoto, 2008, 1-2; Tapscott & Tapscott, 2016, 3, 11, 30; Burton & Barnes, 2017, 6; Zheng, Xie, Dai, Chen & Wang, 2017, 558.)

As an alternative system to central authorities, Nakamoto (2008) sought to create a decentralized, autonomous, automatic, and an independent system that would process payments in peer-to-peer transactions. As such, trust would be facilitated by cryptographic proof, which is the core function of the consensus method in Bitcoin and subsequent blockchains. (Nakamoto, 2008, 1-8; Litan et al., 2019, 2.) The subject of cryptographic proof will be further elaborated on in sub-chapter 2.1.2.

2.1.1 The genesis of Bitcoin

The proposition that Nakamoto presented is a system called Bitcoin. While in the publication Nakamoto only uses the word Bitcoin to introduce his idea, his idea is understood and separated into to two individual entities: Bitcoin and blockchain. Bitcoin is the name of the first system and blockchain is the underlying mechanism or technology that powers Bitcoin. The technology has been introduced as an open source code, meaning it is accessible by everyone. Anyone can download it and develop it to their own purposes, in fact, Bitcoin has been widely adopted and replicated in small variations with each baring their own name. (Buterin, 2014, 1, 4; Tapscott & Tapscott, 2016, 5-6.)

According to Tapscott and Tapscott (2016, 6-8) it is the technology behind Bitcoin that can prove valuable in different ways. It introduces novel and favorable ideas over the traditional payment systems. Furthermore, armed with these specific characteristics, blockchain has the potential to enable tokenizing not only money but other assets, in other words, other assets can be attached to a token. It also enables keeping record of a plethora of important things. (Buterin, 2014, 10-13; Tapscott & Tapscott, 2016, 6-19; O'Dair et al., 2016, 6.)

> *This new digital ledger of economic transactions can be programmed to record virtually everything of value and importance to humankind: birth and death certificates, marriage licenses, deeds and titles of ownership, educational degrees, financial accounts, medical procedures, insurance claims, votes, provenance of food, and anything else that can be expressed in code.* (Tapscott & Tapscott 2016, 7)

Bitcoin is not the first concept of a decentralized digital currency – few concepts were made including the e-cash protocols in the 1980s, and b-money in the 1990s. However, they were challenged with solving the double spending problem without involving third parties, as well as facilitating transparency and privacy. (Buterin, 2014, 4; Tapscott & Tapscott, 2016, 4.) In order to facilitate trust in transactions and in the system, blockchain utilizes a process called proof-of-work (PoW). This is an underlying process where transactions are verified by the whole network, thus achieving consensus. The process recognizes the order of transactions and verifies the first one, effectively eliminating the threat of double spending. (Nakamoto, 2008, 1, 3; Buterin, 2014, 6; Tapscott & Tapscott, 2016, 30-31.) The next sub-chapter (2.1.2) explains the process in detail.

Anyone can participate in a blockchain. The protocol has three actors: a sender, a receiver, and a miner. A miner is a person that voluntarily provides computational power in order to solve the complex calculations required by the system, and in turn is rewarded equity in the protocol, for example a Bitcoin miner is rewarded a predetermined amount of Bitcoin. These computational entities are referred to as nodes. In addition to providing resources, each node stores the transaction records, and maintains a copy of the blockchain. In other words, blockchain is a system that is simultaneously functioning on all nodes at the same time. (Nakamoto, 2008, 5; Buterin, 2014, 7, 9, 32; Tapscott & Tapscott, 2016, 6, 30-33; Zheng et al., 2017, 559.) As of September 2020, there are over 7 000 nodes operating in the Bitcoin ecosystem (Bitnodes).

2.1.2 Proof-of-work consensus method

The proof-of-work method is essential in coordinating consensus and maintaining the system. This process is one of many different consensus methods, however, for the purpose of this research, only this method is focused on. For reference, Zheng et al. (2017, 559-561) present different consensus methods, discuss their implications, and compare their attributes. Other consensus methods include Proof-of-stake (PoS), Proof-of-activity (PoA), Proof-of-capacity (PoC), Proof-of-storage (PoS), Delegated proof of stake (DPOS), Practical byzantine fault tolerance (PBFT), Tendermint, and Ripple (Tapscott & Tapscott, 2016, 32; Zheng et al., 2017, 559-561).

The proof-of-work process flows as follows. All transactions are public. Every ten minutes, transactions are collected into clusters called blocks and each block is processed separately as opposed to each transaction processed separately. If double spending occurs, only the first transaction is included in the process. (Nakamoto, 2008, 2, 5; Buterin, 2014, 2, 6; Zheng et al., 2017, 559.)

In addition to the data of transactions, each block has three figures: a hash, a nonce and a previous hash ('prev' in figure 1). A hash is an existing value that changes every time some information is added or changed within a block. A nonce is a value that nodes must calculate in order to verify the block. The objective is to find the correct nonce (key) that will give the hash the correct value (close the lock). The nodes calculate the nonce again and again until the correct one is calculated, exposing the correct hash, and subsequently gaining a reward for solving the calculation. This trial and error-based process called mining is computationally intensive and takes a lot of time. The intensity is deliberate and is designed to protect the network from outside attacks or manipulation. The probability of finding the correct nonce is predefined and adjustable. The process of finding the correct calculation can be likened to solving a puzzle. (Nakamoto, 2008, 3; Buterin, 2014, 6-8, 32, 46-47.)

As illustrated in figure 1, once the correct nonce is calculated, the block is verified by other nodes and the hash moves to the next block and becomes "the previous hash" of the next block creating a link between all the following blocks, hence blockchain. If the information within a verified block is changed or tampered with, it will change the hash of the block and all of the following blocks, breaking the chain between the blocks. The sequencing of the blocks creates a system full of interlinked blocks that are sensitive to many forms of manipulation. Once a compromised chain is found, it will be deleted and replaced with a valid one. (Nakamoto, 2008, 3-4; Buterin, 2014, 6-8, 10; Zheng et al., 2017, 558.)

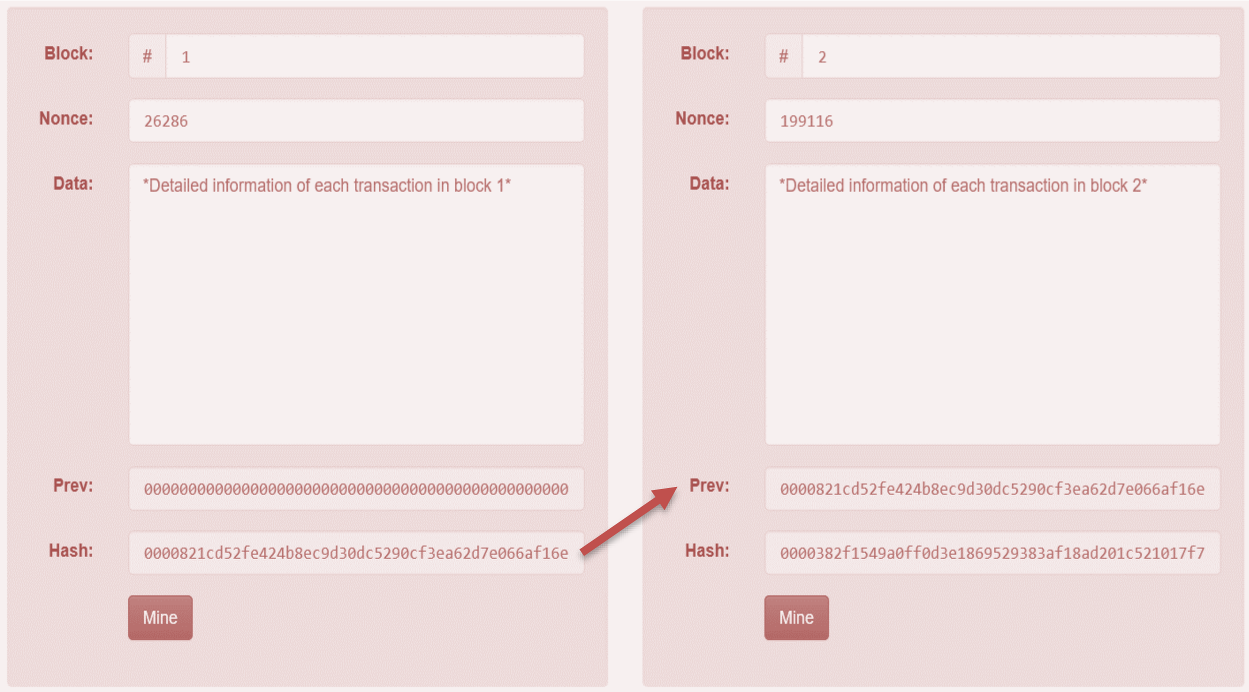

Figure 1 – A visual illustration of a block and their sequencing (Brownworth, 2020)

As mentioned above, when a block is verified it is also updated to each version in each node. This creates a network of many functioning and running particles of the blockchain. Interestingly, while the process of calculating the nonce (mining) is difficult and economically compensated, the process of double-checking that previously calculated nonces are correct can be done very quickly and easily. This enables the system to not only be robust but to also keep surveillance of validity and inject credibility. (Tapscott & Tapscott, 2016, 30-32.)

2.2 Blockchain attributes

Even though the technical side of blockchain was explained in the previous chapter, to deepen the understanding it is important to explain how the technical side translates into attributes and by extension, what kind of advantages, and shortcomings, are implied. In this sub-chapter, each attribute is introduced and discussed. The attributes consist of transparency, security, inclusion, speed, and scalability. While more attributes could be brought up to the conversation, the scope is limited to attributions that are relevant for this research. This excludes discussions on legality and legislation (De León & Gupta, 2017, 25-26). Additionally, dimensions such as governance will be introduced in subchapter 2.3.1.

As it comes to shortcomings, some of the issues can be worked around by altering the code and the consensus method. In fact, many of the different blockchain related currencies vary in terms of consensus method in order to adapt to different environments. (Tapscott & Tapscott, 2016, 32; Zheng et al., 2017, 559-561). For example, Litecoin and Ripple validate blocks in a shorter time, which enables faster transactions. Ripple, in turn, uses collectively trusted nodes to validate blocks, creating trust without consuming large amounts of energy on complicated calculations. (Tapscott & Tapscott, 2016, 257.) In any case, it is imperative to address such deficiencies and this is done in the following subchapters (2.2.1-2.2.3).

2.2.1 Transparency and security

Since the blockchain is public, anyone can see the transactions taking place. The transparency that blockchain introduces is essential to business operations. Poor transparency leads to distrust and hesitation. Additionally, the subsequent data from transactions are extremely valuable. If one entity gets to gather and hoard the data, that becomes influential leverage. (Tapscott & Tapscott, 2016, 10-13.) The consequences can be two-fold. On one hand, the leverage can be overwhelming, especially to less powerful actors in the value chain. On the other hand, lack of information is hindering stakeholders from making appropriate decisions regarding their products and their position in the market. (Tapscott & Tapscott, 2016, 228-230.)

Security can be separated to two different sections; First, the robustness of the system because of the consensus method. Second, the difficulty of unauthorized access to individual accounts based on cryptography. In other words to what was described above, in order to tamper with information of a block, an attacker has to figure out a nonce for the block and all the following blocks faster than the network can print new blocks or before the attack is discovered. As this would require immense computational power, it would be more attractive to support the network by providing computational power instead of attacking the network, as nodes supporting the network get a reward of Bitcoin and/or transaction fees for calculating the correct nonce. (Nakamoto, 2008, 3-5; Buterin, 2014, 7-10; Silver, 2016, 13; Tapscott & Tapscott, 2016, 24, 36-37; Zheng et al., 2017, 558.)

Another implication of the consensus method is that the system exists and functions in many nodes at the same time. Since there is no single point of control or point of failure, the system cannot be shut down. (Tapscott & Tapscott, 2016, 33; O'Dair et al., 2016, 6.) By extension of logic, even a temporary internet shutdown will only be a hinderance, since the information will be stored, intact, and waiting to operate again.

Every transaction has the signatures of the sender and the receiver. The signatures are pseudo anonymous which provides essential privacy within public transactions. (Nakamoto, 2008, 6; Buterin, 2014, 5-7; Zheng et al., 2017, 558.) These signatures consist of a public key and access to the account requires the corresponding private key. This heavy encryption paradigm protects accounts from unauthorized access and attacks. (BitFury Group, 2016, 8; Tapscott & Tapscott, 2016, 6-7; Zheng et al., 2017, 558; Eskandari, Clark, Barrera & Stobert, 2018, 9.) While the signatures do not reveal identity, they link every transaction to an account, making the privacy only partial. If the identity of the account is revealed, it would raise privacy related risks, such as the possibility for surveillance. (Nakamoto, 2008, 6; PwC, 2015, 5; Eskandari et al., 2018, 1.)

Finally, when it comes to wallets, having to remember a public and a private key that consists of a string of numbers can pose inconveniences. This can be perceived as a threshold for users. Furthermore, as the private key is the only way to access the wallet, losing the key renders the wallet unrecoverable. This lends itself to additional concerns such as permanently losing access and ownership of equity. (Tapscott & Tapscott, 2016, 257; Eskandari et al., 2018, 1.)

2.2.2 Global inclusion

For some communities, the infrastructure is not set up to enable access for all. This can be observed for example in the banking industry – some people may not be profitable enough for engagement. By extension, the same people lack access to the economy at large. In contrast, the access to internet is enough to access the blockchain, making it an accessible and inclusive network on a global scale. (Tapscott & Tapscott, 2016, 18, 50-52.) As explained in sub-chapter 2.3, tokenization allows a global audience to remotely invest in a plethora of assets and entities.

