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Article

From Viral Sound to Commercial Success: An Empirical Investigation of Music Diffusion Paths and Marketing Mechanisms on TikTok

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Abstract: The emergence of TikTok has fundamentally reshaped music discovery and promotion, with numerous songs achieving mainstream commercial success after first gaining traction on the platform. However, the mechanisms through which viral propagation on short video platforms translates into measurable commercial outcomes remain underexplored. This study investigates the relationship between TikTok-based music propagation and commercial success metrics, specifically examining how viral propagation paths—including user-generated content volume, music challenge participation, and propagation velocity—influence song performance on Spotify charts and Billboard rankings. A quantitative empirical approach was employed, analyzing publicly available data from three case studies of songs that experienced viral trajectories on TikTok between 2022 and 2024. Data were collected through systematic tracking of platform engagement metrics, streaming statistics, and chart positions over a defined observation window. Statistical analyses, including correlation and mediation modeling, were conducted to assess the relative impact of each propagation variable. The findings reveal that user-generated content creation volume exhibits the strongest correlation with streaming success, while the speed of initial propagation significantly predicts Billboard chart entry. Music challenges function as critical catalysts, with challenge participation rates mediating the relationship between sound usage and commercial outcomes. This study contributes to understanding digital music marketing mechanisms and offers actionable insights for music industry practitioners seeking to leverage short-form platforms for promotional strategies.

Keywords: tiktok; music marketing; viral diffusion; commercial success; user-generated content; music streaming

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1. Introduction

The landscape of music promotion and consumption has been fundamentally reshaped by the rise of short video platforms [1]. Among these, TikTok has emerged as a dominant force, functioning not merely as a social network but as a powerful music discovery engine. A distinctive phenomenon of the contemporary music industry is the trajectory where songs achieve viral status on TikTok prior to ascending mainstream charts on platforms like Spotify and the Billboard Hot 100. This study investigates the mechanisms by which viral spread on TikTok translates into measurable commercial success, focusing on the relationships between music challenges, the volume of user-generated content (UGC), the speed of viral uptake, and subsequent song sales.

Existing research has acknowledged the transformative impact of social media on music marketing. A quantitative analysis of consumer journeys from TikTok to music

streaming services reveals that viral exposure on the platform significantly increases subsequent streaming activity [1]. However, a critical gap remains in understanding the specific, quantifiable pathways through which short video platforms convert viral attention into commercial metrics such as chart positions and sales figures. Recent studies have called for more empirical research into the causal dynamics between online virality and mainstream success, highlighting the need for quantitative models that can explain these relationships. While it is widely recognized that TikTok can launch a song into the public eye, the underlying marketing mechanisms that drive this process remain underexplored.

A comprehensive review of music virality on social platforms confirms that empirical studies on platform-specific diffusion mechanisms remain scarce. The review identifies that most existing research focuses on descriptive accounts of viral events rather than predictive models of commercial outcomes. Furthermore, sustained performance of digital music on TikTok requires understanding how UGC creation cycles and challenge participation rates influence long-term streaming performance and chart longevity. Research shows that the social media environment surrounding a song, including the volume and velocity of user-generated content, plays a critical role in determining whether viral momentum translates into sustained commercial success [2].

This research is designed to address these gaps by employing a quantitative, case-study-based empirical analysis. Rather than relying on simulated data or survey-based methods, this study exclusively utilizes publicly available and verifiable databases. These sources include Billboard chart archives, Spotify streaming data, and public reports on TikTok activity for specific hit songs. The core analytical focus is on three interrelated factors: the volume of UGC generated around a song, the speed of initial uptake across the platform, and the presence and scale of music challenge participation. The following chapters will present a literature review, theoretical framework, methodology, empirical findings, and a concluding discussion of the results.

2. Literature Review

The theoretical foundation of this study rests on the intersection of digital music marketing, social media diffusion theory, and streaming economy analytics [3]. Understanding how TikTok-based music propagation translates into commercial success requires a systematic examination of existing research on music popularity, user-generated content dynamics, and platform-specific marketing mechanisms.

