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## Blockchain and Smart Contracts in the Recording Industry

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**Abstract:**

**Purpose:** A burgeoning body of research has described how the blockchain technology may affect the way firms operate within the recording industry which has undergone profound changes due to the dematerialisation of music and the emergence of new consumption habits. The purpose of the paper is to explore both the challenges and the opportunities related to the application of smart contracts and blockchain mechanisms to the recording industry.

**Approach/Methodology/Design:** Based on a review of contributions made to the literature in various fields, we discuss recent developments, relying on several examples and use cases which bring an updated perspective to a topical question. While the blockchain brings interesting solutions in favour of an improved management of copyright data and fees collection, several barriers impede their uptake and large-scale adoption.

**Findings:** We argue that the absence of both technological and regulatory standards, the resistance to change, and the necessary use of cryptocurrency, are all obstacles to a profound transformation of the sector.

**Practical Implications:** To overcome these limitations, we suggest three recommendations that deal with technological standards, cooperative agreements, and international regulation around blockchain.

**Originality/Value:** So far, the literature tends to focus either on blockchain technology or on smart contracts when discussing technological evolution within the recording industry. In this paper, we bring together these two elements which are definitely complementary to each other. Further research efforts are required to investigate in more details the feasibility and relevance of the recommendations we make.

**Keywords:** Recording industry, blockchain, smart contracts, copyright.

**JEL classification:** F6, K2, O3.

**Paper Type:** Research study.

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## 1. Introduction

The recording industry has always been at the forefront of the sectors that have been impacted by digital technologies. Due to the non-material nature of music, the recording industry has been consistently shaken by technological advances, which have been as swift as they have been profound. The industry has often shown a particularly active hostility towards digital. The fight against piracy, from both a legal and technological standpoint – let us recall the infamous DRM<sup>i</sup> – has demonstrated all of the limitations of an approach that aims to remain consistently on the defensive.

The revenue generated by the recording industry has grown by 8.1% in 2017, thus confirming a reversal in the 2015 trend after fifteen years of consistent drops. With a growth in revenues of more than 40% and 176 million paid users in 2017, streaming has becoming the primary revenue source for the recording industry around the world, surpassing album sales and concert tickets, which are down 5% on an annual basis (IFPI, 2018). Music consumption has officially shifted from a model that is based on ownership towards one that is founded around access to music (Arcos, 2018).

For the first time ever, revenues from digital channels have surpassed physical sales, accounting for 54% of the global market in 2017 (IFPI, 2018). Even legal downloading is no longer bringing in money (-20%). The problem of piracy, therefore, has quickly been relegated to the background, not because of any of the efforts used to contain the scourge, but because of the continuing evolution of music lovers' consumption habits, which has been encouraged by technological innovation.

The *blockchain* is one of the innovations that has great potential to be disruptive. This time, the recording industry seems ready to see this as an opportunity, rather than a threat. In fact, several recent initiatives tend to demonstrate that this technology, in association with smart contracts, would be likely to create value – or, more precisely, to distribute value more equitably – than eliminate it.

The article aims to highlight the recognised fields of application for blockchain in the recording industry. After a brief description of the technologies being considered here, three potential or partially tested applications are discussed. The final section presents the limitations and challenges that still hold us back from what could be seen as a real, in-depth transformation within the industry.

## 2. Blockchain Technology

As its name implies, a blockchain is comprised of a collection of interconnected blocks. Each of these contains specific data. The chain in its entirety forms a secure and unchanging database. It is secure because the information is stored in a decentralised manner in a peer-to-peer network on the network users' servers. There

is no longer a central node. The information is also protected by cryptographic means. It is unchangeable because each block is connected to the next by a protocol that prevents it being modified when backed by the preceding block (Beck *et al.*, 2017). Within blockchain architecture, each node contains a regular update of the blockchain, which implies that there are a variety of virtual copies of this chain, making it almost impossible to falsify in any way.

