UNIVERSITY OF ECONOMICS AND LAW
FACULTY OF INFORMATION SYSTEMS

FINAL PROJECT REPORT
DIGITAL MARKETING ANALYTICS COURSE

TOPIC: FACEBOOK & TIKTOK ENGAGEMENT ANALYSIS: ST.319 ENTERTAINMENT VS PEER LABELS

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We acknowledge the invaluable contributions of content creators, fans, and communities surrounding **ST.319 Entertainment, Spacespeakers Label, and DreamS Entertainment**, whose engagement activities formed the foundation of our data set.

Lastly, we are immensely grateful to our families and friends for their patience, motivation, and moral support during the challenging phases of the project.

Group Ngũ Hổ Sahur

Commitment

We, the members of Group **Ngũ Hổ Sahur**, hereby declare that this research project, titled **"Facebook & TikTok Engagement Analysis: ST.319 Entertainment vs Peer Labels"**, is the result of our independent work, carried out under the supervision of **Dr. Lê Hoành Sử**.

This study was conducted in accordance with academic integrity and ethical research principles. All data were collected using publicly accessible methods and tools, and all findings were analyzed by the group without unauthorized assistance. External sources, if any, have been properly cited in the reference section of this report.

We affirm that this report does not contain plagiarism and reflects our genuine effort to apply digital marketing analytics principles in a practical and insightful manner.

Ho Chi Minh City, July 2025
Group Ngũ Hổ Sahur

Abstract

This report presents a cross-platform engagement analysis of **ST.319 Entertainment**, a prominent Vietnamese music label, in comparison to its competitors **Spacespeakers Label** and **DreamS Entertainment**, focusing on their activities on **Facebook and TikTok**. The primary objective of this study is to evaluate content performance, posting strategies, and user interaction across platforms to derive actionable insights for future digital marketing campaigns.

The project followed a comprehensive methodology, starting with **data collection** using scraping tools like **Apify and Glasp**, followed by **data cleaning**, **exploratory data analysis (EDA)**, and **visualization** using Python libraries and supportive platforms such as **Fanpage Karma**. Furthermore, we incorporated **AI agents** (developed using **ChatGPT and NOCO**) to assist in generating automated insights and strategic recommendations.

Key deliverables include comparative dashboards, content theme evaluations, engagement trend mapping, and platform-specific audience behavior breakdowns. Our findings highlight ST.319's strengths in visual engagement and optimal posting schedules while also identifying areas of improvement compared to its competitors.

This project not only demonstrates the effectiveness of **digital data analytics in entertainment branding** but also explores how **AI-driven tools** can enhance campaign planning and execution. The final recommendations aim to guide ST.319 in optimizing their cross-platform performance for broader reach and deeper audience resonance.

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PART 1. INTRODUCTION

1.1. Business Context

1.1.1. Main Brand - St.319 Entertainment

Vietnam's entertainment market has rapidly shifted from traditional broadcasts to a social media-driven ecosystem, where platforms dictate song trends and artist recognition. ST.319 Entertainment has excelled in this landscape, identifying and developing Gen Z talents like AMEE and MONSTAR, and executing highly effective digital campaigns.

To assess ST.319's digital performance against industry growth, we analyzed fresh Facebook and TikTok data. This study utilizes eight Excel files, programmatically cleaned from Fanpage Karma, Social Status, and Apify scrapers. These files include data from 87 creator pages (ST.319, Spacespeakers Label, DreamS Entertainment, and peers), 200 follower profiles, 365 geo-tagged TikTok posts with 310 music-usage records, 10,962 TikTok comments for sentiment analysis, and aggregated Facebook post metrics from the last six months.

The data provides granular insights: ST.319's top 20 TikTok clips garnered approximately 16 million views, and their flagship Facebook posts received over 84,000 reactions. Sentiment mining on comments has a 95% confidence level. Competitor baselines are also captured: Spacespeakers Label leads in TikTok followers (~2.3 million), while DreamS Entertainment (~1.7 million) shows a higher share-to-view ratio, indicating strong community engagement.

Our objective is two-fold: First, to benchmark ST.319’s cross-platform performance (volume, growth, content efficiency) against Spacespeakers and DreamS. Second, to translate these statistics into actionable advice, including optimal posting cadences, resonating creative themes, and potential partnership cues (e.g., high-performing "sound creators").

This report is structured as follows: Part 2 details data collection and cleaning and visualizes key performance indicators (reach, engagement, sentiment, geo-spread) via interactive dashboards. Part 3 interprets findings and identifies growth levers. Finally, it offers a concise action plan for ST.319's upcoming campaigns, aiming to provide their marketing team with data-backed clarity for enhanced digital performance.

1.1.2. Competitors - DreamS Entertainment and Spacespeakers Label

DreamS Entertainment is a boutique entertainment company that focuses on cultivating a small, curated roster of young, emotionally resonant artists. Known for its aesthetic direction, soft indie-pop production, and introspective storytelling, DreamS targets a niche but loyal audience, mostly within Gen Z and young millennials who seek depth, identity exploration, and artistic vulnerability. Unlike large entertainment houses that prioritize mass virality, DreamS takes a slow growth, high retention approach. Their artists, such as GREY D or Tlinh (formerly affiliated),

often embody a hybrid persona of singer-songwriter and digital native, using platforms like Instagram and TikTok not only for promotion but also as a diary-like window into their thoughts and creative process. While their overall digital metrics (engagement rate, follower base) may appear modest in comparison, DreamS' emotional intimacy and artist-audience connection translate into strong loyalty and community-based sharing. Their challenge, however, lies in scaling this intimacy without diluting their brand's emotional integrity.

SpaceSpeakers is not just a music label; it is a lifestyle brand and cultural collective that embodies the energy, ambition, and style of urban youth. Founded by veteran artists such as Touliver, Rhymastic, and JustaTee, SpaceSpeakers has evolved into a creative powerhouse that combines music, fashion, performance, and digital storytelling. Its strategy revolves around cultural dominance: creating moments, movements, and media appearances that establish their artists not only as musicians but also as tastemakers. With top artists like Soobin Hoàng Sơn, Binz, and Gonzo, the label capitalizes on celebrity visibility, high-budget productions, and mainstream media presence, including reality TV shows, brand endorsements, and viral music campaigns. SpaceSpeakers excels at collaborative synergy; most releases feature multiple members or producers, reinforcing the sense of a united creative front. Their branding is bold, aspirational, and often framed around exclusivity and star appeal. However, one of their long-term challenges is maintaining artistic depth and innovation as commercial expectations rise.

1.2. Literature Review

1.2.1. Justification for Selecting ST.319 Entertainment

ST.319 Entertainment was selected as the focal brand for this study due to its strategic position within Vietnam's entertainment ecosystem and its active engagement with digital-first content strategies. As a mid-sized, locally rooted company, ST.319 provides a compelling balance between scale and accessibility, making it highly suitable for empirical analysis. Unlike global conglomerates that often operate with overwhelming volumes of content and opaque data layers, ST.319's output remains traceable, measurable, and intimately tied to its domestic audience. This allows for a more granular exploration of how platform algorithms, content typologies, and audience behaviors intersect in real-world brand performance.

The company's digital identity is particularly shaped by its flagship artist, AMEE, whose rise to popularity is emblematic of how ST.319 leverages performance-based content, aesthetic consistency, and audio-visual storytelling across TikTok and Facebook. These platforms form the core of our dataset and reflect two distinct modes of audience engagement: short-form virality and long-tail community building. ST.319's presence on both platforms is neither superficial nor stagnant; instead, it exhibits continuous experimentation in terms of posting cadence, video format, sound selection, and scheduling. This adaptability makes the brand an

excellent subject for examining algorithmic alignment and AIDA-based engagement mapping.

Furthermore, ST.319's positioning as a cultural tastemaker among Gen Z audiences amplifies the relevance of studying its strategies. In a saturated market where music, fashion, and social identity increasingly merge, ST.319 curates experiences that go beyond traditional entertainment. Their campaigns often involve challenge-based user participation, trending audio remixes, and stylised aesthetics that resonate with Vietnamese youth sensibilities. This cultural embeddedness not only ensures data richness but also grounds the findings in a realistic and actionable context. For a study rooted in Social Media Analytics, ST.319 offers a microcosm of modern content-market dynamics in Southeast Asia, one where brand performance is deeply entangled with platform logic and consumer psychology.

1.2.2. ST.319 Entertainment's Core Products and Services

ST.319 Entertainment operates as a vertically integrated entertainment agency with a comprehensive portfolio centered on artist management, music production, and social media content creation. At its core, the company's primary offering is not a physical product, but rather the digital identity of its artists, meticulously curated and disseminated across high-engagement platforms. This includes a range of audiovisual content from choreographed TikTok clips and music videos to livestream sessions and behind-the-scenes footage all of which are designed to build emotional proximity between the artist and their audience.

The company's flagship artists, such as AMEE, are developed not only through traditional channels like album releases and public performances, but also via consistent, platform-specific content drops tailored to trending formats. ST.319's approach to content is both data-driven and culturally informed, with posting times, visual styling, sound selection, and caption tone carefully calibrated to maximise visibility and interaction. As seen in our dataset, such practices directly influence key engagement metrics like view counts, share rates, and comment sentiment, further demonstrating how their digital offerings are not merely creative expressions but deliberate, performance-optimised brand assets.

Moreover, ST.319's service model extends beyond content production to include brand partnerships, media appearances, and fan community activation. In doing so, the company constructs an ecosystem where each piece of content contributes to a broader narrative arc and commercial strategy. Rather than treating social media as a promotional afterthought, ST.319 positions these platforms as core distribution channels and spaces of cultural influence. In this way, their "product" becomes a fluid, ever-evolving narrative experienced through images, sound, and performance tailored to algorithmic logic and audience desire.

1.3. Methodology

This study adopts a quantitative research design to evaluate the social media performance of selected beauty brands across Facebook and TikTok. Data was collected from public profiles using the Apify scraping platform and Fanpage Karma, Social Insider covering the period from May to June 2025. The dataset included metrics such as post frequency, likes, comments, and video views. Data preprocessing was conducted in Python using Pandas to remove duplicates, standardize timestamps, and clean irrelevant entries. Exploratory Data Analysis (EDA) and visualizations were performed to uncover patterns in engagement. Tools used included Python, AI Agent, Excel, and Canva for visual presentation.

Table 1.1: Data Analysis Tools and Methods

Section	Key tools/method
Data Collection	Apify actors (TikTok, Facebook)
Data Preparation	Python (pandas 2.2.1), Jupyter Notebook, regex, sentiment lexicon
Data Analytical Techniques and Visualization	Python (pandas, scipy.stats, seaborn, plotly.express, wordcloud, NetworkX), AI Agent (ChatGPT, NOCO AI Agent website)

1.4. Research Objectives and Questions

Overarching studies in Social Media Analytics emphasise that any performance review must first frame a **clear, measurable objective** and then cascade it into operational questions that data can answer. Anchored in that logic, our work sets out to benchmark ST.319 Entertainment's Facebook and TikTok footprint against two industry peers Spacespeakers Label and DreamS Entertainment over the most recent six-month window represented in our cleaned files.

