

A Study on the Transformation of the Music Industry Driven by Digital Technologies

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Abstract:

The global music industry is undergoing a profound transformation because of the swift advancements in artificial intelligence (AI), recommendation systems, and platform economies. In order to understand how technology has completely changed the way music content is created and the way platforms make money, this paper will take Spotify, Apple Music, NetEase Cloud Music, and QQ Music as examples for a closer look. It focuses on four major areas: AI-assisted creation tools, the development of user feedback mechanisms, recommendation algorithm logic, and revenue structures in the streaming era. These aspects highlight two main contradictions in the digital music ecosystem: the authority of platforms versus the concentration of revenue, and the freedom of creation versus the control of algorithms. Platform mechanisms increase efficiency, but they also exacerbate issues like income inequality, homogenized content, and the suppression of artistic expression. The paper proposes several solutions, like allocating revenue by putting users first and designing a diversified recommendation system, so as to achieve a balance between technical efficiency and cultural justice. It also mentions a framework for collaboration between humans and machines and how to regulate the copyright of content created by AI. This paper aims to provide both theoretical insight and practical direction for building a more sustainable, diverse, and innovation-driven digital music environment.

Keywords: Digital music; artificial intelligence; recommendation system; platform economy; creator ecosystem.

1. Introduction

The global music industry has undergone significant change in recent years due to the platform economy, algorithmic recommendation systems, and the rapid

development of AI. Instead of being auxiliary tools, technological forces are now structurally embedded actors that interfere with business logic, content creation, and distribution. Traditional media channels have been supplanted by streaming platforms, and

users' access to content is now determined by algorithms. In some situations, AI technologies are even taking the place of human composers in the creation of music. In Europe and America, platforms such as Spotify and Apple Music continue to innovate in personalized recommendations and data-driven business strategies. Through social listening, emotional tagging, and user-generated content (UGC), QQ Music and NetEase Cloud Music have established localized ecosystems in China. However, these evolutions also raise pressing concerns. Power disparities between platforms and creators are widening, top artists receive the majority of revenue, algorithmic filtering lessens the diversity of content, and AI-generated works subvert established authorship and copyright conventions. These advancements demonstrate that, in today's music ecosystem, technology is a structural force that transforms cultural production and the logic of expression rather than just being an efficient tool [1].

In the field of AI-generated music, Yueyue Zhu et al. surveyed tools such as Amper Music and AIVA, which are widely used for melody generation and emotion modeling [2]. These tools reduce creative barriers but also provoke new debates over ownership and attribution. The Wall Street Journal reported that major record labels are negotiating licensing terms for AI training datasets, reflecting industry concerns over authorship and monetization [3]. Regarding recommendation systems, Yunhak Oh et al. proposed the MUSE model to improve diversity in music suggestions through shuffling mechanisms [4]. Francesco Meggetto et al. used reinforcement learning to examine how skip behavior influences content prioritization [5]. RouteNote Blog noted that over 75% of Spotify's content traffic is shaped by its algorithmic systems, underscoring the influence of recommendation algorithms on visibility and monetization [6]. In terms of platform and creator relations, Music Business Worldwide reported that over 70% of artists are dissatisfied with current payout models, while LALAL.AI revealed that per-stream revenues often fall below \$0.005 [7, 8]. These findings illustrate the growing tension between platform economics and artistic sustainability. Although existing literature has addressed technologies, user experience, and governance, fewer studies explore how creators are shaped by these evolving systems - especially in the Chinese context, where empirical studies on the interaction between platform logic and creative practice remain limited.

Against this background, this paper takes Spotify, Apple Music, NetEase Cloud Music, and QQ Music as research cases. Using comparative analysis and case study methods, it explores how technology reconstructs the music content creation mechanism and platform business model. The article focuses on four dimensions: (1) the application

of AI in music production; (2) the influence of recommendation systems on user and creator dynamics; (3) revenue models and platform power structures in the streaming era; and (4) the resulting challenges and strategic responses. By analyzing these aspects, the study aims to reveal the structural tensions within the current digital music ecosystem and explore possibilities for balancing technology and culture, efficiency and fairness.

2. The Evolution of the Digital Music Industry

2.1 Overview of the Global and Chinese Market

With the rapid development of digital technology, the global music industry is undergoing a profound transformation from physical media to streaming services. Since 2000, the sales of physical audio-visual products such as CDs have continued to decline, while streaming media platforms represented by Spotify have risen rapidly. According to the data from the Global Music Report 2025 (IFPI), the global recorded music revenue reached 2.96 billion US dollars in 2024, increasing by 4.8% year-on-year [9]. Among them, the revenue of streaming media exceeded 20 billion US dollars for the first time, accounting for 69% of the total revenue. Streaming media has become the mainstream way of global music distribution. It has not only reshaped how music is distributed but also brought profound changes to creation, monetization, and audience relationships.

