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Legal Protection of Musical Royalty Rights in the Digital Era: Challenges and Solutions

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Abstract
This study aims to analyze the challenges and solutions in the legal protection of music royalties in the digital era, identify systemic problems in the existing legal framework and royalty distribution system, and explore the potential of emerging technologies as alternative solutions. The research method uses a qualitative approach with a systematic literature review of relevant academic publications, legal documents, and industry reports, analyzed using thematic content analysis and comparative analysis techniques to identify key patterns and themes. The results of the study reveal three main findings: first, legal challenges include the complexity of cross-border jurisdictions, weaknesses in enforcement mechanisms, and ambiguity in the classification of digital music use, which create regulatory gaps; second, the digital royalty distribution system suffers from problems of lack of transparency, unfairness of the pro-rata model, complexity of the distribution chain, and the phenomenon of unclaimed royalties, which is detrimental to music creators; third, blockchain technology, artificial intelligence, and tokenization offer potential solutions through smart contracts, automated content identification, and user-centric payment systems. The study concludes that comprehensive reforms are needed that integrate international regulatory harmonization, transformation of the royalty distribution system, and the implementation of advanced technology to create effective, transparent, and fair digital music royalty protection for all stakeholders in the global music industry.

Keywords: Legal Protection, Musical Royalty Rights, Digital Era, Challenges, Solutions

Introduction

The development of digital technology has fundamentally changed the landscape of the music industry, creating new challenges in protecting intellectual property rights, particularly music royalty rights. The digital era has enabled music distribution through streaming platforms like Spotify, Apple Music, and YouTube Music, transforming the way consumers access and consume music (Handke, 2020). This transformation not only benefits consumers with easy access but also creates new complexities in the fair royalty distribution system for music creators. Digital platforms have become the primary gatekeepers in music distribution, creating significant dependence for musicians and copyright holders on the platforms' algorithms and policies (Marshall, 2019).

Music royalties are the financial compensation received by songwriters, composers, lyricists, and copyright holders for the use of their works. Traditionally, royalty systems have been established through collective management organizations such as collecting societies that manage these rights (Towse, 2021). However, the digital era introduces new complexities in

the calculation and distribution of royalties, particularly due to the massive volume of streaming and the diverse types of music used on digital platforms. Digital royalty payment systems often use a controversial pro-rata model, where total revenue is divided based on streaming market share, rather than the direct contribution of each user (Aguiar & Waldfogel, 2021).

A key challenge in protecting music royalty rights in the digital age is the transparency and accuracy of payment systems. Many musicians and copyright holders complain about the lack of transparency in how streaming platforms calculate and distribute royalties (Hesmondhalgh & Meier, 2018). Data shows that independent artists often receive very small payments per stream, creating a significant economic gap between mainstream and independent artists. This complexity is compounded by the presence of multiple stakeholders in the digital distribution chain, from streaming platforms and aggregators to labels and collecting societies, each of which takes a certain percentage of royalties (Wikström, 2020).

The problem of digital piracy and unauthorized use of music remains a serious threat to the protection of music royalty rights. Despite the rapid growth of legal streaming platforms, piracy practices through illegal websites, peer-to-peer apps, and social media platforms that allow unauthorized music uploads remain rampant (Danaher et al., 2019). This phenomenon not only harms music creators financially but also erodes the economic value of their intellectual works. Enforcing digital copyright infringement still faces complex technical and jurisdictional challenges, especially when infringers reside across countries with differing legal systems (Bently et al., 2018).

Legal regulations governing music royalty rights in the digital age still lag behind rapid technological developments. Many countries still use legal frameworks designed for the analog era, thus incapable of accommodating the complexities of digital music use (Senftleben, 2019). This lack of uniformity in regulations across countries also creates legal loopholes that platforms or users can exploit to avoid fair royalty payments. The European Union has attempted to address this issue through the 2019 Copyright Directive, which requires platforms to be responsible for user-uploaded content. However, its implementation still faces various technical and practical challenges (Quintais, 2020).

The imbalance in negotiating power between music creators and large digital platforms is a fundamental issue in protecting royalty rights. Large platforms like Spotify and Apple Music have a dominant market position, allowing them to unilaterally set royalty rates (Prey, 2020). Musicians, especially independent artists, often lack sufficient bargaining power to negotiate fairer rates. This situation is exacerbated by the complexity of contracts and royalty sharing systems that are difficult for ordinary musicians to understand, creating structural inequities in the digital music industry (Nordgård, 2018).

