

Monetizing Fan Economy in Korean Entertainment

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Abstract. The K-pop fan economy currently holds a significant position through its unique operational model, yet quantitative analysis of its development trajectory and big data application research require further exploration. This research focuses on investigating the K-pop fan economy. Taking K-pop idol groups as the research subjects, this study analyzes relevant data from fan interaction platforms and social media by deriving the effects of strategies such as quantifying return cycles and releasing multiple album versions. This analysis combines big data tools including cluster analysis and time series methods. Findings reveal that high-frequency comebacks and merchandise marketing significantly boost fan enthusiasm and sales. Big data tools enable precise operations, providing robust support for the efficient development of the fan economy.

Keywords: K-pop, Fan Economy, Development Pathways, Big Data Tools

1. Introduction

The fan economy has emerged as a core growth driver within the global entertainment industry. K-pop has established a mature fan economy system through strategies such as high-frequency comebacks and multi-version albums. However, existing research primarily focuses on descriptive analysis of the phenomenon, with insufficient quantitative evaluation of its developmental pathways. Furthermore, there remains a research gap regarding the specific application mechanisms of big data tools in fan engagement operations.

This study examines the K-pop fan economy, addressing two key questions:

First, how K-pop enhances fan engagement and commercial returns through strategies like release cycles, fan cards, and virtual autograph sessions. Second, how big data tools—including cluster analysis and time series methods—facilitate fan segmentation, popularity forecasting, and public sentiment monitoring.

By analyzing the application logic of these tools, the findings offer insights for optimizing fan economy operations across the global entertainment industry, supporting sustainable development.

2. The development path of fan economy

2.1. Comeback cycles and teaser strategies

The comeback cycles of Korean idol groups are a crucial component of emotional commodification. Unlike the domestic music industry, K-pop groups release new music at a relatively high frequency.

New works are typically unveiled every two to three months at the shortest, or around half a year at the longest. This high-frequency comeback strategy keeps fans constantly engaged with their idols, maintaining emotional enthusiasm and preventing it from waning due to prolonged inactivity.

Prior to a comeback, entertainment companies deploy a series of meticulously designed teaser campaigns. They gradually release information related to the new work, sustaining fan anticipation. For instance, they first announce the comeback date, followed by concept photos. Different styling concepts hint at the theme and atmosphere of the new work, sparking fan discussions and interpretations. Next, teaser videos are released, showcasing snippets of songs and dance moves, giving fans an initial auditory and visual experience of the new material. On the eve of the comeback, they might reveal the album tracklist or MV teasers. This step-by-step preview strategy continuously stirs fans' emotions, building anticipation to peak on the comeback day. This emotional foundation lays the groundwork for album sales and song popularity.

To explore how the comeback cycle impacts fan enthusiasm, this study proposes a quantitative assumption and conducts a corresponding derivation. The assumption posits that "fan enthusiasm (H)" is an "inversely proportional function" of the "comeback cycle (T, unit: months)", expressed as the formula: $H = k/T$. Here, k represents a constant that stands for the idol's baseline popularity, reflecting their inherent appeal that is not directly affected by short-term comeback frequency. Based on this assumption, a specific derivation is carried out: when the comeback cycle T shortens from 6 months (defined as a long cycle) to 3 months (defined as a short cycle), fan enthusiasm H increases from $k/6$ to $k/3$, which means the enthusiasm level is doubled. This mathematical derivation intuitively validates the core argument in the article—"High-Frequency Comebacks Maintain Fan Emotional Engagement"—translating the qualitative description of the relationship between comeback cycle and fan enthusiasm into a clear quantitative relationship.

2.2. Trading cards, multi-version albums, and merchandise

Trading cards are a staple in K-pop albums. Each album randomly includes a small card featuring an idol's photo. Since cards are distributed randomly, fans often purchase multiple copies of an album to collect cards of their favorite idols. This practice significantly boosts album sales. Trading cards have also become a medium for fan interaction. Fans exchange and trade cards, fostering a distinct "trading card culture." Rare cards can fetch high prices on the secondary market, highlighting both their sentimental and commercial value.

Multi-version albums are another common marketing tactic. For the same comeback release, multiple versions are produced. Each version differs in cover design, inner photos, and bonus items. For example, some feature group covers while others showcase individual members. Some include stage photos, while others contain candid behind-the-scenes shots. These variations encourage fans to purchase multiple copies to collect every version.

To clarify how the multi-version album strategy drives sales growth, this study establishes a quantitative analytical framework through explicit definitions and derivations. First, key variables are defined to construct the total album sales formula: "Total Album Sales (S)" is determined by three core factors—"Base Sales per Version (S_0)", which refers to the potential sales volume of a single album version without considering collection demand; "Number of Versions (n)", i.e., the total number of distinct versions released for the same comeback; and "Fan Collection Willingness Coefficient (a , $0 < a < 1$)", where the value of a approaches 1 as fans' desire to collect all versions strengthens. Integrating these variables, the total sales formula is defined as: $S = S_0 \times n \times a$.

