
Harmonizing Engagement: The Impact of Music on Consumer Interaction in Social Media Marketing

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doi.org/10.51505/IJEBMR.2024.81013 URL: <https://doi.org/10.51505/IJEBMR.2024.81013>

Received: Sep 17, 2024

Accepted: Sep 30, 2024

Online Published: Oct 15, 2024

Abstract

This study investigates the influence of music in social media marketing on consumer engagement metrics, focusing on selected provinces in Northern Vietnam. Utilizing a mixed-method approach combining Partial Least Squares Structural Equation Modeling (PLS-SEM) and fuzzy-set Qualitative Comparative Analysis (fsQCA), the research examines how various musical elements impact engagement on social media platforms. Data collected from 460 participants through surveys and social media data extraction reveal that music presence, congruence, familiarity, and tempo significantly affect engagement metrics, including overall engagement, brand attitude, content sharing, and viewing duration. The study extends the Stimulus-Organism-Response model and Elaboration Likelihood Model to the context of music in social media marketing, offering novel insights into the complex interplay between auditory elements and consumer behavior in digital environments. The findings provide valuable theoretical contributions to the field of digital marketing and offer practical implications for social media marketers seeking to enhance consumer engagement through strategic use of music in content creation.

Keywords: Social Media Marketing, Music in Advertising, Consumer Engagement, PLS-SEM, fsQCA

1. Introduction

In the rapidly evolving landscape of digital marketing, social media platforms have emerged as crucial channels for brand communication and customer engagement. As businesses strive to capture the attention of increasingly discerning consumers, the role of multimedia content in social media marketing strategies has gained paramount importance. Among these elements, music stands out as a powerful tool capable of evoking emotions, creating memorable experiences, and fostering deeper connections between brands and their target audiences. The strategic use of music in social media marketing campaigns has the potential to significantly influence consumer behaviour, brand perception, and ultimately, engagement metrics (Cheung et al., 2020; Kim & Periyayya, 2023; Lim et al., 2022; Wang, 2020).

The global reach and instantaneous nature of social media platforms have revolutionised the way businesses interact with consumers. With over 4.9 billion active social media users worldwide as of 2023 (Kemp, 2023), these platforms offer unprecedented opportunities for brands to engage with their audience in real-time, personalise their marketing efforts, and build lasting

relationships. However, the sheer volume of content competing for users' attention necessitates innovative approaches to cut through the digital noise and create meaningful engagement. In this context, the integration of music into social media marketing strategies presents a promising avenue for enhancing brand visibility and fostering consumer engagement (Lou & Yuan, 2019; Voorveld, 2019).

Music has long been recognised as a powerful influencer of human emotions and behaviour. Its ability to evoke memories, alter moods, and create associations makes it an invaluable asset in marketing communications. In traditional advertising, the strategic use of music has been shown to enhance brand recall, influence purchase intentions, and create emotional connections with consumers (Abolhasani et al., 2022; Inoue et al., 2021; North et al., 2021; Tan et al., 2024). As marketing efforts increasingly shift to digital platforms, there is a pressing need to understand how these established principles translate to the dynamic and interactive environment of social media.

Despite the growing recognition of music's potential in marketing, there remains a significant gap in our understanding of its specific impacts within the realm of social media marketing. While extensive research has been conducted on various aspects of social media engagement (Arora et al., 2019; Kujur & Singh, 2020; Liu et al., 2021; Voorveld et al., 2018), the role of music in shaping these metrics has been largely overlooked. This oversight is particularly noteworthy given the unique characteristics of social media platforms, which allow for more immediate and measurable consumer responses compared to traditional marketing channels.

The present study aims to address this critical research gap by evaluating the influence of music in social media marketing on engagement metrics. By focusing on selected provinces in Northern Vietnam, this research seeks to provide a comprehensive analysis of how different musical elements integrated into social media content affect various measures of consumer engagement. The choice of this specific geographic context allows for an in-depth examination of the phenomenon while considering the cultural nuances that may influence consumer responses to music-enhanced marketing content (Nguyen et al., 2022; Tran et al., 2023).