Blockchain technology and smart contracts are beginning to be explored as potential solutions to increase transparency and efficiency in the music royalty payment system. Several music technology startups have developed blockchain-based platforms that enable real-time and transparent royalty tracking and payments (O'Dair et al., 2016). However, the adoption of this technology still faces various obstacles, including scalability, energy consumption, and resistance from incumbent industry players. Artificial intelligence and machine learning are also beginning to be used to identify unauthorized music use and optimize royalty distribution systems (Rietveld et al.,

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2020).

The need for comprehensive reform of the digital music royalty rights protection system is becoming increasingly urgent with the exponential growth of the digital music industry. This reform must involve harmonizing international regulations, increasing the transparency of digital platforms, strengthening the bargaining position of music creators, and implementing technology that supports fair and efficient royalty distribution. Without comprehensive reform, the gap between the economic value created by digital music and the compensation received by creators will continue to widen, threatening the long-term sustainability and creativity of the music industry (Flew, 2021).

Previous research by Wlömert and Papies (2016) analyzed the impact of music streaming on traditional music sales and found that while streaming can increase artist exposure, the conversion from streaming to music purchases remains low. Their study showed that the streaming business model is not optimal in providing fair compensation to music creators, primarily due to the very low per-stream rate compared to physical sales or digital downloads. This research also identified that consumer preferences have shifted significantly from an ownership model to an access model, requiring fundamental adaptations in the music royalty system.

Datta et al. (2018) conducted a comprehensive study of the economics of music streaming platforms and their impact on the well-being of artists and consumers. Their research revealed that streaming platforms tend to favor artists with high popularity, while niche or independent artists experience significant revenue declines. They also found that the pro-rata payment system used by most streaming platforms creates inefficient cross-subsidization, where users who listen to niche music indirectly subsidize mainstream artists. This study emphasizes the need for reform in the royalty payment model to create a more equitable distribution.

A thorough analysis of previous studies reveals a significant research gap in the comprehensive understanding of the legal protection mechanisms for music royalties in the digital era, particularly in the context of international regulatory harmonization and the implementation of emerging technologies. While numerous studies have explored the economic aspects and impacts of streaming on the music industry, there is limited research that systematically analyzes the effectiveness of existing legal frameworks in protecting digital music royalties and identifies holistic solutions that integrate legal, technological, and economic aspects. Most previous studies have focused on economic impact analysis or case studies of specific platforms, but none has developed a comprehensive framework for reforming the digital music royalty protection system.

Research gaps were also identified in the analysis of the role of blockchain technology and artificial intelligence as solutions to increase the transparency and efficiency of the music royalty system, as well as how these technologies can be integrated with existing legal frameworks. Previous studies have tended to explore these technologies separately without considering their complex legal and regulatory implications. Furthermore, limited studies have analyzed best practices from various jurisdictions and how international regulatory harmonization can be achieved to create an effective and equitable digital music royalty rights protection system for all stakeholders.

The novelty of this research lies in the development of a holistic framework that integrates legal, technological, and economic analysis to create a comprehensive solution for

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protecting music royalties in the digital era. Unlike previous studies, which tended to be partial, this study will develop a royalty rights protection model that combines regulatory reform, the implementation of blockchain technology for transparency, and mechanisms to strengthen the bargaining position of music creators through technology-enabled collective bargaining. This interdisciplinary approach allows for the identification of solutions that are not only technically feasible but also legally enforceable and economically viable.

Another novelty of this research is the development of an alternative royalty payment model that addresses the weaknesses of the existing pro-rata system through the implementation of a user-centric payment model supported by smart contracts. This research will also explore adaptive royalty protection mechanisms for future technological developments such as AI-generated music and virtual reality concerts, which have not been discussed in depth in the existing literature. The research's methodological innovation also lies in the use of a mixed-methods approach that combines doctrinal legal analysis, technological feasibility studies, and empirical research to produce applicable and actionable recommendations for policymakers, industry players, and music creators.

The current reality of the digital music industry demonstrates a worrying disparity between industry revenue growth and the compensation received by music creators. Recent data shows that although global music industry revenue has recovered and even surpassed pre-digital era levels, the majority of musicians have experienced a significant decline in income. Spotify, the largest streaming platform, pays an average of $0.003-$0.005 per stream to rights holders, meaning an artist needs approximately 300,000 streams per month just to meet minimum wage in the United States. This reality creates a paradox where the music industry is booming but music creators are facing a serious financial sustainability crisis.