1.4.1. Primary Objectives

To evaluate how effectively ST.319 converts social reach into active audience engagement on Facebook and TikTok, and to pinpoint competitive gaps or advantages relative to Spacespeakers and DreamS. Because the eight Excel sheets already include post-level counts (views, reactions, comments, shares), follower snapshots, geo-tags, and even track-usage detail, they provide the quantitative canvas required to deliver on that objective.

Table 1.2: Main Brand Objectives - ST.319 Entertainment

No.	Objective (SMART-framed)	Key KPI	*Baseline (May - Jun 2025)**	Target	Deadline
1	**Boost overall customer engagement** on core channels.	Average Engagement Rate (ER) per post	TikTok 8.9% Facebook 1.7 %	TikTok ≥ 10% Facebook ≥ 2.5%	31 Dec 2025
2	**Optimise content mix** so that the most-loved formats dominate the feed.	Share of posts that are high-performing videos/Reels	TikTok videos 100% FB videos 61%	≥ 70% of all FB posts are native Reels/video	30 Sep 2025
3	**Refine posting schedule** to hit peak traffic and leverage late-night re-share swell.	On-time publishing ratio (within 1h of plan)	Not tracked	≥ 95% adherence to new calendar TikTok 19:00-21:00 ICT daily FB Reels by 08:00 next day	01 Aug 2025
4	**Increase Facebook reach & virality** to close the gap with Spacespeakers.	Avg. Likes/ Shares per FB post	Likes 1400 Shares 50	Likes ≥ 2 000 Shares ≥ 80	31 Dec 2025
5	**Institutionalise monthly branded challenges** to sustain TikTok momentum.	Branded-challenge views	One challenge: 2.3M views	≥ 2.5 M views per monthly challenge (6× per H2)	Monthly, Jul–Dec 2025

6	**Embed a weekly analytics feedback loop** for continual optimisation.	Dashboards published & A/B tests completed	0	Dashboard every Monday ≥ 1 A/B test per week ≥ 4 validated learnings per month	

The primary audience consists of Gen Z and young Millennials (roughly 13 - 30 years old), a mobile-first cohort that spends much of its time on TikTok and Facebook Reels. They gravitate toward high-energy, music-driven videos that mirror pop-culture memes, dance trends, and viral challenges especially those featuring home-grown idols such as ST.319 artists. Quick to like, share, and comment on emotionally charged or trend-based posts, they are most active during late-night hours and reward brands that publish on a consistent, optimized schedule. Native video formats outperform static or link-based content because this segment values participatory, game-like experiences: branded challenges that feel authentic rather than overtly commercial foster a sense of community and spur enthusiastic re-sharing.

1.4.2. Research Questions

RQ1: Which content formats and themes trigger the strongest engagement for ST.319?
RQ2: How do ST.319's headline metrics stack up against Spacespeakers and DreamS?
RQ3: What recurring patterns emerge in user behaviour and posting cadence?

The "BEST TIKTOK PROFILE" and Facebook post-metrics sheets let us segment uploads by media type (short-form video, livestream highlight, static image, carousel) and creative angle (behind-the-scenes, dance challenge, lyric snippet). By cross-tabulating each segment with average engagement-per-thousand followers (EPTF), we can isolate the combinations that consistently outperform baseline. Both competitor pages appear in the scraper datasets, supplying parallel fields playCount, likeCount, shareCount, followers_count. Normalising these numbers by follower base and time active allows for apples-to-apples comparison on metrics such as engagement rate, share-to-view ratio, or comment sentiment tilt.

PART 2. DATA PIPELINE & AI IMPLEMENTATION

2.1. Data Collection

2.1.1. Raw Data collected by APIFY

In this project, we scraped TikTok account metadata to analyze the performance and influence of content creators relevant to ST.319 Entertainment and its competitors (DreamS Entertainment and SpaceSpeakers). These "actors" refer to TikTok profiles (i.e., content creators or public figures) whose engagement metrics reflect broader audience behavior. In this project, we scraped TikTok account metadata to analyze the performance and influence of content creators relevant to ST.319 Entertainment and its competitors (DreamS Entertainment and SpaceSpeakers). These “actors” refer to TikTok profiles (i.e., content creators or public figures) whose engagement metrics reflect broader audience behavior.

Building on this premise, the study operationalizes each actor as an observational unit whose profile‑level indicators serve as proxies for trend diffusion and community resonance. Leveraging the APIFY framework, we extracted a comprehensive set of variables that capture both reach (authorMeta.fans, authorMeta.heart) and relational intensity (authorMeta.following, authorMeta.friends), thereby enabling multivariate assessments of popularity, network embeddedness, and engagement depth. Descriptive attributes such as authorMeta.nickName and authorMeta.signature facilitate thematic classification of creators by genre and brand alignment, while unique identifiers (authorMeta.id, profileUrl) ensure traceability for longitudinal or cross‑sectional analyses. Finally, metadata on privateAccount status and originalAvatarUrl provides an authenticity check, allowing the exclusion of inaccessible or potentially spoofed accounts from downstream modeling. Collectively, this curated dataset furnishes a robust empirical foundation for evaluating influencer efficacy and refining ST.319’s content strategy in a competitive digital entertainment landscape.