Another novelty is that inanimate objects and software can have an account effectively enabling them to recognize each other, collaborate, and transact with each other and with humans (Tapscott & Tapscott, 2016, 7, 22, 122). This is significant for supply chains and production processes, amongst other things. In the context of Internet of Things (IoT, a network of smart things that coordinate together), things can transact money and make autonomous decisions about, for example, buying their own electricity. (Tapscott & Tapscott, 2016, 7, 22, 38; Litan et al., 2019, 6.) As is the case in Bitcoin, a coin is devisable to multiple decimal places, making it possible to make very small transactions. This enables microtransactions, which is relevant in consuming small quantities of something and charging in small increments. (PwC, 2015, 7; BitFury Group, 2016, 9; Tapscott & Tapscott, 2016, 38, 152-154.) In addition, the notion of ownership of an asset by something other than a person or a legal entity has been obscure and novel, however, blockchain has been successful in ignoring personhood (Tapscott & Tapscott, 2016, 125-126). Tapscott and Tapscott (2016, 156-161) discuss how applying blockchain to smart things (IoT) can create unique networks in twelve different contexts ranging from waste management to health case.

2.2.3 Speed and scalability

As the process in blockchain relies on the consensus method, transactions are solely conducted based on algorithms and calculations. Since calculations can be made in a relatively fast speed, ranging from a minute to half an hour, the blockchain system presents a competitive alternative. (Griffith & Grigg, 2014, 2-3; Tapscott & Tapscott, 2016, 31-32.) Silver (2016, 11) notes that since transactions do not have to pass through a central entity, which serves as a bottleneck, transactions can be directed to take the quickest possible route.

In comparison, some transactions through traditional routes, especially international ones, may take an obscenely long time. In the case of remittances, the act of sending money overseas to family, it may take up to weeks, in addition to having hurdles and friction. Comparatively, having transactions process in minutes or an hour gives a tangible edge over traditional systems. (Tapscott & Tapscott, 2016, 20, 30.)

There are few reasons that serve as a bottleneck regarding scalability. First, as each node has to store transaction, the storage needed increases drastically. Second, Bitcoin has limited capacity to process a large number of transactions. “Scalability is essential to achieving adoption by a bigger public”. (Buterin, 2014, 33; Zheng et al., 2017, 561.)

> *…due to the original restriction of block size and the time interval used to generate a new block, the Bitcoin blockchain can only process nearly 7 transactions per second, which cannot fulfill the requirement of processing millions of transactions in real-time fashion.* (Zheng et al., 2017, 561)

In addition to scalability, existing capacity poses an issue stemming from necessary power consumption: due to the intense calculations by the nodes, the maintenance of the system consumes a substantial amount of electricity. As calculated by Stoll, Klaaßen and Gallersdörfer (2019, 6-9), the electricity consumed in mining Bitcoin creates carbon emissions equal to that of some countries. This raises questions regarding ecological sustainability.

2.3 Second generation multipurpose blockchain

This sub-chapter is dedicated to introducing the Ethereum blockchain. While understanding the Bitcoin model is essential in order to illustrate how the technology works, Ethereum will be elaborated on since it will introduce novel ideas that are essential from a business perspective. The technological difference is introduced first, after which the focus will shift more on business related applications. Finally, an understanding will be built about how tokens can theoretically facilitate engagements in an ecosystem.

2.3.1 Smart contracts on Ethereum

In order to extend the capabilities of Bitcoin, Buterin (2014) created another blockchain platform, Ethereum, which can be utilized for varying purposes. According to Tapscott and Tapscott (2016, 83) "Ethereum is the second-longest and fastest-growing public blockchain".

There are two notable differences between the blockchain technology of Bitcoin and Ethereum: smart contracts and token platform. (Buterin, 2014, 13-25; O'Dair et al., 2016, 6.) The former difference is that in Ethereum, a transaction can contain additional data and a transaction can evoke a response from the receiving party. Utilizing this, one can insert certain conditions and clauses within the transaction, which the counter party approves automatically through the act of transacting. In this sense transactions can represent a bilateral legal contract that becomes binding automatically. This means instead of transactions meaning just the exchange of equity (as in Bitcoin), transactions can mean an exchange of services, ownership, etc. Hence, a contract that is predefined, automated and automatic: a smart contract. (Buterin, 2014, 14-19; BitFury Group, 2016, 6; Silver, 2016, 4; Tapscott & Tapscott, 2016, 46-47.) However, there is skepticism regarding the legal scope of these contracts. For example, if parties from different jurisdictions are involved, in case of a dispute or violation, which jurisdiction will interpret and enforce the contract? (De León & Gupta, 2017, 25.)

The latter difference is the fact that Ethereum can function as a development platform. Essentially, instead of each user having to create their own blockchain from start, they can build an application on top of Ethereum and use Ethereum as a source of computational power. This enables users to create their own arbitrary multi-purpose applications that function as an independent blockchain. These applications will have conditions, characteristics, smart contracts, and states as designated by the developer. (Buterin, 2014, 13.) The flexibility of making one's own arbitrary contracts allows different developers to integrate the technologies and practices of their industries and disciplines into their own tokens (eMusic, 2019, 24; Litan et al., 2019, 7).

2.3.2 Decentralized and disintermediated organizations and ecosystems

Bringing all the previous information together, tokens can be explained. Tokens are mediums of exchange that can be coded. Depending on the coding, smart contracts can be embedded into tokens, making the token a medium for enforcing predefined contracts. Tokens can exist within a blockchain, however, some blockchains, such as Ethereum, enable building an additional token system as a layer on top of the blockchain.

Depending on the rules and conditions in the coding, tokens can represent a variety of things: a currency pegged to other fiat currencies or gold, equity of a company, property, intellectual property, coupons, full-scale employment contracts, or even “points” that are distributed to incentivize stakeholders. In other words, assets can be contractually embedded within tokens, meaning buying a token contractually gives the owner the right for a specified amount of a specified asset. In fact, an initial coin offering (ICO) is a way for companies to raise funds by selling a stake of their company through a token. (Buterin, 2014, 19; BitFury Group, 2016, 2, 12; Coinbase, 2016, 1; Tapscott & Tapscott, 2016, 7, 83.) However, it is argued that unless blockchain is used for exchange of information in a multisided network of independent entities, the added value is limited (Litan et al., 2019, 5, 7).

Centralized ecosystems have been necessary in the past – central authorities, such as banks, governments, companies, and organizations, drive business logic and enforce integrity. However, recent platforms, such as Airbnb and Uber, have exhibited a degree of decentralization. The service is created by an independent actor, but it is aggregated through a central authority. (Tapscott & Tapscott, 2016, 11, 17.)

The theme of decentralization can be advanced further, as explained in the next paragraph. While decentralization does not directly correlate with the aggregation of business logic enforcement to the outside, decentralization to independent actors creates a necessity for something to facilitate business logic. As noted by Tapscott and Tapscott (2016, 128), “Code and algorithms could replace a layer of representatives (i.e., the executive board), with shareholders exerting control over that code.”, implying that introduction of smart contracts can substitute traditional governance models. Just as Bitcoin sought to substitute the trust created by centralized financial institutions with code, smart contracts create the possibility of substituting the business logic of centralized businesses with code.

Utilizing tokens creates a possibility for innovative and novel ecosystems. These token systems are often referred to as a decentralized autonomous organization (DAO). DAOs can be likened to a traditional corporation or a value chain, however, the engagement is automated, the actors are unknown and decentralized but engage in a peer-to-peer fashion. DAOs can be characterized not only by their decentralization but also by their lack of intermediaries. Since the actors are independent, they act on their self-interests, which is notably different form an organization with a collective mission. Even with each following their self-interest, smart contracts facilitate mass collaboration by aligning everyone's incentives. This can be seen from miners maintaining the system, all the way to users contributing to the ecosystem. As the incentives themselves are visible to the public, transparency is increased in the system. (Buterin, 2014, 22-25; Tapscott & Tapscott, 2016, 5-6, 34-36, 48, 89.)

Buterin (2014, 22-25), among other examples, presents a DAO in the form of a file storage ecosystem: individuals can rent their hard drives and unused space for a specific amount of money. This is to say that when observing business models around blockchain, occurrence of decentralization and disintermediation is not scarce.

DAOs are not necessarily fully functioning independent blockchains. However, for the purpose of this research DAOs will be referred to as blockchains. In addition, the term DAO, and token systems can be used interchangeably in this research.

2.3.3 Blockchain structure and the engagement with business

In contrast to the traditional public blockchain, it is possible to create a public or a private blockchain. Also, it is possible to create a permissioned instead of a permissionless blockchain. In a private blockchain, limited participants can conduct transactions and access information regarding transactions. (BitFury Group, 2015, 10) This is valuable to operations where transactions or information is confidential, commercially sensitive or a trade secret (O'Dair et al., 2016, 13). In a permissioned one, participants must get a permission to be a node and process transactions, by extension making it a safer ecosystem (BitFury Group, 2015, 10; Tapscott & Tapscott, 2016, 67). Since the nodes are known and trusted, the consensus method does not have to facilitate trust, thus, not having to be as resource intensive (Silver, 2016, 3-4; Tapscott & Tapscott, 2016, 67). In addition, the ecosystem does not necessarily need incentives to drive business logic (BitFury Group, 2015, 12).

The blockchain can be permissioned and public at the same time. This can facilitate a system that enables different levels of access to different stakeholders. (BitFury Group, 2015, 10-11.) This flexibility enables centralized entities to have their own token system at the core of their operation while maintaining privacy and exercising control over participants, decisions, information access, and transaction confirmation, effectively preserving the centralized nature (Buterin, 2015; Zheng et al., 2017, 559).

A good example of a case that utilizes token systems to drive business logic while still maintaining the boundaries of a traditional company is ConsenSys. It offers tokens of all their projects to all of their employees. In a company culture that defines itself as a "hub" rather than a hierarchy, each employee chooses what project they want to work on. "Member ownership explicitly incentivizes this behavior". (Tapscott & Tapscott, 2016, 89-90.)

> *Identify the work to be done, distribute the load among the people eager and able to do it, agree on their roles, responsibilities, and compensation, and then codify these rights in "explicit, detailed, unambiguous, self-enforcing agreements that can serve as the glue to hold all of the business aspects of our relationships together"* – Joseph Lubin, cofounder of ConsenSys (Tapscott & Tapscott, 2016, 90)

It is evident that a token system can be engineered in altering ways ranging on one spectrum from public to private and on another spectrum from permissioned to permissionless. Recalling a statement from the beginning of this thesis, the technology is straight-forward, the process of implementing blockchain is a creative exercise.

3 MUSIC INDUSTRY AND BLOCKCHAIN

In this chapter, the context of this research is presented. First, sub-chapter 3.1 will introduce the recorded music industry and its relevant particles and their dimensions as it pertains to blockchain integration and utilization. Sub-chapters 3.2 and 3.3, in turn, address integration of blockchain in the music industry and present previous research. Finally, by dovetailing this and previous theoretical chapters, a coherent synthesis will be formed in sub-chapter 3.4 as illustrated in figure 3.

3.1 An overview of the music industry

In order to better understand the context of this research, this sub-chapter will briefly dissect the value chain of recorded music. This is done in order to understand different relevant particles and the relationships and key dimensions that govern interactions.

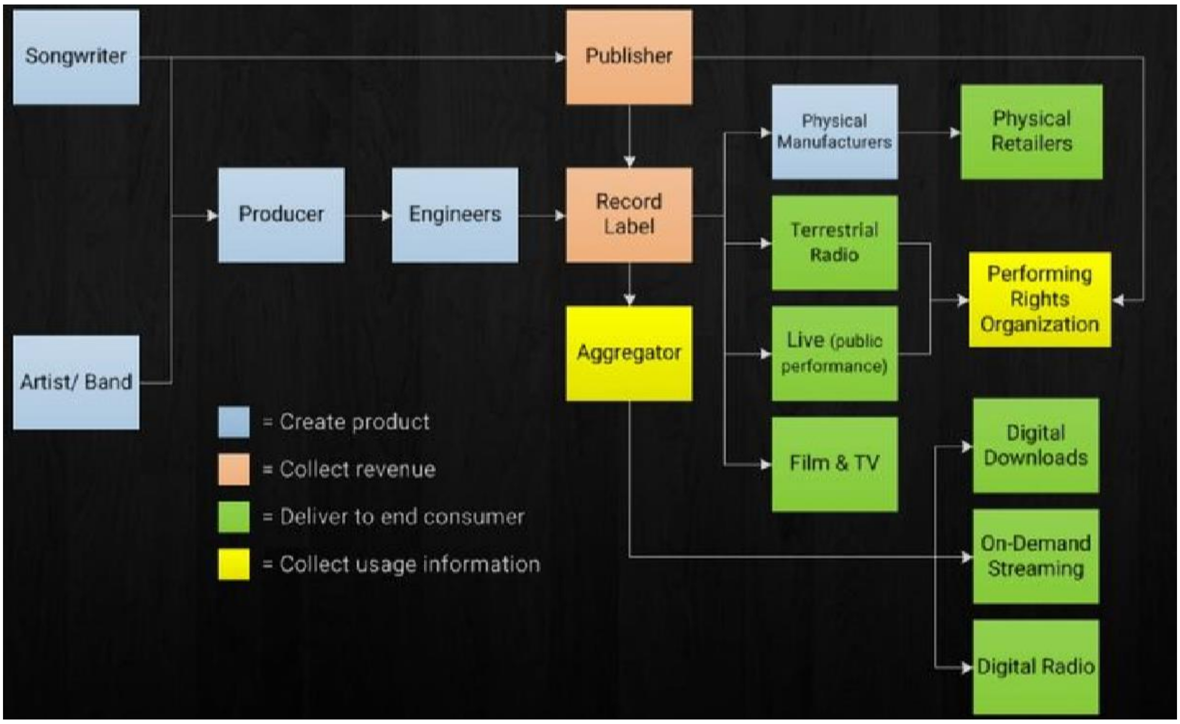

Figure 2 – Recorded music supply chain (Hosoi et al., 2015, 3)

The recorded music industry has traditionally involved many stakeholders (Figure 2). The value chain of recording music utilizes actors such as artists, record labels, distributors, streaming digital service providers (aggregators), publishers and performance rights organization (PROs). (Hosoi et al., 2015, 2-3; O'Dair et al., 2016, 11; De León & Gupta, 2017, 4; eMusic, 2019, 7.)

Songwriters, artists, producers, and engineers are at the core of production. It is noted that this group scattered and their leverage in counterparty negotiations is relatively weak. This can be observed in their consequential position within the industry. (O'Dair et al., 2016, 11; De León & Gupta, 2017, 4.)