Each block contains four elements: two hash functions, an identifier and the time stamp. A hash function is the unique digital imprint for digitalised content. It is generated by an algorithm that transforms the information into an alphanumeric sequence of 64 characters. The first function takes the last data of the preceding block and mixes it with the first data of the current block to connect them. The second represents all of the information contained in a single block. Each *Bitcoin* block, for example, contains an average of 2,500 transactions. The slightest change in the content of a block can significantly impact the hash functions. The identifier is a random value used when verifying a block. Finally, the time stamp makes it possible to add each block to the chain in chronological order. The blockchain is consistently synchronised and, in order to be added, a new block must be validated by the network. Each block added confirms the validity of the previous one. This concludes the overview of the technical aspects.

If the first transaction based around this technology dates back to January 2009, we must wait until late 2015 before the term blockchain gains notoriety, thanks, in particular, to an article called “*The trust machine*” in *The Economist*. Following the 2008 financial crisis, the traditional model, in which the value of money is ensured by large institutions like central banks, is brought into question. In this context, the first true blockchain application appears: *Bitcoin*, a non-regulated, virtual cryptocurrency that is used and accepted by members of the community, which is risky, very volatile and particularly speculative as an asset.

The primary feature of this technology, therefore, is the absence of a trusted third party, which is replaced by a shared trust protocol. This explains why the most common situations that blockchain applications have been envisaged for are those in which confidence and security are key elements, where there is often a need to keep a record of information about transactions or subsequent events (Albekov *et al.*, 2017; Vovchenko *et al.*, 2017).

The example of accounting records for financial transactions comes to mind instantly. This is how legal professionals define the blockchain (Shatkovskaya *et al.*, 2018), referring to an electronic book of incoming and outgoing transactions that compiles information about third-party rights. As noted by Cuccuru (2017), “*at the end of the day, blockchains are nothing more than sophisticated accounting products.*” In addition to accounting, we can also consider medical records, notary documents or even records regarding intellectual property, such as patents,

copyrights and other intellectual property rights. Naturally, the latter will be the focus of this article.

### 3. Automatic Contract Execution

The term *smart contract* appeared in 1994, long before there was any talk about the blockchain. The concept is simply defined by automatically executing the clauses included in a contract, thanks to an IT protocol. The clauses are actually integrated into the source code of the blockchain and are executed once all of the predefined conditions have been met, without any intervention by experts or third parties (hence the automatic nature of the system).

Let us look at a very simple example. Within the context of online sales activity, an interruption of the Internet connection represents a loss of income. Not only is it possible to insure against a risk like this, but, in the event of a problem, it is desirable to have quick and fair compensation. A smart contract could be applied here; the merchant makes an agreement with the person who bears the burden of the risk (the insurer or service provider) about the damage associated with a unit of time, that is, for an hour during which the website cannot be accessed. If necessary, a signal is automatically triggered and, once the system is re-established, the IT protocol calculates the sum of the compensation and executes the payment.

Naturally, the goals of smart contracts are to reduce transaction costs, such as those linked to fraud, arbitration and execution, or any other aspect that could potentially impede the execution of a contract. However, it would be incorrect to conclude that smart contracts are less expensive than their regular equivalents. The inherent costs of implementing the infrastructure needed to collect data – this touches on the concept of the *Internet of Things* (IoT) – and the expertise needed to translate frequently complex contractual clauses, which often contain exceptions, into IT terms is not to be underestimated (Savelyev, 2017).

What about the legal status of these contracts? Some see them as out-of-bounds, believing that IT code cannot serve as a substitute for legal language, while legislation has not (yet) integrated the concept of a self-executing contract that relies on the trust within a community of third parties. Savelyev (2017) notes: “*smart contracts are meant to be stand-alone agreements – not subject to interpretation by outside entities or jurisdictions.*” The individuals involved must therefore develop their own rules for managing conflicts and disagreements that arise.