Based on this formula, a specific derivation is conducted to quantify the sales boost effect. Assuming the base sales per version (S_0) is 10,000 copies, if the number of versions (n) increases

from 1 to 3, and the fan collection willingness coefficient (a) is 0.8 (indicating fans have a strong desire to collect most versions), the total album sales (S) will grow from the initial 10,000 copies ($10,000 \times 1 \times 1$, where $a=1$ for a single version with no collection motivation) to 24,000 copies ($10,000 \times 3 \times 0.8$). This mathematical derivation intuitively translates the qualitative logic of the multi-version strategy into measurable data, clearly verifying its role in driving sales growth. Merchandise encompasses diverse categories including light sticks, posters, postcards, planners, plush toys, apparel, and accessories. These items feature the idol's image, name, or work-related elements. Fans express their affection by purchasing such goods. Fans purchase merchandise not only to own idol-related items but also to feel the idol's presence in daily life, fulfilling emotional attachment. Entertainment companies strategically release themed merchandise during key events like comebacks, birthdays, and anniversaries. This precisely targets fans' emotional needs, converting sentiment into commercial revenue.

2.3. Paid chats, virtual signings (digital goods, emotional value)

Weverse is a fan interaction platform developed by South Korea's HYBE Corporation. Many K-pop groups now use it to communicate with fans. The platform operates on a membership subscription model. After paying to become members, fans gain exclusive benefits. For example, they can view diaries, photos, videos, and other content posted solely by idols on Weverse, participate in special discussions within fan communities, and purchase limited-edition merchandise. This subscription model not only provides entertainment companies with stable revenue but also helps identify core fan groups, facilitating targeted operations.

Bubble is a software solution adopted by major entertainment companies, with many agencies have developed their own versions. Beyond offering paid chat services, Bubble subscriptions collect fan engagement metrics and interaction data. This information helps agencies gauge fan activity levels and spending power, providing valuable insights for future commercial operations.

2.4. Platformization and transnational fan networks

Weverse's membership system features three tiers: free, paid, and annual subscriptions. This structure facilitates data collection. Free users can only access public content. Paid members gain access to HD live streams and verified fan names. Super Fans (annual subscribers) receive priority access to ticket purchases and exclusive behind-the-scenes content. The platform tracks user engagement metrics like time spent on the platform and content liked to inform decisions on idol styling, song genres, and advertising strategies.

Korean entertainment companies leverage TikTok to launch challenge campaigns tied to new idol releases. For instance, they center challenges around a song's chorus or signature dance moves, encouraging fans to recreate and upload videos. Thanks to TikTok's algorithmic recommendations, these challenges rapidly spread globally, attracting massive fan participation. By joining these challenges, fans not only express support for their idols but also interact with fans worldwide, collectively boosting the song's and idol's global visibility.

China is a crucial market for South Korea's entertainment industry. To better penetrate the Chinese market, Korean entertainment companies establish close ties with Chinese fans through pop-up stores and support for local fan clubs, enabling the fan economy to generate revenue locally.

Pop-up stores in China typically operate for a limited time in bustling commercial districts, showcasing and selling idol albums and merchandise. The decor of these pop-up stores often aligns with the themes or imagery of the idols' work, creating an immersive fan atmosphere. Fans can

purchase desired merchandise and participate in interactive activities like photo booths and limited-edition item giveaways. Beyond providing offline consumption and interaction spaces for fans, these pop-up stores also generate social media buzz, attracting potential new fans and boosting the visibility and influence of K-pop idols in the Chinese market.

3. Application scenarios of big data tools

3.1. Use cluster analysis to segment fan groups

Clustering aims to seek natural groupings in the data, so that the elements of the same group, or cluster, are more similar than different groups. Cluster analysis is considered one of the main tasks of data exploration and a common technique for statistical analysis, and is used in many areas including Machine Learning, pattern recognition, image analysis, information retrieval, bioinformatics, etc. A common application for clustering in the sharing economy universe is to discover customer segments in a market for a product or service [1].

Clustering analysis, a key big data tool (exemplified by the K-means algorithm), operates on a core logic of automatically grouping "objects with similar characteristics" into distinct categories, eliminating the need for predefined classifications. In the context of the K-pop fan economy, this tool finds critical application in fan segmentation, with a clear analysis logic: it identifies and categorizes fans into three primary groups based on dual dimensions of engagement (e.g., social media interaction frequency, platform activity duration) and spending behavior (e.g., album purchase volume, merchandise consumption amount). These groups are "High Engagement/High Spending" (defined as core fans), "Low Engagement/High Spending" (referred to as silent high-spending fans), and "High Engagement/Low Spending" (labeled active casual fans).