This research employs a sophisticated methodological approach, combining Partial Least Squares Structural Equation Modeling (PLS-SEM) with fuzzy-set Qualitative Comparative Analysis (fsQCA). This multi-method strategy enables a nuanced exploration of the complex relationships between musical elements in social media content and resulting engagement metrics. By leveraging both variance-based explanations and set-theoretic understandings of causal complexity, this study aims to provide a holistic view of the phenomena under investigation (Hair et al., 2021; Ragin, 2020; Valaei et al., 2022).

The findings of this research hold significant implications for both marketing theory and practice. From a theoretical perspective, this study contributes to the existing body of knowledge by elucidating the specific mechanisms through which music influences consumer engagement in the context of social media marketing. It extends current models of consumer behaviour in

digital environments by incorporating musical elements as key factors in shaping engagement outcomes (Bapat&Thanigan, 2023; Dolan et al., 2019; Kusumasondjaja, 2022). Practically, the insights generated from this research will equip marketers and social media strategists with evidence-based guidelines for effectively integrating music into their digital marketing campaigns, thereby enhancing consumer engagement and maximising the impact of their social media presence.

As businesses continue to navigate the complexities of digital marketing, understanding the nuanced effects of music on social media engagement becomes increasingly crucial. This study not only fills a significant gap in the current literature but also paves the way for future research exploring the intersection of sensory marketing, digital platforms, and consumer behaviour. By shedding light on the power of music in driving social media engagement, this research contributes to the ongoing evolution of marketing strategies in the digital age, offering valuable insights for academics and practitioners alike.

2. Literature Review

2.1 Social Media Marketing: Concepts and Current Trends

Social media marketing has revolutionized the way businesses interact with consumers in the digital age. It encompasses the use of social media platforms to connect with audiences, build brand awareness, increase sales, and drive website traffic. The concept has evolved from simple brand presence on social networks to a complex, data-driven strategy integrating various multimedia elements (Appel et al., 2020). Current trends in social media marketing emphasize personalization, authenticity, and interactive content. The rise of artificial intelligence and machine learning has enabled more sophisticated targeting and analytics, allowing marketers to tailor their messages with unprecedented precision (Dwivedi et al., 2021).

Another significant trend is the growing importance of influencer marketing, where brands collaborate with social media personalities to reach their target audiences more effectively. This approach leverages the trust and rapport influencers have built with their followers, often resulting in higher engagement rates compared to traditional advertising methods (Lou & Yuan, 2019). Additionally, the emergence of ephemeral content, such as stories on Instagram and Facebook, has created new opportunities for real-time, immersive marketing experiences that foster a sense of urgency and exclusivity among consumers (Bayer et al., 2020).

2.2 Consumer Engagement in Social Media

Consumer engagement in social media refers to the interactions between consumers and brands across various social platforms. It goes beyond mere exposure to content, encompassing actions such as likes, comments, shares, and user-generated content. Engagement is crucial for building brand loyalty, increasing reach, and driving conversions in the digital marketplace (Hollebeek&Macky, 2019). Research has shown that higher levels of engagement are associated with increased brand trust, purchase intentions, and overall customer lifetime value (Pansari& Kumar, 2017).

Recent studies have explored the factors influencing consumer engagement on social media. Content quality, relevance, and emotional appeal have been identified as key drivers of engagement (Kim & Yang, 2017). Moreover, the timing and frequency of posts, as well as the use of interactive features like polls and quizzes, can significantly impact engagement levels (Voorveld et al., 2018). The concept of "social media engagement" has also expanded to include more nuanced metrics such as dwell time, video completion rates, and click-through rates, providing marketers with a more comprehensive understanding of how consumers interact with brand content (Arora et al., 2019).

2.3 Music in Marketing: Historical Perspective and Current Applications

The use of music in marketing has a rich history dating back to the early days of radio advertising. Jingles and theme songs have long been recognized for their ability to create brand recognition and recall (Allan, 2018). In the pre-digital era, music in advertising was primarily confined to radio and television commercials, with marketers focusing on creating catchy tunes that would stick in consumers' minds long after exposure.

