International Journal of Music Business Research • 12(2) • 2023
DOI: 10.2478/ijmbr-2023-0006

International Journal of **Music Business Research**

A Perspective on NFTs in the Arts-and-Music Industry*

Research Article

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Received September 14, 2022; Accepted July 27, 2023

Abstract: Significant interest in non-fungible tokens (NFTs) as a means of changing the music industry has motivated this investigation. First, a comprehensive literature review (of strengths, weaknesses, opportunities and threats [SWOT]) provides a summary of the benefits and costs associated with the deployment of blockchain- and NFT-based transactions in the music industry. Considerable effort has been devoted to identifying the economic, legal and regulatory benefits and drawbacks of applying the new technology. NFTs may be the final realisation of the digital universe, bringing exclusivity and revenues to the creator economy and the chance to revalue creative work. The technology's drawbacks may exceed its advantages. Navigation within the crypto regulatory landscape is still deemed as exploring uncharted territory. It is further complicated by the fact that it is largely uncertain which legal framework may apply due to the lack of jurisdiction-identifying criteria. Second, quantitative research is conducted as an online survey directed towards two research questions: *1) What is the extent of familiarity and knowledge related to NFTs, as well as perspectives on NFTs as potential disruptors? 2) What is the extent of music creators' perception of NFT-related opportunities and NFT integration into the music industry?* Twenty EU countries were selected for the survey. Respondents answered twenty questions focused largely on demographics, their awareness of NFTs and their perceived potential for disrupting the music industry. It is too early to say whether NFTs will be utilised successfully, especially by independent musicians. The arguments in favour of NFTs are compelling, but there are issues regarding the levels of awareness and competence required for implementation.

Keywords: *Music industry • Emerging technologies • Blockchain • NFTs • Knowledge transfer • Ownership rights*

1. Introduction

Non-fungible tokens (NFTs) are the latest in a series of tradeable digital assets based on blockchain technology. NFTs, in simplified terms, are blockchain-enabled cryptographic tokens designed to represent ownership of objects such as digitised art and music. With the advent of Web 3.0, blockchain technology and NFTs, advocates for the new technology see NFTs as the solution enabling artists to assert value over their work. Some experts in the music industry consider NFTs as the vehicle for democratisation of the business, generating both value creation and value capture opportunities (Leal 2022).

This research is stimulated by the considerable amount of attention given to NFTs as a vehicle for transforming the music business. First, it appears to the authors that the relevant literature up to the present time fails to provide a balanced synthesis of the likely benefits and costs associated with the introduction of blockchain- and NFT-based

* This research builds on earlier work presented at the programme of the 13th International Music Business Research Days, University of Music and Performing Arts, Vienna, 19 October 2022. The authors express their appreciation for helpful comments received from meeting participants and excellent suggestions from an anonymous referee.

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transactions in the music industry. Considerable effort has been made to identify the opportunities and risks of applying the new technology from the economic, legal and regulatory perspectives. A key insight from the overview is that while NFTs might well be the ultimate realisation of the digital universe, popularly referred to in the context of the metaverse, offering exclusivity and substantial earnings to the creator economy and the opportunity to rectify devalued creative work, the recent technology carries with it several problems that may outweigh the advantages. Despite NFTs' influence on the art and music markets, NFTs continue to be contentious in several ways. To achieve universal acceptance of NFTs, there is a need for marketers, issuers and purchasers of digital assets to enhance their crypto literacy and for more transparency to be offered on issues linked to ownership and intellectual property (IP) rights (Khawaja 2021).

Following this Introduction, the next section sets forth a literature review focused on the importance and viability of NFTs. The published literature includes the perspectives of both technology zealots and naysayers. The authors have adopted the strengths, weaknesses, opportunities and threats (SWOT) framework with the intent of providing the reader with a balanced overview.

The application of a SWOT analysis in academic research is particularly useful for contrasting the various positive and negative factors influencing the NFT landscape and for presenting a synthesis between the literature review and the SWOT analysis results. It further serves to bridge knowledge gaps at different levels of NFT awareness and crypto literacy. A conceptual assessment and integrated analysis provide a wide-ranging synopsis of various performance attributes and contrast the superiority of the novel technology with its shortcomings.

Section 3 is focused on the quantitative methodology, data collection and analyses. Quantitative research is conducted as an online survey designed by the authors and distributed online by Pollfish. The purpose of the survey is to better understand the business innovation landscape for NFTs and blockchain-based technologies in Europe. More specifically, the survey focused on contributing insight with respect to the following research questions:

Q1: What is the extent of familiarity and knowledge related to NFTs, and what are the perspectives on NFTs as potential disruptors?

Q2: What is the extent of music creators' perception of NFT-related opportunities and NFT integration into the music industry?

Key aspects of the pan-European survey are summarised as the initial findings, and they not only set the groundwork for immediate research but set the direction for future research considering a broader geographic sample. Section 5 concludes the paper with a summary of key results from the research and suggestions for future work.

2. NFTs: SWOT Analysis

While many authors have contributed to understanding NFTs and implications for entrepreneurs in the arts and music business (Chandra 2022; Wilson, Karg and Ghaderi 2022; Yemenici 2022; Oliver and Lalchev 2022; Rogers et al. 2022; and Gomes 2021). The full scope of the SWOT approach has not been consolidated in the academic literature. The most comprehensive survey to date is that of Nobanee and Ellili (2023), although their study is focused on blockchain, cryptocurrency and digital art. The purpose of this section is to synthesise both perspectives and the sometimes-disparate facts pertaining to the benefits and drawbacks of the expansion of blockchain-based and NFT transactions in the music industry. A key advantage of a SWOT analysis is its versatile application because it provides a situation analysis technique. It is equally a directional tool to catalyse discussion and the resolution of mission critical concerns. Strengths and weaknesses are considered to be controllable categories, while opportunities and threats are deemed to be outside of the controllable range. Therefore, it is essential to identify potential dependencies and interconnections between the four pillars of the method. Further research is required to provide a scorecard of the four categories and to include other variables in relation to their intensity and relevance and determine to what extent they can balance or neutralise each other.

2.1. Strengths

2.1.1. Disruptive or transformational innovation

There is considerable support for the position that the music business is at a crossroads in terms of digital transformation, and consequently, there is optimism around the acceptance and rapid growth of NFT technology.

The development of blockchain and derivative blockchain technologies gives reasonable cause to predict market disruption in the value exchange process. The promise of innovative technologies is that (i) transactions will be more efficient, i.e. faster and at lower cost; (ii) intermediaries will be eliminated from the value chain; and (iii) security will be enhanced. Further, there is an expectation of new collaborative business models.

Since the introduction of the "disruptive innovation theory," as proposed by Clayton Christensen in his seminal and path-breaking work, *The Innovator's Dilemma* (1997), an immense literature has appeared debating conceptual understandings of disruption and suggesting often idiosyncratic applications (Markides 2006; King & Baatartogtokh 2015). In short, how disruptive innovation happens is a topic widely discussed, yet only partially understood.

Taking disruptive innovation theory as a hybrid drawn from the works of such scholars as Christensen (1997), Chesbrough (2003), Hargadon (2003) and von Hippel (2005), it seems reasonable to state that innovation is a consequence of recombining ideas, information and knowledge of people, over a networked landscape, leading to something new, e.g. an idea, methodology or device. Inventors "borrow" existing ideas and then bring together the physical objects and the people necessary to apply those ideas elsewhere. This perspective posits that innovation as a dynamic process involving the interplay between actions and re-actions of new entrants, incumbents and factors within the external environment is critical.

Disruptive innovation is associated with a paradigm shift, which results in momentous change in market conditions. Generally, the catalyst is a new technology. This change redefines existing industries' structures, product concepts and overall knowledge in a field (Besson & Cartwright 2012). Baiyere and Hukal (2020: 5482) define digital disruptions as "the alteration of a domain-specific paradigm due to the digital attributes of an innovation." Thus, disruptive innovation introduces a new product or service, the market for which is yet non-existent, representing a challenge for incumbents. Certainly, all innovations are not disruptive. Transformational innovations are associated with incremental change. The transformation or streamlining of industries owing to digitisation is well known (Andal-Ancion, Cartwright & Yip 2003). Disruptive innovations are associated with non-incremental or discontinuous outcomes.

From the published literature, it is apparent that blockchain technologies have potential for disrupting markets in which security of ownership and transparency of transactions are problematic. Blockchain technologies offer efficiency in facilitating and authenticating trade (O'Dair 2018; Tapscott & Tapscott 2016), and the literature points towards blockchain-based technologies as having the potential to transform the digital creative industries in numerous ways:

1. By enabling digital rarity, creating opportunities for systematic digital assets.
2. By forging potential new capital investment sources for creative enterprises, including the option of collective/micro sponsorship and peer-to-peer finance.
3. By linking potentially transformational, computational processes to social value exchange.
4. By streamlining complex IP and distribution management systems, helping to offset digital fraud and exploitation.
5. By enabling people to share in the value of their own mediated activities and leverage cloud computing capacity more easily.
6. By privileging collaborative data-sharing networks and more-open, collective intelligence business models.

2.1.2. Royalties and resale rights of artists

Royalties have long been a critical source of income for music producers, and the commercial exploitation of copyright ownership in the music business is well known. The absence of validated, consolidated records of ownership and copyrights facilitates lack of transparency and dubious practices in the markets for music. There is considerable information asymmetry among labels, music publishers, artists and other stakeholders, benefiting major labels and precluding fair revenue sharing among the right holders (Heap 2017).