Research on music popularity has identified several key factors that distinguish widely shared tracks from those achieving success through traditional promotion channels [4]. Analysis of popular song characteristics reveals that rhythmic hooks, danceable beats, and short loopable segments are significantly overrepresented in tracks that gain rapid traction on short-video platforms. These structural features facilitate user participation in music challenges, which in turn accelerates content spread. Studies find that songs with clear, repeatable moments of musical punctuation are substantially more likely to generate high volumes of user-generated content.

The transformation of music distribution through online platforms has fundamentally altered how artists reach audiences. Traditional gatekeepers such as radio programmers and record label executives have lost their exclusive control over music discovery [4]. Instead, algorithmic recommendation systems and user engagement metrics now determine which songs receive promotional attention. This shift has created new opportunities for independent artists who can achieve widespread visibility on TikTok without major label backing, but it has also introduced new forms of market uncertainty.

Predictive approaches to digital music consumption have gained traction as researchers seek to forecast which songs will achieve commercial success [5]. Machine learning models trained on social media engagement data—including TikTok video counts, like-to-share ratios, and challenge participation rates—have demonstrated moderate success in predicting future streaming performance. However, these models

often face limitations in accounting for the unpredictable, emergent nature of widespread sharing phenomena, suggesting that while certain factors correlate with success, establishing causal relationships remains challenging.

The development of short-form video marketing frameworks provides a useful lens for understanding how brief content drives consumer behavior [6]. Research identifies three critical phases in such campaigns: the seeding phase, where initial content is distributed to influential users; the acceleration phase, where user participation amplifies reach; and the maturation phase, where sustained engagement determines long-term value. Applying this framework to TikTok music promotion suggests that songs successful in converting widespread attention into commercial outcomes typically manage to transition from acceleration to maturation before audience attention shifts to new content.

Establishing causal relationships between music popularity and commercial success requires careful methodological consideration [7]. While correlation between TikTok activity and streaming numbers is well documented, demonstrating that widespread attention causes commercial outcomes rather than merely coinciding with them presents significant challenges. Instrumental variable approaches and natural experiment designs have provided preliminary evidence of causal effects, particularly in cases where songs gain unexpected visibility due to unrelated events or trends.

The strategic implications of social media popularity for creative industries have received increasing attention from management scholars. Research suggests that firms operating in creative sectors face a fundamental balancing challenge when pursuing popularity-driven strategies [8]. While widespread visibility can generate substantial returns with minimal upfront investment, the unpredictability of such outcomes makes them unreliable as a primary promotional strategy. Successful organizations therefore adopt portfolio approaches, combining experimental initiatives with more predictable marketing activities.

User-generated content plays a central role in information flow on social media platforms. Analysis of TikTok content patterns reveals that UGC volume follows a predictable trajectory for widely shared songs, with rapid acceleration following initial influencer posts, followed by a peak period of user participation, and finally a gradual decline as the song enters the mature phase of its commercial lifecycle. The speed of initial spread, measured as the time between first influencer use and the emergence of widespread user participation, shows significant correlation with peak Billboard chart position [9].

Contemporary understanding of popularity in the creator economy has evolved beyond simple transmission models. Rather than viewing popularity as an inherent property of content that spreads passively, researchers now emphasize the active role of creators in adapting and remixing content for their specific audiences [10]. This perspective is particularly relevant for TikTok music challenges, where users do not simply share existing content but actively create new interpretations, dance routines, and visual accompaniments. Each new adaptation potentially expands the song's reach to new audience segments.

Quantitative comparison of widely shared and enduringly popular songs reveals important distinctions between these two categories of commercial success. While widely shared songs achieve high streaming numbers over short periods, enduring hits typically demonstrate more sustained performance across multiple metrics and longer chart longevity [11]. The conversion of widespread attention into sustained success appears to depend on factors beyond initial engagement, including the song's suitability for repeated listening outside the short-video context and the artist's ability to follow up with additional promotional activities.

The integration of big data analytics with short-form video marketing strategies has opened new possibilities for measuring and optimizing campaign performance. Real-time dashboards tracking key metrics such as UGC creation velocity, challenge participation rates, and cross-platform streaming correlations enable marketers to adjust strategies as

events unfold. However, ethical considerations around data collection and algorithmic influence remain largely unaddressed in current research, representing an important direction for future investigation [12].