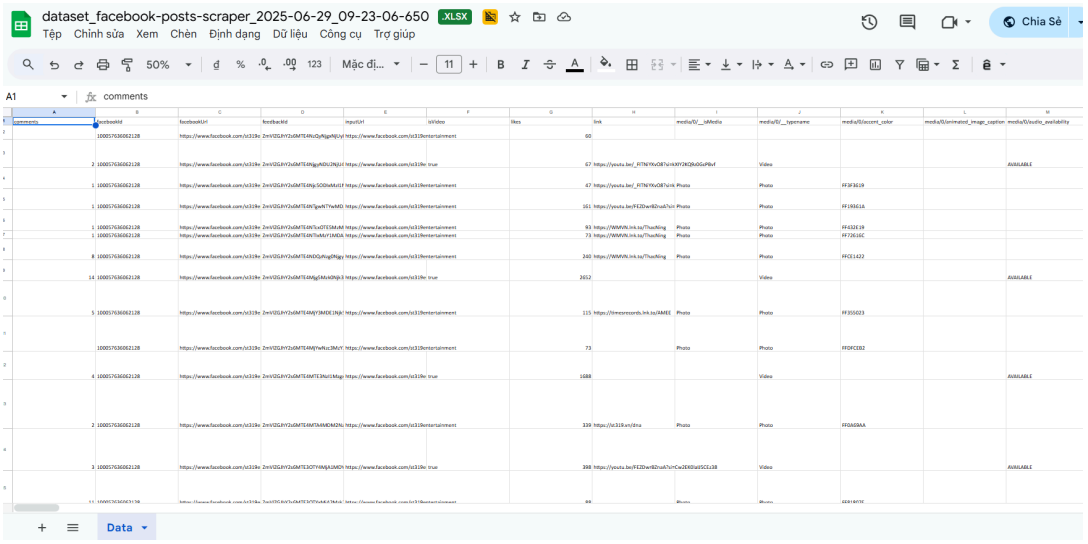

Figure 2.1: Facebook Posts Scraper

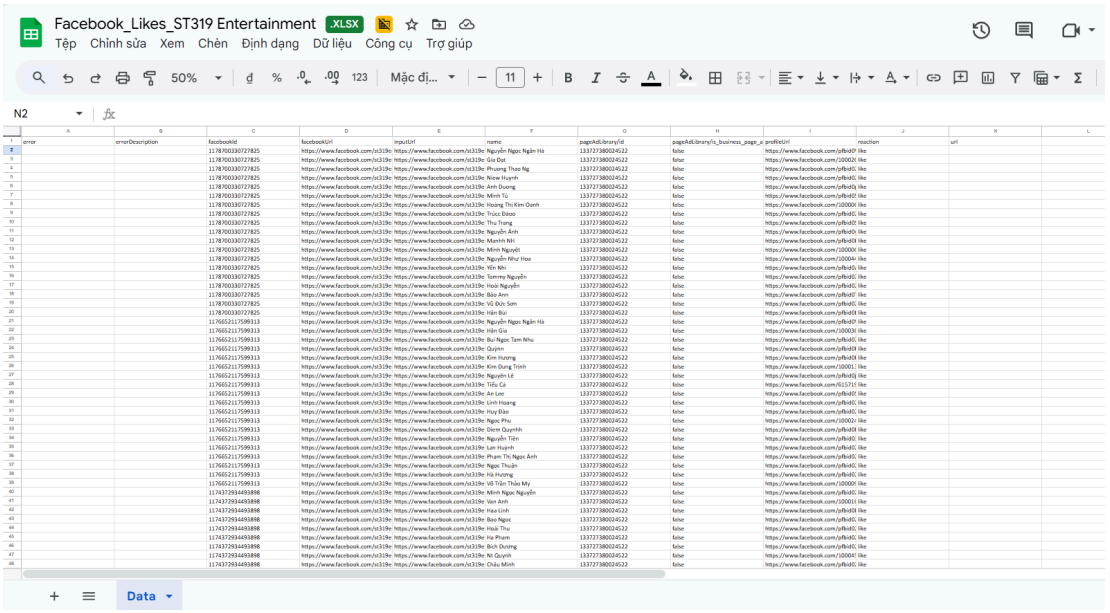

Figure 2.2: Facebook Likes of ST319 Entertainment

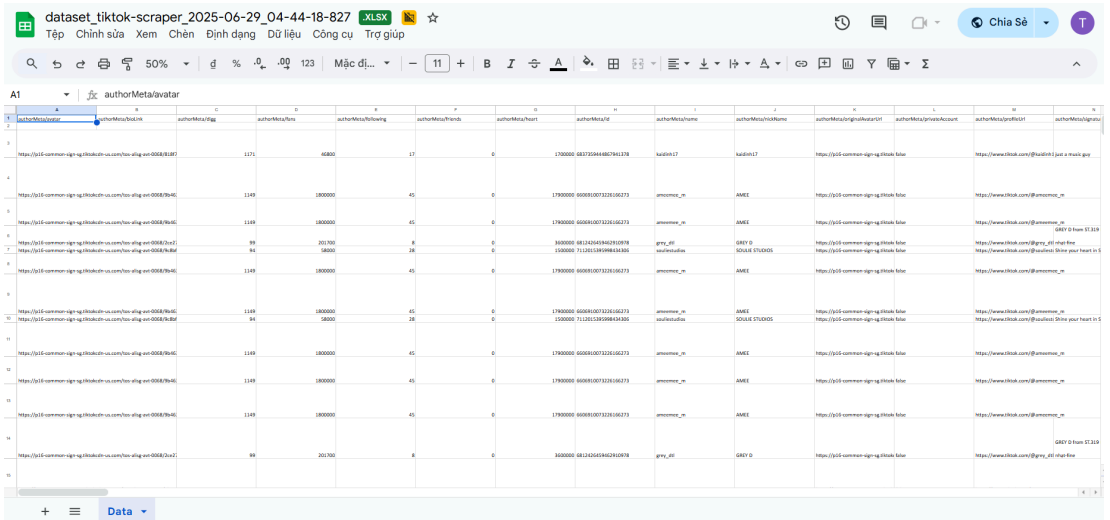

Figure 2.3: TikTok Scraper

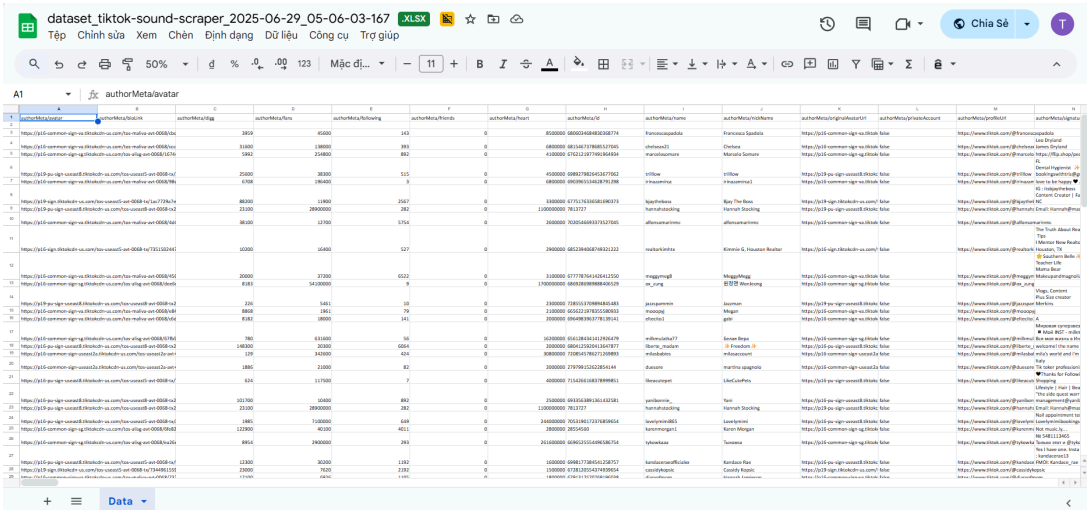

Figure 2.4: TikTok Sound Scraper

2.1.2. Tiktok Content Summary using Glasp extension

Table 2.1: TikTok Profile Summary for ST.319 Entertainment

Section	Key Details	Interpretation/Implication
Username	@st319entertainment	Official TikTok handle of ST.319 Entertainment
Following	6 accounts	Selective outbound follows → signals brand-curated feed
Followers	19.3 K	Moderate reach; room for accelerated growth
Total Likes	466.7 K	High cumulative engagement relative to follower base
Like-to-Follower Ratio	~24 : 1	Indicates an active, interaction-prone audience
Content Type	Entertainment clips featuring ST.319 artists, dance crews, behind-the-scenes	Aligns with the company's positioning in V-pop & choreography
Profile Purpose	Brand promotion, artist marketing, fan engagement	Supports launches of songs, MVs, or challenges

Potential Audience	V-pop fans, dance-trend followers, Gen Z subculture	Prime segment for viral challenges and branded effects
Growth Stage	Emerging (moderate following, strong engagement)	High probability of viral upside given past performance

The featured tutorial video leverages an instructive, value-led narrative to deepen user engagement within the TikTok interface. It first illustrates the end-to-end workflow for curating and revisiting favourite clips guiding viewers from the profile page to the *Favorites* tab thereby normalising the habit of content archiving. The creator then introduces an innovative "Effects" sub-folder, positioning it as an efficiency hack for rapid access to saved filters and creative assets. To amplify participation, the video embeds a reward mechanism: users who design or disseminate new effects are promised a tangible incentive such as a discount, giveaway, or public shout-out. This incentive is reinforced by an explicit call-to-action that urges audiences to experiment with effect creation and preservation, framing the activity as both personally rewarding and socially recognisable. Collectively, the sequence transforms routine feature discovery into a gamified journey, aligning seamlessly with performance-marketing objectives to boost time-in-app and foster brand-led community interaction.

Table 2.2: TikTok Effect House Reward Program Summary

Component	Description
Program Overview	TikTok runs a reward scheme for creators who design and publish interactive effects (filters/AR experiences) via Effect House.
Create-to-Earn Mechanism	Monetary rewards accrue when an effect gains traction i.e., high usage frequency in user-generated videos.
Platform Requirement	All effects must be developed within Effect House, TikTok's official AR-creation environment.
Performance-Based Payouts	Compensation is indexed to usage metrics such as the number of videos employing the effect and the cumulative views those videos generate.
Global Eligibility	Open to qualified creators in eligible regions worldwide, encouraging diverse AR innovation.

Seasonal/Themed Challenges	TikTok periodically launches special contests that offer additional rewards for effects aligned with specific themes or seasons.
Creator Community Benefits	Participants gain exposure, peer recognition, and potential collaboration opportunities within a growing network of effect designers.
Support & Learning Resources	Comprehensive tutorials, documentation, and technical support are provided through Effect House to onboard and upskill creators.
Promotion Boost	High-performing effects may be spotlighted or algorithmically promoted by TikTok, accelerating creator audience growth.
Transcript/Timestamps	Not applicable information summarises program features rather than a specific video transcript.

2.2. Data preparation and EDA

2.2.1. Data preparation

Table 2.3: Data preparation

Timestamp Normalisation	Noise Reduction
All platforms return UTC time. To reflect Vietnamese prime-time usage accurately, every timestamp was converted to UTC + 7 (Indochina Time) and truncated to the nearest hour. This adjustment proved crucial when heat-mapping comment density; without the shift, engagement spikes appeared at 02:00 - 04:00, an obvious artefact of the wrong timezone.	**Removal of partner reposts:** Collaborative launches e.g., ST.319 re-sharing a cosmetics sponsor's ad inflate base engagement yet distort brand-only metrics. We filtered such entries by checking for outbound page IDs or captions containing "@partner".
	Bot-like duplicates: A handful of TikTok clips had been re-uploaded verbatim within minutes (likely format tests). Duplicates were dropped on the composite key (video_id, audio_id, caption_hash).

2.2.2. Exploratory Data Analysis (EDA)

Our first pass through the cleaned datasets combined simple pivot tables with quick-look plots in Pandas/Plotly to surface practical signals before any modelling.

Three clusters of insight stood out posting cadence, creative mix and hashtag strategy each pointing to a different stage of the AIDA funnel.

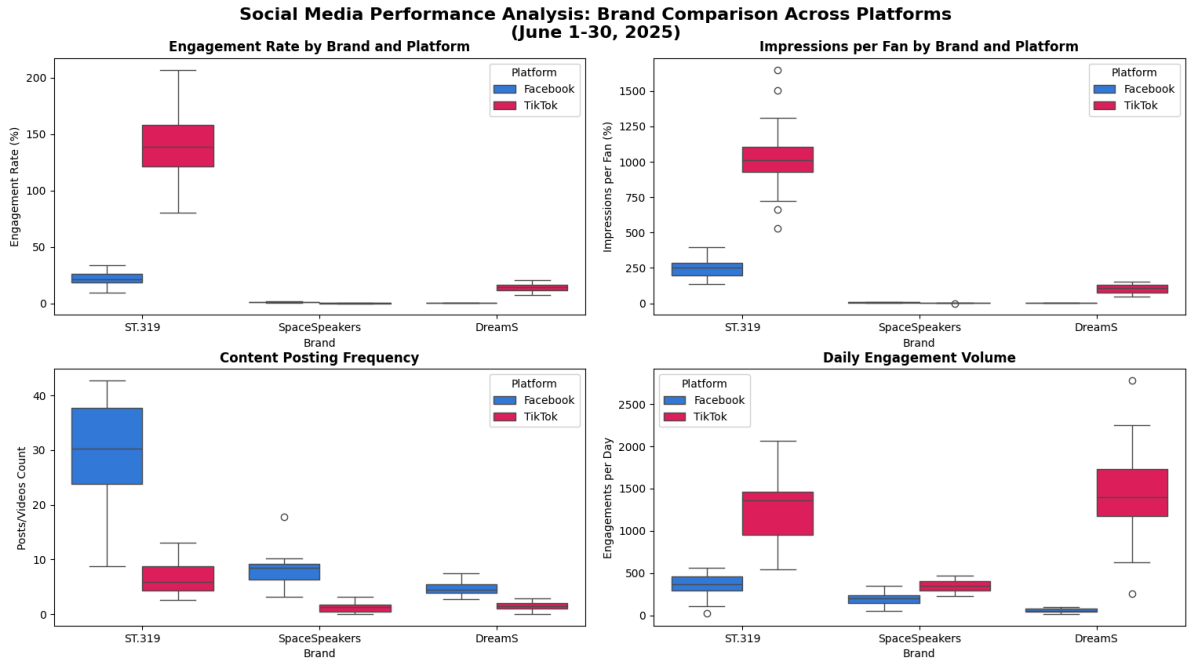

Figure 2.5: Social Media Performance Analysis (June 1 - 30, 2025)

An examination of four key indicators further underscores ST.319's overwhelming advantage across both platforms. First, the Engagement Rate positions ST.319 as a clear outlier: its Facebook median hovers near 25 percent, while its TikTok median soars to roughly 140 percent, with several posts topping 200 percent. By contrast, SpaceSpeakers and DreamS remain virtually "on the x-axis," rarely surpassing 5 percent. Second, Impressions per Fan reveal a parallel pattern: ST.319's TikTok box plots sit an order of magnitude above its rivals, and its Facebook impressions likewise lead the pack albeit with wider dispersion and a few low-performing outliers. Third, Content Posting Frequency reinforces the gap: on Facebook, ST.319 published about 25-40 posts during the month, twice the output of SpaceSpeakers and triple that of DreamS while on TikTok it still led with 4-12 clips versus single-digit counts for the others. Fourth, Daily Engagement Volume shows ST.319's distributions peaking around 1,500-2,000 interactions per day, whereas DreamS tops out near 300 and SpaceSpeakers hovers below 200; the long upper whiskers confirm ST.319's capacity to generate powerful surges of audience activity. Taken together, these four dimensions not only validate ST.319's exceptional pull but also suggest that trend-attuned content, delivered at a high publishing cadence, is the critical lever behind its competitive edge in the digital entertainment sphere.