The smart contract capabilities of blockchain technology and NFTs have the potential to radically alter how artists are compensated, as the blockchain is, in the strictest sense, a database that offers time-stamped entries protected in a decentralised register (Whitaker 2019). Cryptography is a useful tool for music composers wanting to protect evidence of originality and manage both licence agreements and income distributions (Hemming 2018). A unique feature of blockchain is that it contains public domain registers listing the entire history of initial ownership and subsequent transfers of title, allowing for disintermediation of labels and music publishers for the control of billing and settlement of royalty payments.

As an enabling technology, blockchain helps to reshape the notion of ownership by offering both fractional ownership to digital natives and digital immigrants and fractional equity ownership to music creators.

2.1.2.1. European Union (EU) and United Kingdom (UK) considerations

Many jurisdictions including the EU and the UK entitle artists to resale royalties, establishing an indefinite claim of the creator to receive compensation for his/her creative work.

Potentially, the new technology paves the way for a quiet revolution within the creative economy, particularly for independent artists who are not backed by major labels. This possibility provides a powerful incentive for musicians to embrace business and continue integrating with their fan base to extract further value.

2.1.3. Fractional ownership

The technological infrastructure around the NFT Ethereum Request for Comments (ERC)-721 token allows a fractionalisation mechanism that divides the main NFT into fractional NFTs (or F-NFTs). Similar to shares of publicly traded firms, each F-NFT represents fractional ownership of the underlying digital asset embedded inside the original NFT. This technology opens a gateway to a new class of micro-investments in the realm of NFTs, greatly lowering the barriers to entry for high-value investments and providing the digital marketplaces with supplementary liquidity.

2.1.4. Scarcity and authenticity

According to psychologist Robert Cialdini (2009), in art markets, the primary value drivers are authenticity and scarcity, and one of the most effective strategies to influence consumer behaviour is to create the scarcity of a product, thereby defining the value of the same. Within the context of a limited distribution of items, both authenticity and scarcity contribute to elevated levels of prestige and awareness within the target groups. Scarcity, real or perceived, can generate a high degree of prestige and awareness among the relevant target groups within the framework of a limited distribution of the products.

The most crucial metric for validating scarcity is evidence of the number of reproductions of the original work that have been made. This attestation is especially difficult to get in the digital universe, because illegal copying is a straightforward task in the absence of stringent control systems and monitoring. Whenever a music artist releases a song with an NFT, the proof of ownership is stored digitally so that it refers to the creator for copyright protection. This unambiguous traceability gives the song the distinction of being unique and scarce – which, in turn, drives the value of the digital asset. With the certificate of authenticity, NFTs are providing a new solution within the realm of crypto marketing to block the distribution of counterfeits, unauthorised copies and stolen artwork while managing the coordination of transfer of ownership.

As the ERC-721 token provides evidence of ownership and validity, NFTs provide a kind of alchemy to protect against counterfeits, ensuring that the original work cannot be covertly duplicated. The technology provides a set of digital identifiers that are linked with the real-world structural qualities of the physical goods in issue and may be encoded into a smart contract (Sundararajan 2022). The certification process for the scarcity of a work of art requires a proof of its authenticity. Using NFTs, artists directly record provenance information into the immutable blockchain code. Since everything is recorded, the art can be traced back to the owner and the first date in which it was published. This is particularly advantageous for art dealers, as confirming authenticity formerly required the services of an art specialist, whose costs are likely to be expensive.

When a musician releases a song with an NFT, the evidence of ownership is digitally preserved so that it is traceable back to the originator for copyright protection. This explicit traceability confers exclusivity and scarcity to the music, which – in principle – increases the value of the digital asset.

2.1.5. Fan economy

The cryptographic architecture enables the production of a new class of media assets, including music artefacts, collectibles, very important person (VIP) backstage passes for events, membership cards, special video content, reduced ticket subscriptions and exclusive products. The ecosystem around NFTs is tokenising the entire fan economy, allowing for a new standard of community engagement. The digital element of the fan integration media specifically targets tech-savvy members of the millennial and generation-Z audience socio-demographics. Thus, the

business model offers music creators with a new method for monetising their works and serves as a catalyst for building and retaining fan groups. It has the ability to provide another facet to a proactive artist community.

2.2. Weaknesses

2.2.1. Interoperability of NFT platforms

The interoperability of blockchains is the key to success in the Web 3.0 economy as it enables the movement of digital assets across applications (apps) such as gaming, sports and music. The current lack of interoperability poses a significant obstacle to the establishment of several NFT markets. The absence of this function creates information asymmetry between two or more platforms as regards records of digital ownership and related rights (Belchior et al. 2021). NFTs enable the creator economy to record crucial data on the blockchain, including resale rights. If the transfer occurred between two non-transmutable Ethereum-based platforms, this code would be lost when transferring the digital assets off-chain. It is vital for the inventor of an NFT to mint the NFT on a platform that is interoperable with others and provides the needed degree of flexibility for monitoring the characteristics of the NFT.

In order to guarantee data completeness and integrity, smart contract functionality must be interoperable with various blockchains. The platform developers are tasked with forming collaborations to provide integrative cross-chain interoperability and communication solutions. According to a recommendation from the International Association for Trusted Blockchain Platforms (INATBA) to the European Commission, there is widespread consensus that a joint initiative is necessary to harmonise the technological and regulatory environment across major blockchain platforms and ensure interoperability (INATBA 2022). Such a framework among all parties would offer the public with the intended advantages, including safety and stability. Similarly, other developers are constructing interfaces to enable inter-platform communication of coded contracts to ensure data integrity and standardisation across blockchains.

2.2.2. Notion of ownership

Since NFTs are not actual real assetsbut operate as title deeds for digital or physical assets, typically, how ownership is transferred is not legally stated (Kostopoulos et al. 2021). The buyer of a non-financial asset (NFA) acquires ownership of the NFA itself, but not necessarily the underlying assets. Other characteristics of the contractual arrangement are encoded in the smart contract, although it is uncertain whether the stipulations of the contract will hold up in court.

The rights that one obtains regarding the physical or digital original by way of the acquisition of an NFT presents a conundrum. The primary distinction between physical assets and digital works is that only physical assets are subject to ownership rights, but the buyer of digital works receives merely a licence to use the work. The establishment of ownership rights is not a characteristic of NFTs. Opponents of the NFT technology assert that transactions using NFT encompass just the purchase and sale of NFT. The connection to a digital or physical object serves primarily as an identification for the NFT.

2.2.3. IP rights: a legal embroglio

2.2.3.1. United States (US) considerations

US copyright law defines copyright as the right to protect the creator's IP that has been fixed in a physical form of expression (U.S. Copyright Office 2022). The NFT does not qualify for copyright protection since it is not an original concept and does not exist in physical form. However, the multifaceted world of copyright and associated rights contains much more, including moral rights and equality rights for artificial intelligence (AI)-generated generative music. In the United States, the Visual Artists Rights Act of 1990 protects the moral right of attribution and the moral right of integrity, stipulating that "an artist in the process of creation injects his spirit into the work and that the artist's personality, as well as the integrity of the work, should therefore be preserved" (Carter *v*. Helmsley-Spear, Inc. 1995). Prior to assigning moral rights, the court must settle the dilemma with NFTs and examine the merits of contending that the digital asset is an original work of art or, alternatively, a simple encoded certificate only referencing the artworks (Swanson 2021). It would be a blatant infringement of the author's moral rights if the NFTs contained incorrect information about the owner of the underlying asset, as this would violate his/her right to attribution.

2.2.3.2. EU considerations

The main idea is that when an investor purchases an NFT, he or she receives rights to the NFT itself, but not necessarily the copyrights associated with the underlying asset (European Commission 2022).

The NFT is often a publicly accessible token that refers to a digital or physical item without any copyright or IP rights attached, unless otherwise specified (Trautman 2021). Commercial prudence mandates that in a purchase-and-sale transaction involving a copyrighted property, the creator and the purchaser must contractually define the scope of the rights to be transferred. Given the lack of specialised jurisprudence, the same process applies to NFTs and copyright law regardless of their technological characteristics. As such, the original author retains full rights, as the creation of an NFT is considered a copy or derivative of the original work. In the absence of additional stated restrictions, the only authorised issuers of NFTs referencing copyright-protected works are the right holders and their licensees (Fuchs 2022). When acquiring an NFT, it is crucial to understand the distinction between ownership of the NFT and copyright of the underlying material. The owner of the NFT automatically acquires the right to duplicate the underlying work, develop derivative works from it or perform, display or distribute the work.

In the Web 3.0 economy, music created by AI will be of crucial relevance for the creative design of the metaverse. Existing copyright protection systems and enforcement rely heavily on the platform, which also functions as a mediator in dispute settlements. Major markets are already equipped with filters whose purpose is to avoid infringements of IP rights. The inadequate evaluation of rights and associated rights in connection with the minting and acquisition of NFTs will be the topic of several future judicial issues (Guadamuz 2021). Courts and the underlying case law will give legal guidance. Alternately, as some proponents of the decentralised nature of Web 3.0 have suggested, copyright rules will be liberalised, opening the path for decentralised IP (Lee 2022). Until this becomes clear based on precedent (i.e. case law), creators are urged to create a clear IP strategy, explain precisely what is being sold, which rights are transferred to holders of the NFT and which rights the artist, issuer and secondary market platform are permitted. It does not come as a mystery that due to the disparity in legislation, there will be a strong regulatory arbitrage among jurisdictions, laying down the frameworks for operating the new technology.