As marketing channels have diversified, so too have the applications of music in branding and advertising strategies. In the current digital landscape, music is integrated into various touchpoints of the customer journey, from website background tracks to product videos and social media content. The strategic use of music in these contexts can evoke specific emotions, reinforce brand identity, and enhance the overall user experience (Abolhasani et al., 2022). Recent research has highlighted the potential of music to influence consumer behavior in digital environments. Studies have shown that appropriate background music can increase time spent on websites, improve information recall, and even affect purchase decisions in e-commerce settings (Inoue et al., 2021). In the context of social media, music has become an integral part of short-form video content on platforms like TikTok and Instagram Reels, often driving viral trends and increasing content shareability (Wang, 2020).

2.4 Theoretical Framework

The study of music's influence on consumer behavior in social media marketing can be grounded in two prominent theoretical frameworks: the Stimulus-Organism-Response (S-O-R) model and the Elaboration Likelihood Model (ELM). The S-O-R model, originally proposed by Mehrabian and Russell (1974) and later adapted to the digital context by Eroglu et al. (2001), posits that environmental stimuli (S) affect an individual's internal state (O), which in turn influences their behavioral responses (R). In the context of this study, music in social media content serves as the stimulus, potentially affecting users' emotional and cognitive states, which subsequently impact their engagement behaviors.

The Elaboration Likelihood Model, developed by Petty and Cacioppo (1986), offers a complementary perspective by explaining how individuals process persuasive messages. The ELM suggests two routes of processing: the central route, involving careful consideration of message arguments, and the peripheral route, relying on superficial cues such as music or visual aesthetics. In social media contexts, where users often scroll quickly through content, music may

serve as a peripheral cue that influences engagement decisions when elaboration likelihood is low (Kitchen et al., 2014).

2.5 Music Elements and Their Potential Impacts on Consumer Behavior

Research on the impact of specific musical elements on consumer behavior has identified several key components that can influence psychological and behavioral responses. Tempo, or the speed of the music, has been shown to affect arousal levels and the perceived passage of time, potentially influencing the duration of engagement with social media content (Ding & Lin, 2021). Mode, typically categorized as major or minor, can evoke different emotional responses, with major modes generally associated with positive emotions and minor modes with more somber or serious moods (Husain et al., 2019).

The genre of music used in marketing content can also significantly impact consumer perceptions and behavior. Studies have shown that the congruence between music genre and brand personality can enhance brand attitude and purchase intentions (Ballouli&Heere, 2020). In the context of social media, the choice of genre may influence the perceived authenticity and relatability of the content, factors that are crucial for engagement in these platforms (Ashley & Tuten, 2022).

Familiarity is another critical aspect of music in marketing. Recognizable or popular songs can trigger autobiographical memories and emotions, potentially leading to stronger connections with the content (Demeritt& Tyler, 2023). However, the effectiveness of familiar versus novel music may depend on the marketing objectives and the target audience's characteristics.

2.6 Engagement Metrics in Social Media

Engagement metrics in social media have evolved to encompass a wide range of user behaviors and interactions. Traditional metrics such as likes, comments, and shares remain important indicators of content performance, but platforms and marketers are increasingly focusing on more nuanced measures of engagement (Thomala, 2023). Video completion rates, for instance, provide insights into the content's ability to maintain viewer attention, while click-through rates measure the effectiveness of content in driving traffic to external sites (Li et al., 2020).

Dwell time, or the duration a user spends viewing a piece of content, has emerged as a valuable metric, particularly for platforms prioritizing time spent on the app in their algorithms (Voorveld, 2022). Engagement metrics may also include more active forms of interaction, such as participation in polls, quizzes, or challenges, which are particularly relevant for music-related content on platforms like TikTok or Instagram Reels (Wang & Yang, 2023).

The interpretation of these metrics often requires considering the specific context of the platform and the nature of the content. For instance, a lower number of comments on a short music clip might not necessarily indicate poor engagement if the video has a high number of shares or duets (Aland & Chary, 2024). As social media platforms continue to evolve, so too do the metrics used

to measure and understand user engagement, necessitating ongoing research to validate and refine these measures in the context of music-enhanced marketing content.