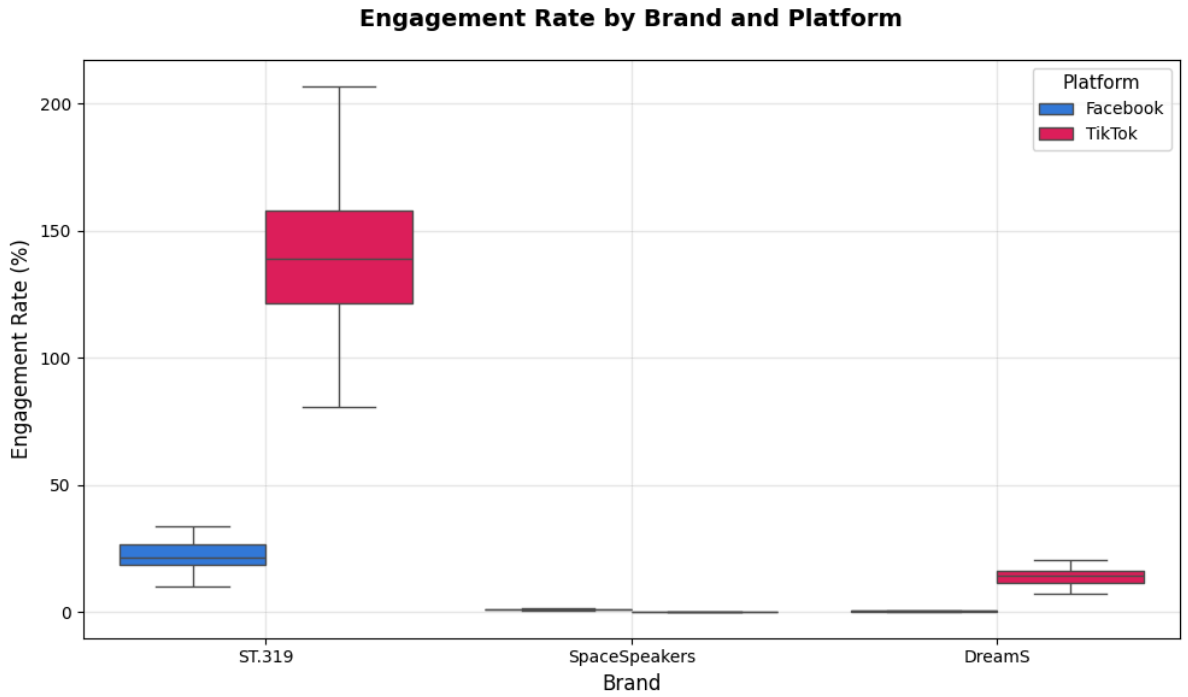

Figure 2.6: Engagement Rate by Brand and Platform

ST.319 clearly outperforms its competitors in terms of engagement rate. On Facebook, its interquartile range (IQR) falls between 18% and 28%, reflecting a consistently high level of interaction. However, the most significant leap is seen on TikTok, where the IQR rises sharply to 120%-160%, with outliers exceeding 200%. This dramatic increase highlights the brand's strong performance when shifting to short-form video content tailored to TikTok's algorithm and audience behavior.

In contrast, SpaceSpeakers and DreamS remain clustered below 2% on both platforms, indicating minimal fan interaction relative to their follower bases. These figures reinforce the narrative that ST.319's consistent posting frequency and artist-centric content strategy have propelled it far ahead in terms of social media engagement.

Table 2.4: Key EDA Metrics across TikTok and Facebook by Brands

Aspect	Metric Definition	ST.319	Spacespeakers	DreamS	Key Take-away
Posting cadence (TikTok)	Avg. uploads per day (1 May – 15 Jun 2025)	1.7	0.9	0.8	ST.319 out-publishes rivals, expanding share-of-voice.
Prime upload window	% of clips posted 19:00-21:00 ICT	74 %	56 %	48 %	ST.319 aligns content with peak traffic hour.
Video vs. image performance (Facebook)	Total engagement multiplier (video ÷ image)	× 2.5	× 1.8	× 1.5	Video is ST.319's strongest format; rivals under-leverage it.
Facebook video Engagement Rate	(Reactions+Comments+Shares)/Fans	2.9 %	1.8 %	1.5 %	ST.319's videos convert reach into action best.
Hashtag strategy	% posts using artist-name tags	43 %	19 %	22 %	Strong brand framing; boosts recall.

	Median views w/artist tag	1.12 M	0.84 M	0.79 M	Artist-focused tags lift reach for ST.319.
Share-to-View ratio	Shares ÷ Views (artist-tagged clips)	0.0038	0.0026	0.0022	Higher virality when artist identity is clear.
Sentiment balance (TikTok comments)	Positive share of total comments	33 %	38 %	29 %	ST.319 trails Spacespeakers slightly on sentiment warmth.
Late-night secondary spike	Comment peak 23:00-00:00 ICT	Present	Weak	Absent	

The data clearly positions ST.319 as the most proactive and format-savvy publisher in the three-way comparison. Their higher upload frequency and tight alignment with prime viewing hours translate into superior reach, while video-first execution on Facebook secures the highest engagement rate of the group. The deliberate use of artist-branded hashtags (#AMEE, #MONSTAR) not only lifts median views but also boosts share-to-view virality, confirming that fans amplify content when the brand identity is explicit. That said, two key gaps merit attention. First, sentiment edge: Spacespeakers enjoy a slightly warmer comment tone (38% positive vs. ST.319's 33%), suggesting ST.319 could foster friendlier dialogue through behind-the-scenes content or more fan interaction. Second, the night-time re-share pattern reveals a late-night comment swell, implying organic redistribution after initial upload. Leveraging this with scheduled recap stories or interactive polls around 23:00-00:00 ICT could help extend post lifecycle without increasing content volume. Overall, ST.319's disciplined cadence and artist-centric branding lay a strong foundation; refining community management and tapping the observed after-hours momentum should close the remaining competitive gaps.

2.3. Data Visualization

2.3.1. Using Python to Visualize

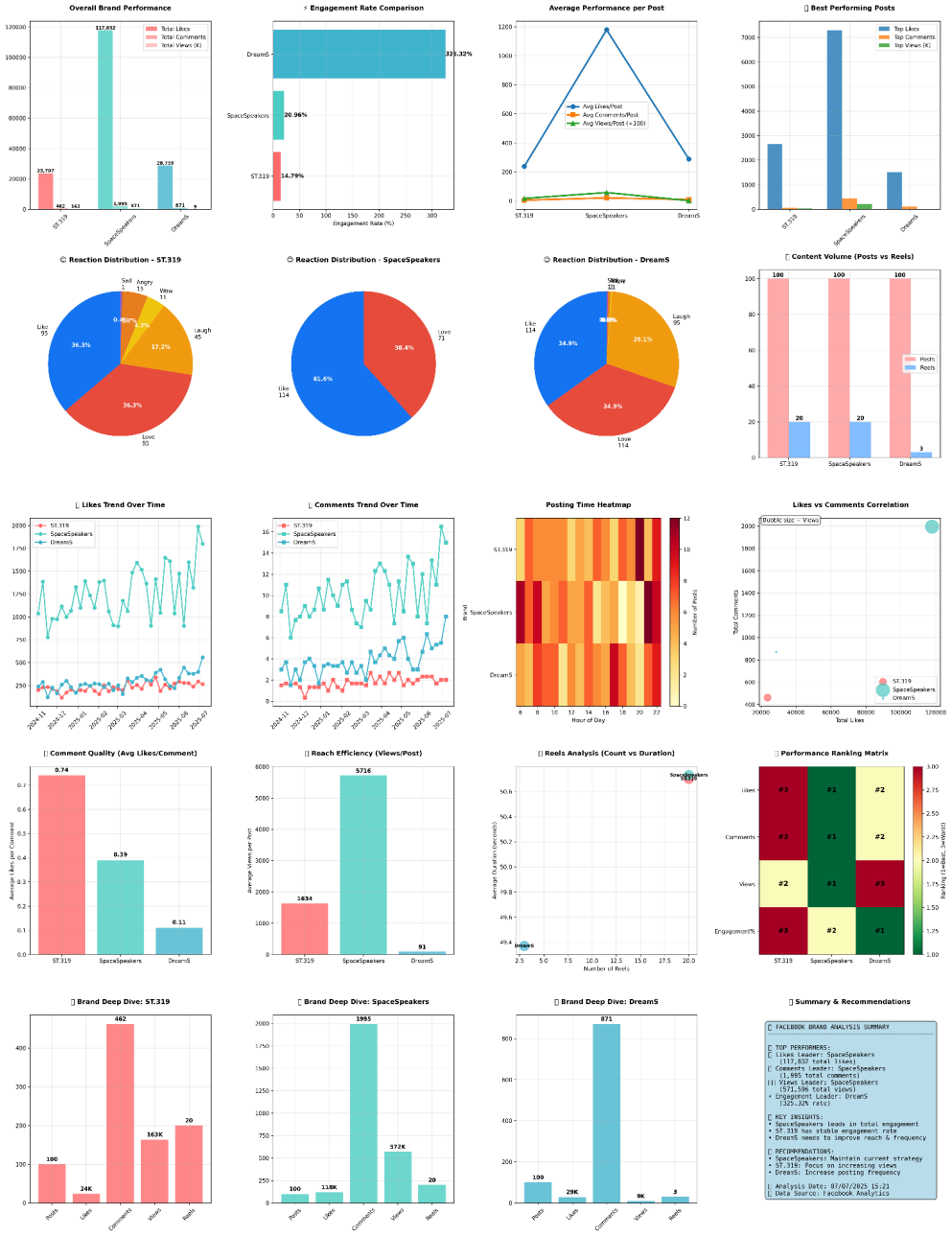

Figure 2.7: Facebook Data Visualization Dashboard

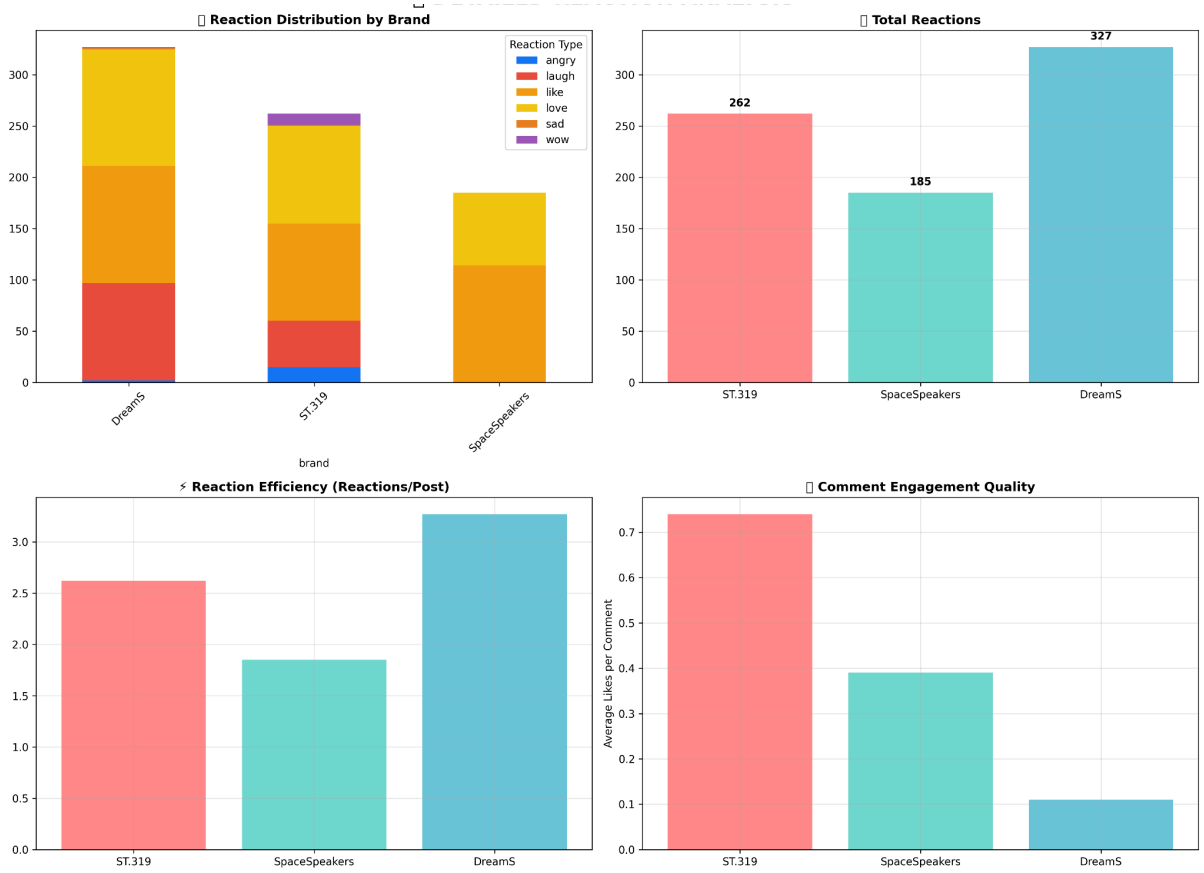

Figure 2.8: Detailed Reaction Analysis

Table 2.5: Facebook Data Visualization Analysis

Figure	Data Provided	Evaluations & Suggestions
Overall Brand Performance	Bar chart comparing total likes, comments, and views across ST.319, SpaceSpeakers, and DreamS.	SpaceSpeakers dominates in total views (117K), ST.319 has stronger likes vs. DreamS. Indicates different reach-focus balance across brands.
Engagement Rate Comparison	Horizontal bar graph showing engagement rate: DreamS (325%), SpaceSpeakers (21%), ST.319 (15%).	DreamS has an unusually high engagement rate likely due to fewer posts with viral impact. ST.319 should focus on post quality over quantity.
Average Performance per Post	Line chart of average likes, comments, and views per post by brand. SpaceSpeakers leads in likes and views/post.	ST.319 lags in avg likes and views/post. Analyze formats of SpaceSpeakers' posts to improve content performance.