2.3. Opportunities

2.3.1. Decentralisation

As a result of the widespread adoption of Internet 2.0, the power dynamics between suppliers and consumers have evolved dramatically, and the purchase decision process, namely the customer journey, has taken on new shapes (Tueanrat et al. 2021). NFTs, which are a Web 3.0 gateway to traditional business, can circumvent the platform-centric environment of Web 2.0 (Grider & Maximo 2021) and a move to trans-medial use across decentralised apps.

Blockchain-inspired innovations will disrupt the world of digital marketing and commercial tactics for corporations (Treiblmaier 2021). Music NFTs are poised to revolutionise the creator_community connection, since they will play a crucial role in creating better relationships between artists and fans while enabling artists to successfully monetise their IP.

2.3.2. Collaboration, ownership and growth

NFTs are becoming the basis of a multilayered consumer relationship and ownership economy. The metaverse, a manifestation of a virtual world in which physical reality and virtual reality combine, arises as a new online media-and-community participation platform that incorporates numerous modern technologies. As individuals spend more time in the digital realm, digital representation is becoming increasingly crucial. This further growth of the Internet will provide a medium in which users will have unrestricted freedom of movement.

2.3.3. Entrepreneurship, community building and fairness

Convergence is occurring at different levels between the music business and the metaverse as a result of the incorporation of Web 3.0 technologies. This shift is simultaneously altering the tastes of audiences and the way groups engage around common interests. Creators of music are enabled to become entrepreneurs and advance their fan base. Simultaneously, fans are becoming entrepreneurs as they actively participate in the creation process, become involved in the artwork and contribute to the innovation cycle. NFTs have the potential to become an effective tool for combating monopolies, power imbalances and injustice and unfairness in the next generation of music commerce.

2.4. Threats

2.4.1. Speculative bubble

The primary motive for trading art and collectible NFTs is the short-term expectation of high profits owing to easy entry and surging prices, particularly on secondary markets (McAndrew 2022). According to transaction data

gathered by OpenSea, the exceptionally low entry barriers of trading platforms have attracted many speculators and financial investors (Chainanalysis 2020). The value generation process of NFTs is driven by perception and expectations, on the part of influencer or communities, compiled from whitelisting (Chainanalysis 2022). Whitelisting is a form of application control in which a list of trusted organisations, such as apps and websites, is collected and granted exclusive permissions for network access.

However, there is a substantial financial risk associated with the trading of NFTs. Only 28.5 percent of those bought during the minting phase have produced a profit when resold. Because the market lacks fundamentals and transparency, it is difficult to capture pricing mechanisms for valuation and price predictability using conventional frameworks. Arguably, behavioural finance is a more appropriate framework for describing the pricing mechanisms of digital assets. More specifically, according to academic studies, exchange-traded funds (ETFs) with extraordinarily high average weekly returns tend to underperform their respective market index (Borri, Liu & Tsyvisnki 2022). The retroactive sales history of items within the same collection during the main sale is one of the most accurate predictors of future price methods on secondary markets. It is difficult to predict longer-term yield patterns as the predictive power of historical sales decreases with time (Nadini 2021).

The jeopardy to the NFT ecosystem is owing to the lack of a “true” market value based on conventional fundamentals. Thus, the possibility of a bubble is particularly strong. Economic theory dictates that a capital market bubble results from market players inflating the values of underlying assets relative to a particular valuation method. In a market where a Twitter post can generate volatility in the price of commodities, the possible abrupt withdrawal of many speculators would produce a serious liquidity crunch as the majority of trades are highly leveraged.

The presence of a sudden liquidity crisis would result in a severe market disruption affecting the crypto markets, leading to default on many asset classes. An analogous situation is the Internet dotcom bubble of 2000, which followed the failed megamerger of America Online (AOL) and Time Warner and erased billions of dollars in market value. Investors acting on the promise of quick profits followed the popular news, leading to the market shakeout that resulted in an industry reorganisation and the survival of a few peers such as Amazon.

2.4.2. Counterfeiting and fraud

While NFT markets have aroused considerable interest among investors and art lovers, the new technology has become the target of fraudulent schemes and illegal operations. Technically, an NFT is a derivative of the artists’ original work, with the creator being the only authorised right holder to make an NFT. However, the market has seen an influx of fraudulent operations involving counterfeiters and con artists “minting” and selling NFTs without the authorisation of their rightful owners.

The increasing sophistication of blockchain-based commerce and the *caveat emptor* principle, in which the buyer assumes the risk of purchase, are adding to the burdens of buy-side market players. Since anybody can produce NFTs, it is difficult to counteract illegitimate NFT minting in the absence of effective curation and onboarding protocols for NFTs sold on multiple markets. The minting process includes anonymous cryptocurrency wallet addresses making final-owner attribution and consequent benefits distributions difficult. The enforcement mechanism against fraudulent trades becomes a conundrum. There is the practice of the so-called “wash trading,” in which shares are purchased from one broker and sold to another. This type of illegal process is found on the NFT market (Cao et al. 2016). Given the intent to artificially inflate the value of the underlying asset, the offender would either initiate transactions between wallets in which he has beneficial ownership or form a trading consortium with the same purpose. Prior to the deal, the target’s wallet would have sufficient funds to meet the purchase price. Once the final sale has occurred to an unconnected third party outside the inner circle, the offender is assured of receiving the full remuneration for the digital asset, which substantially exceeds its fair market worth (McAndrew 2022). There are no compliance filter mechanisms comparable to the upload filter for streaming services in marketplaces.

2.4.3. Smart contracts and contract law

As indicated previously, smart contracts, a partially or completely automated and self-enforcing computer code reflecting an interparty agreement, govern the execution, control and documentation of NFTs. Since the programmed sequences operate with minimal human interaction, they are unchangeable. Researchers and practitioners disagree on whether these contracts may be construed in accordance with current contract rules and whether they represent a legally binding and enforceable agreement. Some researchers, such as Savelyev (2017), propose that smart contracts should be evaluated as a *causa sui* notion with the aim of replacing the whole legal system

without the need for a legal framework. Others contest their incorporation into the legal system on the grounds that such contracts lack validity and enforcement mechanisms.

If the prerequisites for the establishment of a contractual agreement are met, the fact that smart contracts are captured by code is unimportant for their widespread incorporation into the legal system. In the Civil Law system, the offer must be accepted, but in the Common Law system, the offer and acceptance are based on deliberation (World Bank Group 2020). Unarguable drawbacks of smart contracts include their immutability, making it difficult to amend or halt their execution.

During the creation process, smart contracts have no means by which to prevent *contra bonos mores* or fraudulent or unlawful agreements or transactions. Code-driven smart contracts are susceptible to coding mistakes, necessitating procedures for contract modifications. To comply with contract law principles, smart contracts require an established framework of on-chain and off-chain arbitration, dispute resolution and third-party intervention methods. As jurisprudence typically lags technology development, early adopters will secure competitive advantages in the crypto economy for certain locations and offer chances for legal arbitrage, as the regulation of smart contracts would vary significantly between countries.

2.4.3.1. UK considerations

One of the most significant shortcomings of smart contracts is the widespread absence of a law that is relevant to the contract relationship and that would offer more clarity to the parties on the legal risk accepted with the execution of the contract (United Kingdom Legal Commission 2021). As distributed ledger technology litigation is still in its infancy (Vos 2019), it is probable that smart contracts will continue to be used as a complement to regular contracts and it will be some time before the codified law establishes legal foundations for code-based cryptographic contracts.

2.4.4. Environmental, social and governance (ESG) concerns

The minting procedure for the generation of NFTs comprises a confirmation protocol, a form of “proof of work” (PoW) consensus method. This mechanism protects the integrity of the transactions’ time-ordered ledger. The process involves miners, who solve a complicated cryptographic challenge in exchange for the privilege of minting the NFT. The entire process requires specialised computational capacity and information technology (IT) architecture, which often use enormous quantities of electricity (Castor 2022).

The global commodity super cycle and geopolitical crises have caused a rapid rebound in global energy demand, resulting in a price spike for electricity and a severe power shortage across regions (International Energy Agency 2022). The market consensus is that businesses must shift to energy-efficient models with a strong emphasis on exploitation of renewables. Following the move to a low-carbon economy, cryptographic solutions must use energy-saving approaches to obtain greener credentials. To fulfil the industry’s sustainability criteria and in response to community outcry, development has shifted towards a proof-of-stake (PoS) method that uses a fraction of the energy that PoW does.

The PoS protocol differs from the PoW protocol in that validators are picked randomly by an algorithm in the absence of peer competition. The validation procedure is also known as attesting, and the validator validates the blockchain’s accuracy (Ethereum.org 2022). PoS is a consensus mechanism used by blockchains to achieve distributed consensus. The next step of consensus algorithm testing (Hu et al. 2020) involves a community-elected committee of validators to participate in the consensus protocol based on their ability for “staking” digital money (Cevallos & Stewart 2020). Validators are ranked higher in the digital hierarchy based on the magnitude of their crypto wealth as determined by token ownership. In exchange, this wallet coinage establishes their mining strength within the consensus procedure (Yee, Welfare & Wyper 2020; Reaume 2022).

PoS would drastically minimise unnecessary energy usage during the mining process, and it can be implemented across all existing platforms to become a standard blockchain consensus method. Ethereum is at the forefront of this process, reengineering towards the PoS technique, which is still in its infancy since it will be an arduous struggle to eradicate all defects and get widespread use.

2.4.4.1. US considerations

To date, the majority of platforms have not fully transitioned to energy-efficient alternatives, exposing the blockchain technology to regulatory sanctions comparable to the harmful New York Senate Bill S6486D,

which resulted in a moratorium on all cryptocurrency mining activities utilising the PoW algorithm (U.S. Senate 2021).