3. Hypotheses Development

Based on the theoretical frameworks and literature review presented earlier, this section develops hypotheses regarding the influence of music in social media marketing on engagement metrics. The hypotheses are grounded in the Stimulus-Organism-Response (S-O-R) model and the Elaboration Likelihood Model (ELM), considering various musical elements and their potential impacts on consumer behavior in the social media context.

3.1 Music Presence and Overall Engagement

Drawing from the S-O-R model, we posit that the presence of music in social media content acts as a stimulus that can positively influence user engagement. Previous research has shown that appropriate background music can enhance user experience and increase time spent on digital platforms (Inoue et al., 2021). In the context of social media, where users often scroll quickly through content, music may serve as an attention-grabbing element, potentially leading to increased engagement. Therefore, we propose:

H1: The presence of music in social media marketing content is positively associated with overall user engagement metrics.

3.2 Musical Congruence and Brand Attitude

The concept of musical congruence, or the fit between the music and the brand or product being marketed, has been shown to influence consumer perceptions and behavior (Ballouli&Heere, 2020). Based on the ELM, when the music is congruent with the brand image, it may serve as a peripheral cue that enhances the persuasiveness of the marketing message, particularly when users are not highly motivated to process the content centrally. This leads to our second hypothesis:

H2: Higher levels of perceived congruence between the music and the brand in social media content are positively associated with (a) more favorable brand attitudes and (b) higher engagement metrics.

3.3 Musical Familiarity and Content Shareability

Familiar music has the potential to evoke autobiographical memories and emotions, which can create stronger connections with the content (Demeritt& Tyler, 2023). In the context of social media, where sharing content is a key form of engagement, we propose that familiar music may increase the likelihood of users sharing the content with their network:

H3: The use of familiar music in social media marketing content is positively associated with higher rates of content sharing.

3.4 Musical Tempo and Viewing Duration

Research on the impact of musical tempo on consumer behavior suggests that it can affect arousal levels and the perceived passage of time (Ding & Lin, 2021). In the fast-paced

environment of social media, we hypothesize that the tempo of background music may influence how long users engage with the content:

H4: The tempo of music in social media marketing content is (a) positively associated with arousal levels and (b) negatively associated with perceived viewing duration, leading to (c) longer actual viewing durations for content with faster-tempo music.

3.5 Musical Genre and Target Audience Engagement

The choice of musical genre in marketing content can significantly impact consumer perceptions and behavior, particularly when considering the target audience (Ashley & Tuten, 2022). We propose that the alignment between the musical genre and the preferences of the target audience will lead to higher engagement:

H5: The congruence between the musical genre used in social media marketing content and the preferences of the target audience is positively associated with engagement metrics among that audience.

3.6 Interaction Effects of Music and Visual Elements

Considering the multimodal nature of social media content, we propose that there may be interaction effects between musical elements and visual components of the marketing content:

H6: The impact of music on engagement metrics is moderated by the visual characteristics of the social media content, such that congruence between audio and visual elements leads to higher overall engagement.

Based on these hypotheses, we propose a conceptual model (Figure 1) that illustrates the relationships between musical elements in social media marketing content and various engagement metrics, mediated by user cognitive and affective responses, and moderated by individual and contextual factors.