The complexity of the digital royalty distribution system is also reflected in the slow payments and lack of transparency experienced by musicians worldwide. A recent survey of 1,200 independent musicians showed that 78% of them did not fully understand how their royalties were calculated and distributed by streaming platforms. This uncertainty is exacerbated by the presence of multiple intermediaries in the royalty payment chain, each of which takes a commission, resulting in a very small portion reaching music creators. This phenomenon occurs not only in developing countries but also in developed countries with relatively well-established legal systems, indicating that this problem is structural and systemic and requires comprehensive regulatory intervention.

Method

This study uses a qualitative approach with a literature review method to analyze the legal protection of music royalty rights in the digital era. The qualitative method was chosen because it allows for in-depth exploration of complex phenomena involving legal, technological, and economic aspects in the digital music industry (Creswell & Creswell, 2018). This approach allows researchers to understand the nuances and complexities of music royalty rights protection issues that cannot be fully captured through quantitative approaches. Qualitative methods also provide the flexibility to explore various perspectives and dimensions of issues that arise in the digital era, including social, cultural, and technological aspects that influence the music royalty system. Literature review was chosen as the primary research strategy to systematically analyze various academic sources and legal documents relevant to digital music royalty rights protection. According to Hart (2018), literature review allows

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researchers to identify, evaluate, and integrate findings from various previous studies to develop a comprehensive understanding of the research topic. This method is particularly suitable for legal and policy research because it allows for in-depth analysis of regulatory developments, jurisprudence, and industry practices in a broader context. The literature review also facilitated the identification of research gaps and the development of new theoretical frameworks that could significantly contribute to the body of knowledge in digital intellectual property law. Data collection was conducted through a systematic search of academic literature, legal documents, industry reports, and policy publications related to digital music royalty rights. Primary data sources included copyright laws, music industry regulations, relevant court decisions, and policy documents from international organizations such as WIPO and UNESCO. Secondary data sources included academic journal articles, textbooks, research reports, and industry publications from databases such as Google Scholar, JSTOR, HeinOnline, and Westlaw. Inclusion criteria for literature selection included topic relevance, source credibility, and publication period within the last 15 years to ensure currency and relevance of the information to current digital technology developments. Data analysis was conducted using thematic content analysis techniques that allow the identification of patterns, themes, and categories from the collected data. The analysis process began with systematic coding of all data to identify key concepts, followed by categorization and development of key themes emerging from the data (Braun & Clarke, 2019). A comparative analysis was also conducted to compare music royalty protection practices across jurisdictions and identify best practices that could be adopted. Data triangulation was conducted by comparing findings from various sources to enhance the validity and reliability of the research results. Research validity was ensured through the application of rigorous evaluation criteria to data sources, including peer review status for academic publications and institutional credibility for policy documents and industry reports. Research dependability was strengthened through systematic documentation of the data collection and analysis process, as well as an audit trail that enabled verification of the research steps taken (Lincoln & Guba, 1985). Transferability of research results was facilitated through in-depth descriptions of the research context and the characteristics of the data analyzed. Confirmability was ensured through researcher reflexivity and the use of multiple sources to support each finding and conclusion.

Hasil dan Pembahasan

A. Result

1. Legal Challenges in Protecting Digital Music Royalty Rights

The complexity of jurisdictions in the digital era presents a fundamental challenge in protecting music royalty rights, as musical works can be accessed globally through streaming platforms operating across countries with varying legal frameworks. The lack of uniformity in copyright regulations across countries creates legal loopholes that digital platforms can exploit to minimize royalty payment obligations (Goldstein, 2019). Forum shopping is a common practice, where digital platforms choose jurisdictions with the most favorable regulations to establish their headquarters, thereby avoiding higher royalty payments in countries with stronger copyright protection. This problem is exacerbated by the difficulty in determining the location of copyright infringement in the digital context, whether it is where the server is located, where users access the content, or where the platform operates.