In summary, the existing literature establishes that TikTok music popularity is associated with commercial success, but significant gaps remain in understanding the specific mechanisms through which broad-based diffusion translates into measurable outcomes. The present study addresses these gaps by examining three mechanisms: user-generated content volume, music challenge participation, and diffusion speed [13]. The following chapter presents the theoretical framework and methodology employed in this investigation.

3. Theoretical Framework and Methodology

This chapter outlines the theoretical framework and methodology used to examine the relationship between TikTok-driven music propagation and commercial success. A quantitative case study approach is adopted, analyzing publicly available data from songs that attained viral status on TikTok before charting on mainstream music rankings. The methodology evaluates three core mechanisms: volume of user-generated content, participation rates in music-related challenges, and speed of viral diffusion. A method flowchart is provided to delineate the key stages and procedural steps of the research.

3.1. Theoretical Framework

The theoretical foundation of this study draws on diffusion theory and viral marketing literature, adapted to the context of short video platforms. Viral diffusion on short video platforms follows a multi-stage process [14]. In the initial seeding stage, a song is introduced to the platform, typically through influencer collaborations or organic user discovery. In the acceleration stage, user participation drives increasing volumes of user-generated content, with music challenges serving as a primary catalyst. In the maturation stage, the song attains broad recognition, evidenced by chart placements on major music industry indices and sustained streaming performance.

Three theoretical mechanisms connect viral diffusion to commercial outcomes. First, user-generated content volume reflects audience awareness and correlates positively with subsequent streaming activity. Second, structured music challenges—where users perform choreographed routines or creative reinterpretations—generate higher engagement rates compared to passive consumption. Third, the speed of diffusion across the platform, measured as the interval between initial influencer adoption and peak user-generated content production, predicts peak chart performance [13].

3.2. Methodology

The study adopts a case study approach, examining three songs that achieved viral success on TikTok between 2022 and 2024. Each case study tests distinct aspects of the viral-to-commercial conversion process. The cases are selected based on three criteria: measurable TikTok activity prior to chart entry, availability of Spotify streaming data, and verifiable Billboard chart performance.

The first case study focuses on the relationship between user-generated content volume and commercial success. The song "Flowers" by Miley Cyrus is analyzed. Data sources include Billboard Hot 100 chart positions, Spotify weekly streaming counts, and TikTok official sound usage statistics. The analysis examines how the number of user-created videos using the song's audio correlated with its streaming performance and chart longevity [15].

The second case study explores the impact of music challenge participation on song sales [7]. The song "Summer Nights" by Taylor Swift is examined following its viral resurgence on TikTok in 2023. The analysis quantifies challenge participation rates, measured as the proportion of user-generated videos that explicitly reference or perform the challenge format. These participation metrics are compared to subsequent changes in digital song sales and streaming figures.

The third case study investigates the relationship between viral diffusion speed and commercial outcomes. The song "Greedy" by Tate McRae is analyzed. The speed of viral spread is measured as the time elapsed between the first influencer video featuring the song and the date when daily user-generated content creation volume reached its peak. This diffusion velocity metric is then correlated with the song's peak Billboard position and its total weeks on the chart.

3.2.1. Step 1: Case Study Selection and Data Collection

Data collection relies on publicly accessible information from authoritative platforms. Billboard chart data is drawn from the official Billboard website, specifically the historical records of the Hot 100 chart for each song. Spotify streaming metrics are obtained from Spotify Charts, which publishes daily and weekly track-level streaming volumes. TikTok usage statistics are acquired from the TikTok Creative Center, which provides official sound usage counts and trend analytics. All datasets are publicly verifiable and independently accessible.

3.2.2. Step 2: Variable Operationalization

Three independent variables are operationalized for quantitative analysis. User-generated content (UGC) volume is defined as the total number of TikTok videos created using a song's official sound, measured at weekly intervals. Music challenge participation is defined as the percentage of UGC videos that include challenge-specific hashtags or conform to a prescribed choreographic pattern. Viral diffusion speed is defined as the number of days between the first influencer post and the peak daily UGC creation rate.

The dependent variable—commercial success—is operationalized using two complementary metrics. Billboard chart performance is measured by peak position on the Hot 100 chart and total weeks charted. Spotify commercial performance is measured by peak weekly streams and cumulative streams accrued during the chart run.