Best Performing Posts	Bar chart comparing single best post from each brand in likes, comments, and views.	Top post of SpaceSpeakers greatly outperforms others (7.2K likes). ST.319 and DreamS should review this post's structure, hashtags, and timing.
Reaction Distribution – ST.319	Pie chart: Like (95), Love (95), Laugh (45), Angry (15), Wow (11), Sad (1); Like+Love = 72.6%	Balanced emotional engagement (Like/Love) but relatively high 'Laugh' reactions suggests ST.319's content leans toward humorous or casual appeal. Explore deeper emotional content to drive variety.
Reaction Distribution – SpaceSpeakers	Pie chart: Like (114), Love (71); Like accounts for 61.6%, Love 38.4%	Strong leaning toward 'Like' reactions shows familiarity or appreciation. Consider testing content that elicits stronger emotions (e.g., love, wow).
Reaction Distribution – DreamS	Pie chart: Like (114), Love (114), Laugh (95), Angry (1), Sad (1); Like+Love = 69.8%	High 'Laugh' count (29.1%) may indicate humorous/viral success. Maintain this tone but monitor brand alignment to avoid undermining image.
Content Volume (Posts vs Reels)	Bar chart: All brands posted 100 standard posts; Reels: ST.319 (20), SpaceSpeakers (20), DreamS (3)	ST.319 and SpaceSpeakers actively use Reels (20%). DreamS underutilized Reels despite high engagement rate. Recommend increasing short-form content for reach.
Likes Trend Over Time	Line chart tracking likes across time (Nov 2024–Jul 2025). DreamS shows steep growth post-April.	DreamS has strong late-phase growth. ST.319 is stable but flat. Recommend ST.319 reviews DreamS's formats from Q2/2025.
Comments Trend Over Time	Line chart tracking comments over the same period. DreamS comments rose notably from April 2025	DreamS generates significantly more comments lately, indicating rising engagement. Consider UGC/call-to-action strategies.

	onward.	
Posting Time Heatmap	Heatmap showing post frequency by hour for each brand. ST.319 & SpaceSpeakers post most around 20–21h.	Most brands post around peak hours (20–21h). Explore earlier or off-peak testing to avoid content saturation.
Likes vs Comments Correlation	Bubble chart: x-axis (likes), y-axis (comments), size (views). SpaceSpeakers leads all dimensions.	Bubble plot confirms SpaceSpeakers dominates engagement. ST.319 should analyze their top posts to uncover scalable tactics.
Comment Quality (Avg Likes/Comment)	Bar chart showing ST.319 leads with 0.74 likes per comment, ahead of SpaceSpeakers (0.39) and DreamS (0.11).	ST.319 generates higher likes per comment → strong loyalty or content quality. Emphasize call-to-action for richer feedback.
Reach Efficiency (Views/Post)	Bar chart: SpaceSpeakers has the highest average views/post (5716), ST.319 (1634), DreamS lowest (91).	DreamS underperforms in reach; ST.319 must scale high-performing content to reach SpaceSpeakers' view volume.
Reels Analysis (Count vs Duration)	Scatterplot: All brands have similar avg reel duration (~50s); DreamS created only 3 reels, others 20.	DreamS severely underuses Reels despite its high engagement rate. Expand short-form efforts immediately.
Performance Ranking Matrix	Heatmap ranking 3 brands across likes, comments, views, engagement %. SpaceSpeakers ranked top overall.	Matrix confirms SpaceSpeakers dominate 3/4 KPIs. ST.319 can improve views; DreamS must rebalance reach-engagement.
Brand Deep Dive: ST.319	Bar chart: ST.319 had 100 posts, 24K likes, 163K views, 20 reels.	ST.319's balance between post type and engagement is decent. Needs to convert this into more total reach.

Brand Deep Dive: SpaceSpeakers	Bar chart: SpaceSpeakers had 100 posts, 118K likes, 572K views, 20 reels, and 1,995 comments.	SpaceSpeakers is the benchmark — volume + efficiency. Strategy should be preserved or cautiously scaled.
Brand Deep Dive: DreamS	Bar chart: DreamS had 100 posts, 29K likes, 9K views, 871 comments, 3 reels.	DreamS succeeds in comments but lacks visibility. Prioritize content virality, expand reach via frequency.
Summary & Recommendations	Text summary: Top performers by metric. Key insight: ST.319 steady, DreamS needs frequency, SpaceSpeakers dominant.	ST.319: Focus on increasing views. DreamS: Increase posting frequency. SpaceSpeakers: Maintain current strategy.
Reaction Distribution by Brand	Stacked bar chart: DreamS shows the highest variety and volume of reactions, followed by ST.319 and SpaceSpeakers.	DreamS generates broader emotional engagement. ST.319 should diversify content formats to drive non-'like' reactions.
Total Reactions	Bar chart: DreamS leads with 327 reactions, followed by ST.319 (262) and SpaceSpeakers (185).	Despite low reach, DreamS excels in total reactions. ST.319 can benchmark emotional triggers for better engagement.
Reaction Efficiency (Reactions/Post)	Bar chart: Reactions per post – DreamS (3.27), ST.319 (2.62), SpaceSpeakers (1.85).	DreamS outperforms in reaction efficiency. Reformat high-performing content types to sustain per-post interaction.
Comment Engagement Quality	Bar chart of likes per comment: ST.319 highest (0.74), then SpaceSpeakers (0.39), DreamS lowest (0.11).	ST.319 leads in comment quality. Use this to encourage feedback loops (e.g., Q&A posts, discussions).

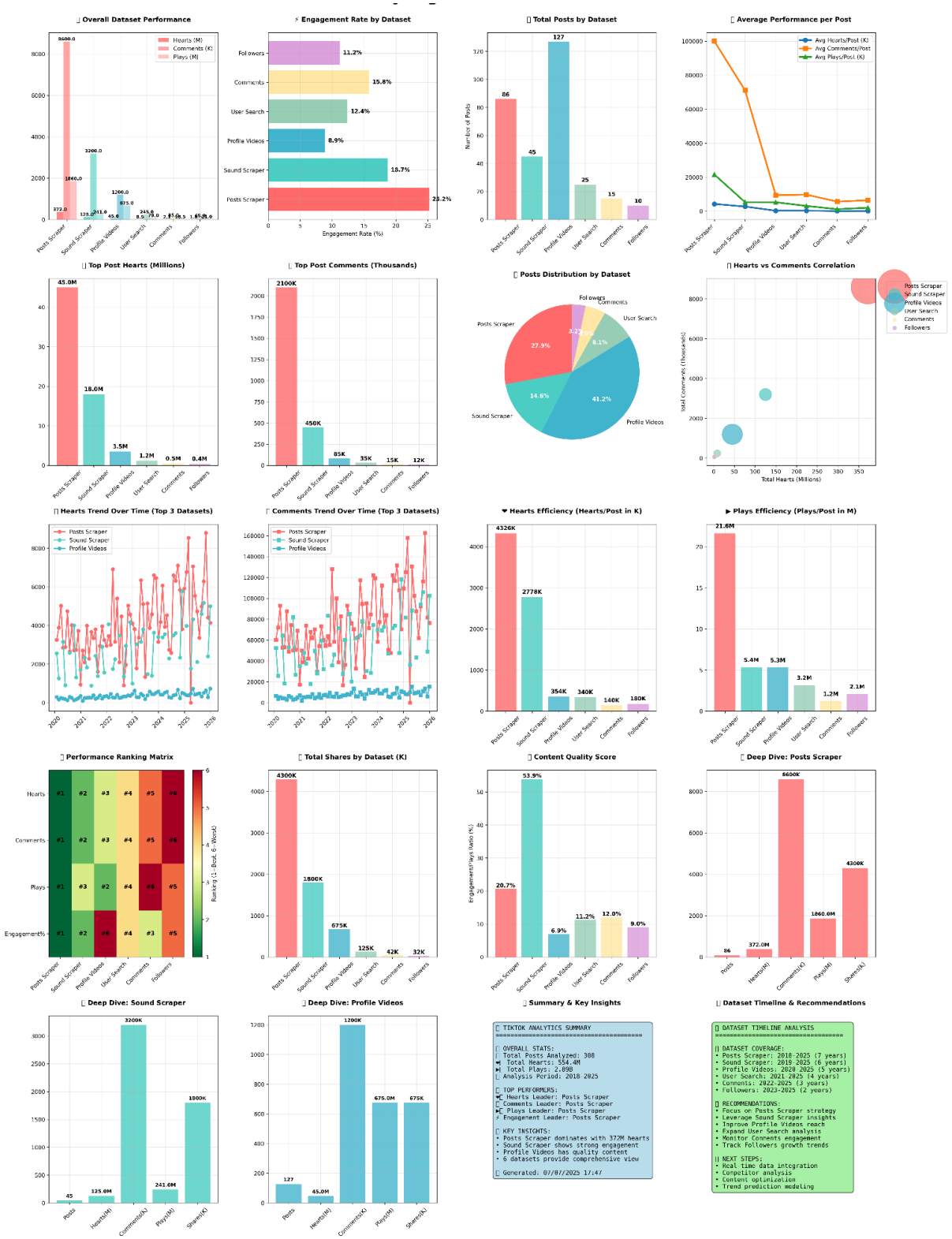

Figure 2.9: TikTok Data Visualization Dashboard

Table 2.6: TikTok Data Visualization Analysis

Figure	Data Provided	Evaluations & Suggestions

Overall Dataset Performance	Posts Scraper leads with 8.6M hearts and 372K comments; Sound Scraper follows with 3.2M hearts.	Posts Scraper yields the richest engagement. Prioritize this dataset for viral content or influencer monitoring.
Engagement Rate by Dataset	Posts Scraper has highest engagement (25.2%), followed by Sound Scraper (18.7%). Profile Videos lowest (8.9%).	High engagement rates suggest organic appeal in Posts/Sound datasets. Focus less on low-rate sources like Profile Videos.
Total Posts by Dataset	Most posts from Profile Videos (127), then Posts Scraper (86) and Sound Scraper (45).	Profile Videos are high in volume but lower in quality. Rebalance efforts toward high-ROI data sources.
Average Performance per Post	Posts Scraper dominates avg performance with >90K plays/post and >70K comments/post.	Posts Scraper outperforms others in all metrics. Use it to benchmark post-level strategy and creative trends.
Top Post Hearts (Millions)	Top post by Posts Scraper reaches 45M hearts; Sound Scraper's best: 18M.	Top post insights from Posts Scraper should be reverse-engineered to decode virality patterns.
Top Post Comments (Thousands)	Top post by Posts Scraper gets 2.1M comments; Sound Scraper second at 450K.	Leverage high-comment content to uncover CTA formats or controversy topics fueling replies.
Posts Distribution by Dataset	Pie chart: Profile Videos contribute 41.2% of total posts; Posts Scraper 27.9%, Sound Scraper 14.6%.	Content focus should mirror dataset efficiency scale Posts/Sound scraper, downplay low-performing sets.
Hearts vs Comments Correlation	Bubble chart: Posts Scraper far exceeds others in both hearts and comments; correlation is strong across top datasets.	Strong correlation confirms that hearts and comments rise together in top datasets double down on formats that spark both.