Labels represent an artist and their musical assets. They are partially responsible for production, promotion and release of musical projects and often own the master copyright of the assets. By making contracts with the label or an independent artist, distributors make the music available on platforms of different aggregators. Aggregators, such as Spotify, provide streaming services for end-users. In figure 2, aggregators and distributors are illustrated as the same entity. Often, especially in this digital era, the value chain extends from labels directly to a streaming service. (Hosoi et al., 2015, 2-3; De León & Gupta, 2017, 5; eMusic, 2019, 7.)

PROs have traditionally been responsible for collecting royalties from establishments for public use of music. These establishments include restaurants, bars, radio stations and retail stores. (De León & Gupta, 2017, 6; eMusic, 2019, 7.)

A common point of pressure within the value chain is the lack of information transparency. As an example, due to the complexity of revenues structures from service providers, it is hard to determine revenues per song (Cooke, 2015, 5; De León & Gupta, 2017, 6, 9; eMusic, 2019, 10). These information asymmetries leave certain actors outside the knowledge pool of transactional information, revenue streams, and value proposition of each musical product. Thus, artists and producers alike are left confused about their revenues and usage data. For example, revenue streams are noted as being a summary of complex and opaque calculations that are hard for recipients to calculate and audit. (Cooke, 2015, 5, 11-12; Hosoi et al., 2015, 2; Rethink Music Initiative, 2015, 3; O'Dair et al., 2016, 3; Heap, 2017.)

Furthermore, revenue streams take a long time to reach the beginning of the value chain, while becoming more obscure in the process. In some cases, revenues may not end up to the right parties. This further exacerbates the fact that artists face major challenges with accessing capital and funding for their operations. (Cooke, 2015, 11; Rethink Music Initiative, 2015, 3-4; O'Dair et al., 2016, 11-14; De León & Gupta, 2017, 5; Heap, 2017.)

In addition, major record labels have been able to make lucrative deals where they offer aggregators access to their musical catalogue in exchange for guaranteed advance payments. These payments are left out of the revenue calculations for artists. In fact, record labels have enjoyed substantial leverage and are allocated an unproportionately large portion of revenues, up to 50 percent. (Cooke, 2015, 12; Hosoi et al., 2015, 2; Rethink Music Initiative, 2015, 4; De León & Gupta, 2017, 6; eMusic, 2019, 9-11.)

3.2 Blockchain disrupting or rearranging the music industry?

Although the value chain includes many intermediaries, each have traditionally added necessary strength to the structure. As quoted from De León and Gupta (2017, 5), intermediaries provide value in three different ways.

- Providing artists with access to recording equipment, operational support, branding and marketing, and sales channels.
- Monitoring and managing IP (registration and infringement).
- Monetizing IP by managing royalty payments (e.g., processing licensing fees)

However, technology has had a role in altering the need of intermediaries. Some argue that the introduction of internet has increased the need for intermediaries and their oversight (Merges, 2008; De León & Gupta, 2017, 7). Others argue the diminishing value brought by intermediaries in processes regarding production, marketing, and distribution (Hosoi et al., 2015, 2).

While research and application is still in its beginning, similar arguments can be seen regarding blockchain: while some (PwC, 2015, 6; see O'Dair et al., 2016, 6, 22) argue for the potential to disintermediate and decentralize, others (O'Dair et al., 2016, 16-22; Silver, 2016, 47; De León & Gupta, 2017, 24-25; Torbensen & Ciriello 2019, 10) argue that blockchain would introduce yet another intermediary, or at least maintain the need for existing ones. Baym, Swartz & Alarcon (2019, 412) argue that "business logic itself is neither logical nor immutable, so writing it into permanent blocks will raise problems of its own", suggesting that writing business logic and abstractions, such as fair use or parody in smart contracts and letting it drive business is remote, and at best requires high maintenance (Baym et al, 2019, 411-412; Graham, 2015).

Silver (2016, 58) also argues that for success to be achieved in this endeavor, operations have to "gain critical mass". This gives leverage for incumbent major companies. In the case of large companies applying blockchain, they will likely opt in for a permissioned version (Silver, 2016, 11). This further supports the perspective that a potential network would have a centralized authority overseeing the system and providing permissions. O'Dair et al. (2016, 17) argue that since using private and public keys may pose inconveniencies, a more practical application might be necessary. The quote below implies that the existing intermediaries and platforms will still operate as an aggregator to the end-consumer.

> *More widespread adoption may be dependent on blockchain technology becoming 'invisible', affecting the back end of music transactions rather than the user experience.* (O'Dair et al., 2016, 17)

If blockchain indeed would be used in the back-end, companies would have the access to account keys resulting in consumers' lack of access. This would consequently limit the consumer's control and power over the blockchain ledger which further supports the above argument of overseeing centralized authorities.

3.3 Use cases in the music industry

In any case, it can be noted that the introduction of blockchain can have meaningful effects on the industry (O'Dair et al., 2016, 16). Music related blockchain literature highlights the functionality of transparency: it enables stakeholders to observe the revenues cumulated by end-user consumption and how the revenues are distributed across actors. In addition, it can enable almost instant allocation and access to the revenues. This is a stark contrast to a traditional opaque pipeline of royalty flows. (Tapscott & Tapscott, 2016, 233-234; O'Dair et al., 2016, 8, 11.) O'Dair et al. (2016, 11) add the notion of a counterparty risk: while revenues proceed from an intermediary to another, they may become exposed to losses due to business failure. This can be eliminated utilizing blockchain.

Furthermore, transparency grants access to user data. Familiarity with this information would enhance decision making. (Tapscott & Tapscott, 2016, 233-234.) A potential and novel use case for utilizing information has been presented. Utilizing the transaction history of a wallet, peers can determine the credibility of other peers and entities. Silver (2016, 4) proposes a similar idea where identities can be established, validated, and tracked. This form of reputation system can enhance decision making when it comes to deal making between actors and peers in the value chain. (Silver, 2016, 4; Tapscott & Tapscott, 2016, 233-235.) While literature mentions that information asymmetry may result in increasing leverage for large actors such as labels, it is argued that transparency does not necessary result in higher negotiating power for smaller actors, such as artists (De León & Gupta, 2017, 23).

Literature also points out that blockchain can act as a tool for creators and owners to manage their rights and musical assets in an efficient manner. Records of rights information can be stored on a blockchain, while smart contracts can be equipped with conditions and terms of use that dictate who can use the asset and to what capacity. (Tapscott & Tapscott, 2016, 234, 238; O'Dair et al., 2016, 8-9; De León & Gupta, 2017, 23.) As noted by Baym et al. (2019, 408) "Instead of independent musicians or labels having to get music distributed everywhere, they could enter it into the blockchain where it would be available to all."

Coming back to transparency, it is challenging to track the proper owner and contributors of an asset since in some cases there are many uncomprehensive databases with potentially inconsistent information (Cooke, 2015, 12; Howard, 2016; O'Dair et al., 2016, 8; Torbensen & Ciriello 2019, 7). The problem of metadata has been cited as one of the most challenging issues in the music industry (Howard, 2016). Including that information to the metadata of a blockchain can prove helpful and insightful. Previous research supports this hypothesis and identifies a few use cases for the function of rights management and control. (O'Dair et al., 2016, 8-9; De León & Gupta, 2017, 17-19.) Metadata could include additional information such as contact information, lyrics, instruments, and the story of the inception (see Silver, 2016, 36). However, creating, verifying, and maintaining such a registry requires resources and consensus on protocols, rendering the idea challenging (O'Dair et al., 2016, 9; see Baym et al., 2019, 409).

It is argued that contracts in the music industry are quite sophisticated and hard to compress into a form that fits in a smart contract. It is likely that contracts have to be kept in a separate data bank. Furthermore, even in the event of having simple contracts, processing them would require considerably larger block sizes. (Silver, 2016, 14-18.) This can have implications on the sustainability of the blockchain in terms of its resource consumption or its scalability to have more transactions. In any case, this hinders possibility of having complicated metadata about rights information.

Additional suggestions for added functionality are presented. Tapscott and Tapscott (2016, 233-234) bring up an idea of micro metering in the context of music consumption: the consumption of music in small increments and the payments of consumption in microtransactions, thus creating an instant and continuous flow of royalties to the relevant parties in the value chain. They also bring up the idea of dynamic pricing mechanisms. Here, pricing of a musical asset is modified according to some observable condition, for example, from influxes of demand. (Tapscott & Tapscott, 2016, 233-234; O'Dair et al., 2016, 10-11; De León & Gupta, 2017, 22-23; Sitonio & Nucciarelli, 2018, 10.)

Blockchain can serve as a tool for accessing alternative sources of capital. This can be likened to the notion of an IPO or crowdfunding: artists can issue their own tokens. Previous research supports the claim that musical assets and their rights can be attached to a token and exchanged in a secondary market. (O'Dair et al., 2016, 8, 14, 21; Massey, Dalal & Dakshinamoorthy, 2017, 5.) In such a scenario the value of the token will reflect the demand and popularity of the asset. In extension, musical assets can be compared with each other, enabling a type of curation of artists and musical assets. (Tapscott & Tapscott, 2016, 238-239.) The possibility of including fans in the ownership of a musical asset can create addition incentive schemes where fans promote music (Silver, 2016, 30). De León and Gupta (2017, 25) propose a case where fans are rewarded for promoting products or suggesting music to their friends. However, Silver (2016, 30) suspects that fans that appreciate cultural credibility might not be as motivated by financial incentives.

In closing, it is noted that many conclusions in theory and previous research are derived from experimental and forward-looking cases. It is noted that projecting the evolution and implications of blockchain in the music industry is difficult. (De León & Gupta, 2017, 21; Sitonio & Nucciarelli, 2018, 12.) In addition, many thresholds for adoption in the music industry have not yet been sufficiently addressed (see Baym et al., 2019, 409; Torbensen & Ciriello 2019, 10). The argument is that the technology is still not mature enough and maturity is estimated to be achieved in the distant future (De León & Gupta, 2017, 21; Baym et al., 2019, 409; Torbensen & Ciriello 2019, 10; Litan et al., 2019, 2; Kandaswamy & Furlonger, 2018, 1).

Marques (2019, 37) points out that a few of the blockchain related platforms target independent artists. Few reasons are presented in the literature. First, major players are not incentivized enough and are hesitant to take on the risks (Torbensen & Ciriello 2019, 11). Second, artists have extensive contracts in which labels handle a wide variety of tasks. This makes blockchain related platforms economically unattractive. (Marques, 2019, 36-37.) Third, mass consumption is not yet feasible since the technology is immature, as noted above (Torbensen & Ciriello 2019, 10). A study tracking the sentiment of blockchain related attitude in the music industry notes that the sentiment for blockchain has shifted from a revolutionary and radical to a more realistic and less ambitious (Baym et al., 2019, 413). Another study concludes that few people are aware of the technology or its implications in the industry (Marques, 2019, 46). This further supports the perspective that the technology has a long way to go.

3.4 Theory synthesis

Following the theoretical exploration of the research, a theoretical framework can be concluded. The framework (figure 3) is threefold and will serve as a guide for the thematic analysis of the empirical data. It is also modeled to answer each sub-question separately.

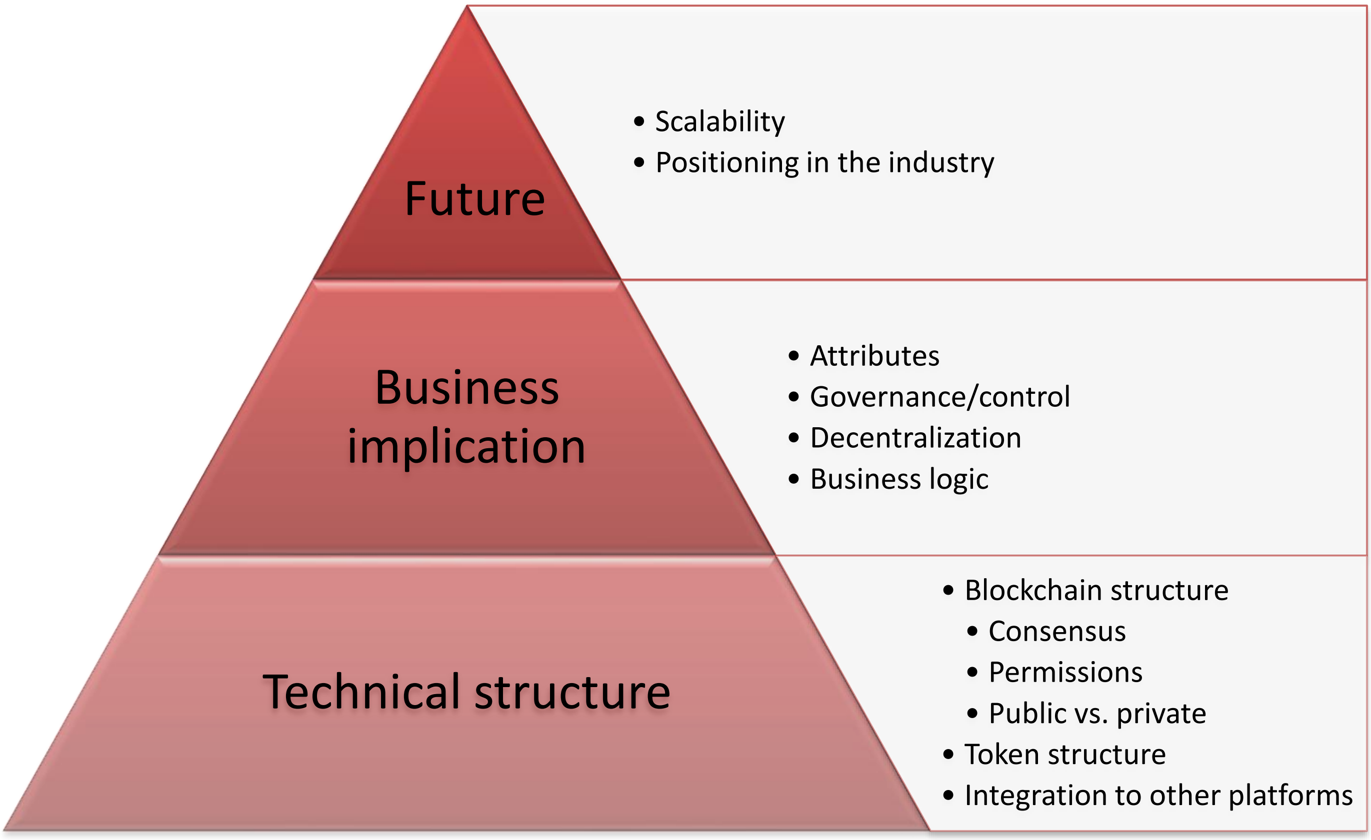

Figure 3 – A framework for examining the application of blockchain in the music industry

To answer the first sub-question, this research will try to understand how blockchain is applied in the chosen cases. The understanding will be derived from the technical structure and focus will be given to as many technical details as possible. As shown in the bottom layer of figure 3, the research will analyze each case in terms of the consensus method, the degree of privacy and publicity, and the way permission is granted for stakeholders to operate in within the ecosystem. Additionally, the underlying token structure will be examined. The token structure will reveal the smart contracts and subsequent engagements between stakeholders. Lastly, the research will examine how the blockchain engages and integrates within other technological platforms. This will give an understanding of necessities and synergies of other technologies.