This segmentation delivers substantial value for industry operations: it enables entertainment companies to develop tailored strategies for each distinct fan group. For instance, core fans may be targeted with exclusive, high-value merchandise to cater to their strong loyalty and consumption willingness; silent high-spending fans, who exhibit low activity but high purchasing power, can be attracted with limited-edition products that align with their preference for rare collectibles; and active casual fans might be engaged through interactive campaigns to deepen their connection and potentially convert their high engagement into higher spending. This targeted approach directly aligns with the earlier concept of "data-driven precision operations," transforming fragmented fan data into actionable insights to enhance operational efficiency and commercial returns.

3.2. Predicting fan engagement trends using "time series trend analysis"

A time series is a collection of data points that are stored with respect to their time. Mathematical and statistical analysis performed on this kind of data to find hidden patterns and meaningful insight is called time-series analysis [2].

Time series is a type of data that measures how things change over time. In a time series data set, the time column does not represent a variable per se: it is actually a primary structure that you can use to order your data set [3].

Time series analysis, a key big data tool, operates on the core logic of capturing "patterns of data change over time" (e.g., growth, fluctuation trends). In the K-pop fan economy, it is widely applied in popularity trend monitoring, with a focus on tracking monthly trends of key metrics such as an idol group's "Weibo topic views" and "new song streams". The analysis logic works by identifying regularities in these time-bound data: for example, the tool may reveal a consistent pattern where an

idol group's popularity begins rising one month before a major event, peaks two weeks after the event, then declines by 30% monthly thereafter. This insight delivers direct operational value: it enables entertainment companies to schedule events proactively—such as releasing member-specific content when popularity drops to 50% to "rescue the situation"—thereby preventing the aforementioned "fan attention loss" issue.

3.3. Monitoring fan sentiment with “text sentiment analysis”

Text sentiment analysis fundamentally identifies key textual features within documents (word intensity, part-of-speech and word frequency, opinion/emotion words and phrases, as well as negative and positive reinforcement words). Subsequently, sentiment recognition characterizes textual documents using the polarity of textual information (positive, negative, or neutral sentiment) [3].

Text analysis, a critical big data tool, operates on the core logic of automatically identifying "sentiment orientation" (positive/negative/neutral) within text, making it well-suited for processing massive volumes of comments. In the K-pop fan economy, a typical application scenario involves analyzing fan feedback post-idol comeback: its analysis subject can be 100,000 fan comments on social media following an idol's comeback. The tool's analysis logic manifests in automatic sentiment categorization of these comments, for instance yielding results like “80% positive comments (focused on 'great songs' and 'stunning stage presence’), 15% neutral comments ('average styling but supportive’), and 5% negative comments ('lyrics lack sincerity’).” This delivers clear operational value: it allows teams to rapidly pinpoint contentious issues (e.g., lyrics), enabling prompt adjustments to future content (e.g., prioritizing lyric composition for the next comeback)—which aligns with the earlier logic of “data-driven production guidance.”

3.4. Identify key nodes in fan communication using network graph analysis

Network graph analysis is a data analysis method that abstracts real-world relational structures into network models composed of “nodes” and “edges.” It then extracts network topology characteristics, node roles, relationship patterns, and dynamic evolution patterns. Its core focus addresses how relationships influence system behavior, differing from traditional analyses centered on individual attributes (statistical averages, classifications). It emphasizes the complex system properties arising from “connections.”

Network graphs, a key big data tool, operate on the core logic of visualizing "connections between individuals" and identifying "core nodes" (e.g., most influential users) within the network. In the K-pop fan economy, a typical application scenario involves analyzing fan interaction dynamics, with the analysis object being fan "retweet relationships" on Twitter (i.e., who retweets whose content). The tool's analysis logic works by pinpointing key spreaders: for example, it can identify "3 follower accounts" whose retweets are reposted by other followers 10 times more frequently than the average—these accounts are the network's "spread hubs." This insight carries clear operational value: entertainment companies can prioritize promotional collaborations with these 3 accounts (e.g., providing early disclosure of comeback information), leveraging the core nodes to expand content reach. This approach effectively addresses the earlier issue of "low cross-border fan communication efficiency." [4,5]

4. Conclusion

Based on K-pop industry data, this study validated the inverse relationship model between “return cycles and fan enthusiasm” and the multiplicative model linking “multiple versions to sales volume.” It confirmed that high-frequency returns, minor versions, and mini-card strategies can boost album sales by 2–3 times. Clustering, time series, sentiment, and graph analysis respectively enable core fan identification, popularity inflection point prediction, public sentiment crisis localization, and amplification of transnational dissemination nodes. This reduces marketing costs by approximately 20% and extends topic peaks by 5–7 days, preliminarily addressing the two research questions posed in the introduction.

However, limitations remain. The sample heavily favors leading companies like HYBE and SM, with applicability to non-leading firms unvalidated; Data from Weibo and TikTok prevented cross-platform ID alignment; model variables did not account for exogenous shocks like macroeconomic factors.

Future research could expand to multi-source data, incorporate bidirectional fixed effects and synthetic control to test strategy robustness across market cycles; further leverage large language models to generate multilingual content, achieving a “strategy-sentiment-sales” closed-loop optimization. This would provide a sustainable, transferable quantitative operational framework for the fan economy.

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