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The weaknesses of traditional copyright law enforcement mechanisms become increasingly apparent when faced with the scale and speed of digital music distribution. The notice-and-takedown system adopted by many streaming platforms has proven ineffective in protecting music royalty rights because it places the burden of monitoring and enforcement on copyright holders (Urban et al., 2017). The process of identifying music copyright infringement in the millions of pieces of content uploaded daily requires massive technological and financial resources, often unavailable to independent musicians or small labels. The legal system's limitations in accommodating automated enforcement also create friction between the need for effective copyright protection and the principles of due process and fair use within the legal system.

Ambiguity in the definition and classification of digital music use creates significant legal uncertainty in the calculation and distribution of royalties. The distinction between mechanical rights, performance rights, and synchronization rights becomes blurred in the context of streaming and music use on social media platforms (Towse, 2020). Digital platforms often claim that their services do not fall under the category of public performance and therefore do not need to pay performance royalties, or use a very narrow interpretation of mechanical rights to minimize payment obligations. This ambiguity is exacerbated by the development of new technologies such as interactive streaming, on-demand services, and user-generated content that are not anticipated within the traditional copyright legal framework.

Weak enforcement of digital piracy and unauthorized use of music remains a major challenge despite intensive enforcement efforts. The proliferation of peer-to-peer file-sharing platforms, stream-ripping services, and illegal streaming sites creates unfair competition against legal streaming platforms (Danaher & Smith, 2014). The difficulty in identifying and prosecuting digital piracy perpetrators, especially those operating from jurisdictions with weak copyright protection, makes the deterrent effect of legal sanctions minimal. The whack-a-mole phenomenon, where shut-down piracy sites quickly reappear under different domains or names, demonstrates the limitations of a reactive enforcement approach to addressing digital piracy.

2. Problems with the Digital Royalty Distribution System

The lack of transparency in the digital royalty distribution system is a major complaint from music creators, as streaming platforms do not provide sufficient detailed information on how royalties are calculated and distributed. Most streaming platforms use a "black box" approach to explaining their royalty distribution formulas, providing only aggregate information without a breakdown that would allow music creators to verify the accuracy of their payments (Hesmondhalgh & Meier, 2018). The lack of standardized reporting formats across platforms also makes it difficult for musicians and their management to reconcile and audit royalty payments. Available information is often delayed and not real-time, making it difficult for music creators to track and monitor the performance of their work across platforms.

The pro-rata payment model adopted by most streaming platforms creates economic distortions that disadvantage artists with loyal but non-mainstream fanbases. In a pro-rata system, total revenue from subscriptions and advertising is divided based on global streaming market share, rather than the direct contribution of each subscriber (Aguiar & Waldfogel, 2021). This means that subscribers who exclusively listen to one artist indirectly

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subsidize mainstream artists with high streaming volumes. This injustice is further exacerbated by the practices of playlist manipulation and streaming fraud, which can artificially inflate streaming numbers, diverting royalties from legitimate artists to fraudsters.

The complexity of the digital royalty distribution chain involves multiple intermediaries, each taking a commission, resulting in a very small portion reaching music creators. This chain involves streaming platforms, aggregators, labels, distributors, collecting societies, and publishers, each with different contracts and rate structures (Marshall, 2019). Inefficiencies in this distribution chain not only reduce the economic value received by music creators but also create payment delays that can last months or even years. This fragmentation in the payment system also creates the risk of errors and underpayments that are difficult to detect and correct.

The issue of unclaimed royalties is a worrying phenomenon in the digital music industry, with billions of dollars in royalties going unpaid to rights owners due to identification and matching issues. Inaccuracies in music metadata, inconsistencies in artist names and song titles, and the lack of a universally unique identifier cause automated matching systems to fail to identify legitimate rights owners (Wikström, 2020). Collecting societies and streaming platforms often hold these unclaimed royalties in opaque black box funds, creating potential conflicts of interest. This problem is exacerbated by the lack of global standardization in music identification systems and the limitations of technology for fuzzy matching inaccurate or incomplete metadata.

3. Technology as an Alternative Solution

Blockchain technology offers revolutionary potential in creating a transparent and efficient music royalty payment system through the implementation of smart contracts that can automate payment distribution based on pre-defined rules. Blockchain-based platforms such as Mycelia and Ujo Music have demonstrated the ability to create an immutable ledger that records all royalty transactions in real time and transparently (O'Dair et al., 2016). Smart contracts enable the automatic distribution of royalties to all stakeholders according to agreed-upon percentages, eliminating the need for multiple intermediaries and reducing transaction costs. This technology also enables the implementation of micropayments, facilitating fairer compensation for low-volume streaming.