Second, the research will try to understand the engagement of the technical side of blockchain with the music industry from a business perspective. This is illustrated in figure 3 as the middle layer. This discussion will explore attributes introduced in sub-chapter 2.2: transparency, security, inclusion, speed, and scalability. It will also address the business structure of each case in terms of their governance and aggregation of control, the level of centralization, and underlying business logic throughout the ecosystem.

Third, this research will try to understand the holistic nature of the positioning of blockchain in the present and future of the music industry. This will include discussions on scalability and adoption.

In the following chapter, the methodological design will be elaborated on. This includes the logic for data selection, case introduction, approach for data analysis and evaluation of the study.

4 METHODOLOGY

This chapter will lay out the methodological design, including the research decisions taken and their motivations and justifications. In short, this research is conducted as a qualitative multiple-case study with empirical data from secondary articles, white papers. The empirical data is dissected and processed in a thematic manner as outlined in the synthesis sub-chapter (3.4). The cases are extensively introduced in sub-section 4.2. Furthermore, the second sub-chapter will present the logic and justification for choosing the cases. The third sub-chapter will expound the process of analysis and the last sub-chapter will evaluate the data by reflecting on its trustworthiness.

4.1 Research approach

This research intends to explore and understand the phenomenon of implementing blockchain in the music industry. As mentioned in sub-chapter 1.2, the research questions are aimed to understand how blockchain is currently used in the music industry, what attributes of blockchain are utilized in the music industry, and what the future trajectory of blockchain is in the music industry.

Blockchain and cryptocurrencies are relatively new topics, and the start-up field develops in an extremely fast pace. As it is argued that research is behind practitioners, bridging the gap between academic literature and current business models seemed like a proper approach. (Wörner, Von Bomhard, Schreier & Bilgeri, 2016, 2.) Since this phenomenon is novel and in development, a qualitative approach was chosen, as it is appropriate for exploring "unstructured problems" (Ghauri & Gronhaug, 2005, 202). In this, the intention is to uncover how the music industry sees meaning in the technology and how technology developers see meaning in applying blockchain in different industries. A qualitative methodology is appropriate in exploring "how" and "what" questions. As such, this research does not intend to infer generalizable information per se, but tries to understand how the technology engages with a certain context. (Eriksson & Kovalainen 2008, 4-5, 120-121; Liamputtong, 2013, 14.)

The intent is to explore an entity, in this case a DAO, and gain an in-depth understanding. More precisely, an understanding of the engagement of different particles of the environment in the presence of the technology. For this reason, a case study is appropriate. (Bryman & Bell, 2011, 60, 63.) Looking through a case study, a researcher aims to gain insight through the perspective and lived experience of the particular case in a specific "historical, economic, technological, social, and cultural context" (Eriksson & Kovalainen, 2008, 115).

As this is a global field, geographical distance posed challenges in terms of access to data. For this, the researcher opted for convenience sampling in the form of secondary empirical data. (Liamputtong, 2013, 15.) After a brief probe on accessible information online, it was concluded that there is a large sample of secondary articles that include sufficient information. To form a holistic understanding of the phenomena in question, this research will be conducted as a multiple-case study. This decision is further supported with the argument that in the presence of more resources, studying multiple cases should be preferred. (Yin, 2003, 53; see Eriksson & Kovalainen, 2008, 118.)

Furthermore, as the target of analysis is complex, intensive analysis emerges as the appropriate approach. As noted by Eriksson and Kovalainen (2008, 119), "Intensive, or classic, case study research draws on the qualitative and ethnographic research traditions, emphasizing interpretation and understanding of the case as well as elaboration of cultural meanings and sense-making processes in specific contexts. The main aim is to understand and explore the case from 'the inside'…" In this study, each case is thoroughly studied and analyzed as topics arise. The researcher intends to explore all available data, ensuring a high-quality analysis. (Yin, 2003, 137.) In accordance with intensive case study methodology, this research aims to provide a thick description reflecting the researcher's interpretation and analysis of each case. The analysis will be mainly conducted as a static analysis. The third research question, however, has a dynamic side and aims to understand the integration of blockchain over time. (Eriksson & Kovalainen, 2008, 120.) This is done by incorporating the empirical data of this research with that of previous research.

This research does not analyze each case rigorously through a specific theoretical framework as in deductive approaches. While a theoretical framework has been constructed from existing literature, the framework serves as a reference and a knowledge background for analyzing the cases. The objective is to analyze each case thoroughly as per intensive case analysis and derive findings that would engage with theory or explore and provide additional interesting perspectives. This form of inductive research fits with understanding each case in a holistic way. (Eriksson & Kovalainen, 2008, 119, 121, 128-129.)

4.2 Data selection

The secondary data for this research comes in the form of white papers. White papers are documents that a specific company releases and are directed to the public (mainly investors). It contains the business plan, business model, presents company goals and addresses progress and milestones. Most importantly, in most music related whitepapers, they will present the architecture of the of the blockchain system and explain how it will serve as a base for company operations. (Coinbase, 2016, 4; Chen, 2018, 570.)

The criteria for case selection are the following. First, the case has to utilize tokens and smart contracts as a core of their business model. Second, while the focus of this research falls on DAOs, the cases do not have to be fully decentralized. It is sufficient that some players in the industry, including consumers, engage through the token system in a peer-to-peer fashion. Third, the token system has to be creative and diverse enough and apply blockchain in several ways. Intensity sampling was chosen in order to gain a wider and more comprehensive understanding of the phenomenon (Liamputtong, 2013, 16). Lastly, the whitepaper has to outline the technical backdrop of the blockchain technology in a sufficient manner. This is essential for the intended contribution of this research.

Currently there are at least over 40 whitepapers of blockchain based companies in the music industry (Shilina, 2019). Most of the applications were focused on automating revenue streams or compiling a system for rights information. While these are important issues, their scope is too narrow and less experimental for the purpose of this research. From the list presented by Shilina (2019), the first three cases that fit the above criteria where chosen for this research. The whitepapers of two cases were published in 2019 and the third in 2017. The combined page count of all three documents is 87 pages.

It is noteworthy that a few cases that fulfilled these requirements were inaccessible and/or their website was taken down. This has an implication that supports theoretical arguments of blockchain not being mature enough, and that current cases are experimental and consequently prone to failure. This is discussed in the analysis section (sub-chapter 5.3). To name a few cases that were inaccessible: Choon and Inmusic. All three cases selected for this research were accessible during the selection process.

In order to form a deeper understanding of the analysis, it is necessary to be familiar with the cases selected for this research. The following sub-chapters serve a brief introduction to the cases, including their nature, objectives, and the positioning in the music industry.

4.2.1 Case eMusic

eMusic is a music streaming and distribution platform, first launching in 1998 as the first legal digital music store. From inception they have strived to be a fair-pay platform, where supporting artists is a core value. Now they strive to pioneer the implementation of blockchain. (eMusic, 2019, 4, 6, 12, 14.)

As a significant player in the industry, they seem to have recognized many inefficiencies and unfair positions between different stakeholders. Leading by example, they are striving to bring many changes into the distribution infrastructure. These changes range from bringing transparency and fair revenue distribution, to bringing operational efficiencies and disintermediation. While championing the rights of artists is at the fore-front, the benefits should also be evident to other stakeholders, like service providers, labels, and end-consumers. (eMusic, 2019, 8-19.)

Blockchain plays a crucial role in all this. Not only do they strive to lead the industry transition to the blockchain, but they also utilize blockchain as a core technology in achieving their long-term objectives. In essence, the eMusic protocol functions as a token system on top of the Ethereum blockchain. They utilize a token with two separate smart contracts that regulate information regarding rights and sales. Transactions are made through their own token and the data is auditable and transparent. The network can also connect and engage with off-chain systems of existing platforms. (eMusic, 2019, 5-6, 2-30.)

4.2.2 Case Audius

With the introduction of technologies, music production and distribution has become easier on an independent basis. With this reasoning, Audius leads with a goal to introduce improvements in the music industry regarding transparency, decentralization, governance, and convenience. Audius is a newly established project in the form of a music streaming protocol. This protocol consists of several components that each dictate how the protocol functions. (Rumburg, Sethi & Nagaraj, 2019, 4-7; Audius.) Each component is introduced in more detail in sub-chapter 5.1.2. At the time of writing, it seems that Audius is still in the alpha testing phase with limited employed components. (Manjunath, 2019; Rumburg et al., 2019, 16-17.)

The protocol is intended to be fully decentralized with all activities aggregated to the community/ecosystem. The community consists of artists, listeners, and service providers. Service providers consist of willing participants that facilitate and maintain components within the protocol. Community members also engage with each other to make decisions regarding the protocol and each member is proportionally compensated for the value they add to the ecosystem. Blockchain will function as the core of the protocol, however, other technologies will also be utilized. (Rumburg et al., 2019.)

In summary, creators independently upload their content to the system. Other members can, among other things, dictate which content is accepted in the system, provide storage services, or function as an arbitrator for different cases. As the ecosystem is decentralized and governance is aggregated to individuals, the protocol is constructed with smart contracts and subsequent reward mechanisms. Two tokens are utilized: one as a medium for exchange and the other as a medium for governance. (Rumburg et al., 2019.)

4.2.3 Case Musicoin

Musicoin is a decentralized blockchain protocol and prides itself for being the first of its kind in the music industry. The primary goal for Musicoin is to disintermediate everything between the creator and the listener. Furthermore, they want to introduce transparency, sustainability, and fairness to stakeholders. This is done with the premise that the current incumbents have rendered the music industry unfair. Their long-term objective is to gain a considerable market share, including hosting one million artists on their platform. This will be facilitated by, among other things, enabling free content for listeners, disabling commercials, ensuring income for creators, and focusing on providing content from independent creators. (Musicoin, 2017, 3-15.)

The protocol is a functioning independent blockchain that is modeled after the Ethereum blockchain. In its core, Musicoin uses a single token, the $Music token. The ecosystem consists of creators, consumers, miners, and third-party service providers. In addition, just as Ethereum, Musicoin enables development of token layers on top of the protocol. (Musicoin, 2017, 12-24.)

4.3 Data analysis

As presented in sub-section 3.4, this research presents a framework constructed from relevant themes encountered throughout the literature. The framework is not extensive, it only focuses on topics relevant for scope of the research. In fact, the framework is divided into sections in accordance with the research questions. Since the framework is comprehensive enough to help understand the nature of the phenomenon, the empirical analysis strives to inductively understand the cases and improve the framework. The intent is to dissect themes and components that answer the research questions as they emerge from the empirical data. (see Braun & Clarke, 2006, 85; Eriksson & Kovalainen, 2008, 129-130.) The emerging results from this thematic analysis of each case (as described below) will be dovetailed with the theoretical framework in hopes of unearthing interesting conclusions (Braun & Clarke, 2006, 88).

This multiple-case research was conducted according to the six-phase procedure, as proposed by Braun and Clarke (2006). The first phase is to get familiar with the cases and explores meaning and patterns. During this, the researcher is mindful about coding and tries to divide each case into three sections reflecting each part of the theoretical framework, subsequently answering each sub-question. Second, all the topics in the cases are manually coded. The coding is theory driven and some of the codes are grouped according to the topics presented in each section of the theoretical framework (figure 3). However, the coding is also data driven – coding is not limited to theory and topics outside the framework can be included. Codes are then sorted into different themes and sub-themes, and reviewed, as per phases 3 and 4 respectively (Braun & Clarke, 2006, 89-93).

For reference, the first overarching theme addresses everything related to the technical side of each case and includes codes related to the blockchain structure, token structure, and integration to other platforms. The analysis of the blockchain technology is deliberately as detailed as possible to provide an intensive approach. The contribution should be evident: an explicit presentation of technical blockchain integration in protocols that operate in the music industry. Previous research has space for improvement. The second theme tries to understand the business-related implications of the technology. This includes understanding the attributes adopted, the level of decentralization, control, peer-to-peer nature, and any other possible perspective regarding business logic.

Each theme requires interpretation and comparison between cases and previous research. This ensures a refined analysis that presents themes in a coherent way (phase 5). As per the last phase, the analysis is presented in chapter 5. (Braun & Clarke, 2006, 95-99.)

4.4 Evaluation of the study

The quality of this research will be evaluated using the method provided by Lincoln and Guba (1985, 290-331). Trustworthiness is a tool for assessing empirical findings and it is expressed in the following four dimensions: credibility, transferability, dependability, and conformability. Each dimension is discussed in turn.

Credibility consists of the researcher's knowledge of the subject and the adequacy of the material (Lincoln & Guba, 1985, 294-296, 301-316). While the researcher had a base knowledge of the technology in question, the understanding of different implementations had been narrow prior to this research. Thus, a prolonged and thorough learning process or incorporating an expert would increase credibility to a great degree.