Furthermore, the development of streaming media platforms has also promoted the new consumption form of "music as a service". Users do not need to own the songs themselves. Instead, they can access the vast online music library without limit through a subscription. This model has gradually replaced the past ownership logic of "purchase - download - collection". The number of paid subscription users increased by 10.6% to 752 million. This indicates that digital platforms are becoming the mainstream way of global music consumption. In the global market, Spotify and Apple Music are the two dominant platforms. Data from 2024 shows that Spotify has 678 million active users, among which 265 million are paying users, with a market share of 31.7%. Apple Music has approximately 93 million paid subscribers. With high sound quality and ecological integration as its core advantages, Apple Music pays artists an average of about \$0.0076 per play.

Meanwhile, the digital music market in China is also showing a trend of rapid growth. According to the 2024 China Online Music Industry Research Report, by the end of 2023, the number of online music users in China had

reached 745 million, with a user penetration rate exceeding 90%, far higher than the global average. Among them, QQ Music and NetEase Cloud Music form a duopoly pattern. With the empowerment of Tencent's ecosystem and its vast ability to integrate copyright resources, QQ Music has over 500 million monthly active users and a music library of over 80 million legal songs. It is currently the music platform with the largest user base in China. NetEase Cloud Music is renowned for its unique comment section atmosphere and UGC mechanism, with high user stickiness. The platform also enhances the interaction between listeners and creators through features such as Cloud Village Community. In addition, with the rise of short video platforms and AI content creation tools, Chinese music platforms are accelerating their technological transformation. For example, NetEase Cloud Music is attempting to integrate a hybrid recommendation system. It combines AI intelligent recommendation and social feedback to further enhance the personalized experience [10].

2.2 Platform Selection and Strategic Comparison

This paper selects four representative music platforms - Spotify, Apple Music, NetEase Cloud Music and QQ Music - as the basis for comparative analysis. These plat-

forms not only dominate their respective regional markets but also reflect different technological strategies and user logics.

As shown in Table 1, Spotify is the world's largest music streaming platform. Its personalized recommendation systems, including Discover Weekly and Release Radar, are widely regarded as industry benchmarks of significant research value in terms of user stickiness and behavior prediction. Apple Music emphasizes high-quality sound and seamless integration with the Apple hardware ecosystem. With a pure subscription model and no free tier, it has maintained a high user payment conversion rate and has become a useful comparison point with Spotify. NetEase Cloud Music has a powerful UGC mechanism and an emotional community culture. Its comment section is an important social space for music listening. Its recommendation system is increasingly driven by emotional tags and user participation, providing a different feedback path from foreign platforms. QQ Music, a subsidiary of Tencent, benefits from the powerful integration of industrial resources and enjoys obvious advantages in copyright, marketing and distribution. The platform mechanism leans towards the mainstream content pushing model, which is an important case study of how platform dominance affects the relationship between artists and audiences.

Table 1. Comparative Features of Spotify, Apple Music, NetEase Cloud Music, and QQ Music

Platform	Region	Platform Logic	Monetization Model	Recommendation Mechanism	User Experience	Creative Support Path
Spotify	Global	Open	Freemium (Free + Subscription)	Algorithm-driven (AI-based, data-centric)	Strong personalization, high user autonomy	Exposure relies on an algorithm, data-oriented
Apple Music	Global	Closed	Subscription-only, no free tier	Human curation + algorithmic assistance	High-quality audio, ad-free, seamless Apple integration	Focus on curated content, favors mainstream artists
NetEase Cloud Music	China	Community-driven / Emotion-oriented	Subscription + virtual items + UGC monetization	Emotional tagging + user comment participation	Strong emotional resonance, active UGC culture	Supports niche creators and community co-creation
QQ Music	China	Closed / Mainstream-oriented	Subscription + virtual goods + ads	Mainstream content pushing + chart-based ranking	Strong social integration, vast licensed library	Favors commercial content and major artist partnerships

3. Technology and Music Content Creation

3.1 AI and Algorithm-Assisted Composition

In recent years, artificial intelligence technology has become increasingly common in music creation, and is almost becoming a crucial point in technological innovation in this industry. AI tools like Amper Music, AIVA, Suno, and Boomy have gradually become popular tools in the music creation circle. They can be used to create melodies, automatically arrange music, synthesize sounds, and even write lyrics. These tools now make making music much easier, and even non-professionals can play with music creation [11].