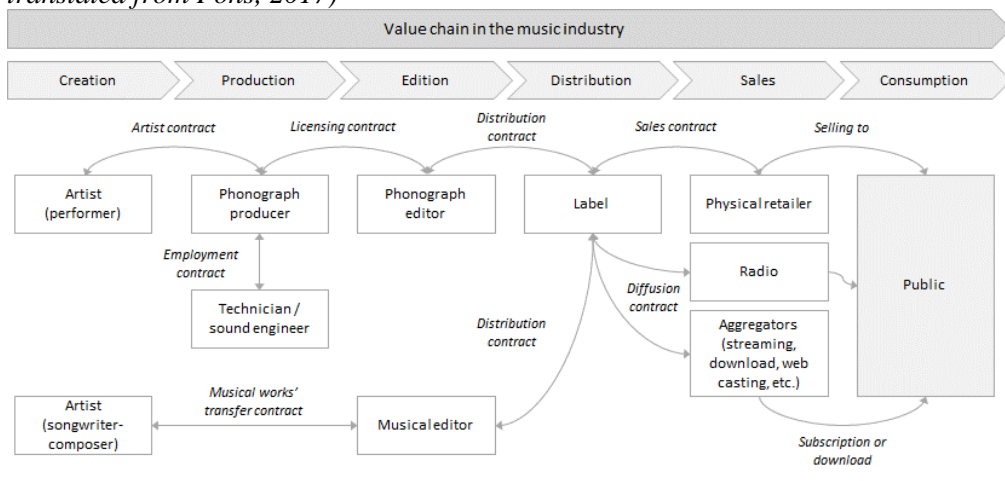
### 4. Application in the Recording Industry

If online streaming platforms, such as Spotify or Deezer for example, have contributed majorly to the dissemination of music, they also represent a new intermediary in a value chain that was already under significant stress, with a compensation system that is not very transparent and which has been proven to not

necessarily benefit the artist (Quinn, 2018). The average sum paid to the artist is 12% of the total amount paid by the consumer. Furthermore, more than three-quarters of the sums that are returned go to the top 1% of artists (Mire, 2018).

As seen in the diagram below (Figure 1), the value chain of the recording industry is particularly complex and contains multiple intermediaries that separate the artist from the end consumer. Furthermore, each of these players is connected to the next by specific contracts. However, the diagram does not show the importance that labels exert, in terms of power and influence, in the distribution of music, compared to the other, more fragmented players (Sater, 2018).

**Figure 1.** The end-to-end value chain in the recording industry (adapted and translated from Pons, 2017)



Source: Own.

From the early days of its existence, blockchain technology has naturally been seen as a solution that would revolutionise the recording industry. Three types of applications have emerged: the management of copyright data, the collection of copyright fees by artists and, finally, the fight against music piracy.

#### 4.1 Optimised Copyright Management

With blockchain, we touch upon the principles that govern the management of databases of copyrighted musical content. In fact, before we consider the collection of copyright fees, it is important to consider the available and collected data. Without an exhaustive and detailed database, it will be impossible to provide appropriate compensation, since we do not know what is due back to whom.

The problem here is that the data related to a specific title – known as “*metadata*” to differentiate between data related to the intrinsic content of a piece (title, melody,

lyrics) and related data (copyright and related rights) – are very rarely declared upstream. Indeed, this metadata is not systematically declared during recording sessions (Pons, 2017). Furthermore, this data is only partially consolidated on a global level. To date, there is no universal database that contains all copyrights for music (O’Dair and Beaven, 2017).

Copyright collectives, which are known as Performances Rights Organizations (PROs) in North America, play an important role in the industry in this sense. By possessing proprietary databases – that is, databases that are not publicly available – these organisations help artists and labels to receive compensation for the use of their work, by collecting royalties on behalf of their members (Arcos, 2018). However, there are lots of these databases, the identification codes of which only pertain to partial rights. For example, artists’ rights (IPN codes) are not necessarily collected in the same database that is used for authors’ and composers’ rights (IPI codes), which does not simplify the problem when we know that a musical composition comprises at least two copyrights: one for the recorded music and the other for the lyrics and melody.