2.4.4.2. EU considerations

For the blockchain architecture to achieve widespread adoption across all economic sectors, a fundamental shift in the current paradigm with a significant emphasis on renewable energy is needed. This technical transition poses a test for the whole crypto economy, as well as a chance to serve as a model for other businesses threatened by the social stigma of ESG activism in connection with their carbon footprint (De Vries & Gallersdörfer 2022).

With "The Merge," Ethereum blockchain has successfully completed its transformation in September 2022 from the PoW to the PoS consensus algorithm. This change resulted in a 99 percent reduction in energy consumption and mitigation of social stigmatisation. The Solana blockchain is a competing crypto architecture that is renowned for its shortened transaction speeds and cheap processing costs. The platform is validating the transaction using the proof of history (PoH) consensus process. The programme generates historical evidence that an event occurred at a certain point in time by generating historical records. The process is secure since the input cannot anticipate the output. The winner of the competition for the greatest mainstream blockchain platform will be the first to design a system that drastically decreases energy usage, boosts transaction speed and minimises transaction costs.

In the sociopolitical and economic arenas, scholars such as Frye (2021) and Chalmers et al. (2022) express concern that bundling Web 3.0, blockchain technologies and NFTs introduces the possibility of a shift to a Web 3.0 collaborative commons (Rifkin 2014). Brown (2003) and Schuelke-Leech (2018) call attention to the importance of considering the broader consequences of such a paradigm shift and the social, political and business implications.

The conventional thinking is that democracy, or moreover democracy coupled with market capitalism, permits the uncoerced communication of equal participants with equal access and equal rights to participate. However, in oversaturated, networked markets, a few dominant entities rise to prominence and can enjoy enormous wealth (Mulligan 2014). It cannot be overlooked that networked commerce encourages the rise of platform monopolies and, in the creative industries, it can create vast income disparities.

2.4.5. Governance of crypto assets

Recently, the world of cryptocurrencies has been influenced by a sequence of shock waves, which might have caused the market to collapse. A significant example is the now-infamous hacking attempt on the decentralised autonomous organisation (DAO) in 2016. An unknown hacker moved around 3.6 million Ethereum (equal to US$50 million) to a DAO under its control. The criminal act led the price of Ethereum to plummet from US$20.50 to US$11.00 (Dalton 2016) and prompted serious doubts about the technology.

2.4.5.1. US considerations

Studies indicate that the vast majority of initial coin offerings (ICOs) were fraudulent schemes draining millions of dollars from naive investors, further complicating the problem. A survey by the New York-based Satiris Group LLC reveals that roughly 80 percent of ICOs are associated with fraudulent activity (Seth 2018). As a consequence of these and similar fraud incidents, the biggest stock exchange authorities in the United States (U.S. Securities and Exchange Commission) and the Eurozone (European Securities and Markets Authority [ESMA]) have determined that crypto assets are especially susceptible to cyberattacks and fraud. There is a possibility that digital assets and investors who trade NFTs on the market would become victims of orchestrated assaults given that crypto asset investments are unregulated compared to traditional capital markets (U.S. Securities and Exchange Commission 2021).

Bitcoin and Ethereum were not considered securities for quite some time, with the former being a currency and the latter characterised by its decentralised nature and lack of central control and governance. In fact, the argument around NFTs leans towards classifying them as they are considered as derivatives of assets. When determining whether an NFT transaction falls under the Securities Act, US regulators typically consult prior case law, such as the 1946 US Supreme Court judgement in the Court, which articulated the so-called Howey Test, which defines an entity as an investment instrument based on the following criteria: (1) a financial investment; (2) is a common

enterprise; (3) with a reasonable expectation of profits; and (4) to be derived from the entrepreneurial or managerial efforts of others.

2.4.5.2. EU considerations

Following an evaluation of the crypto economy in the European Community, the Commission adopted a historic regulation for the digitisation of the financial sector on 24 September 2020. The proposed directive intends to regulate digital finance and includes directives on markets for crypto assets (MiCA) and for ensuring digital operational stability (DORA), as well as a concept proposal on distributed ledger technology (DLT) (European Commission 2020). This regulatory framework attempts to fill an existing legal void; the law is not intended to impede the growth of the crypto economy but to pave the way for regulated market activities, to limit operational risks and ensure consumer and investor safety (European Union, Eur-Lex 2021). However, based on an evaluation of the proposed rules, MiCA does not appear to include NFTs within its scope. Article 4(2) states that issuers of "unique and non-fungible crypto-assets" are not required to publish or register a white paper for them. Under inclusion of this clause, NFTs are immune from any prospectus or authorisation requirements under financial legislation requiring that investors be transparently informed about the substance and dangers of the underlying asset to make an educated decision. This exception does not apply to F-NFTs due to the fungibility of the underlying assets. The most recent draft of MiCA says that the proposed regulation shall clearly apply if the NFT offers the holder or issuer certain rights linked to those of financial instruments, including profit rights or other entitlements. If an NFT fails this criteria, its tokens will be deemed securities and be subject to the appropriate regulatory frameworks (Salmon & Gerlach 2021).

The technology landscape around NFTs is very susceptible to money-laundering schemes. It may be used to execute self-laundering activities. The offenders would purchase an NFT with cash from dubious sources and use wash trading between wallet coins under their control to construct an NFT transaction history. Once a good sales record has been established, the NFT would be transferred to a third party, which would then clear the deal by injecting uncontested, clean cash (U.S. Department of Treasury 2022). In addition, worldwide regulators have expressed worry that NFTs can be used for terrorist funding and evasion of sanctions. According to Gebhard Wengenroth (2021), a notable crypto specialist from Capgemini who advises big European banks on the deployment of crypto assets, "The market for crypto-based money laundering is technologically driven and well ahead of authorities. This cannot and must not continue to be the situation. Planned steps for worldwide regulation must be executed expeditiously; this demands a high degree of professional and technological crypto competence inside the organisation, which may begin to be developed immediately" (Wengenroth 2021).

Several proposals are under consideration to create Central Bank Digital Currencies (CBDCs), giving central banks power over digital currencies and derivatives. Such frameworks will be established to govern unregulated cryptographic asset structures, minimise volatility and provide investor safety (Assenmacher et al. 2021). China, Europe and the United States, the three most significant crypto marketplaces in the world, are already developing their own CBDC proposals. Future developments and research will enhance the understanding of how CBDCs will affect the crypto ecosystem's power structures. It remains to be seen whether there will be a shift from decentralised and autonomous digital ecosystems to regionally decentralised structures or to centralised ecosystems. Notably any shift towards centralisation stands in opposition to the attributed advantage of decentralisation under the Web 3.0 economy. Alternatively, legislation may follow the logic of decentralised systems defining the crypto economy. Regardless of the exuberance surrounding NFTs, regulatory authorities' actions will have a significant impact on the future technological development of blockchain and NFTs.

3. Methodology and Data Analysis

3.1. Methodology

The methodology adopted for this study is quantitative and survey based. The results are presented as descriptive and exploratory. Following Leedy and Ormrod (2001), the descriptive research approach is a basic research method that examines the situation in its current state and involves identification of attributes of a particular phenomenon based on an observation or correlation. For this research, the authors entertain *working hypotheses*. A working hypothesis is understood in the sense of Oppenheim and Putnam's well-known publication, *Unity of Science as a Working Hypothesis* (1958). Paraphrasing Oppenheim and Putnam, given the force of reason, a working hypothesis is that which can be accepted assuming that further work can be done without declaring its validity or denying that

truth may be unattainable (Oppenheim and Putnam 1958). The working hypothesis can subsequently be rigorously tested by confirmatory data analysis. The authors recognise that confirmatory data analysis is structured and rigorous; however, exploratory data analysis can be open-minded and speculative (Tukey 1980).

Recall that this research explores the extent of familiarity and knowledge related to NFTs, as well as perspectives on NFTs as potential disruptors *(Q1)* and the research intends to give insight into the extent of music creators' perception of NFT-related opportunities and NFT integration into the music industry *(Q2)*.

3.2. Quantitative Research

The quantitative research is based upon a purpose-designed questionnaire in two parts. Part One provided demographic information, and Part Two included twenty statements set against a five-point Likert scale, namely (1) strongly disagree to (5) strongly agree. The statements are derived directly from the existing literature and the interviews discussed above and were grouped in three categories: NFTs; Music and Music Industry Business; and Investment, Arts and Music. All statements in the questionnaire relate to manifestations of the blockchain technology, NFTs and arts and music. Examples are Q 9 ("NFTs will revolutionise the supply chain within the music industry"); and Q 14 ("I believe that NFTs will alter the way artists interact with their fan community"). Considering the limited resources allocated for this study, data obtained from the first twenty-five respondents were used to establish the internal reliability of the instrument. A Cronbach's alpha coefficient of 0.876 was achieved, which is statistically very good.

Questionnaires were distributed to respondents across twenty EU countries through the market research provider Pollfish. The total number of respondents was n=200, randomised to consumers in the targeted demographics. In order to avoid the pitfall of river sampling, respondents were invited to participate in the survey using the Pollfish double opt-in procedure (see Appendix for details of the questionnaire).

The survey sample included respondents from twenty EU countries. However, the distribution was particularly dense for Spain (n=30), Poland (n=28), Italy (n=27) and France (n=21). The sample was relatively balanced for female (48 percent) and male (52 percent) respondents. The age categories of 18–24 years and 25–34 years were the most heavily populated. Only ten respondents were aged 55 years or older. Most of the participants had high school degrees (n=44) or college–university educations at the undergraduate (n=116) or graduate levels (n=33). For the most part, respondents reported being employed at the level of employee (salaried). The modal household income was reported as less than €20K, although the distribution was nearly equal across categories less than €20K (n=57), between €20K and €34K (n=52) and €35K–€49K (n=50).