In specific application scenarios, the AI system can automatically create music pieces based on style parameters. It does this based on the style parameters given by the user, like mood, rhythm, and favorite instruments. It is often used in advertising music, film and television soundtracks, and initial creative plans. For example, Taryn Southern used AI to help create her 2019 album I AM AI, demonstrating the actual potential of AI in music production. In addition, many AI platforms replicate artists' creative styles by "imitation learning" from existing songs, which has led to discussions on the ethical and legal issues of copyright and originality.

3.2 Closed-loop Mechanism of User Feedback Loops in Creative Processes

In addition to AI's direct participation in creation, user behavior data on the platform is increasingly becoming an important feedback mechanism that influences the direction of music creation. For example, Spotify's "Fans Also Like" feature. This feature analyzes other artists preferred by listeners whose styles are similar to those of a certain artist. In reverse, it influences the artist's style adjustment, making it "easier to be recommended" an implicit creative goal. In addition, the comment section's emotion tag mechanism of NetEase Cloud Music. This platform encourages users to express their listening feelings and emotions in the comments, such as "Emo", "Healing", "Suitable for Late Night", etc. These tags not only affect the priority of song distribution in the recommendation system but also subtly guide creators to adapt to certain emotional expression trends.

This closed-loop mechanism of data - creation - feedback - re-creation makes the creative process increasingly platform-oriented. Artists need to take into account the balance between artistic expression and the logic of platform recommendations. To some extent, it also reflects the

tension between creative freedom and commercial algorithms.

4. Digital Platforms and Business Model Innovation

4.1 Streaming Revenue and Monetization Models

In the traditional record industry, music creation and distribution mainly relied on record companies, agents and physical album sales. The rise of digital platforms, especially the popularity of Spotify, Apple Music, etc., has completely changed the income structure and value distribution system of music. Among global platforms, Spotify implements the per-stream payout model. According to the data, the average income per play for artists on Spotify is approximately between \$0.003 and \$0.005, which means that unless the play count of a single is extremely high, the income is very limited [12].

In contrast, domestic platforms such as NetEase Cloud Music and QQ Music have more diverse business models. Besides VIP subscription, there are also income sources such as e-commerce driven by community interaction and performance sharing, user tipping mechanism, and digital album sales for musicians. This model places more emphasis on the connection with fans, which helps enhance the independent operation ability of artists. However, it also intensifies the problems of the Head Effect and uneven resource distribution.

4.2 The contradiction between Platform Power and Artist Compensation

In the current era dominated by algorithmic recommendation mechanisms, platforms hold the power over whether music content can be "seen". The recommendation algorithm determines which songs will appear on the user's homepage and the recommended playlist. This "visibility" directly affects the artist's exposure and income. This structure of unequal power has sparked many controversies. Taylor Swift's removal of all her works from Spotify in 2014 is an important case. In her article in The Wall Street Journal, she argued that piracy, file sharing, and streaming had severely reduced paid album sales and emphasized that valuable creative work deserves fair compensation. This act has sparked a global discussion on the boundaries between artists' rights and the power of streaming platforms.

Although the platform has brought convenience to users, creators have limited control over the logic of their algorithms and bargaining power, which makes it difficult for

many small and medium-sized artists to obtain sustainable income.

4.3 Recommendation System Mechanism and Impact

Algorithmic recommendation is the core link in the current business logic of digital music platforms. Mainstream platforms such as Spotify and NetEase Cloud Music generally adopt hybrid recommender systems, combining collaborative filtering and content-based filtering. The former makes recommendations based on the similarity of users' behaviors, while the latter matches based on features such as the style, rhythm, language and mood of songs. For instance, Spotify's personalized playlists have effectively increased user stickiness, with research showing that the recommendation systems drive over two-thirds of the platform's traffic.

However, some platforms have been criticized for creating Filter Bubbles, concentrating too much on popular trends and weakening diversity in music discovery. While the platform is pursuing click-through rates and dwell times, it may have overlooked the promotion of unpopular works and the growth of new users. This enables the recommendation system to enhance user experience and business efficiency while also triggering continuous discussions on content diversity and platform responsibility.

5. Challenges and Suggestions for the Digital Music Industry

Although digital platforms and technological innovations have greatly enhanced the accessibility and creative efficiency of music, they have also brought about many structural problems. To promote the fair and sustainable development of the music ecosystem, this chapter will analyze these challenges and introduce possible response paths.