To date, private initiatives aiming to create an exhaustive centralised database of copyrights have not been successful, as evidenced by the 2014 failure of the Global Repertoire Database (GRD), a project that began in 2008 and was abandoned due to the lack of cooperation between copyright organisations. However, the blockchain has created a new impetus. In April 2017, three copyright management organisations – SACEM (France) along with ASCAP<sup>ii</sup> and PRS for Music<sup>iii</sup>, its American and British counterparts respectively – launched the Elixir project. They are partnering with IBM – which has a blockchain technology called *Hyperledger* – to reconcile the codes related to a single piece or song, but which are currently found in different databases.

The first application, therefore, consists of the creation of a meta-database, which would record the data related to copyrights for songs. A system like this based on the blockchain would ensure greater transparency and reliability regarding the identity of the holder of the rights for each musical work. It would also replace traditional mechanisms that are not very digitised and which are very time-consuming (Savelyev, 2018). A copyright that is recorded in this way would also make it possible to cover any creations that are connected to the musical work, such as a music video, an interview with the artist or a biography of the writer (O’Dair and Beaven, 2017).

#### 4.2 Payment and Micro-Transactions

Smart contracts make it possible to create a model that improves the redistribution of expected fees, eliminating some intermediaries. This pioneering case is undoubtedly the Ujo Music platform that was created in 2015. The first work available on this platform was the song *Tiny Human* by Imogen Heap. No centralised database code is

associated with this title and, as a result, the song did not follow the traditional path. It is solely available on the Ujo Music platform, which aims to be an alternative within the industry to facilitate the recognition of rights.

Anyone who wanted to download or stream the singer's song had to use the *Ethereum* blockchain system – which resembles *Bitcoin* – by creating a virtual account, on which they could buy *Ethers*, the crypto-currency for this system, on credit. Once the purchase has been made, the payment is instantly carried out by distributing the rights in the following manner: 91.25% to the singer and 1.25% to the sound engineer and each of the six musicians.

Here, consumption creates a smart contract and automatically implies a division of the revenue that takes predefined parameters into account. These are translated into code and directly associated with the blockchain code for the title in question. In this way, the holders of the rights receive their royalties directly. Today, payment is slow. In the United Kingdom, for example, the two organisations responsible for collecting royalties – Phonographic Performance and PRS for Music – remunerate the rights holders on an annual or quarterly basis (O'Dair and Beaven, 2017).

In cases that involve international payments, this can take years. This automation and the instant nature of payments – sometimes these are very small amounts, but with a very significant volume, hence the term micro-payment – could accelerate the disintermediation process and eliminate intermediaries like the copyright organisations (Savelyev, 2018).

Furthermore, in addition to the increased speed of paying the copyright holders, the blockchain facilitates greater access to musical works that are less widely disseminated on traditional channels. Labels act as a filter at the source, by deciding which titles to prioritise or not. As Marshall underlines (2015), *“Thanks to this micropayment scheme, long tail economics could occur. This means that independent, lesser-known artists could benefit from their small, but now impactful fan base”*. As a result, some artists could benefit from greater visibility by taking advantage of shorter distribution channels, which offer, on one hand, increased proximity to their audience and, on the other, higher revenue due to the elimination of certain intermediaries, such as distributors, as well as savings on fees paid to copyright-management organisations.

This second application demonstrates that the blockchain technology associated with smart contracts offers artists greater autonomy. In fact, each artist could establish the use that could be made of their music in advance, by defining the terms of the licensing contract, which may vary based on the identity of the licensee (regular listener, radios, clubs, ad agencies, etc.). Finally, the revenues would be automatically distributed between the different rights holders for a given title.