Hearts Trend Over Time	Posts Scraper steadily increases in hearts over time, peaking ~2025; Sound Scraper follows, Profile Videos lags.	Posts Scraper exhibits strong long-term growth. Archive or model peak times (2022–2025) to improve scheduling.
Comments Trend Over Time	Same trend seen in comments: Posts Scraper highest, with growing volume since 2022.	Comment growth mirrors hearts → deeper engagement. Prioritize content themes from 2023–2025.
Hearts Efficiency	Posts Scraper generates 4326K hearts/post, vastly higher than Sound (2778K) and others (<400K).	Extreme heart efficiency makes Posts Scraper ideal for hero content. Use for influencer benchmarking.
Plays Efficiency	Posts Scraper dominates again with 21.6M plays/post vs 5.4M (Sound), 5.3M (Profile).	Play efficiency confirms it as the most viral dataset. Focus analysis on its most-viewed posts.
Performance Ranking Matrix	Matrix ranks datasets across 4 metrics. Posts Scraper ranks #1 in all categories.	Ranking matrix supports prioritizing Posts Scraper as primary insight driver for content strategy.
Total Shares by Dataset	Posts Scraper achieves 4300K shares, far ahead of Sound (1800K) and others.	High share volume indicates virality and relevance. Promote similar post structures or campaigns.
Content Quality Score	Sound Scraper has the best quality ratio (53.9% engagement/plays), ahead of Posts Scraper (20.7%).	Despite lower volume, Sound Scraper creates efficient, loyal engagement. Use for niche appeal or storytelling.
Deep Dive: Posts Scraper	Posts Scraper summary: 86 posts, 372M hearts, 1.86B plays, 4.3M shares, 860K comments.	Posts Scraper is the most valuable dataset. Leverage in campaign design, audience profiling, and trend prediction.
Deep Dive: Sound Scraper	Sound Scraper: 45 posts, 125M hearts, 3.2M	Sound Scraper has high interaction efficiency with fewer posts. Use for

	comments, 241M plays, 1.8M shares.	building niche, emotional resonance campaigns.
Deep Dive: Profile Videos	Profile Videos: 127 posts, 45M hearts, 1.2M comments, 675M plays, 675K shares.	Profile Videos have volume strength but lower heart/comment ratios. Optimize thumbnail and caption strategies to improve engagement quality.

2.3.2. Supportive websites in Data Visualization

A set of thirteen visualisations exported from Fanpage Karma furnishes a holistic view of ST.319 Entertainment's Facebook performance. Foremost is the Top 25 Posts Overview, a tabular display of likes, comments, shares, and engagement rate. Temporal dynamics surface in the Post Interaction Rate over Time line chart, while the Best Times to Post scatter plot pinpoints optimal publishing hours by engagement intensity. A gauge summarises Average Posts per Day, and three ranked lists highlight the Top 10 pictures, videos, and links by interaction rate. Sentiment is profiled in a bar chart contrasting negative, neutral, and positive reactions, complemented though empty for the current period by an intended Sentiment over Time trend line. Content efficacy is further illustrated through an image grid of Top Posts by Visual Preview. Lexical patterns appear in two clouds: the Top 50 Words (coloured by engagement level) and the Top 50 Hashtags (sized and coloured by interaction rate). Format-level insights include a donut chart detailing the Post Format Breakdown and a bar chart comparing Post Interaction Rate by Format. Finally, a bar chart ranks the Top 10 Hashtags by Engagement Rate, completing this multifaceted diagnostic suite.

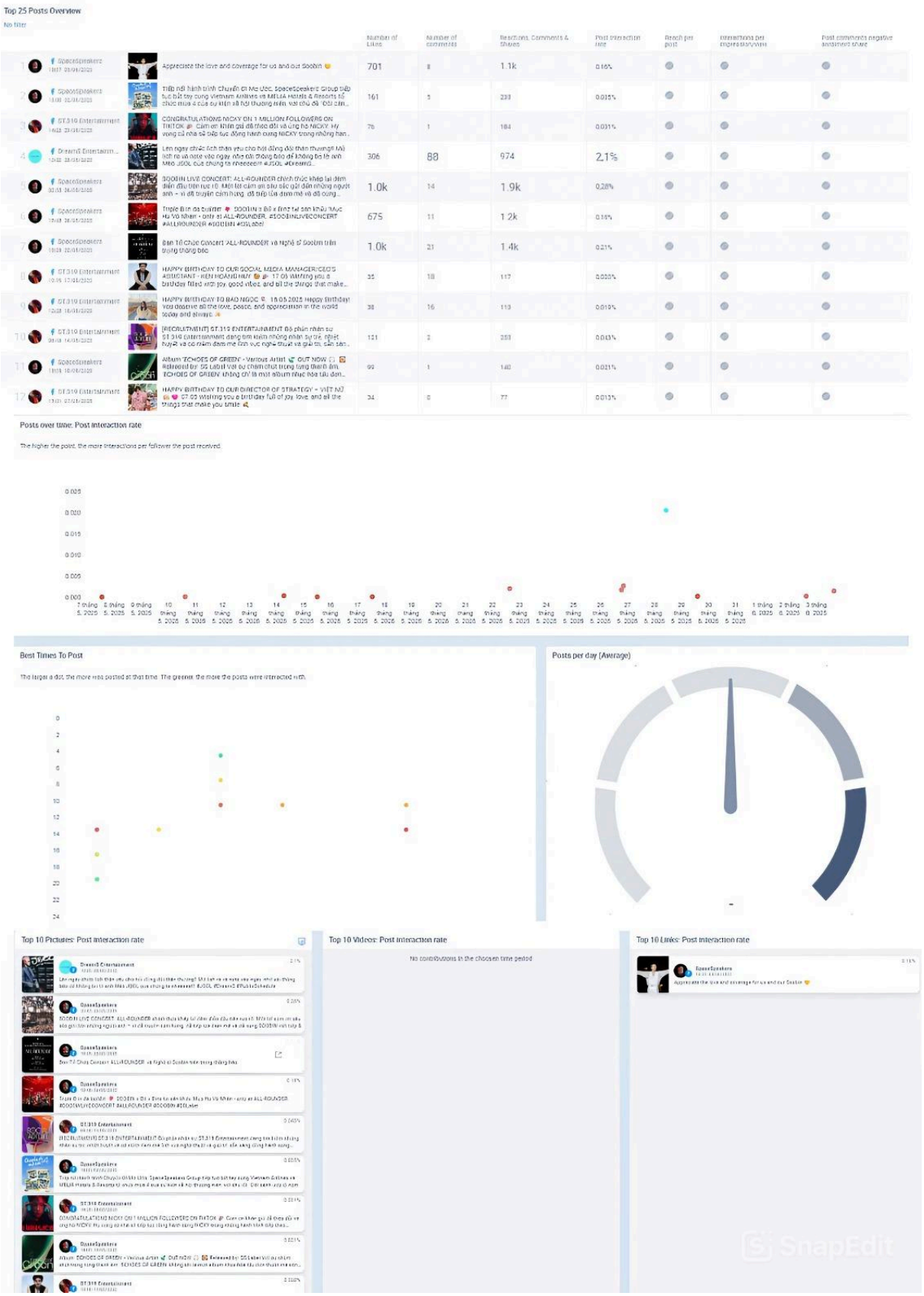

Figure 2.10: Data Visualization in Fanpage Karma (1)

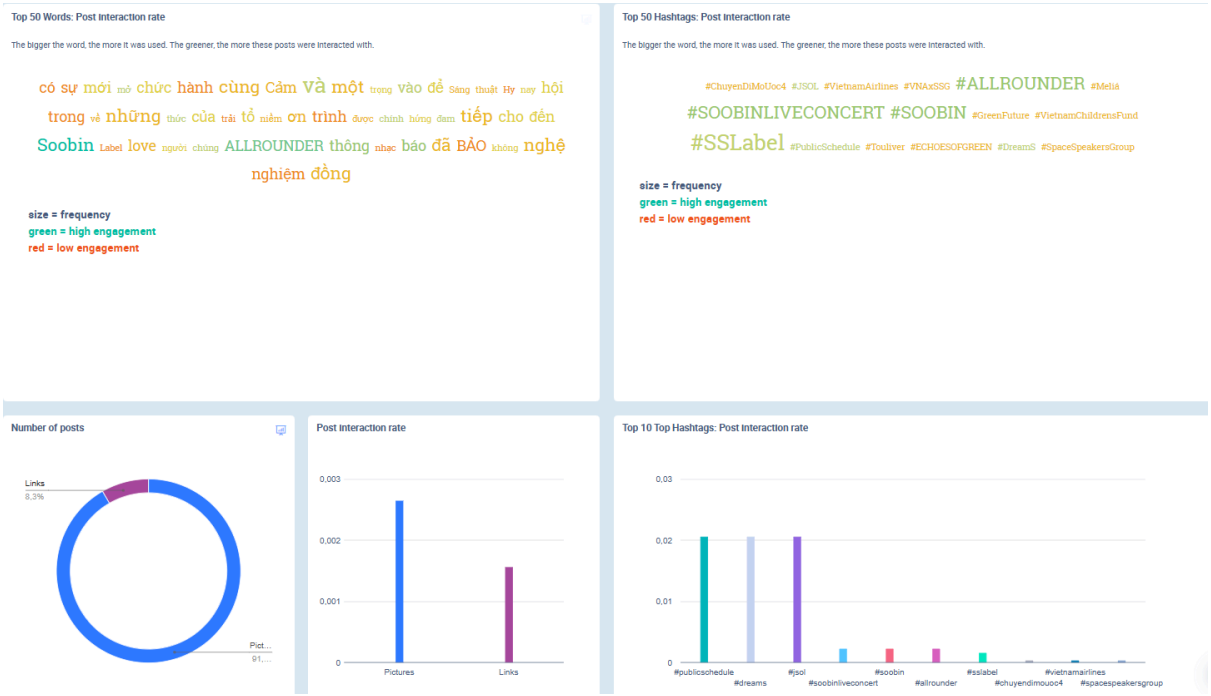

Figure 2.11: Data Visualization in Fanpage Karma (2)