The theoretical data collected for this research have come from online queries. While data collection and analysis has not been methodically strict nor extensive, the researcher has sought to utilize the most relevant and useful data for constructing a theoretical framework. The core theoretical framework has been built from the first articles that introduced the technology of blockchain, written by the respective inventors. This increases credibility. However, many articles are not peer reviewed journal entries, which decreases credibility. It was noted, however, that much of the theoretical landscape is derived from books or reports from credible consultancy entities.

The empirical sample is narrow, consists of forward-looking narrative, and is aimed to attract investors and stakeholders. It can be interpreted as a subjective perspective of the future that may or may not include personal biases and distortion (Yin, 2003, 87). In reality, the field of implementing blockchain is constantly developing and changing. Furthermore, it is a polarizing topic with opinions ranging across a spectrum. As such, the target of research cannot be considered consistent nor static, nor can the findings be considered an objective caption of reality. This decreases the credibility of the empirical data. However, as the data is secondary, it has not been influenced by the researcher.

Researchers should be quite descriptive of their empirical data. This enables the *transferability* of the research to another environment. In the event of a similar research, transferability enhances the ability to recreate the empirical context to a certain degree, or at least be aware of contextual similarities. This is not to argue that empirical findings are generalizable across any or all contexts but to be able to infer similar findings from similar contexts. (Lincoln & Guba, 1985, 297-298, 316.) As the empirical context of this research is derived from secondary data, the data is well documented and accessible for the general public. As such, transferability should be evident. Furthermore, each of the whitepapers define the cases and their boundaries in a precise way, which is important in case studies (see Eriksson & Kovalainen, 2008, 117, 123). Since the cases are complex in nature and analyzed qualitatively and intensively, the understanding and consequently the descriptions of the cases are not simplistic (see Eriksson & Kovalainen, 2008, 116-120; Ghauri & Gronhaug, 2005, 271).

Dependability refers to consistency between data and the findings. By achieving adequate reporting, peers can audit and critique the logic, processes, and decision of a research. (Lincoln & Guba, 1985, 299-300, 316-318.) This research has followed a standard thematic analysis of cases. This is a relatively simplistic process that is easily reported. Furthermore, the data is secondary and publicly accessible. Themes are analyzed following a framework derived from the theoretical analysis. However, the theoretical analysis may not be extensive enough for deducing an effectively systematic approach. In other words, as the analysis was not as methodical and systematic, the clarity of the process might be sub-standard. Building a more comprehensive theoretical framework would enable a more logical and consistent analysis. In any case, the researcher has sought to elaborate and verbalize this analysis thoroughly and display the logic behind interpreting the empirical data by giving a thick description (see Eriksson & Kovalainen, 2008, 119-120).

The interpretation of the data should be objective and devoid of imagination. This is referred to as *conformability*. As described by Lincoln and Guba (1985, 290) it is "the degree to which findings are determined by the respondents and conditions of the inquiry and not by the biases, motivations, interests or perspectives of the inquirer". (Lincoln & Guba, 1985, 300, 318-327.) Incorporating several researchers would introduce congruency (Eriksson & Kovalainen, 2008, 123). This research, however, was conducted alone. Due to limited understanding of the technology, it was challenging to bring forth nuanced discrepancies between the case and the theory. In other words, this research was susceptible to error. As this is an inductive and intensive multiple-case study, the researcher has interpreted the empirical data through their own knowledge and perception which decreases conformability (Eriksson & Kovalainen, 2008, 120). On the other hand, the data was thematically analyzed in order to establish and understand many facets of this phenomenon. This increased conformability.

5 EMPIRICAL FINDINGS AND ANALYSIS

The analysis of this research will be expounded in this chapter. The analysis is conducted as a multiple-case analysis based on the secondary data introduced in sub-chapter 4.2. Each sub-chapter aims to answer a sub-question respectively. First, it will introduce the technical blueprint of each case and discuss relevant technical topics introduced in the theory section and the synthesis in sub-chapter 3.4. The objective is to answer the first sub-question: How is blockchain currently used in the music industry?

Second, sub-chapter 5.2 will take a deeper look into the fit of blockchain in music industry, answering the second sub-question: What attributes of blockchain are utilized in the music industry? This includes topics related to decentralization, incentives, and business logic. Finally, sub-chapter 5.3 will explore the future-oriented position of blockchain in the music industry, answering the third sub-question: What is the future trajectory of blockchain in the music industry?

5.1 Technical blueprint

In this sub-chapter, the technical blueprint of each case is detailed as it pertains to answering the first research question. This includes introducing the blockchain structure of each case in terms of consensus, token structure, smart contracts, and engagement between stakeholders and engagement between technologies through the underlying code. Furthermore, it will explore the nature of each case in the dichotomy of private vs. public and permission vs. permissionless. For reference, in the analysis section the word protocol refers to the extensive blockchain structure while the word platform refers to streaming platforms that offer music to end-consumers. However, quotes might use the word platform to refer to blockchain structures. Many of these topics have implications to the following sub-question, which is why they are discussed from a business perspective in sub-chapter 5.2.

5.1.1 eMusic

eMusic is a company that launched the eMusic protocol. Part of their role is to oversee and develop the protocol in regard to its code and promote and develop its content. In exchange, a percentage of revenues from the protocol flows back to the company. (eMusic, 2019, 2, 14-18, 30, 36.) The content from the protocol is streamed through the eMusic company's platform, but not exclusively. (eMusic, 2019, 2, 14-18, 30, 36.) As the protocol is built on top of the Ethereum, Ethereum will provide the computational power and mining necessary to maintain the security of eMusic.

As mentioned above, the protocol uses a single token that is used to facilitate transactions. The eMusic token includes two smart contracts*: content contract and sales contract*. The former smart contract is focused on musical assets and keeps records of metadata regarding ownership and rights. This includes information of "which service providers they wish to distribute their content to, whether it can be streamed, downloaded or licensed, and how much it should cost." This information is inputted by the artist or the label and registered in the system. The information will serve as the legal accord and will act as a reference point for other functions. Thus, for example, revenue streams can be coded and automated. (eMusic, 2019, 16, 20, 24.)

> *The distribution platform will rely on this Smart Contract to maintain record of a music asset, where and how that asset may be published to each service provider, who the rights holders are and the percentage of the generated revenue each rights holder is eligible to receive.* (eMusic, 2019, 20)

The second smart contract will compile information regarding sales. In detail, it will collect information such as the number of streams per asset and the cumulated revenues. In addition, it will collect the actual revenues and funds from sales. Artists and stakeholders can access the funds according to the conditions set in the content contract. (eMusic, 2019, 21-22.)

The blockchain can engage with outside platforms referred to as off-chain systems (figure 4). This allows for back-end integration with third party service providers such as streaming platforms. Integration into the protocol is allowed through application program interfaces (APIs). It also allows third parties to build additional functionality over the eMusic protocol. Third-party services can integrate to the protocol without permission, making that specific function permissionless. (eMusic, 2019, 23, 27.) The white paper does not explicitly state whether the whole blockchain, including all the functions, is permissionless or permissioned, making it unclear whether other functions in the blockchain are permissionless and peer-to-peer, or permissioned and centralized. If the case is the latter, the company can decide which on the inclusion of certain stakeholders. As third-party services can act permissionless, functioning as a streaming platform requires "partnership" with eMusic, making it permissioned (eMusic, 2019, 18).

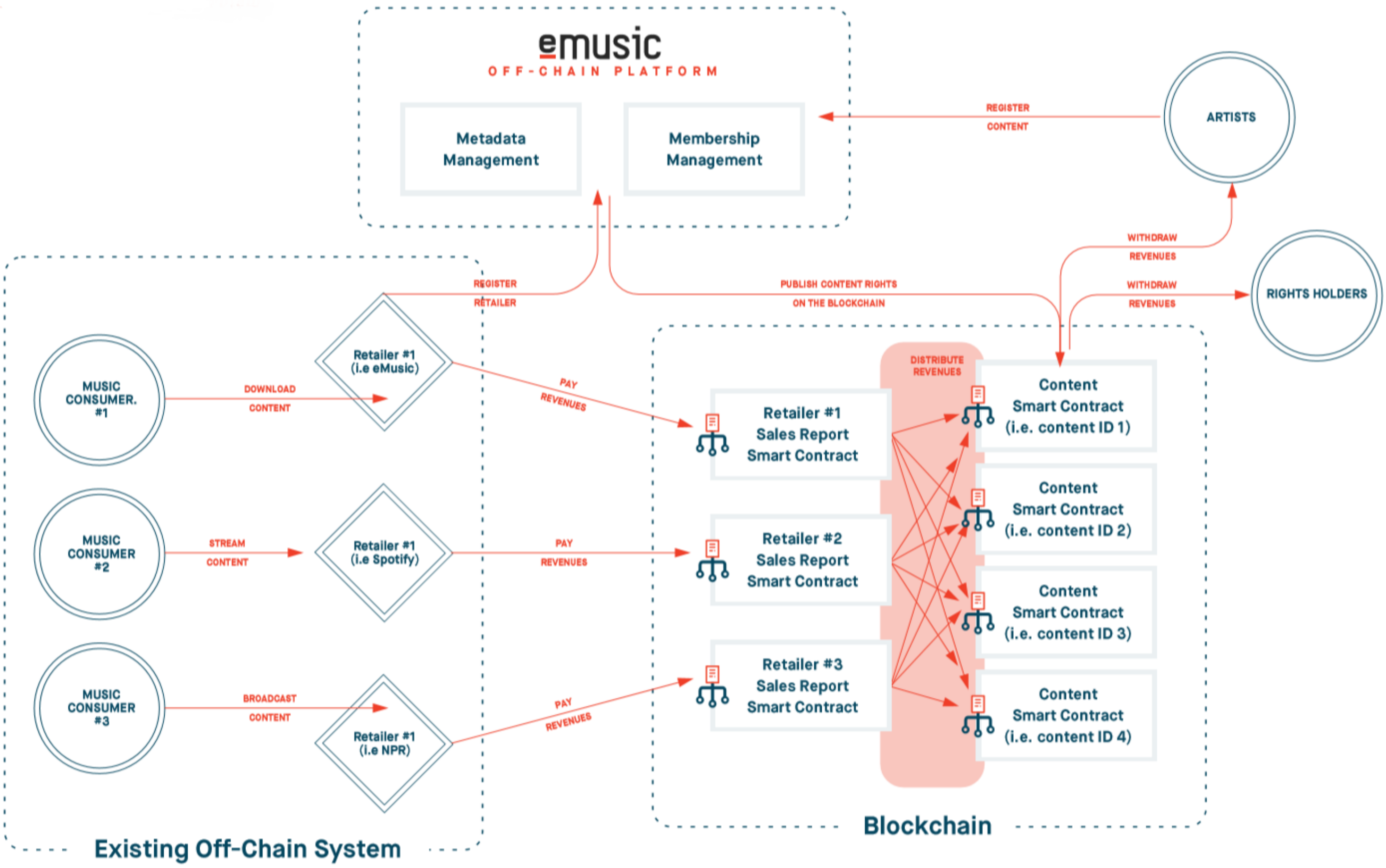

Figure 4 – eMusic technical overview (eMusic, 2019, 23)

As figure 4 illustrates, the metadata and member management are maintained on an off-chain. It is unclear whether the off-chain is a different type of platform or a private and/or permissioned blockchain. In case of it being the latter, it might imply that either the information is commercially sensitive, or the access and/or administrative rights are reserved for selected participants. In case it is not a blockchain, it suggests that the metadata could be too rich and dense to be kept on a blockchain.

It is also mentioned that creators have a dashboard interface through which they can manage their contents in terms of distribution. This interface is evidently part of the aforementioned off-chain. Again, in case the off-chain is blockchain based, the decisions creators will make will affect the smart contracts directly and consequently other stakeholders in a peer-to-peer fashion. In case it is not, the creator then engages with eMusic as a company, which in turn makes changes to the protocol and the content smart contract. Alternatively, the latter implies a more centralized structure. In contrast to Audius, as described below, any arbitration and governance process is seemingly handled within the borders of the eMusic company. This will be discussed more broadly in sub-chapter 5.2.2.

5.1.2 Audius

As mentioned in the case introduction, the ecosystem consists of creators, listeners, and service providers. As per the values of the protocol, each stakeholder can engage in the protocol in a permissionless way and all the information is public. Service providers facilitate one or more of the following components: discovery services, content services, arbitration, and governance (Rumburg et al., 2019, 4, 7). Each component will be addressed later. The protocol is seemingly in its alpha testing phase and lacks the availability of majority of these components, including the tokens, governance, and arbitration. The protocol is intended to be built on top of an existing blockchain protocol or protocols, however, it remains unclear which protocol will be used. (Manjunath, 2019; Rumburg et al., 2019, 5, 7, 16-17.) While this has not yet been decided in the latest whitepaper, a newer update on an associate website makes references to the Audius token being deployed on the Ethereum blockchain (Manjunath, 2019; Nagaraj, 2019; Sethi, 2019).

In the Audius protocol, two tokens will be used: Loud and Audius tokens (Rumburg et al., 2019, 5-6). The Loud token will function as a medium of exchange. For the token to function as a stable store of value, price volatility will be diminished. This is done by backing the token by a “stablecoin” and enabling interchangeability between the Loud token and a stablecoin. (Rumburg et al., 2019, 5-6.) Essentially, stablecoins are tokens that are backed by a fiat currency via a smart contract. For example, owning such a token contractually constitutes as the ownership of a US dollar, thus, the value of the token fluctuates just as the fiat currency does. (Centre, 2018, 6-7; Rumburg et al., 2019, 5-6.) By proxy, Loud functions as a digital dollar.

The Loud token will be used by creators and listeners in paying for services and content. Payments will flow from listeners directly to creators according to determined splits, however, transaction fees will be collected and allocated to the community through the Audius tokens, as explained below and illustrated in figure 5. (Rumburg et al., 2019, 5-13.)