### 4.3 Music Piracy

Blockchain technology could finally represent an opportunity in the fight against copyright protection in the recording industry, relying on watermarking (Rosenblatt, 2017). The latter is a technique by which information is directly embedded to an audio recording in such a way as to be imperceptible to listeners. Watermark is the best suitable way to trace an audio file since it combines four key attributes: data flexibility, security, identifier reliability and robustness.

A watermark is, so to say, impossible to remove. Indeed, it will not be altered even in case of a resizing, downscaling or copy of the song which contains the watermark. This is particularly relevant in case of music synchronization. For instance, let us assume that a DJ uses a particular record as “raw material” for a remix, the soundtrack for an ad or a video clip. If the author of the original record finds out that her or his music is being used without proper authorization, she or he could prove his ownership simply by referring to the embedded watermark (Rosenblatt, 2017).

As a third application, watermarking a music record on a blockchain would ensure the traceability of music and a solution to the problem of illicit music licensing and music piracy (Gidron and Kessels, 2019). Blockchain technology allows artists to declare distinct terms of use and licensing rights to music records – from very restricted use to free of use rights – depending on whose making use of the music (Mire, 2017). Therefore, because of its inviolability, blockchain could contribute in fighting against illegal use of music.

## 5. Limitations and Challenges

Now that we have described the applications, we will review the main obstacles that are preventing them from being implemented. Indeed, while blockchain technology seems to represent the ideal solution to the issue of value sharing in the recording industry, literature has also proposed several limitations to this decentralised model.

### 5.1 Technological Standard and Inter-Operability

Like almost every new technology, the development process tends to explore various possibilities without immediately landing upon a single standard. However, in the context of a particularly globalised industry like music, having different initiatives for reconciling information that are not based on a single technological standard may ultimately be counter-productive. As highlighted by Gough (2018), inter-operability between platforms requires industry players to agree on information-sharing protocols, in particular as it pertains to the definition of a standard format for metadata.

Furthermore, a lack of collaboration between the different blockchain developers could impede technological development and prevent widespread adoption, even



outside the recording industry (Gidron and Kessels, 2019). The fact that several competing blockchain technologies are currently available is not comforting to project managers, who are afraid to launch their endeavours in case their chosen solution is ultimately abandoned in favour of another. Furthermore, this inability to choose a single technological trend creates a certain hesitancy from investors, who are, in turn, hesitant to support the managers of blockchain projects in the recording industry.

## 5.2 Critical Mass and Desire for Transparency

The successful creation of a global and shared record of metadata in the recording industry naturally requires the participation of players at every level of the value chain. However, some are more interested in a global and shared meta-database than others. In fact, such a solution will reduce the power imbalances between players. The players who currently hold enormous power – known as the majors – are less inclined to participate. They are already in possession of much of the information mentioned here and have little incentive to share it with lots of people.

The willingness to move towards transparency may also be lacking on the side of the artists (Mire, 2018). The establishment of a public blockchain system would not only make everyone aware of the information about songs (the *metadata*), but also of their success in terms of the amount of revenue that they generate in terms of copyright. As noted by O’Dair and Beaven (2017, p. 475), “*unaffiliated artists don’t always want transparency either. Why? Because, across the board, from the bottom to the top, the recording industry is built on people pretending to be bigger than they really are.*”

## 5.3 Forced to Use Crypto-Currency

In terms of copyright payments in a blockchain system, these should be carried out by means of crypto-currency. However, the uncertainty and speculative nature of this payment method still prevent its widespread adoption, not to mention the legal and regulatory risks of such a selection.

Moreover, each platform may have its own electronic currency and, since there is currently no inter-operability between crypto-currencies, this would mean that a user would be required to have different accounts to use the services of various platforms. However, as Gidron and Kessels (2018) point out, “*in a world full of blockchain applications in various industries, users are not expected to hold several different types of tokens.*” In any case, it is unlikely that users, who carry out most of their online transactions using established electronic methods (PayPal, mobile payment via a banking app, etc.), will agree to switch to crypto-currency to consume music if this conversion is not automatic.