Artificial intelligence and machine learning provide solutions to the problem of music identification and accurate metadata matching through audio fingerprinting and content recognition technology. AI systems can analyze the unique audio characteristics of each music track and create a digital fingerprint that can be used for accurate identification even when metadata is missing or inaccurate (Rietveld et al., 2020). This technology has been implemented by platforms such as YouTube's Content ID and ACRCloud to identify unauthorized music use and facilitate automated royalty payments. Machine learning algorithms can also be used to detect streaming fraud and playlist manipulation through the analysis of abnormal listening patterns.

Non-fungible tokens (NFTs) and the tokenization of music rights open a new paradigm in music royalty ownership and trading, allowing music creators to sell part or all of their future royalties to investors or fans. Platforms like Royal and Opulous have developed models where fans can purchase fractional ownership in music royalty rights and receive payments based on the work's streaming performance (Chohan, 2021). This model not only provides liquidity to music

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creators but also aligns interests between artists and fans. Tokenization also facilitates a secondary market for music rights trading, creating a more efficient price discovery mechanism for valuing musical works.

Implementing user-centric payment systems through advanced analytics and real-time processing technology can address the inequities of traditional pro-rata models by ensuring that each user's subscription fee is allocated proportionally to the music they listen to. Platforms like SoundCloud have begun testing fan-powered royalties models that allocate subscriber payments based on their individual listening behavior (Masnick & Ho, 2019). Big data analytics technology enables processing of massive volumes of streaming data to calculate accurate royalty distributions in real time. Implementing this system requires sophisticated technological infrastructure but can create significant fairness in artist compensation, especially for niche and independent artists with dedicated fanbases.

B. Discussion

1. Analysis of Legal Challenges from an International Legal Theory Perspective

The jurisdictional challenges in protecting digital music royalty rights can be analyzed through the lens of territorial jurisdiction theory developed by Ryngaert (2015), which emphasizes that the traditional concept of territorial sovereignty faces new complexities in the digital age. This theory explains that when economic activity transcends traditional geographic boundaries, as occurs in global music streaming, a reformulation of the concept of jurisdiction is necessary to accommodate digital realities. The phenomenon of forum shopping by streaming platforms reflects weaknesses in international legal harmonization, where substantial differences in copyright regulations between countries create a race to the bottom in protecting the rights of music creators. Regulatory arbitrage theory (Bratton & McCahery, 2020) explains how business entities strategically choose jurisdictions with the lowest regulatory burden, which in the context of digital music means selecting countries with minimal royalty payment obligations.

The weaknesses of enforcement mechanisms in digital copyright law can be understood through deterrence theory developed by Becker (1968) and adapted to the intellectual property context by Landes and Posner (2003). This theory states that the effectiveness of enforcement depends on the probability of detection and the magnitude of the sanctions imposed. In the context of digital music, the low probability of detecting copyright infringement due to the massive volume of content and limited monitoring technology results in a weak deterrent effect from existing legal sanctions. The notice and takedown system adopted by streaming platforms reflects a safe harbor approach that prioritizes the protection of intermediaries over rights holders, as criticized by Ginsburg (2018), who stated that this system creates an imbalance of power that disadvantages content creators.

The ambiguity in the classification of digital music uses reflects the inability of traditional legal frameworks to accommodate technological convergence, as explained in the theory of law and technology by Brownsword (2019). This theory emphasizes that law often lags behind technological developments (a pacing problem), creating regulatory gaps that can be exploited by industry players. In the context of music royalties, the convergence of broadcasting, telecommunications, and computing technology creates categories of music use unanticipated in the traditional copyright framework. This requires an adaptive regulatory approach that can dynamically

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respond to technological changes, as proposed by Murray (2019) in his concept of responsive regulation for the digital age.

2. Evaluating the Royalty Distribution System through Economic Justice Theory

The lack of transparency in the digital royalty distribution system can be analyzed using the information asymmetry theory developed by Akerlof (1970) and expanded in the context of digital platforms by Parker et al. (2016). This theory explains that when one party has superior information compared to another, market inefficiency and exploitation will occur. In the context of digital music, streaming platforms possess complete information about user behavior, advertising revenue, and cost structure, while music creators only possess limited aggregate data. This asymmetry creates a principal-agent problem where the platform, as the agent, does not act in the best interests of the music creator, as the principal, due to the lack of adequate transparency and accountability mechanisms.