4. Results

Table 1 indicates the categories of statements and the number of statements per category.

Particularly interesting are the responses to statements S1 and S2 ("I am familiar with the concept of NFTs" and "I am knowledgeable about NFTs both in theory and practice", respectively). Table 2 shows the selected statistics for these questions.

Category	Number of statements
Non-fungible tokens	6
Music and the music industry business	8
Investment, arts and music	6

Table 1. Categories in the questionnaire with the corresponding number of statements

Statement	Mean	Standard deviation	Median	Mode	Modal frequency	Skewness (Pearson)	Kurtosis (Pearson)
S1	3.565	0.998	4	4	90	–0.527	–0.329
S2	3.295	1.038	3	4	81	–0.531	–0.284

Table 2. Selected statistics for survey statements S1 and S2

The results indicate that, on average, familiarity with NFTs and knowledge about NFTs in theory and practice falls between "unsure" and "agree." However, the modal category for both statements is four, indicating that based on the value that appears most often, respondents felt strongly about their familiarity and knowledge of NFTs. The results raise the possibility of some degree of upward inertia.

Table 3 shows the descriptive statistics for statements S1–S20. Based on the hyper-distribution of the responses to statements, the estimated grand mean is 3.30 and standard deviation is 0.311. The average median is 3.50, with standard deviation of 0.513. However, the distributions are negatively skewed for eighteen of the twenty statements, and kurtosis is negative for sixteen of the statements. Recall that negative values for the skewness indicate data that are skewed left, i.e. the left tail is long relative to the right tail. Negative values of kurtosis indicate that a distribution has thin tails. Platykurtic distributions have negative kurtosis values.

Figure 1A–1D summarises the statistical results for the twenty statements. It is notable that mean values are found between three (unsure) and four (agree; strong). Figure 1C shows that the response distribution to statement S5 (I am familiar with the platform OpenSea) is positively skewed. Response distributions for the statements S4 (I am familiar with the platform Apple Music), S7 (The existing revenue-sharing mechanism for music creators and intermediaries is providing a fair revenue split), S10 (As a fan of music, I prefer to engage with my favourite artists by listening to their recordings) and S11 (As a fan of music, I prefer to engage with my favourite artists by attending live concerts) show positive kurtosis. Otherwise, the distributions have thin tails, indicating fewer values in the distribution tails.

A clustering exercise was undertaken, aggregating similar data points together in order to reveal underlying groups or clusters of statements. Application of K-means clustering resulted in two clusters. However, evolution of the inertia and silhouette score raised some ambiguity; so, as an alternative, agglomerative hierarchical clustering (AHC) was applied. The results from the AHC algorithm are shown in Figure 2 as a dendrogram. The algorithm confirmed the K-means application of two clusters; however, the dendrogram is more readily interpreted.

The dendrogram for the data shows that the twenty statement points are merged from two to a single cluster indicating homogeneity at the line shown at approximately 310. Interpretation of the dendrogram is based on identifying clusters that are dissimilar, i.e. the bigger the distance between links, the bigger is the dissimilarity between the statements. Alternatively, the key to interpreting a dendrogram is to focus on the height at which any two objects are joined together. The height of the dendrogram indicates the order in which the clusters were joined.

Concerning the groups shown in blue, Age and Employment Status are most similar, as the height of the link that joins them together is the smallest. The next two most similar objects are Employment Position and Household Income. The fact that the demographic information links to form a cluster is not surprising. However, inclusion of statement S8 must be considered as an aberration.

With the exception of statement S8 (I am not familiar with the revenue-sharing mechanism for music creators and intermediaries), the nineteen remaining statements are found in the red groupings.

Statement S19 (As an investor, I believe investments in digital art are attractive) and statement S20 (As an investor, I believe that investments in music NFTs are attractive) are most similar. Statements S1 and S2, referred to earlier, are the next two most similar statements. Overall, the clusters are confirmatory with respect to the sections of the survey. The role that investor preferences take is ambiguous.

Given the nature of this research, it is necessary to clarify that the empirical work is presented as purposeful for generating working hypotheses in the sense cited earlier. While intuitive relationships between the statements have been considered, such *a priori* hypothesis must not be confused with the more-rigorous standards associated with hypothesis testing in confirmatory quantitative research.

A first-pass analysis was based on the dendrogram shown here. Considering the "blue" cluster, gender, education level, employment status and household income are likely candidates for future work focused specifically on determinants of awareness and knowledge. Relationships between variables in the "red" cluster are more difficult to discern with a high degree of reliability owing to collinearity.

As concerns the second research question, bivariate correlations indicate the relevance of not only knowledge of NFTs but also optimism towards NFTs as a disruptor of the music supply chain and interest in NFTs as an investment. More analysis is required, however. There is concern over circularity of awareness and perspective

Statistic	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Number of observations	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Frequency of min=1	5	14	17	11	27	32	14	9	5	3	9	14	18	13	18	23	27	27	17	18
Frequency of max=5	31	17	13	44	20	16	10	14	15	54	40	30	34	14	11	89	25	15	20	22
Mean	3.565	3.295	3.020	3.800	2.835	2.910	3.440	3.065	3.305	4.050	3.720	3.310	3.335	3.275	3.115	3.005	3.255	2.955	3.395	3.345
Standard deviation (n)	0.998	1.038	1.081	1.054	1.199	1.221	0.875	1.025	0.939	0.835	1.050	1.181	1.238	1.019	1.073	1.056	1.257	1.193	1.104	1.125
Skewness (Pearson)	−0.527	−0.531	−0.135	−1.185	0.198	−0.091	1.158	0.009	−0.278	−1.330	−0.954	−0.326	−0.402	−0.541	−0.400	−0.596	−0.519	−0.125	−0.759	−0.622
Kurtosis (Pearson)	−0.329	−0.284	−0.821	0.907	−0.932	−1.092	1.834	−0.821	−0.487	2.436	0.330	−0.951	−0.981	−0.326	−0.708	−0.982	−0.919	−1.079	−0.279	−0.448

Table 3. Descriptive statistics for statements S1–S20

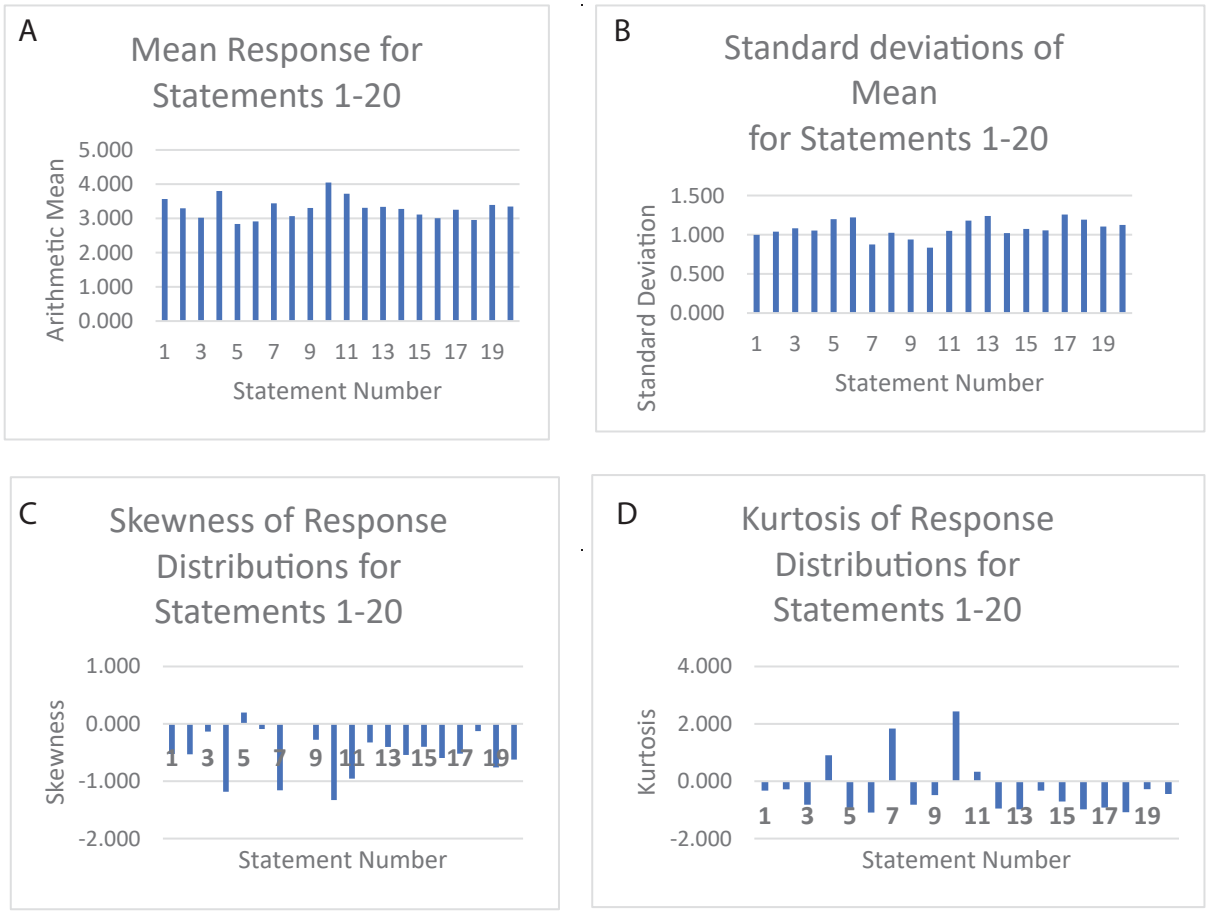


Figure 1. Statistical results for the twenty statements: (A) Mean responses, statements S1–S20; (B) standard deviations from mean for statements S1–S20; (C) skewness: distribution of responses to statements S1–S20; (D) kurtosis: distribution of mean responses to statements S1–S20.

on NFTs, including NFTs as an investment. In other words, it is highly unlikely that a respondent would express a positive view towards the future of NFTs without having awareness in the first place. This is an issue for consideration in future research as well.