5.1 Inequality in Artist Revenue and Platform Dependence

According to the data released by Spotify, in 2024, the platform paid more than 10 billion US dollars in royalties to artists, but only about 4% of the artists received sustainable revenue. This highlights the extremely unbalanced income gap under the celebrity effect and long tail effect. Many independent musicians and emerging artists can only rely on non-platform channels, such as performances and e-commerce, to obtain supplementary income [13]. In the Chinese market, this problem is more prominent. The platform's distribution mechanism prioritizes the push of traffic works, and independent musicians often face difficulties such as limited exposure, weak bargaining power,

and impaired creative autonomy. The platform economy is gradually strengthening creators' reliance on the "seeing mechanism" of the platform, and creative freedom is indirectly suppressed. To address this structural imbalance, more platforms are exploring new allocation mechanisms. Platforms aim to distribute users' subscription fees based on the actual artists users listen to, to more accurately reflect user value and enhance the revenue sustainability of niche musicians.

5.2 Copyright, Piracy, and Regulatory Gaps

Although China has strengthened the construction of the music copyright system in recent years, copyright disputes still occur frequently between platforms and content providers. In 2021, Tencent Music was investigated for allegedly monopolizing its music library resources, which drew public attention to copyright barriers and market fairness. In addition, emerging issues such as piracy, unauthorized covers, and unclear copyright ownership of AI-generated content have also become obstacles to the healthy development of the digital music industry. At present, there is no unified copyright regulation on the ownership of AI music creation worldwide, which poses higher requirements for platform managers, lawmakers and content creators.

Against this backdrop, promoting the transparency of the platform's recommendation mechanism has become one of the necessary paths. For instance, platforms are trying methods such as publicly disclosing some algorithm logics. They also set up rare song discovery channels or apply diversity weights. These actions help weaken the centralized monopoly of copyright resources and allow more legal and diverse content to be discovered. Thus, a certain supplement of industry self-discipline can be formed in the institutional gap.

5.3 Market Concentration and Platform Monopoly

In the global market, Spotify and Apple Music together account for more than 60% of the market share. However, in the Chinese market, the Tencent group (QQ Music, Kugou Music, Kuwo Music) has long held a monopolistic position, while NetEase Cloud Music ranks second. This highly concentrated state of the market gives the platform a significant advantage in aspects such as pricing power, algorithm rights, and copyright bargaining. The relationship between artists and platforms is increasingly resembling a game between content providers and algorithm schedulers. Whether a platform has the motivation to support niche creations, diverse styles and independent voices increasingly depends on its business model rather

than cultural responsibility. This trend poses a threat to the healthy development of the overall music culture.

Therefore, in the continuous evolution of platform technology, it is essential to introduce more design concepts oriented towards the rights and interests of creators. For example, marking AI participation and encouraging support mechanisms for original content. This can help break through the boundaries of algorithm-driven creation. They also help restore space for diverse styles and cultural expressions in the music market.

5.4 Creative Homogenization and Algorithm Bias

Although algorithmic recommendation improves the matching efficiency, its logic based on behavioral similarity is highly likely to cause music creation to tend towards popular style termination, namely the so-called “hit song formula”. This will lead to the loss of innovation space for music content in the long term. It is reported that the combination of AI-generated music and recommendation bias is concerning. Emotion prediction and algorithm distribution may dominate the entire creative process. As a result, works increasingly resemble algorithm products rather than genuine emotional expressions. To reverse this trend, some platforms have introduced creator analytics dashboards. These tools assist artists in understanding their audience structure and content dissemination paths. This helps to rebuild creative initiative and diversity while still benefiting from data support.

6. Conclusion

By focusing on Spotify, Apple Music, NetEase Cloud Music, and QQ Music, this paper discusses advances in AI creation tools, platform recommendation systems, streaming revenue models, and what influence these have on creators. While digital technology enhances the efficiency and accessibility of the music industry, it also brings multiple challenges such as structural inequality, content convergence, and platform power concentration. As a new type of creative tool, AI is changing the content production process, but its big-scale application has also given rise to new copyright disputes and difficulties in originality review. The algorithmic recommendation mechanism led by the platform enhances the user experience, but invisibly shapes the content standards and affects the creative freedom and diverse expression. The power imbalance between platforms and creators is exacerbated by playback-oriented revenue-sharing models, which put independent musicians at a long-term income disadvantage. Future platforms should balance technological efficiency and cultural equity by improving revenue models, increas-

ing transparency in recommendation systems, promoting collaborations of human and machine, and developing copyright frameworks for AI-generated content.

In conclusion, digital technology is reshaping the content logic and platform ecosystem of the music industry in a systematic way. At the intersection of platform governance, algorithm design and artistic practice, building a new ecological structure that takes into account both creative freedom and industrial efficiency, as well as cultural expression and technical norms, will become the key direction for the future development of digital music. However, this paper mainly focuses on platform and creation-level mechanisms and does not fully address how user behavior and regional cultural differences influence platform ecosystems. This could be investigated in future studies using cross-regional comparisons and user data.

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