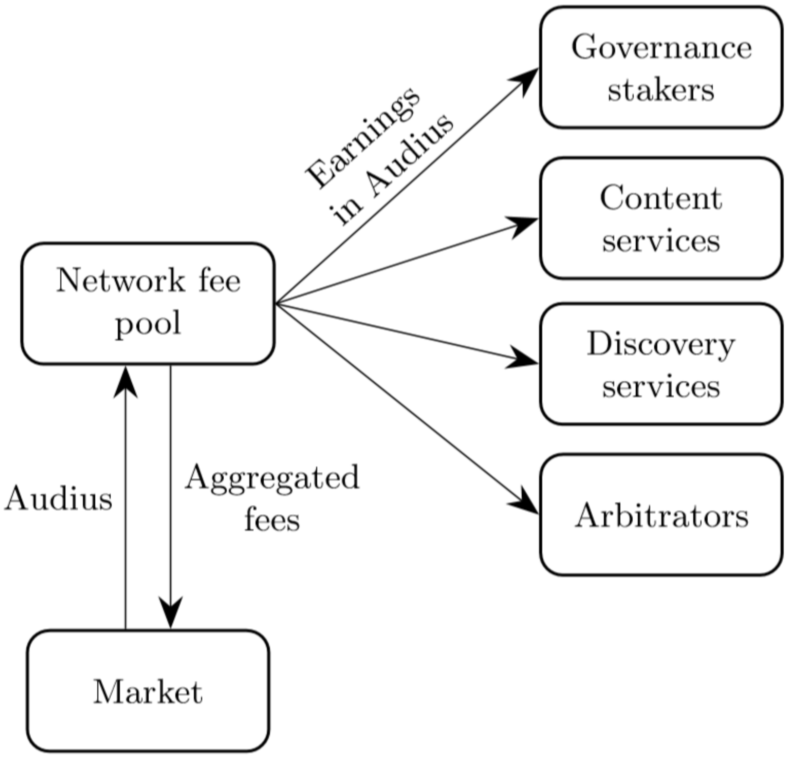

Figure 5 – Function of the Audius token and its distribution as a reward (Rumburg et al., 2019, 7)

The Audius token will function as a tool for governance and cooperation between community members. This token will be used in facilitating all of the aforementioned components. Through the token, stakeholders can, among other things, vote for proposals, propose changes to metadata structure, and decide on protocol prices. This token does not function as a stablecoin, by extension of logic, this research assumes that the price is a function of supply and demand. Some transaction fees within the protocol are collected in Loud tokens and used to buy Audius tokens at market price. As shown in figure 5, these tokens are allocated to a fee pool and redistributed to the community. This is done to distribute the value that is captured within the protocol and reward the service providers. (Rumburg et al., 2019, 6-8, 14.)

The use of the Audius token is mainly conducted through a method called staking (Rumburg et al., 2019, 7). Since the whitepaper does not disclose what type of blockchain is used, it remains unclear whether staking refers to a "proof-of-stake" consensus method of an underlying blockchain or a method coded into the smart contracts on top of a blockchain, such as Ethereum. For reference, in the proof-of-stake consensus method, the larger the proportion of tokens an actor has staked, the more control within the protocol they have. This is in parts proposed to distribute power to members in proportion to their contribution. On the other hand, it protects the blockchain from attacks in the following way. In the same way an attacker would need more than half of the computing power in a proof-of-work consensus method, an attacker needs more than half of outstanding tokens to take over the protocol. (EthHub; Rumburg et al., 2019, 7.). In any case, the staking mechanism in Audius works on related principles. For reference, eMusic on the other hand will seemingly use the proof-of-work, through the Ethereum blockchain.

Here, the business model is expounded on, revealing each component, and their subsequent mechanisms. Also, the use of staking is elaborated. In essence, each service, as shown in figure 6, is facilitated in a peer-to-peer fashion by willing participants. First, creators upload their music and metadata, and store it as described below, after which the link for both are shared through the blockchain.

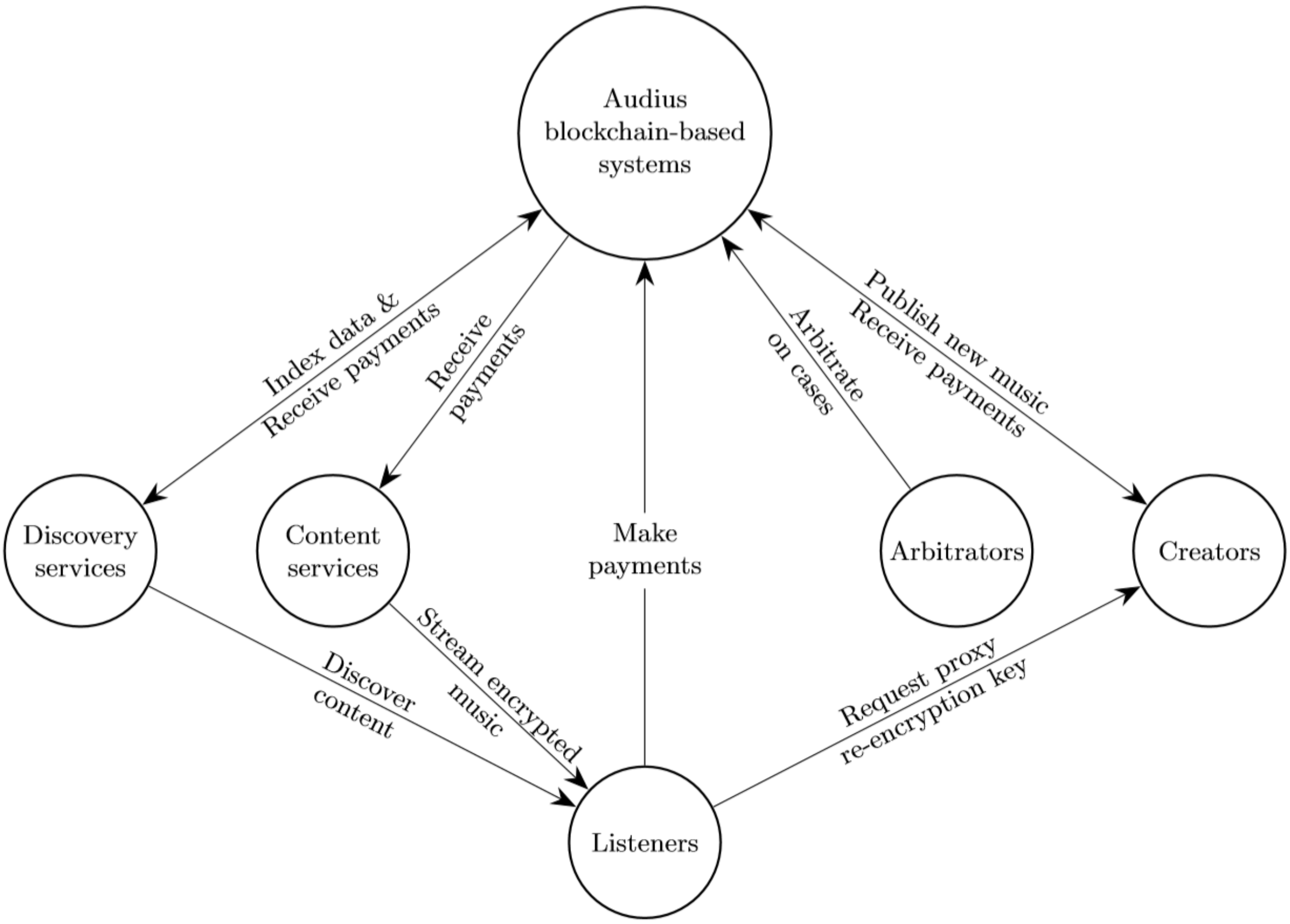

Figure 6 – Audius technical overview (Rumburg et al., 2019, 5)

Second, individuals, denoted as content service providers in figure 6, will fetch the content through the link and also host the content in a peer-to-peer manner for financial incentives. While the storage system is not blockchain related, it functions similarly as a blockchain: it is decentralized, peer-to-peer and immutable. (Benet, 2014, 3; Rumburg et al., 2019, 7-8.) Content service providers will distribute an encrypted version of the content for each listener request. The listener will also receive a decryption key from the creator with which they unlock the content. (Rumburg et al., 2019, 8-9.) In contrast, eMusic seems to store files on their own company internal storage. In addition, while the distribution of the content and decryption key is conducted in a peer-to-peer manner in Audius, in eMusic, the arbitrage is conducted within the company and not by the community. In comparison, Audius is more of a decentralized system.

Third, discovery services provide listeners with a platform through which content can be searched. A provider can either create an API or use an API to establish a connection between the listener and the content. The platform, in any case, will search content on the blockchain. (Rumburg et al., 2019, 10-11.) Here back-end integration resembles that of in eMusic.

Next, arbitration and governance will be explained. An arbitrator is described as "someone registered to vote on arbitration of disputes within Audius" and is dedicated to enforcing integrity and honesty within service providers (Rumburg et al., 2019, 11, 21). There are several case types that arbitrators process, for example, they can judge the accuracy of discovery services, compliance with protocol, or requests of creators to claim a percentage of a song's revenue streams. Lastly, users can submit governance proposals which will be voted on by other users. Voting power is weighted based on the users' role and value added to the protocol. There are several proposal types regarding fee and revenue structures, content formats, or governance protocols. (Rumburg et al., 2019, 13-16.)

Here the staking mechanism will be explained, as dictated in the Audius protocol. The whitepaper also mentions the word bonding in a similar matter, and it remains unclear if the words bonding and staking are used interchangeably. Each service provider, as well as contributors to governance must stake an amount of Audius or loud tokens to establish themselves and function in the community. The staking functions in different ways for different purposes for each provider and actor. For some, staking is necessary to encourage good services and discourage bad services. (Rumburg et al., 2019, 7, 11, 15.)

> *Service providers must stake Audius tokens to register their services; this requires one to have a stake in the protocol's long-term success in order to operate on the network, aligning their incentives with long-term network value creation.* (Rumburg et al., 2019, 7)

As an example, a discovery service provider stakes an amount of Audius tokens. If the service quality declines, these tokens get deducted, until they decline below a certain level, which terminates the service provider from the ecosystem. (Rumburg et al., 2019, 11.)

5.1.3 Musicoin

The Musicoin protocol operates as an independent blockchain. The Musicoin blockchain is a copy of the Ethereum blockchain tailored for the music industry, and thus, functions in a similar way, however, it works with a proof-of-work consensus mechanism. Since it is an independent blockchain, it is maintained by individual miners. The whitepaper does not mention whether the blockchain is private or public nor if it is permissioned or permissionless. Thus, it is not clear whether all information is publicly accessible and if stakeholders must gain permission to operate as a miner or a service provider. However, as transparency is stated to be an important feature of the protocol, it is assumed to be public to a certain degree. (Musicoin, 2017, 12, 17, 24.)

As a replication of Ethereum, the Musicoin blockchain enables developers to create tokens with smart contracts on top of the blockchain, creating the possibility of additional applications (Musicoin, 2017, 19- 24). The whitepaper does not go into deeper detail

In Musicoin, content is stored with the same technology as in the Audius protocol. Individuals store and send an encrypted version of the music to the listener in a peer-to-peer fashion. The protocol utilizes a token, $Music, which will function as an exchange of value between the creator and the listener according to predetermined splits in the smart contract. The token is not a stablecoin, so it is exposed to the forces of supply and demand, and volatility. (Musicoin, 2017, 12-15.)

In a future iteration of the protocol, Musicoin will have an economic concept called the universal basic income (UBI) that will guarantee an income for each creator. As illustrated in figure 7, the UBI will be facilitated by creating a UBI pool that collects resources from different stakeholders and distributing a flat fee for creators for the consumption of any content. In the later iteration the protocol will also offer its content to listeners for free and without any ads. In replacement for payments, Musicoin encourages tipping from listeners to creators. (Musicoin, 2017, 15-17.)

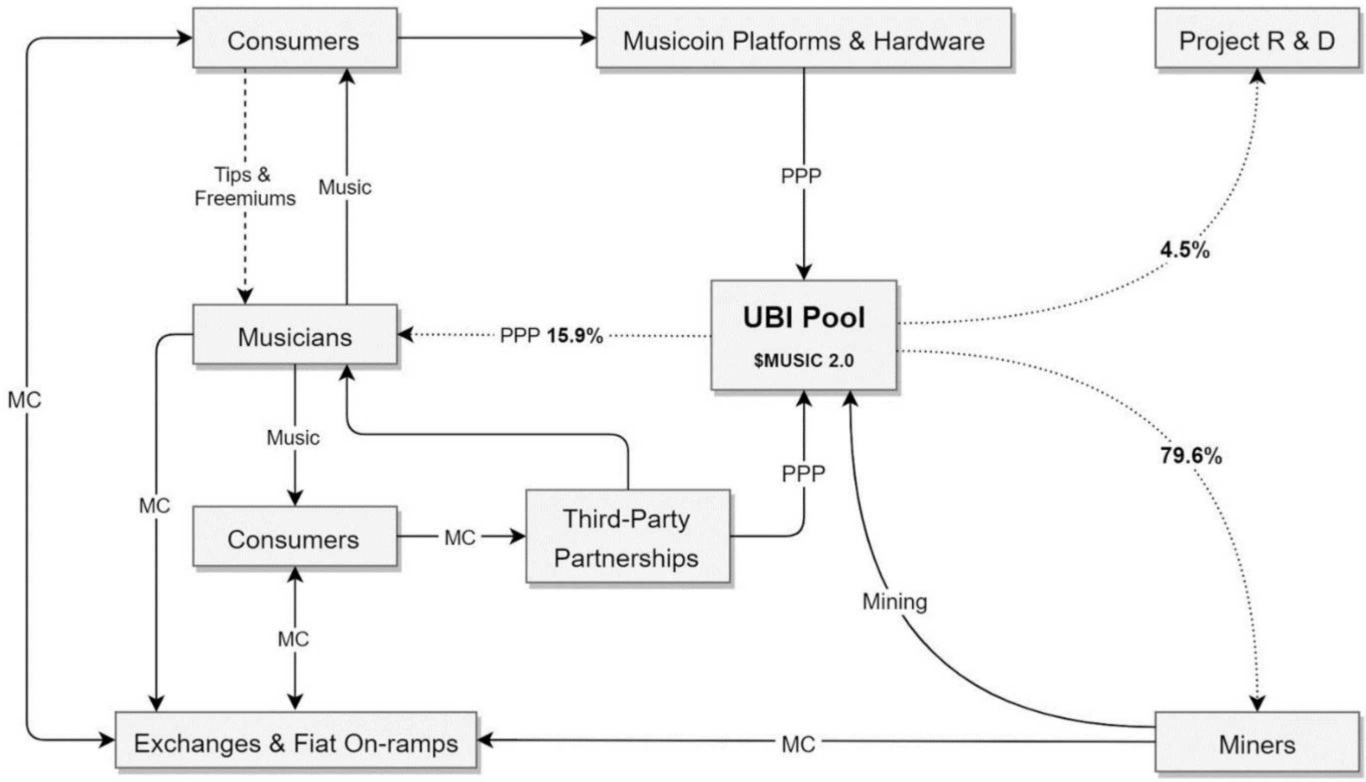

Figure 7 – Musicoin technical overview (Musicoin, 2017, 16)

The Musicoin protocol is launched and maintained by the Musicoin company. In addition, developments to the protocol, such as the UBI, is conducted by the company. While the whitepapers mention that Musicoin will license content to other service providers, it remains unclear if the licensing is conducted through the company or can service providers integrate to the protocol and engage with the blockchain directly. This has implications to centralization, intermediation, and business logic, as discussed below. It seems that streaming is currently accessible exclusively through the company's own platform. (Musicoin, 2017, 19-20.) This has further implications on the inclusion and centralization of the protocol.