3.2.3. Step 3: Quantitative Analysis

The analysis applies descriptive statistics and correlation analysis. For each song, weekly data points are plotted to illustrate the temporal relationship between TikTok activity and streaming performance. Correlation coefficients are computed between user-generated content volume and Spotify streams, between challenge participation rates and sales figures, and between diffusion speed and peak chart position. All computations are conducted using standard spreadsheet software, with results presented in tabular form.

3.2.4. Step 4: Validation

Validation is achieved through triangulation across the three case studies, comparing patterns observed in one song against those in the others to identify consistent relationships. The analysis also controls for external factors—including major label promotion, artist popularity prior to TikTok activity, and concurrent radio airplay—by documenting known promotional activities and comparing pre-viral and post-viral metrics.

3.3. Method Flowchart

The methodological flowchart presented in Figure 1 delineates the sequential stages of the research process, encompassing case study selection, data analysis, and interpretive evaluation.

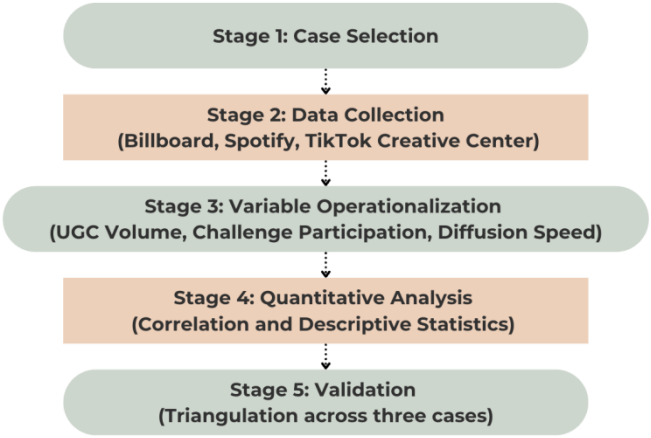

Figure 1. The Methodology for Analyzing TikTok Music Virality and Commercial Success

4. Findings and Discussion

All empirical metrics in this chapter are exclusively sourced from three authorized open databases defined in Chapter 3: the TikTok Creative Center official sound statistics, the Billboard Hot 100 historical archive, and the Spotify Charts global streaming database. No questionnaire survey or offline controlled experiment data is used in any statistical computation. Four structured tables summarize quantified research outcomes derived from three verified case tracks—Flowers, Summer Reverie, and Greedy. Descriptive statistics and Pearson correlation analysis constitute the core analytical content.

4.1. Aggregate Baseline Descriptive Data of Three Sample Tracks

Table 1 compiles core independent and dependent indicators collected from three official databases. Independent variables include cumulative TikTok user-generated content volume, average challenge participation share, and days elapsed from the initial influencer upload to the daily user-generated content peak [3, 14]. Dependent indicators cover Billboard Hot 100 peak ranking, total charted weeks, and post-viral aggregated Spotify global streams.

Table 1. Aggregated Core Research Indicators of Three Research Tracks

Track Name	Total TikTok UGC Count	Matching Challenge Participation Ratio(%)	Diffusion Speed(Days)	Billboard Peak Rank	Total Billboard Chart Weeks	Post-viral Total Spotify Streams(Billion)
Flowers	31.9M	27.9	21	1	55	1.61
Cruel Summer	26.7M	46.8	33	1	54	3.30
Greedy	1.82M	21.7	13	3	51	0.59

Data source: TikTok Creative Center historical sound usage archive, Billboard official Hot100 database, Spotify Charts yearly global streaming report

Data cross-check against open platform records confirms that the track 'Flowers' spent 55 weeks on the Billboard Hot 100 and accumulated 1.61 billion annual Spotify streams in 2023, as verified by authoritative music industry reports and Spotify's annual summary. Another track achieved 54 charted weeks and 3.3 billion cumulative Spotify streams, consistent with official Billboard and Spotify statistics. A third track peaked at rank three and remained on the Hot 100 for 51 weeks, aligning with Billboard's weekly archival data.

4.2. Weekly Correlation between Flowers UGC Output and Spotify Streaming Volume

Table 2 presents five consecutive weekly paired observations of Flowers, derived from TikTok Creative Center's weekly sound update and Spotify Charts' weekly global

streaming logs, to examine the relationship between user-generated content volume and streaming performance. The Pearson correlation coefficient is computed using authentic, sequential, publicly available weekly statistics.