## 5.4 Governance and Legal Framework

Let's get to the obvious question regarding the absence of an appropriate regulatory framework. Various researchers have already warned that the implementation of a more efficient system for paying artists will not fully satisfy expectations, since the rights that result from transactions based on blockchain technology will not be included in a clear legal framework (Shatkovskaya *et al.*, 2018).

The use of the Internet – more specifically, search engines and sharing platforms – has led to a situation in which intellectual property rights are consistently infringed upon. In fact, the ease and speed with which non-material content is exchanged or distributed online no longer fits with the traditional legal framework for the transfer of intellectual property. Legislation on this subject is a challenge that is increasingly significant and complex, because it sits at the juncture of two goals that are both noble and contradictory at the same time. On the one hand, it is necessary to protect the private interests of the rights holder and, on the other hand, impeding the open sharing of the result of intellectual activity for the sake of positive emulation and the common good should be avoided, as evidenced by the fashionable concept of open innovation.

If we start from the principle that using the blockchain and smart contracts aims to redistribute cultural value more equitably, it is possible to draw a parallel with economic value here. The issue of redistributing economic wealth in a given society is one of the major themes addressed by researchers of political economics. While the creation of economic value is often the result of market logics that are unregulated or regulated in a very minor way – the rule of supply and demand is a good example – redistributing wealth, as a rule, depends on ad hoc legal standards and regulatory frameworks that are based on the political history of the society in question. This leads us to believe that redistributing value, whatever it may be, at the societal level must imply the use of a clear and shared regulatory framework.

## 6. Concluding Remarks

In principle, the use of blockchain technology makes it possible to counter three major weaknesses of the current model on which the recording industry is based:

- (1) the transition from a model where copyrights are centralised in different databases, which are hard to reconcile, to a decentralised management model where copyrights are found in the same record, which is secure, accessible to all and cannot be falsified;
- (2) the transition from a system for repaying rights holders that is slow, ineffective and not adapted to the current means of music consumption, to a copyright calculation and payment system that is automated, accurate and instant; and, finally,
- (3) the transition from an industry that is particularly packed with intermediaries and

often deemed to be lacking in transparency to a fairer industry, thanks to greater visibility throughout the value chain.

However, we have highlighted several limitations and barriers to the implementation of a model that is designed for efficiency and equity: the absence of a technological standard, the resistance to change of those who benefit from the current model, the unreliability of crypto-currencies as an underlying payment method, the complexity of the rules for governance that need to be implemented, and the absence of a shared legislative framework for smart contracts and decentralised independent organisations.

In order to remove these barriers, some are calling for greater legislative involvement. To this end, here are three areas for reflection that could be studied in future research:

- (1) the establishment of a technological standard in the recording industry, on which all private initiatives based on blockchain technology will be built, or, at the minimum, obligatory inter-operability between the systems;
- (2) international agreements that would support the creation of a single, decentralised and complete copyright record for the entire industry;
- (3) the development of an international legislative corpus – already referred to as *Lex Cryptographia* – that makes it possible to regulate crypto-currency transactions that stem from the execution of smart contracts.

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## Notes:

<sup>i</sup>*Digital Rights Management (DRM) refers to the collection of techniques used to limit access to, and use of, audio or visual works through digital formats. Converted into supranational legal standards at the end of the 1990s, these technological constraints, which, for example, prevent the private copying of media or limit its usage to a specific geographic location, have been roundly questioned in the years since. Since 2006, several initiatives have been launched by companies to eliminate DRM from musical works, including big players like Apple and EMI.*

<sup>ii</sup>*The American Society for Composers Authors and Publishers (ASCAP) is an American organization founded in 1914, that administers the copyrights of composers, authors and publishers of music. The competing company is called Broadcast Music Incorporated (BMI). Today, these two companies share the US market about halfway.*

<sup>iii</sup>*Performing Right Society for Music is UK's leading collecting society. Also founded in 1914, it provides collective management of rights in musical works on behalf of its 140,000 members.*