The dominant pro-rata payment model in the streaming industry can be criticized using distributive justice theory developed by Rawls (1971) and adapted to the digital economy context by Zuboff (2019). Distributive justice theory emphasizes that resource allocation should be based on the principle of fairness, which takes into account the actual contributions of each party. The pro-rata system creates unfair cross-subsidization because subscribers loyal to certain artists indirectly fund mainstream artists they don't listen to. This contradicts the principle of contribution-based distribution, which should underpin any royalty payment system. Critchley and Supran (2021) state that the pro-rata system is a manifestation of platform capitalism, which optimizes platform profits at the expense of fair compensation for content creators.

The complexity of the digital royalty distribution chain reflects the problem of intermediation costs in the digital economy, as analyzed by Brynjolfsson and McAfee (2017) in their theory of digital transformation. This theory explains that although digital technology should reduce transaction and intermediation costs, in practice, the proliferation of intermediaries often increases complexity and costs. In the context of digital music, multiple layers of intermediaries create rent-seeking behavior, where each intermediary extracts value without providing proportional added value. The phenomenon of unclaimed royalties can be understood as the result of information friction and coordination failure in complex multi-agent systems, as explained by Milgrom and Roberts (1992) in their theory of organizational economics.

3. The Potential of Blockchain Technology within an Institutional Economics Framework

The implementation of blockchain technology in the music royalty system can be analyzed through institutional economics theory developed by North (1990) and expanded in the context of digital institutions by Davidson et al. (2018). This theory emphasizes that institutions function as rules of the game, reducing transaction costs and uncertainty in economic interactions. Blockchain technology creates cryptographic institutions that can replace traditional trusted intermediaries through algorithmic governance and cryptographic proof. Smart contracts enable the enforcement of agreements without the need for third-party intervention, reducing transaction costs and increasing efficiency in royalty distribution. This aligns with the Coase theorem, which states that under zero transaction costs, economic efficiency can be achieved through private bargaining.

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Artificial intelligence and machine learning in the context of music royalties can be understood through algorithmic governance theory developed by Yeung (2017) and Danaher et al. (2017). This theory explains that algorithms can function as governance mechanisms that automate decision-making processes and reduce human bias in resource allocation. AI-powered content identification and fraud detection create automated compliance systems that can improve the accuracy and efficiency of royalty distribution. However, algorithmic governance also raises concerns about accountability and transparency, as the decision-making process in AI systems is often a black box, difficult to audit and explain to stakeholders.

The tokenization of music rights through NFTs and fractional ownership can be analyzed using property rights theory developed by Demsetz (1967) and adapted for digital assets by Fairfield (2021). This theory emphasizes that clear definition and transferability of property rights increase economic efficiency through better resource allocation. Tokenization creates more granular and tradable property rights, enabling more accurate price discovery for music assets. User-centric payment systems reflect the implementation of the preference revelation mechanism in mechanism design theory (Myerson, 1991), where individual preferences can be accommodated through sophisticated allocation algorithms. Big data analytics technology enables the implementation of personalized payment systems that can improve satisfaction and fairness in compensation distribution.

Conclusion

This research identifies that the legal protection of music royalties in the digital era faces systemic challenges that require comprehensive reform across three key dimensions: harmonization of international regulations, transformation of the royalty distribution system, and implementation of blockchain and AI technology to increase transparency and efficiency. Jurisdictional and enforcement challenges in traditional copyright law, combined with the opaqueness of the pro-rata system and the complexity of the royalty distribution chain, have created structural inequities that disadvantage music creators, particularly independent artists. The phenomena of forum shopping, regulatory arbitrage, and information asymmetry demonstrate that the existing legal framework is unable to accommodate the complexity of technological convergence and the global nature of the digital music industry.

Proposed holistic solutions include the implementation of blockchain technology to create an immutable and transparent royalty distribution system, the use of AI and machine learning for automated content identification and fraud detection, and the development of user-centric payment models that replace the unfair pro-rata system. Tokenization of music rights through NFTs and smart contracts can create a more liquid and efficient market for music assets, while harmonization of international regulations through multilateral treaties can reduce regulatory arbitrage and increase consistency in global music royalty protection. Implementing these solutions requires collaboration between policymakers, industry stakeholders, and technology developers to create a sustainable and fair ecosystem for all parties involved in the digital music industry.

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