The protocol does not address the speed of transactions and weather the blockchain can process transaction in a larger scale as needed for mass consumption. It also does not address whether the blockchain can process elaborate contracts that are exhibited in the music industry. The question of scalability and ecological sustainability will be addressed more broadly in sub-section 5.3.

5.2 Current functions of blockchain within the music industry

By outlining the technological functioning of blockchain and its implementation in all cases, this sub-chapter can start dissecting the effects of blockchain from a business perspective, answering the second research question. This will include the effects on the business logic in sub-chapter 5.2.2 and incentives in sub-chapter 5.2.3. Sub-chapter 5.2.3 will also dissect the topic from the perspective of each stakeholder, starting from the end-users and artists.

The core narrative in all cases is that using blockchain, processes and transactions can be streamlined, efficiencies can be introduced to the value chain, and benefits can be better distributed to stakeholders, in particular, creators (Musicoin, 2017, 3; eMusic, 2019, 4; Rumburg et al., 2019, 4).

5.2.1 Attributes

The primary attribute utilized in all protocols is transparency. Each case also prefaces their contribution to the industry by arguing against an existing lack of transparency (Musicoin, 2017, 6, 10-13; eMusic, 2019, 10; Rumburg et al., 2019, 4). The following list culminates existing issues in the music industry as seen from the perspective of Audius, echoing many sentiments presented in the theory section (Rumburg et al., 2019, 4).

1. There is little to no transparency around the origins of creator payouts (e.g. number of plays, location, original gross payment before fees)
2. Incomplete rights ownership data often prevents content creators from getting paid; instead, earnings accumulate in digital service providers (DSPs) and rights societies
3. There are layers of middlemen and significant time delay involved in payments to creators
4. Publishing rights are complicated and opaque, with no incentives for the industry to make rights data public and accurate
5. Remixes, covers, and other derivative content are largely censored due to rights management issues
6. Licensing issues prevent DSPs and content from being accessible worldwide

All information in Audius should be publicly accessible (Rumburg et al., 2019, 4). By extension, this makes Audius a fully public blockchain. In eMusic, transactions conducted on the blockchain are publicly accessible (eMusic, 2019, 18). As per Musicoin, it remains unclear if transactions are publicly accessible, however, the whitepaper maintains that transparency is an important component in their protocol (Musicoin, 2017, 12, 20).

As mentioned in sub-chapter 3.1, information asymmetry has caused unfavorable positions to artists when it comes to knowing the value of their music, the revenues accumulated from streaming, and the usage data of end-consumers. As this data is documented on the blockchain, enabling auditing, stakeholders will have access to valuable data streams (Rumburg et al., 2019, 9-10). eMusic posits that labels and service providers will also benefit from the accounting done by the blockchain. In essence, since transactions and royalties are recorded automatically, labels have access to a hands-off auditable reporting system as opposed to maintaining their own. (eMusic, 2019, 17, 19.)

Audius follows a premise where it is accessible for anyone to operate in, making it inclusive. This is extended to all stakeholders, including users, creators, and service providers. The other two cases, however, do not mention whether they are extensively permissioned or permissionless. Furthermore, it is evident that many business functions are conducted internally in the business instead of through the blockchain, which has negative implications for both transparency and inclusion.

None of the cases sufficiently address speed, scalability, nor security. At least one case, possibly two cases, are built on top of an existing blockchain, therefore, the answers to each attribute should be found from the underlying blockchain. However, since Musicoin has their own blockchain, it would be appropriate to address each attribute. In general, Scalability, in turn, is discussed in sub-chapter 5.3 in a future oriented context.

Another attribute that is a subsequent result from the business logic in the cases is engagement – stakeholders are incentivized and encouraged to engage with each other in a peer-to-peer fashion, enriching the experience. For example, users are incentivized to provide reviews, rating each other's reviews, or contributing to discussions. Furthermore, users are encouraged to tip creators directly and arbitrators are rewarded for assessing the quality of other service providers. (Musicoin, 2017, 15-16; eMusic, 2019, 26; Rumburg et al., 2019, 11-13.)

5.2.2 Decentralization and business logic

As governance goes, all cases exhibit a different level of decentralization. As noted earlier, Audius displays the highest degree of decentralization – all functions are conducted peer-to-peer within the ecosystem. Everything from ownership of the protocol to governance, the power is extended to individual stakeholders and the logic is embedded in the protocol.

Both in eMusic and Musicoin, some functions are conducted within the ecosystem, while others are conducted within company borders. For the functions that are conducted within the protocol, business logic is driven according to the code. Interestingly, one case exhibit how a protocol can facilitate a unique activity for service providers – a service provider can function as a storage and distributor of content. This is also an interesting example of how a traditionally company internal function can be conducted externally. However, as the company can control the code and possibly require stakeholders to have a permission, a considerable amount of control is still within the company, diminishing the decentralized nature of their protocol (Musicoin, 2017; eMusic, 2019, 15). By extension of some functions being internal within the company, the companies drive a considerable amount of business logic and exercise control which limits the available transparency and aggregated control.

As noted earlier, Audius has their own token for governance. Actors can vote and influence decision in proportion to their ownership of the token. In addition, value captured from the protocol is redistributed to Audius token holders on the basis that they are the ones contributing to the ecosystem. Since the structure of the protocol is so decentralized, it is important to address how the business logic is facilitated and incentivized. In the following sub-chapter, this research will discuss incentives. Musicoin and eMusic maintains development in-house, Musicoin also retains a percentage of the revenues of the protocol.

While the Audius protocol preaches decentralization, it is evident that this novel token system introduces services that do not exist in a traditional value chain. This introduces possibilities where new entities can create a layer of intermediaries (Rumburg et al., 2019, 9, 15, 20). As theory suggests, blockchain may not necessarily fully decentralize, but shuffle the roles of each stakeholder. Furthermore, even though these services can be fulfilled by anyone, since they are predicated on efficiency, entities can cluster and create dominance based on their superior performance compared to other decentralized service providers.

Consumption is not necessarily tied to a subscription model: content can be paid for by each listen. This form of consumption is observed in all three cases. The notion of a pay-per-listen is a close variation of micro metering that was introduced in theory. In two cases revenues went directly to the creator, while in eMusic, revenues were accessible to creators by request. However, all three flows were transparent, automated, and rather quick in comparison to the current standard.

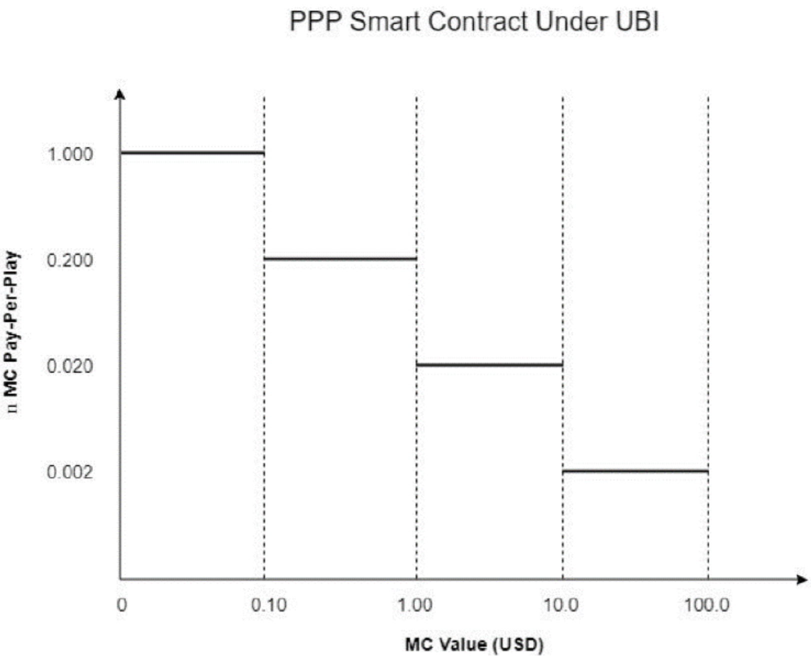

Figure 8 – Dynamic pricing of $Music (Musicoin, 2017, 17-18)

A variation of the concept of dynamic pricing, introduced in theory, can be observed in the Musicoin protocol (Figure 8). While the protocol will pay content creators a flat fee for consumption of each song, the flat fee is determined based on the value of the underlying token. (Musicoin, 2017, 17-18.) As mentioned in theory, the fee could also be calculated based on other qualifications, such as demand.

5.2.3 Incentives

In all cases, blockchain facilitated incentives are used to varying degrees. These incentives are often constructed from financial benefits but can also provide convenience or utility. The incentive structures are built differently in each case. In this sub-chapter, incentives are inspected from the perspective of different stakeholders: creators, users, service providers, and companies.

> *Service providers must stake Audius tokens to register their services; this requires one to have a stake in the protocol's long-term success in order to operate on the network, aligning their incentives with long-term network value creation.* (Rumburg et al., 2019, 7)

As evident from previous sub-chapters, the use of incentives is most apparent in the Audius protocol degree, essentially using incentives to drive business logic throughout the whole ecosystem.

The following incentive occurs in all the cases in this research. Since some tokens derive their price based on supply demand, holders of these tokens are exposed to price volatility. In case the protocol gains traction and demand, early adopter and holders of the token will benefit from the subsequent price increase. The opposite is true, where holders will lose value if the protocol fails and loses demand. As such, stakeholders are rewarded based on the performance of the protocol.

Tokens enable creators to self-publish in a unique way: As an artist submits their musical asset, they specify conditions as best suited for them. These conditions can include how the asset is distributed, to what price, and these conditions can be modified. This effectively enables artists to exercise better control over their product. Additionally, as the transactions become automatic and automated, artists are spared from the transactional costs of having to negotiate each collateral contract. (Rumburg et al., 2019, 13; eMusic, 2019, 15-16, 26.)

Smart contracts execute each transaction according to pre-negotiated splits. The revenue becomes instantaneous and automated which can enhance the position of creators compared to the current lengthy process of revenue and royalty payments. (Musicoin, 2017, 12; eMusic, 2019, 16.)

Another interesting application is the ability to embed rights into a token. In such cases, an artist can sell their rights and the subsequent rights can be effectively exchanged on a secondary market. (eMusic, 2019, 26.) As such, this DAO utilizes the function of tokenizing assets as outlined in the Ethereum whitepaper (Buterin, 2014, 14-16, 19). This has implications to how artists can raise funding for their operations (eMusic, 2019, 27).

Users, both in eMusic and Musicoin, will benefit from the increase in the value, incentivizing them to be an early adopter. Since the Loud token in Audius is a stablecoin, such benefits do not exist. In the case of tokenization of a musical asset, users can benefit from price fluctuations, benefit from their artists’ success, or exchange tokens like a commodity or a stock.

In the case of eMusic, the efficiency comes from the functionality of the token; First, eMusic can offer users exclusive content that can only be exchanged with tokens or available to token holders. Owning tokens can create access to additional services, such as purchasing tokens gives access to cloud storage. (eMusic, 2019, 24-26.)

Second, eMusic users can be rewarded for specific actions that bring value to the ecosystem (eMusic, 2019, 25-26). This kind of incentive-based engagement can enhance the experience and utility of end-users and bring value to the ecosystem. User rewards are issued from a plethora of activities ranging from interacting with other users, curating content, rating reviews, and promoting (eMusic, 2019, 26-27). This brings ability to reward users for activities that have fallen outside the scope of traditional reward systems. In particular, curation, such as creating playlists and engaging with other users have not been economically incentivized in traditional platforms. Similar function can be observed in the Audius protocol, where stakeholders can arbitrate cases between each other, although, these functions are reserved for separate service providers, arbitrators.

> *Rating Reviews and Enhanced User Interaction: Using tokens, customers may rate the quality of reviews provided by other customers and industry experts. Customers may receive tokens from eMusic as a result of contributing to community discussions, providing valued reviews, ensuring the quality of the Platform by flagging incorrect data, or referring new artists to the Platform.* (eMusic, 2019, 26)

Finally, incentives are inspected from the perspectives of service providers and companies. As Audius exhibits more of a decentralized peer-to-peer nature, many functions, as described above, are allocated to the ecosystem and its stakeholders. As dictated by the staking method, Audius service providers stake an amount of token in order to operate. The quality of the service determines if the service provider (gains) or loses the staked amount, and consequently lose their right to participate. In this way, not only are they rewarded for certain outcomes, but they can also be punished for other outcomes. In some cases, two service providers can represent one side a dispute. In such a situation, one side wins the staked amount of the other side (Rumburg et al., 2019, 11).