Considering the ambiguities of the foregoing analysis, data reduction was pursued. The two most common variable reduction techniques are principal component analysis (PCA) and factor analysis (FA). Recall that the solution to the PCA involves the eigenvalues and eigenvectors of the variance–covariance matrix associated with the vector of variables. The estimated principal components are defined using the eigenvectors as the coefficients associated with the variables. The objectives are as follows: 1) to retain only the first *k* principal components explaining most of the overall variation; and 2) to avoid loss of information, the proportion of variation explained by the first *k* principal components should be as close to 1.0 as possible. PCA analysis indicates that most of the variation is captured by the first two principal components. The results from FA indicate that on the basis of having chosen a final communality score ≥0.7 as the selection criterion, the FA model with two factors has significant explanatory power with respect to the statements S1, S2, S5 and S20. The results of both the PCA and FA analyses suggest that, for future research, a survey of fewer than twenty statements can be entirely adequate in the context of this research.

In short, the data analysis points towards the need to carefully consider the demographic variables income, education level, employment status and professional status. The implication at this point is that familiarity with NFTs is the highest among persons with relatively high incomes, advanced education and relatively important professional positions, i.e. senior-level management and above.

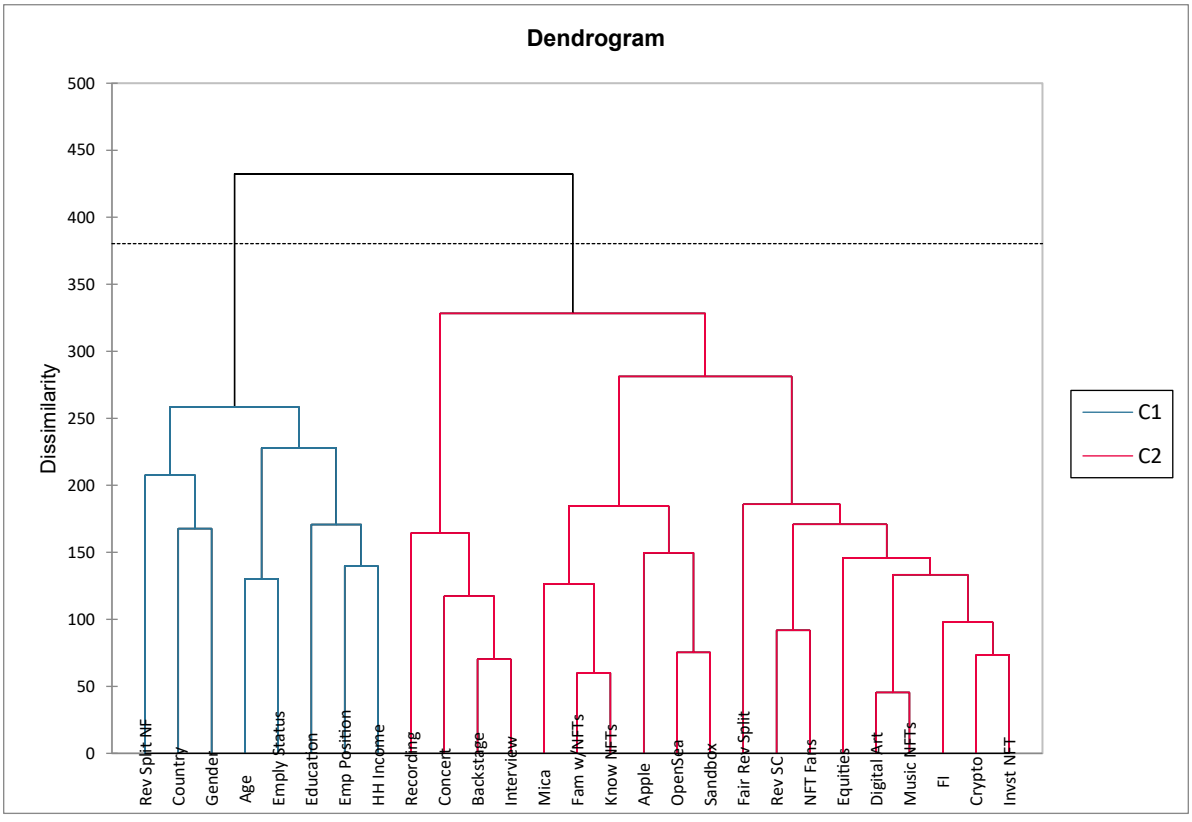


Figure 2. Dendrogram obtained using agglomerative hierarchical clustering. NFT, non-fungible token. C1 and C2 refers to cluster 1 and cluster 2 respectively

5. Summary and Conclusions

NFTs have resulted in a reversal of long-established marketing and distribution concepts. In contrast to the visual arts, which primarily generate original works and are connected to the concept of uniqueness, the traditional music industry has always operated on a mass distribution scale. The new technology surrounding NFTs has revolutionised the entire music industry by providing music lovers with exclusive music events and one-of-a-kind consumer goods. By implementing the principle of scarcity, the industry is adapting to shifting consumer preferences, as it satisfies the rising demand for customised fan experiences. It is claimed that NFTs will facilitate the democratisation of the music and art industries. The technological infrastructure provides unbounded marketing opportunities for musical compositions and related products. With the expansion of the metaverse, the music industry is presented with a unique opportunity to completely reimagine channels of music consumption and community engagement, thereby delineating a new class of meta-entrepreneurs. This paper's literature review and empirical research via surveys have conclusively confirmed the hypothesis that Web 3.0 and NFT technology provide not only an excellent new instrument for music creators but also a completely novel and equitable economic model for fans and artists. According to recent developments in the NFT ecosystem, the purportedly disruptive aura frequently ascribed to the technology does not meet the criteria for classification as a disruptive innovation under the widely accepted disruption theory (Christensen 2015). The incumbents have reacted effectively and promptly to the potential threat of disruption and are well positioned to benefit from novel economic models. Big tech and music titans have already secured Web 3.0 marketing channels and begun reconfiguring their community outreach. There is a clear risk of the emergence of a digital oligopolistic economy, in which a few large actors dominate and control the majority of the market, making it increasingly difficult for newcomers to establish a foothold. The conducted quantitative survey confirmed that the average consumer's crypto literacy level is still quite low. Average consumers and neo-entrepreneurs in the digital realms are exposed to unregulated legal and financial risks due to the observed lack of regulation

in the crypto industry, which vary among jurisdictions. The recent collapse of the Ethereum blockchain, triggered by a large-scale transaction initiated by Yuga Labs "Otherside" mints (Nasdaq 2022), has resulted in substantial losses for many NFT minters due to the exorbitant gas fees. This and other incidents have exposed the limitations and deficiencies of the current blockchain technology.

There is clearly a fundamental reshaping of the music industry's value creation. A new equity model for music creators should facilitate their forward integration with their audience base, thereby facilitating their transition into entrepreneurship. To identify one-of-a-kind virtual objects, the world of NFTs offers immense potential for innovative campaigns and entirely new business models in the fan economy. However, national and international legislators and regulators must collaborate to completely elucidate the underlying technology and foster a higher level of crypto literacy in order to realise the full potential of cryptography and launch the mainstream exploitation of the new medium. Evidence suggests that there is awareness of NFTs and there is potential for change in the music industry, but this awareness may well be limited to an elite segment of the market. Specifically, preliminary analysis points towards awareness being associated with people having relatively high levels of income, education and professional status. NFT awareness is not commonplace. The responsibility of regulators and legislators is to enact protective technical, IP-related and regulatory frameworks that permit the minting and trading of NFTs to occur in a regulated environment.

References

Assenmacher K, Berentsen A, Brand C and Lamersdorf N (2021) A Unified Framework for CBDC Design, remuneration, Collateral Haircuts and Quantity Constraints. Working Paper, ECB WP 2021/2578. Available at http:/dx.doi.org/10.2139/ssrn.3896787 (accessed 2 January 2023).

Andal-Ancion A, Cartwright P and Tip, G (2003) Digital Transformation of Traditional Businesses. *MIT Sloan Management Review* 44 (4): 34-41.

Baiyere A and Hukal P (2020) Digital Disruption: A Conceptual Clarification. In: Proceedingsof the 53rd Hawaii International Conference on System Sciences (HICSS). Available at https://doi.org/http://hdl.handle.net/10125/64416 (accessed 5 January 2023).

Besson E and Cartwright P (2012) A Perspective on Disruptive Innovation. In: Nurdin G (Ed) *Les Nouveaux Enjeux de Management.* Paris: L'Harmattan: 89-112.

Borri N, Liu Y and Tsyvisnki A (2022) The Economics of Non-Fungible Tokens. SSRN Research Paper. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=405204 (accessed 5 January 2023).

Brown JS (2003) *Innovating Innovation*. Available at http://www.johnseelybrown.com/innovatinginnovation.pdf (accessed 5 January 2023).