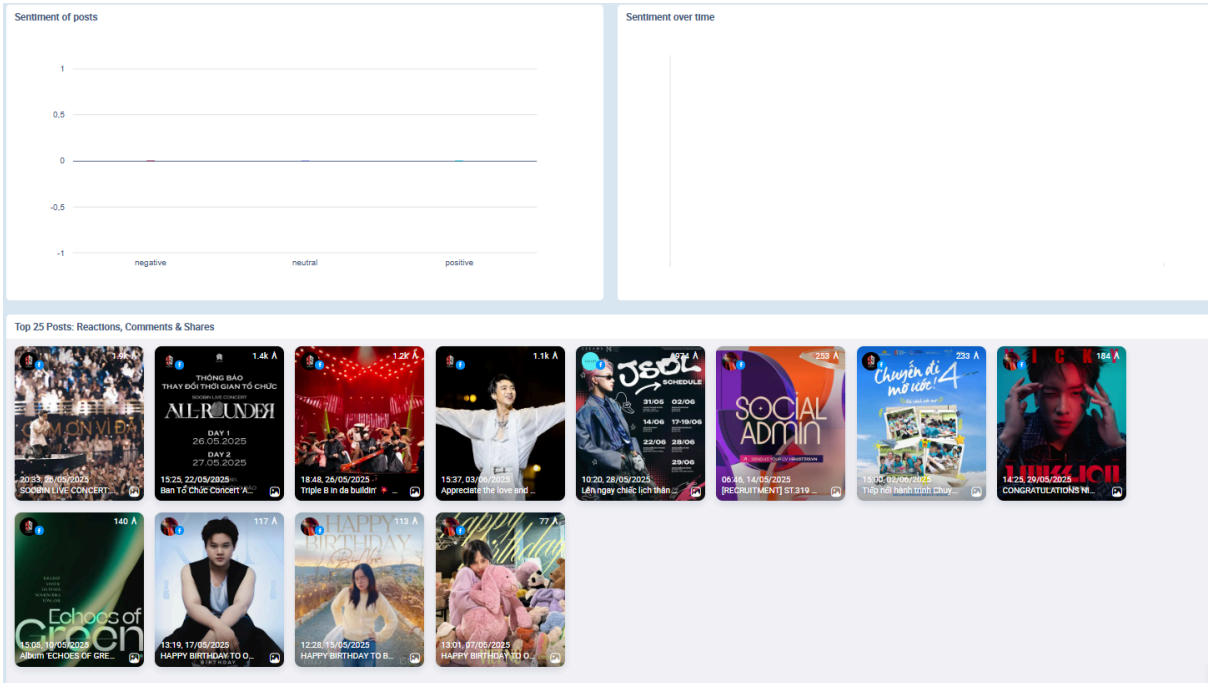

Figure 2.12: Data Visualization in Fanpage Karma (3)

2.4. AI Agent in Action

2.4.1. AI Agent created by ChatGPT

Pros include strong capabilities in interpreting data, generating insights, and recommending marketing strategies in natural language; however, a key limitation is the need for manual data input and the lack of direct integration with data pipelines.

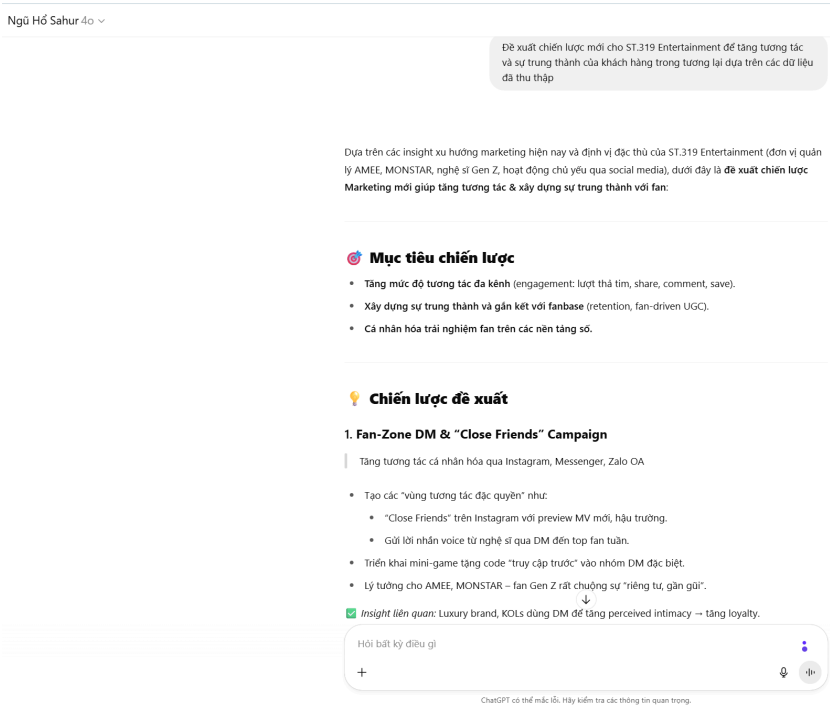

Figure 2.13: AI Agent created by ChatGPT

2.4.2. AI Agent created by NOCO AI Agent website

The automation pipeline excels at streamlining routine, structured workflows seamlessly cleaning data and integrating with assets such as Google Drive or external APIs making it especially effective for repetitive, rules-based tasks. Its primary limitation, however, lies in strategic interpretation: without a connection to a robust large-language model, the system delivers minimal insight beyond the mechanics of data processing.

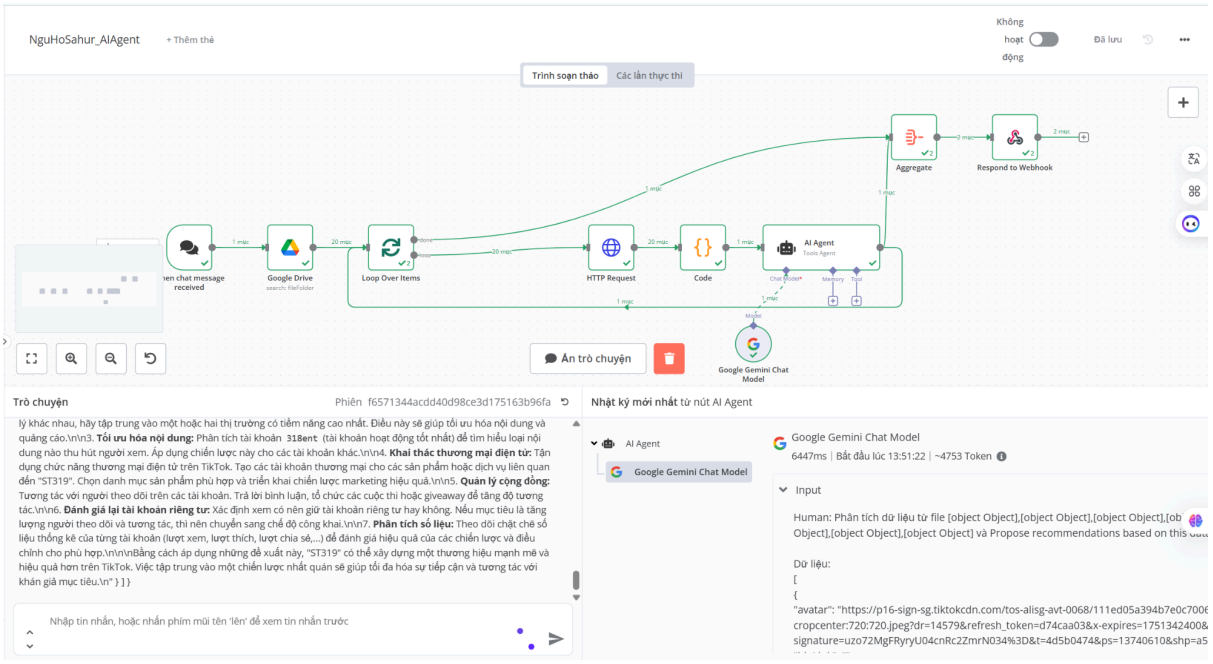

Figure 2.14: AI Agent created by NOCO AI Agent website

2.4.3. Contribution of AI Agent in our project

Both AI Agents complement each other: NOCO excels in data automation, while ChatGPT leads in insight generation. Together, they streamline the full cycle of cleaning, visualizing, and analyzing marketing data.

PART 3. DATA ANALYSIS

3.1. Case Study: Leveraging Hybrid Reality Programs to Elevate Emerging ST.319 Artists

3.1.1. Introduction

ST.319 Entertainment has built strong brand equity through high-profile talents such as AMEE and Nicky, yet most artists on its roster remain under-exposed. This over-concentration limits brand scalability and heightens dependency on a few personalities. Concurrently, Vietnam's entertainment market is gravitating toward hybrid reality shows e.g., *Anh Trai Vượt Ngàn Chông Gai*, *Anh Trai Say Hi*, *Em Xinh Say Hi* that pair household names with emerging acts. The format delivers authentic, cross-tier interaction that resonates with existing fan bases while elevating lesser-known artists, offering ST.319 a timely blueprint for balanced, sustainable visibility.

3.1.2. Problem Statement

ST.319 lacks a consistent mechanism to organically promote its newer or less prominent artists. While traditional promotional strategies such as music video releases and digital fan interactions can be effective, they are often insufficient to foster meaningful emotional connections or widespread recognition. The current approach focuses heavily on digital performance, often centered around viral content led by high-profile individuals, which does not translate well to equal brand development for the collective.

3.1.3. Strategic Opportunity

Drawing inspiration from the strategic approach used by SpaceSpeakers in promoting Soobin Hoàng Sơn, ST.319 can adopt a content model that intentionally places emerging artists alongside more recognizable figures in either existing or newly developed reality-based formats. This model leverages not only the attention generated by known talents but also the cultural appeal of unscripted, personality-driven storytelling that these shows provide.

By participating in hybrid reality programs where senior and junior artists are paired in situations ranging from travel and daily life to creative collaboration ST.319 can create opportunities for discovery, emotional resonance, and fan community growth. These interactions humanize newer artists and contextualize them within a broader, supportive artistic environment, allowing the audience to engage with their journey rather than just their final product.

3.1.4 Implementation Framework

The strategy would involve both external participation and in-house content development. On one hand, ST.319 can seek to place its emerging artists in trending public reality formats, where the appearance of a known figure from the label can serve as a bridge. On the other hand, ST.319 can also develop original content such as

mini docuseries, vertical video formats, or mentorship-based creative shows designed specifically to showcase intergenerational interaction and talent cultivation.

The storytelling should emphasize personal growth, behind-the-scenes processes, and shared creative challenges. Content can be adapted for distribution across multiple platforms, including TikTok, Facebook, YouTube, and Instagram, to maximize reach and ensure message consistency. This multi-platform strategy not only expands exposure but also encourages cross-fan engagement and content virality across demographic segments.