This represents an interesting incentive scheme where community members finance each other's incentives in a peer-to-peer manner as dictated by the code in the protocol. The incentive structure also includes a dimension where bad behavior is punished. In the Audius protocol, this is referred to as a "decentralized bounty economy protocol". (Rumburg et al., 2019, 17.)

eMusic posits that third parties can interact with the protocol and create additional services with synergic benefits. As such, service providers can introduce the ecosystem and it's benefits to their own core users.

> *Non-affiliated businesses will be able to create APIs for the Platform in order to allow their users to interact with the Platform for products and services, such as the purchase of concert tickets, obtaining (or providing) music news, and sales of artist-oriented merchandise, among others. (eMusic, 2019, 27)*

In Musicoin, the fees paid for miners will decrease by 20%, of which a part will be distributed to content creators and a part to the company (Musicoin, 2017, 17, 19). Similarly, in eMusic part of revenues flow back to the company. In such a structure, both companies are incentivized to oversee, maintain, and develop the protocol. (Musicoin, 2017, 19; eMusic, 2019, 16-17, 30.)

5.3 Future of blockchain in the music industry

While many whitepapers aim to provide an alternative blockchain-solution to the music industry, it is imperative to discuss the feasibility and ecological sustainability of these endeavors. This sub-chapter addresses the positioning of blockchain from a long-term perspective. As blockchain is being perceived and promoted as a tool for equalizing the unfair positioning of powerful players and the intermediaries, the value offering for stakeholders should be evident. The following quote illustrates how blockchain is positioned.

> *As more content is distributed through the distribution platform to external service providers, the more the promotions and plays will follow what the fans want to hear and discover vs. what the labels and algorithms have negotiated in their contracts. This will be particularly attractive to the small but vocal population of music consumers who have thus far conscientiously resisted giving their business to streaming platforms.* (eMusic, 2019, 15)

However, it was noted that the success of blockchain related protocols are predicated on the fact that they are able to attract a larger user-base. This has been noted in literature as well.

> *...success is dependent on luring enough users and content creators away from these providers [established services like Spotify, Apple Music, Amazon, QQ Music and KuGou] to reach scale...* (eMusic,2019, 13)

The market for digital streaming has matured, with U.S. on-demand consumption reaching over one trillion (BuzzAngle Music, 2019, 16). While the consumer base for digital streams is large, it is important to understand what the required scale is in order to achieve competitiveness on the longer term. While blockchain brings function, its shortcoming is in the scalability and capacity to process larger quantities of transactions, especially transactions related to compilated contracts (Buterin, 2014, 33).

All cases fail to adequately address concerns about scalability to mass consumption, its sustainability regarding electricity consumption, and the capacity for the chain to process elaborate and sophisticated smart contracts. Since eMusic mentions that it runs on top of Ethereum, these questions possibly fall outside the scope of the whitepaper. This calls for further research on the capacity of Ethereum to process large transactions that occur in high frequencies. Furthermore, since Audius and Musicoin may use the proof-of-stake mechanism, electricity might not pose as significant of an issue. While Musicoin has created their own blockchain and poses an objective of hosting a million artists, it would be especially appropriate to address each of the issues. Furthermore, speed and security will likely be issues that create a threshold for users to adopt a blockchain based protocol, making them an important topic to address.

As noted, eMusic keeps its metadata and content on an off-chain. This might be due to a scalability issue. Furthermore, the nature of the off-chain is not described in the whitepaper. In the cases of Audius and Musicoin, both metadata and content are kept in an off-chain, however, the off-chain functions in a peer-to-peer, immutable, and transparent manner, maintaining the decentralized nature of blockchain. While Audius bases the solution for peer-to-peer storage on the premise that it is a more scalable solution, Musicoin insinuates that peer-to-peer storage is relatively safer and less expensive. (Benet, 2014, 3; Musicoin, 2017, 12; Rumburg et al., 2019, 7-8.)

The objective of reaching mass consumption seems like a discrepancy, since two cases are directing their services to independent artists instead of popular mainstream-artists (Musicoin, 2017, 3; eMusic, 2019, 4-5). As discussed in paragraph 3.3, advertising to independent artists may reflect low technological maturity and low incentives for major artists and labels. Additionally, since blockchain seems to position itself against powerful incumbents, it might be difficult for blockchain startups to gain attraction of major artists that are very engaged with labels. However, all cases prefaced their value by criticizing the current industry and the incumbents (Musicoin, 2017, 6-11; eMusic, 2019, 9-11; Rumburg et al., 2019, 4). Musicoin also suggests that the current status in the music industry is beneficiary for the incumbents, creating an incentive for them to not change. Musicoin seems indifferent about major labels, as it is confident that it can gain a large market share by offering content from independent artists. (Musicoin, 2017, 4-5, 10.)

Another interesting point is that aggregators have to pay heavy advance payments to offer label-owned content. This might be circumvented by building an offering from independent artists' content that does not require heavy up-front payments and is paid for incrementally only after consumption. In Musicoin's case content will be free for users and will not have ads. Furthermore, the protocol will pay content creators more than other protocols. It remains unclear, how the protocol plans to maintain payments for creators and decrease revenues from customer payments and ads, however, it is implied that lack of up-front payments and lack of intermediaries would free resources to a great degree. Musicoin, however, gives a context in which consumption of independent artists is increasing and serving their content will facilitate mass consumption. (Musicoin, 2017, 3-5, 13-15.)

As proposed in theory, mass adoption may require back-end integration due to the complexity/inconvenience of the technology. As observed in the cases, consumer facing communication and marketing is positioned as a streaming platform like others. In this sense blockchain is back-end integrated and not visible for end consumers at the forefront of engagement.

In any case, all three cases, are in the beginning phases of planning or transitioning from beta testing into fully functioning protocols. This is reflected in the disclaimer in the Audius whitepaper that reads “Audius is a work in progress and the contents of this paper are subject to change”. (eMusic; Audius; eMusic, 2019, 28, 31; Rumburg et al., 2019, 1.) As such, it is difficult, if possible, to assess feasibility or success of such token systems. This supports the argument in literature that conclusions are derived from premature empirical cases. Furthermore, as mentioned in the data collection section, several companies that appear in previous research are no longer functioning. This further supports the notion of prematurity. Also, in the whitepaper of Musicoin, a reference is made to a newer whitepaper that would be published the following year, 2018. However, the new version has not been published yet, three years later, which might have implications that the protocol development has not materialized as expected. (Musicoin, 2017, 25.)

As it comes to governance, it is a probability that decisions manifested as the outcome of multiple unknown parties would not be the optimum decision especially as on the longer run. For this, a longitudinal study of a functioning ecosystem with shared governance would be appropriate.

6 CONCLUSIONS

The objective of this chapter is to dovetail the findings of the case with the theoretical framework and infer possible conclusions. While the analysis section dissects the case, the analysis is advanced to further maturity in this chapter.

6.1 Theoretical contributions

The desire of utilizing the blockchain technology in different fields is visible. While the technology itself seems simple, the application of it calls for creativity and ingenuity. For the complexity and multi dynamic relations observed in the music industry, blockchain seems to have an impact. This research offers four observations and contributions to theory.

First, this research sheds light on how blockchain is applied in practice. The detailed analysis of the technical side is intended to showcase nuances and their subsequent effects on business logic and structure. Previous research lacks such careful examination. This empirical analysis observes how in each case the technology is used in different ways and to varying degrees. For example, blockchain was the core technology in Audius and the point of control for all engagements between all stakeholders, resembling a fully decentralized organization. Musicoin and eMusic used the technology to a lesser degree, showcasing the flexibility of the technology.

Second, the different uses of blockchain have consequent implications to governance, structure, and business logic that differ in each case. In Audius, decision making and arbitration was maintained by the stakeholders. This supports previous research arguing that blockchain could "replace a layer of representatives (i.e., the executive board), with shareholders exerting control over that code" (Tapscott & Tapscott, 2016, 128). In addition, Audius showcased how transactions could be facilitated with incentives, which enabled each stakeholder to pursue their own benefits. This validates blockchain as a decentralized organization that facilitates mass collaboration by aligning everyone's interests (Tapscott & Tapscott, 2016, 5, 34-48).

In the other two cases, eMusic and Musicoin, as blockchain was used to a lesser degree, the structure was relatively more centralized – some engagement between stakeholders would be conducted through the company. Furthermore, the companies behind the eMusic and Musicoin protocols could drive more business logic while retaining more decision power. The possibility for entities to exercise control in flexible ways through blockchain is noted in previous literature (Buterin, 2015; Zheng et al., 2017, 559).

Third, it was evident form each case that the implementation of blockchain was in the beginning stages and in many ways subject to further modifications and development. Furthermore, many subsequent business structures in the empirical cases are yet to be proven successful and long-lasting. On this basis, this research provides credibility to theory and previous research that claims that the technology is not mature enough, and that projecting the evolution and implications of blockchain in the music industry is difficult. Just like previous research, this one derives conclusions from empirical data that is experimental and future oriented. (De León & Gupta, 2017, 21; Sitonio & Nucciarelli, 2018, 12.) For example, after empirical findings, it still remains unclear how and if blockchain can facilitate transactions at scale, reiterating Torbensen and Ciriello (2019, 10).

Lastly, this research provides a theoretical framework (figure 3) that works as a tool for analyzing empirical cases. The framework is divided into three parts that can be used individually, each addressing an important aspect of implementing blockchain: technological structure, business implication, and future. Each part consists of relevant sub-themes that represent important elements worthy of consideration. As the themes collected from the empirical analysis largely match with the sub-themes of the framework, it is concluded that the framework functions as an appropriate guiding map for analyzing cases.

6.2 Managerial implications

This sub-chapter addresses the topic from a managerial perspective. This research provides perspectives on how blockchain can shape the business model, most importantly, how to engage different stakeholders in an intensive way.

From a managerial perspective the key message is to understand the relation of the company to each stakeholder and the incentives of each stakeholder for participation. Utilizing this, the blockchain protocol can be tailored to firstly fit the structure of the desired organization in terms of relevant dynamics including governance, decision power, and transparency. Second, at the core of the protocol, the smart contracts have to be tailored to facilitate the incentives in a way where it is attractive to stakeholders and the incentives are aligned with the goal of the company. As the music industry echoes the need for structural changes, creating a functioning attractive protocol could create a competitive edge in the market.

Two implications can be observed across most stakeholders. First, theory states that transparency brings additional value to the ecosystem. This was supported in the analysis: gaining access to different data points can bring meaningful value for stakeholders and diminish information asymmetry. Second, stakeholders that hold ownership of a specific token within the protocol are exposed to the financial success or failure of each protocol.

The implications can be observed from the perspective of each stakeholder. Content creators can experience greater control regarding their musical assets and utilize tools that enable efficient control through blockchain. In addition, creators can access financial flows in meaningfully more attractive and efficient ways.

Users can engage and be engaged intensively and through a wide variety of transactions. For example, users can be incentivized with financial rewards to interact with other users, curate content, write and rate reviews, and promote. Users can also access products or ownership of the protocol or musical assets in a novel way.

Lastly, depending on the protocol, anyone could function as a service provider and theoretically contribute to a protocol by taking part in maintenance, governance, and arbitration, which traditionally are reserved and conducted internally within a company. The contribution can be relatively frictionless and automated, creating an interesting environment for contribution. Additionally, a protocol can also enable unique activities for service providers – for example, a service provider can function as a content storage and distributor.

6.3 Limitations of this study and future research

As the final part of the discussion, this sub-chapter addresses limitations and short comings of this research. This is done to shed light on the credibility of the findings and to advice further research. Also, future research topics are addressed here.

This research was conducted as a multiple-case study, basing empirical material on secondary data on publicly accessible white papers. As the field progresses rapidly, more studies should be conducted to capture the current state. Furthermore, in order to extensively understand the implications of blockchain in the music industry, a larger sample of whitepapers should be processed. While some comments and observations can be made based on these cases, it is challenging to understand the wholistic nature of how blockchain fits in the music industry and in which ways it can modify and disrupt existing processes, protocols, and business models. This study deliberately explores the impact on the music industry, however, many parallels can be drawn between music and digital media in general. Therefore, a more comprehensive approach is to study the impact of blockchain on digital media, particularly in streaming format.

Since many objectives in the whitepapers are forward-looking and optimistic, a follow-up study should be conducted to assess how the implication of blockchain have developed. While this research has identified a token system that can be described as fully decentralized automated through smart contracts and incentives, at the moment of writing, the case was in the beginning phases of its development. As such, this research could not explore the feasibility and difficulty of creating such a token system. Furthermore, it could not explore the difficulties and shortcomings of such a system from a business or governance standpoint. Further research focusing on a proven fully decentralized running token system is necessary. From a technical standpoint, it was noted in theory that scalability could be an issue to mass adoption. The explored cases failed to adequately address such discussions.

7 SUMMARY

The aim of this research is to understand how the newly developed technology, blockchain, can be integrated in the music industry. Blockchain is a public ledger that enables independent and unknown parties to transact and engage with each other in a trustless environment. In other words, it creates trust through its secure mechanism. The system maintains itself independently of a legal entity and functions according to predefined code.

The predefined code can be highly tailored to fit differing environments. Most notably, the code can have embedded conditions to transactions, making each transaction a legally binding contract. As such, users can create an ecosystem where unknown parties can transact according to predefined business logic.

This research focuses on the implementation of blockchain in the music industry. The music industry provides an interesting context: multiple parties engage in activities within complex relationships, providing a digital asset to an end-consumer. In such a context, blockchain is said to have potentially meaningful effects.

This research was conducted as an intensive and inductive qualitative multiple-case study. The sub-questions are the following. How is blockchain currently used in the music industry? What attributes of blockchain are utilized in the music industry? What is the future trajectory of blockchain in the music industry? Three cases, which all had a blockchain focused protocol, were studied. The empirical data was collected from secondary articles referred to as whitepapers.

This research concludes that the utilization of blockchain can occur in varying ways and to varying degrees. The consequential effects can be observed in the governance, structure, and business logic of each case, which this research showcases in detail. While this research was able to provide differing possibilities for use, the cases did not address questions regarding scalability and mass adoption, thus supporting arguments presented in previous research and theory about the immaturity of the technology.

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