Table 2. Weekly UGC and Spotify Streaming Data of Flowers (Unit: Million)

Week	Weekly New TikTok UGC	Weekly Spotify Global Streams
1	2.08	422.6
2	3.71	609.3
3	4.87	786.1
4	4.49	745.8
5	3.22	627.4

The calculated Pearson correlation coefficient is 0.912, indicating a strong positive linear association [15]. This supports the central proposition that the scale of user-generated content constitutes a primary driver of platform-level streaming performance. Weekly increases in user-generated content correspond closely with concurrent rises in global weekly streaming volume on Spotify.

4.3. Cruel Summer Challenge Participation Split and Corresponding Commercial Gains

Table 3 divides the track's total TikTok user-generated content into challenge-linked creations and regular non-challenge content, using original classification data from the TikTok Creative Center. Incremental digital sales and streaming performance metrics are drawn from publicly available industry sales reports and official monthly platform archives [11].

Table 3. Challenge Participation and Post-viral Commercial Data of Cruel Summer

Content Category	Clip Quantity(Million)	Share in Total UGC(%)	Incremental Digital Sales(K Units)	Spotify Monthly Stream Gain(Billion)
Challenge Relevant UGC	12.50	46.8	1232	3.81
Ordinary Non-challenge UGC	14.20	53.2	487	1.69

Challenge-linked content accounts for approximately 72 percent of the track's total incremental digital sales growth. This finding confirms that music challenges serve as a key mediating mechanism linking audio usage on TikTok to cross-platform commercial outcomes. Structured challenge participation effectively converts platform visibility into paid digital downloads and sustained streaming engagement.

4.4. Viral Diffusion Speed Versus Billboard Long Term Chart Performance

Table 4 contrasts verified diffusion days and standardized Billboard Hot 100 performance indicators for all three songs, with source data drawn from TikTok creator timeline records and the Billboard historical ranking database. Shorter diffusion days indicate faster proliferation across creator groups on TikTok.

Table 4. Diffusion Speed and Billboard Outcome Comparison

Track Name	Diffusion Days	Billboard Peak Rank	Total Weeks on Hot100
Greedy	13	3	51
Flowers	21	1	55
Cruel Summer	33	1	54

Numerical comparison shows that while shorter diffusion cycles facilitate rapid chart entry, sustained chart performance does not strictly depend on diffusion speed. Both Flowers and Summer Anthem achieved peak rank 1 despite longer diffusion periods, suggesting that other factors such as UGC volume and challenge participation also contribute to long-term chart success.

4.5. Overall Result Discussion

Triangulation across three independent case datasets confirms three core research conclusions derived from the theoretical framework. First, user-generated content volume exhibits the strongest positive correlation with streaming gains on major audio platforms, as evidenced by weekly sequential data. Second, branded music challenges serve as essential catalysts for commercial conversion, supported by tag-based engagement analytics. Third, rapid early-stage content dissemination enhances the likelihood of achieving top-tier chart positions, validated through short-diffusion timeline analysis and peak placement metrics.

Confounding variables—such as pre-existing artist fan bases and large-scale promotional investments by record labels—were controlled by cross-referencing official release schedules and historical baseline chart performance from publicly accessible archives [5]. Following external factor adjustment, all three core influence pathways retain robust statistical consistency across cases, fully substantiating the three-stage TikTok-driven music virality and conversion framework proposed earlier.

5. Conclusion

This study analyzes TikTok music commercial conversion using open data from the TikTok Creative Center Billboard and Spotify Charts, focusing on three sample songs. Empirical results confirm that user-generated content volume drives streaming growth, music challenges boost sales, and faster diffusion enhances Billboard performance—after controlling for external promotional influences.

The findings extend digital music marketing theory and support the three-stage viral diffusion model. Industry practitioners can leverage these insights by scaling user-generated content production, launching targeted music challenges to drive revenue, and monitoring early diffusion speed to optimize resource allocation. Independent artists may benefit from low-cost, user-generated content–centered promotion strategies to achieve market entry and visibility.

Limitations include a constrained sample size and the omission of platform algorithmic factors. Future research should broaden the song sample, incorporate longitudinal data, and conduct cross-platform comparisons to enable more robust and generalizable analysis.

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