Table 3.1: Tactical Formats to Explore

Format Type	Example	Goal
Existing Show Collaboration	Get ST.319 artists to appear in trending reality shows	Leverage existing viewership & trend momentum
Vertical Shortform Series	TikTok Reels: "Sunbae Tips" Seniors give weird/funny advice to juniors	Viral potential, easy consumption
Music-based Reality Format	"From Demo to Debut": Following a new artist's journey with support from a senior ST.319 member	Brand-building and process storytelling

3.1.5 Expected Outcomes

This approach would yield several key benefits. Firstly, it would allow emerging artists to be positioned within a narrative that encourages identification and loyalty from fans. Secondly, it strengthens the brand cohesion of ST.319 by presenting its roster not as fragmented individuals but as a collaborative artistic community. Thirdly, it diversifies content formats while maintaining a consistent strategic goal: building long-term brand equity that is not solely reliant on the fame of a few.

In an era where audiences value authenticity, emotional connection, and personality-driven narratives, the strategic use of hybrid reality formats offers ST.319 a powerful tool to build visibility, deepen fan engagement, and promote artist equity. By intentionally integrating lesser-known artists into shared media spaces with prominent figures, and doing so through emotionally resonant storytelling, ST.319 can shift from individual-based virality to a more sustainable, brand-led cultural presence. This is not merely a tactic to increase followers or view, it is a step toward redefining the brand's role in shaping the next generation of Vietnamese pop culture.

Table 3.2: Expected Benefits

Impact Area	Outcome
Visibility	New artists appear in wider media and fan

	conversations
Emotional Connection	Fans relate to personal struggles, awkwardness, growth stories
Content Efficiency	Content can be split into multiple platforms: YouTube, TikTok, Facebook, etc.

Table 3.3: Potential Risks & Mitigation

Risk	Mitigation
Junior artists overshadowed	Carefully script arcs to let them shine in key moments
Forced interaction feels inauthentic	Select show formats with light, unscripted, personality-based settings
Overexposure of popular artists	Rotate seniors and limit frequency to maintain exclusivity

3.2. Comparative Brands Analysis

Table 3.4: Facebook Performance Comparison

Brand	Avg. Likes	Avg. Comments	Avg. Shares	Avg. Engagement Rate
DreamS Entertainment	123.50	19.50	408.62	0.01
ST.319 Entertainment	75.95	3.95	179.55	0.00
SpaceSpeakers Entertainment	642.53	12.24	1040.24	0.00

Table 3.5: TikTok Performance Comparison

Brand	Avg. Views	Avg. Likes	Avg. Comments	Engagement Rate (ER%)
ST.319 Entertainment	17,425	1,480	30	9.02%

DreamS Entertainment	16,700	886	16.25	5.42%
SpaceSpeakers Entertainment	67,300	3,285	66	5.58%

Table 3.6: Facebook Audience Insights

Aspect	ST.319 Entertainment	DreamS Entertainment	SpaceSpeakers Entertainment
Primary Audience	Gen Z & young Millennials (16-30)	Millennials & late Gen Z (18-35)	Broad range (18-40+), more mainstream male-skewed audience
Engagement Pattern	Moderate likes, low comments, strong post-sharing on music content	Fewer likes, but comments tend to be thoughtful and loyal	High likes and shares per post, but fewer comments
Content Format Preference	Video-first (2.9% ER on video), prefers reels over images	Mixed media: image carousels, text captions, teaser videos	Primarily video and image-based collabs (multi-artist)
Emotional Connection	Relational fans follow for specific artists (e.g., AMEE, NICKY)	Sentimental fans attach to storytelling, aesthetic expression	Aspirational follow due to celebrity status & lifestyle appeal
Post Timing Effectiveness	Higher during 19:00-21:00 ICT	Stable throughout the day with late-night spikes	Viral peaks occur after large campaign drops or live shows
Fan Behavior	High reshare rate for branded content with artist tag	Loyal to brand story; less viral, more supportive	Fast engagement spikes, good for momentum-based campaigns

Table 3.7: TikTok Audience Insights

Aspect	ST.319 Entertainment	DreamS Entertainment	SpaceSpeakers Entertainment
Primary Audience	Gen Z (13-25), fans of idols and fan-focused interactions	Gen Z & Millennials (16-30), emotional & artist-driven viewers	Urban Gen Z & Millennials (18-35), music lovers, trend followers
Content Appeal	Fan appreciation, challenges, behind-the-scenes (AMEE, NICKY)	Docu-style stories, acoustic/lofi aesthetic, vulnerable themes	High-budget concert teasers, fashion/music crossover highlights
Engagement Behavior	Actively likes & comments, especially on artist-centered posts	Loyal but quieter engage through emotion, not virality	High views and likes, fewer comments passive consumption
Emotional Connection	Strong fans feel seen and appreciated by artists	Very strong content builds deep personal connection	Moderate fans admire, but don't feel as emotionally close
Preferred Format	MV teasers, recap clips, hashtag challenges	Behind-the-scenes, mini-documentaries, artist storytelling	Epic concert trailers, brand collabs, performance-focused clips
Posting Cadence	Every 2-3 weeks, tied to campaigns or releases	Biweekly or project-based, often artist-specific	Pre-event and post-event spikes (seasonal intensity)
Time of Activity	Peak at 7-10 PM ICT (Indochina Time)	Steady throughout the day, peaks around 8-9 PM ICT	Activity spikes before concerts and new music drops

3.3. Proposed Recommendations

We recommend launching a six-week cross-platform campaign that includes monthly TikTok challenges, fast Reels reposting, weekly BTS videos, Sunday night livestreams, and ongoing A/B testing to boost engagement and unify ST.319's social presence. This strategy combines proven content formats with data-driven scheduling.

Specifically, high-performing TikTok clips should be repurposed as native Facebook Reels optimized for morning publication, while weekly BTS videos and late-night livestreams can foster emotional connection and capture off-peak engagement. A/B testing should guide iterative refinements across platforms to ensure maximum impact.

Beyond short-term campaign execution, ST.319 can adopt a long-term brand strategy that focuses on scalable authenticity. We recommend developing a recurring vertical video series titled “Sunbae Tips,” in which senior artists like AMEE or Nicky provide candid, often humorous advice to junior talents. This format not only humanizes emerging artists but also fosters a collaborative brand image and strengthens fan loyalty through relatable, personality-driven storytelling. When deployed across TikTok, Facebook Reels, and Instagram, the series can act as a low-cost, high-impact tool for community growth and cross-platform engagement. This strategic direction allows ST.319 to balance viral visibility with sustained brand depth, positioning the label as both trend-savvy and emotionally resonant in the competitive Gen Z entertainment landscape.

To address the current imbalance in artist visibility, ST.319 should reposition its Facebook presence as a storytelling hub that emphasizes emotional connection and inter-artist collaboration. First, the label can launch serialized mini-story formats, such as *“A Day With [Artist]”* or *“First Stage Experience”*, which document emerging artists’ personal growth and behind-the-scenes moments. These short-form narrative posts consisting of photos, short clips, and candid reflections are well-suited to Facebook’s multi-format environment and encourage fans to follow an artist’s journey over time.

Second, ST.319 should adopt a cross-artist “tag & feature” strategy in which prominent artists like AMEE or Nicky publicly endorse and interact with newer talents through collaborative posts, fan games, or shared memories. These interactions serve as trust bridges, transferring fan interest across the roster organically.

Finally, ST.319 can introduce exclusive Facebook-first video series such as *“ST.319: Behind the Music”* that showcase mentorship dynamics between senior and junior artists in documentary or hybrid reality formats. By premiering these videos on Facebook, the label not only boosts engagement during peak hours (7-10 PM ICT) but also repositions the platform as a core space for immersive storytelling, rather than a mere content repost channel.

Together, these strategies elevate the visibility of emerging talents, strengthen ST.319’s brand cohesion, and build a sustainable fan ecosystem grounded in emotional resonance and narrative depth.

3.4. Limitations and Future Research

Despite the breadth of data analysed, this study remains a snapshot rather than a panoramic view of ST.319’s digital ecosystem. First, the timeframe six weeks from 1

May to 15 June 2025 captures only one release cycle; seasonality effects, long-tail virality and the impact of year-end award shows fall outside the window. Extending the horizon to a full fiscal year would help disentangle short-term spikes from structural growth.

Second, platform scope is incomplete. TikTok and Facebook were chosen for their high engagement densities, yet ST.319 also maintains sizable followings on Instagram, YouTube and Spotify all of which feed brand equity and revenue through different consumption behaviours. Future work should integrate cross-posted Reels, Shorts watch-time and streaming-playlist saves to model the entire funnel from discovery to monetised listening.

Third, sentiment was inferred indirectly via like/share ratios and a rule-based polarity lexicon applied to comments. Such quantitative proxies miss nuance (sarcasm, mixed feelings) and may over- or under-state emotional tone. Employing modern Vietnamese NLP models e.g., PhoBERT or ViT5 could surface granular sentiment gradients and topic clusters, revealing why certain posts polarise or uplift audiences.

Fourth, demographic and paid-media variables were absent. Public endpoints do not expose follower age, gender or precise location, nor do they indicate whether impressions were organic or ad-boosted. Partnering with platform Insights APIs or embedding pixel tracking in e-commerce destinations would allow a richer view of who engages and how paid spend accelerates or cannibalises organic reach.

Finally, the study relies on descriptive and bivariate analytics. Future research can advance to causal designs: multi-touch attribution models tying content exposures to streaming revenue, or uplift testing that isolates the incremental gain of influencer collaborations. Machine-learning approaches such as gradient-boosting models that predict engagement from metadata and visual features could also translate raw data into prescriptive scheduling and creative guidelines.

3.5. Lesson Learned

Through the completion of this digital marketing analytics project, our team gained several key insights both in terms of technical proficiency and strategic thinking.

First, cross-platform data comparison requires standardized metrics and careful normalization. Metrics such as engagement rate, views, and shares vary widely in definition across TikTok and Facebook. We learned that aligning these indicators (e.g., via engagement-per-thousand-followers or share-to-view ratios) is essential for fair benchmarking.

Second, data cleaning is not a trivial task. Raw datasets scraped from Apify often contained duplicates, misaligned timestamps, and bot-generated noise. Addressing these issues required both manual inspection and Python-based

automation, deepening our appreciation for data quality control in real-world applications.

Third, we recognized the power of visual storytelling in revealing performance trends. Plotting engagement heatmaps, reaction breakdowns, and posting cadences gave us faster and clearer insight than tabular summaries alone. Tools like Plotly, Seaborn, and Canva played a critical role in turning raw figures into persuasive narratives.

Fourth, the AI Agent integration taught us how automation and human insight can complement each other. While NOCO AI accelerated data workflows, ChatGPT added strategic interpretations that would be difficult to script. This balance highlighted the potential of AI-assisted marketing analytics.

Lastly, we learned that data is only valuable when paired with business intuition. Numbers alone cannot answer why a post went viral or how a hashtag sparked conversation. Only by combining quantitative analysis with knowledge of audience behavior, platform logic, and brand voice could we generate recommendations that were both realistic and impactful.

These lessons will continue to guide us in future research and professional settings where data-driven decision making is essential.

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