Cao Y, Li Y, Coleman S, Belatrenche A and McGinny T (2016) Detecting Wash Trade in Financial Markets Using Digraphs and Dynamic Programming. In: *IEEE Transactions on Neural Networks and Learning Systems* 27 (11): 2351-2363.

Castor A (2022) Why Ethereum is switching to proof of stake and how it will work. *MIT Technology Review*, March 4, 2022. Available at https://www.technologyreview.com/2022/03/04/1046636/ethereum-blockchain-proof-of-stake/(accessed 7 January 2023).

Cevallos A and Stewart A (2020) A verifiably secure and proportional committee election rule. Cornell University arXiv:2004.12990v3 (accessed 7 January 2023).

Chainanalysis (2022) The 2021 NFT Market Report. Updated January 2022. Available at https://go.chainanalysis.com/rs/503-FAP-074/images/Chainanalysispercent20NFTpercent20Marketpercent20Report.pdf (accessed 7 January 2023).

Chainanalysis (2020) The 2019 NFT Market Report. Updated January 2020. Available at https://go.chainanalysis.com/rs/503-FAP-074/images/2020-Crypto-Crime-Report.pdf (accessed 7 January 2023).

Chalmers D,Fisch C, Mathews R, Quinn W and Reckter J (2022) Beyond the bubble: Will NFTs and digital proof of ownership empower creative industry entrepreneurs? *Journal of Business Venturing Insights* 17: 1-8.

Chandra Y (2022) Non-fungible token-enabled entrepreneurship: A conceptual framework. *Journal of Business Venturing Insights* 18: 1-9.

Chesbrough H (2003) *Open Innovation*, *The New Imperative for Creating and Profiting from Technology.* Boston: Harvard Business School Press.

Christensen, CM (1997) *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail.* Boston: Harvard University Press.

Christensen, Clayton M./Raynor, Michael E./McDonald Rory – (2015) "What is disruptive Innovation?" – Harvard Business Review - https://hbr.org/2015/12/what-is-disruptive-innovation, as (accessed 15th February 2022)

Cialdini R (2009) *Influence: Science and Practice.* New York: Harper Collins e-books.

Dalton D (2016) The DAZO Attack. Deloitte Articles, Deloitte Ireland LLP. Available at https://www2.deloitte.com/ie/en/pages/technology/articles/DAO-Attack-Analysis.html (accessed 10 January 2023).

De Vries A, Gallersdörfer U, Klassen L and Stoll C (2022) Revisiting Bitcoin's carbon footprint.*Joule* 6 (3): 498-302.

Dutra A, Tumasjan A, and Welpe, IM (2018). Blockchain is changing how media and entertainment companies compete. *MIT Sloan Management Review.* 60 (1): 39-45.

European Commission (2022) *Making Sense of NFTs and What They Mean from an IP Standpoint in India.* News Article 25 March; brussels: European Commission. Available at https://intellectual-property-helpdesk.ec.europa.eu/news-events/news/making-sense-nfts-and-what-they-mean-ip-standpoint-india-2022-03-25_en (accessed 12 January 2023).

European Commission (2020) *Directive (EU) 2019/1937 on Markets in Crypto Assets.* Brussels: European Commission. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEXpercent3A52020PC0593 (accessed 12 January 2023).

Frye BL (2021) NFTs & the Death of Art. Available at https://ssrn.com/abstract=3829399 or http://dx.doi.org/10.2139/ssrn.3829399 (accessed 12 January 2023).

Fuchs A (2022) NFTs and Copyright Law. JD Supora Legal News, February 10. Available at https://www.jdsupra.com/legalnews/nfts-and-copyright-law-7361836/ (accessed 12 January 2023).

Gomes ML de Costa (2021) A Direct-to-fan Approach for the Music Business Unpublished MSc thesis. Lisbon: Catolica_Lisbon School of Business and Economics.

Grider D and Maximo M (2021) *The Metaverse – Web 3.0 Virtual Cloud Economies*. November 2021. Stamford: Grayscale Investments LLC. Available at https://grayscale.com/wp-content/uploads/2021/11/Grayscale_Metaverse_Report_Nov2021.pdf (accessed 12 January 2023).

Guadamuz A (2021) The Treachery of Images: Non-fungible tokens and copyright. *Journal of Intellectual Property Law & Practice* 16 (12): 1367–1385.

Hargadon A (2003) *How Breakthroughs Happen: The Surprising Truth About How Companies Innovate.* Boston: Harvard Business School Press.

Heap I (2017) Blockchain Could Help Musicians Make Money Again. *Harvard Business Review*, June. Available at https://hbr.org/2017/06/blockchain-could-help-musicians-make-money-again (accessed 12 January 2023).

Hemming J (2018) Perspectives in music arising out of blockchain-technology and its corresponding research strategies. *Etnomüzikoloji Dergisi/Ethnomusicology Journal*. Special Issue "Music and Politics" 1 (2): S. 97-126.

Hu Q, Yan B, Han Y, and Yu J (2021) An Improved Delegated Proof of Stake Consensus Algorithm. *Procedia Computer Science* 187: 341-346.

International Energy Agency (2022) *Electricity Market Report*. Paris: International Energy Agency. Available at https://iea.blob.core.windows.net/assets/d75d928b-9448-4c9b-b13d-6a92145aF5a3/EIectricityMarketReport_January2022.pdf (accessed 7 January 2023).

King AA and Baatartogtokh B (2015) How useful is the theory of disruptive innovation? *MIT Sloan Management Review* 57 (1):77.

Kostopoulos N, Dionysopoulos L, Noszek Z, Papoutsoglou J, and Roy I (2021) Demystifying Non-Fungible Tokens (NFTs). Report submitted November 2021. Brussels: The European Union Blockchain Observatory and Forum.

Leal SR (2022) Democratization of the Music Industry, Vol 3; NFTs. *Medium.* Available at https://www.eublockchainforum.eu/sites/default/files/reports/DemystifyingNFTs_November%202021_2.pdf (accessed 8 January 2023)

Lee E (2022) NFTs as Decentralized Intellectual Property? SSRN, March 25, 2022. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4023736 (accessed 10 January 2023). Leedy P and Omroad J (2001) Practical research: Planning and Design. 7th Ed. Saddle River, NJ: Merrill Prentice Hall.

Markides C (2006) Disruptive innovation in need of better theory. *Journal of Product Innovation Management* 23 (1): 19-25.

McAndrew C (2022) Initiatives: An Art Basel and UBS Report. Basel: Art Basel and UBS. Available at https://www.artbasel.com/about/initiatives/the-art-market?gclid=CjwKCAjwi6WSBhA-EiwA6Niok1PeI_M1T0ZIVjCgxqu7HQLrfvR2LW4YQIVFGSOA2ac9QcHsJXDjARoC78IQAvD_BwE (accessed 10 January 2023).

Mulligan M. (2014) The death of the long tail: The superstar musiceconomy. *MIDiA*. Available at https://www.midiaresearch.com/downloads/the-death-of-the-long-tail-the-superstar-music-economy/(accessed 12 January 2023).

Nadini M, Alessandretti L, Di Giacinto F, Martino M, Aiello L, and Baronchelli A (2021) Mapping the NFT revolution: market trends, trade networks, and visual features. *Sci Rep* 11 (20902). Available at https://doi.org/10.1038/s41598-021-00053-8 (accessed 12 January 2023).

Nobanee H, Ould N, Ellili D (2023) Non-fungible tokens (NFTs): A bibliometric and systematic review, current streams, developments, and directions for future research. *International Review of Economics & Finance* 84 (4): 460-473.

New York State (2021) Senate Bill S6486D. The New York State Senate, Bills, Allbany, NY. Available at https://www.nysenate.gov/legislation/bills/2021/S6486 (accessed 12 January 2023).

O'Dair M (2018) *Distributed creativity: How Blockchain technology will transform the creative economy*. Cham, CH: Springer Nature Switzerland AG.

Oliver PG, Lalchev S (2022) Digital Transformation in the Music Industry: How the COVID-19 Pandemic Has Accelerated New Business Opportunities. In: Morrow, G., Nordgård, D., Tschmuck, P. (Eds) *Rethinking the Music Business. Music Business Research*. Cham, CH: Springer Nature Switzerland AG.

Oppenheim P and Putnam, H (1958) *Unity of science as a working hypothesis.* Minneapolis: University of Minnesota Press.

Reaume A (2022) Proof Of Work vs Proof of Stake: Explained. *Seeking Alpha.* Available at https://seekingalpha.com/article/4468656-proof-of-work-vs-proof-of-stake?external=true&gclid=Cj0KCQjw0umSBhDrARIsAH7FCoe1iCxeg-iZ71Ae3GT7J-mbd2scf2UBKsMbr51bGZADu80fi9×2UJ8aAvIIEALw_wcB&utm_campaign=16160107180&utm_medium=cpc&utm_source=google&utm_term=138882501091percent5Eaud-1222051479117percent3Adsa-1485125208378percent5Epercent5E581249221152percent5Epercent5Epercent5Eg (accessed 15 January 2023).

Rifkin J (2014) *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism.* London: St. Martin's Press.

Rogers I, Carter D, Morgan B, and Edgington, A (2022) Diminishing Dreams: The Scoping Down of the Music NFT. M/C Journal, 25 (2). Available at https://journal.media-culture.org.au/index.php/mcjournal/article/view/2884 (accessed 23 January 2023).

Salmon J and von Gerlach L (2021) On-fungible tokens: NFTs and the silence of the EU legislator, Hogan Lovells, *JDSUPRA*. Available at https://www.jdsupra.com/legalnews/non-fungible-tokens-nfts-and-the-2780299/ (accessed 15 January 2023).

Savelyev A (2017) Contract law 2.0: Smart contracts as the beginning of the end of classic contract law. *Information and Communications Technology Law* 26 (2): 116–134. https://doi.org/10.1080/13600834.2017.1301036.

Schuelke-Leech B-A (2018) A model for understanding the orders of magnitude of disruptive technologies. *Technological Forecasting and Social Change* 129: 261–274.

Seth S (2018) 80 percent of ICOS are scams. *Investopedia News Report*. Available at https://www.investopedia.com/news/80-icos-are-scams-report/(accessed 15 January 2023).

Sundararajan A (2022) How Your Brands should use NFTs. *Harvard Business Review*, February. Available at https://hbr.org/2022/02/how-your-brand-should-use-nfts (accessed 15 January 2023).

Swanson A (2021) Will – and Should – VARA Cover NFTs? *The NYU Journal of Intellectual Property and Entertainment Law*, JIPEL Blog 2021-2022. Available at https://blog.jipel.law.nyu.edu/2021/11/will-and-should-vara-cover-nfts/(accessed 15 January 2023)

Tapscott D and Tapscott A (2016) *Blockchain revolution: How the technology behind Bitcoin and Cryptocurrency is changing the world*. New York: Penguin Random House

Trautman L J (2021) Virtual Art and Non-fungible Tokens. *Hofstra Law Review* (50): 361-426. Available at https://ssrn.com/abstract=3814087 (accessed 15 January 2023).

Treiblmaier H (2021) Beyond Blockchain: How Tokens Trigger the Internet of Value and What Marketing Researchers Need to Know About Them. *Journal of Marketing Communications.* DOI: 10.1080/13527266.2021.2011375

Tueanrat Y Papagiannidis S and Alamanos E (2021) Going on a journey: A review of the customer journey literature. *Journal of Business Research* 125: 336-353.

Tukey, J (1980) We need both exploratory and confirmatory. *Amer. Statist.* 34 (1):23–25.

United States Securities and Exchange Commission (2021) Spotlight on Initial Coin Offerings(ICOs). Report. Washington, D.C.: United States Securities and Exchange Commission. Available at https://www.sec.gov/ICO (accessed 17 January 2023).

United States Supreme Court (1946) United States Supreme Court Case Law, SEC v. W.J. Howey Co., 328 U.S. 293 (1946). Available at https://supreme.justia.com/cases/federal/us/328/293/(accessed 17 January 2023).

United States Department of Treasury (2022) Study of the Facilitation of Money Laundering and Terror Finance Through the Trade in Works of Art. Report. Washington, D.C.: United States Department of Treasury. Available at https://home.treasury.gov/system/files/136/Treasury_Study_WoA.pdf (Accessed 17 January 2023).

von Hippel E (2005) *Democratizing Innovation.* Cambridge: MIT Press.

Vos G (2019) Chancellor of the High Court, Future Proofing for Commercial Lawyers in an Unpredictable World, Annual COMBAR Lecture. Available at https://www.judiciary.uk/wpontent/uploads/2019/11/COMBAR. lecture2019.final_.pdf (accessed 17 January 2023).

United States Copyright Office (2022) Definition of Copyright. Report. Washington, D.C.: United States Copyright Office. Available at https://www.copyright.gov/what-is-copyright/(accessed 17 January 2023).

Wengenroth G (2021) The regulation of the crypto market is both an opportunity and a challenge for banks. Report. Paris: Cap Gemini Analytics.

Whitaker, A. (2021). Equity for Artists – Reflections on the Political Economy and Sociology of Ownership. Unpublished Ph.D. dissertation. London: Goldsmiths, University of London. Available at https://research.gold. ac.uk/id/eprint/30380/ (accessed 17 January 2023).

Wilson KB, Karg A, and Ghaderi H (2022) Prospecting non-fungible tokens in the digital economy: Stakeholders and ecosystem, risk and opportunity, *Business Horizons* 5 (September-October): 657-670).

World Bank Group (2020, Smart Contract Technology and Financial Inclusion. Report. Washington,D.C.: The World Bank Group. Available at https://openknowledge.worldbank.org/bitstream/handle/10986/33723/Smart-Contract-Technology-and-Financial-Inclusion.pdf?sequence=5 (accessed 17 January 2023).

Yee A, Welfare A, Wyper C, Schwartz D et al. (2020) The Internet of Value, UCL Centre for Blockchain Technologies. London: University College London Centre for Blockchain Technologies. Available at http://blockchain.cs.ucl. ac.uk/wp-content/uploads/2020/07/Complete-Manuscript_v1_early_release.pdf (accessed 17 January 2023).

Yemenici AD (2022) Entrepreneurship in The World of Metaverse: Virtual or Real? *Journal of Metaverse* 2, (2): 71-82.

Appendix: Survey Questions

Introduction

Thank you for considering to take part in our research project, undertaken as part of the academic research initiated by Zarja Peters, MBA, MA, and Phillip Cartwright, PhD. This research is intended to deepen and broaden the understanding of the use of NFT Technology for Management of Property Rights in the Arts and Music Industry.

Why have you been chosen?

We have asked you to respond to our questionnaire because you may be involved with either current technologies for facilitating market transaction in arts and music markets or you might simply be interested in the subject.

Informed consent

Your participation in this research is voluntary, and you may withdraw from the study at any time prior to publication if you wish. By submitting a completed questionnaire, however, you are giving your informed consent to participate in our study, and you confirm that you are at least 18 years of age. You do not have to answer any question that you do not wish to answer.

What will we do with your data?

The data you provide will be anonymous (separated from your name) and confidential (not disclosed to anyone else). We may publish reports based on our findings, but you will not be identifiable from the data included. The data themselves will be stored securely on the hard drives of the researchers named above and password protected for 5 years. If we wish to reuse your data within this time period, we will seek your permission to do so. At the end of the period, your data will be destroyed.

Contact for further information

If you would like to know more about this research, please contact zaria.peters@protonmail.com

- ☑ Please tick one box following each statement regarding a recent performance involving your school music ensemble to indicate the extent to which you feel it applies. Each question or statement will have a scale of responses indicated above. There are four pages.
- ☑ These questions and statements concern your perception of how musical leadership affects your ensemble. Your feelings are personal and do not need to reflect how other people feel.
- ☑ Please tick clearly inside a box and do not tick the space in between boxes.
- ☑ There are no right or wrong answers.
- ☑ By writing the name of your institution and ensemble below, you are allowing us to correspond your data with the responses from other musicians in your ensemble. Your responses will remain anonymous and the identities of you and your institution will not appear in any part of the research.

Part I

Please tick the box that best represents you.

Gender	Male	☐	Female	☐			
Age, years	18–24	☐	25–34	☐	35–44	☐	45–54 ☐
	55–64	☐	65+	☐			■
Education	High school	☐	College	☐	University	☐	Postgraduate ☐
	Vocational–technical	☐	Other	☐			
Employment status (check all that apply)	Student	☐	Unemployed	☐	Self-mployed	☐	Employed (salaried) ☐
	Retired	☐		■		■	■
Professional status (if employed)	Employee	☐	Middle management	☐	Senior management	☐	C-level executive ☐
Household income	<€20K	☐	€20K–€34.999K	☐	€35K–€49.999K	☐	€50K–€74.999K ☐
	€75K–€99.999K	☐	>€100.000K	☐		■	■

Part 2

Please tick **one** box for each statement that best describes how you feel. ☑

NFTs		1 = Strongly disagree	2 = Disagree	3 =Unsure	4 = Agree	5 = Strongly agree
1	I am familiar with the concept of NFTs.					
2	I am knowledgeable about NFTs both in theory and practice.					
3	I am aware of the MiCA (Markets in Crypto-assets) directive.					
IT and platforms		1 = Strongly disagree	2 = Disagree	3 = Unsure	4 = Agree	5 = Strongly agree
4	I am familiar with the platform Apple Music.					
5	I am familiar with the platform OpenSea.					
6	I am familiar with the platform Sandbox.					
Music and music industry business		1 = Strongly disagree	2 = Disagree	3 = Unsure	4 = Agree	5 = Strongly agree
7	The existing revenue-sharing mechanism for music creators and intermediaries is providing a fair revenue split.					
8	I am not familiar with the revenue-sharing mechanism for music creators and intermediaries.					
9	NFTs will revolutionise the supply chain within the music industry.					
Fans of music		1 = Strongly disagree	2 = Disagree	3 = Unsure	4 = Agree	5 = Strongly agree
10	As a fan of music, I prefer to engage with my favourite artists by listening to their recordings.					
11	As a fan of music, I prefer to engage with my favourite artists by attending live concerts.					
12	As a fan of music, I prefer to engage with my favourite artists by meeting them backstage at concerts.					
13	As a fan of music, I prefer to engage with my favourite artists by participating in interview and autograph signing sessions.					
14	I believe that NFTs will alter the way artists interact with their fan community.					
Investment, arts and music		1 = Strongly disagree	2 = Disagree	3 = Unsure	4 = Agree	5 = Strongly agree
15	As an investor, I invest in fixed income assets.					
16	As an investor, I invest in equities.					
17	As an investor, I invest in cryptocurrencies.					
18	As an investor, I invest in NFTs.					
19	As an investor, I believe investments in digital art are attractive.					
20	As an investor, I believe investments in music NFTs are attractive.					

Please add any comments about how you feel about your school ensemble.

IT, information technology; NFT, non-fungible token.