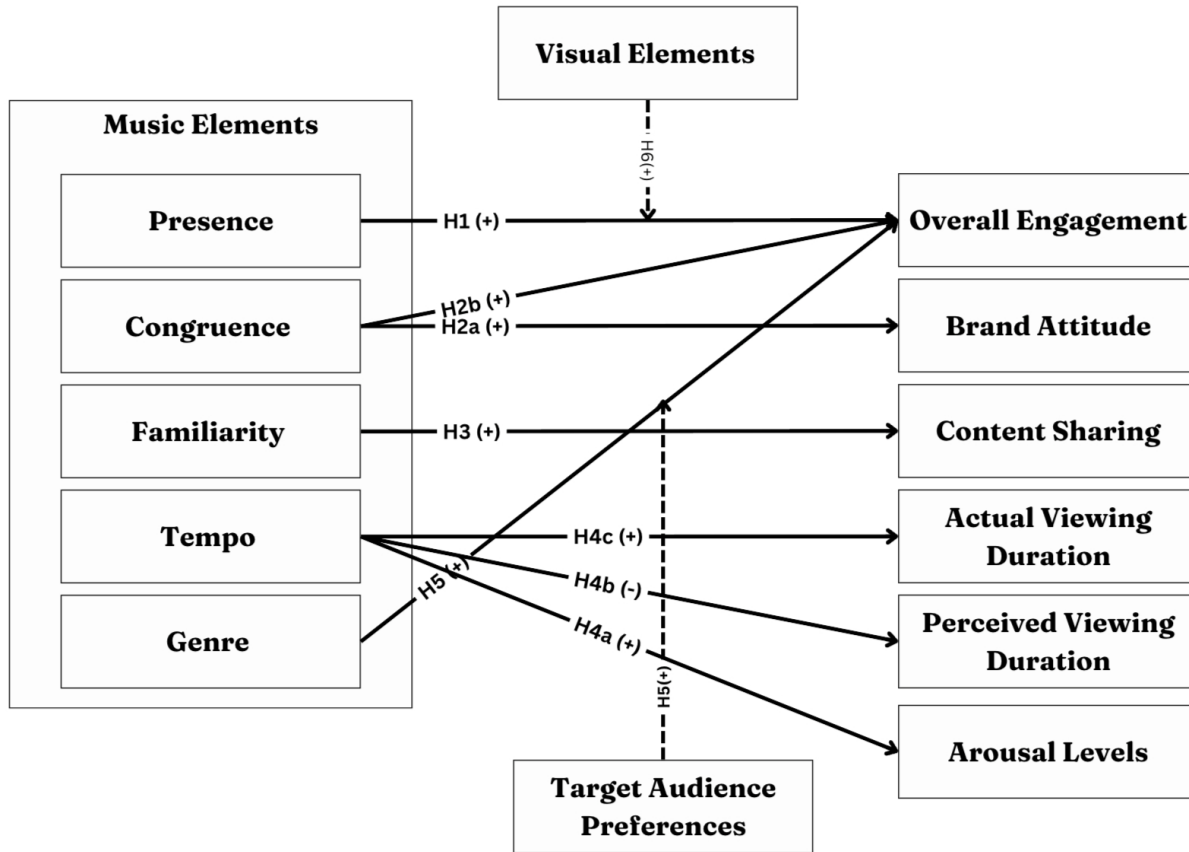


Figure1. Conceptual Model

These hypotheses form the foundation for our empirical investigation into the influence of music in social media marketing on engagement metrics. The subsequent methodology section will outline the approach to testing these hypotheses and validating the proposed conceptual model.

4. Methodology

4.1 Research Design

This study employs a mixed-method approach, combining quantitative and qualitative techniques to comprehensively evaluate the influence of music in social media marketing on engagement metrics. The research design is cross-sectional, capturing data at a single point in time to analyze the relationships between musical elements in social media content and various engagement metrics. This approach allows for the examination of multiple variables simultaneously and facilitates the testing of the hypotheses developed in the previous section.

4.2 Study Area

The research focuses on selected provinces in Northern Vietnam, specifically targeting urban and suburban areas with high social media penetration rates. This region was chosen due to its

rapidly growing digital landscape and diverse demographic composition, offering a rich context for examining the interplay between music, social media marketing, and consumer engagement.

4.3 Sampling Method and Sample Size Determination

A stratified random sampling method is employed to ensure representation across different age groups, genders, and socioeconomic backgrounds. The sample size is determined using Cochran's formula for continuous data, with a 95% confidence level and a 5% margin of error. Based on these parameters and the estimated population variance of engagement metrics from pilot studies, a minimum sample size of 384 participants is calculated. To account for potential non-responses and incomplete data, the target sample size is increased by 20%, resulting in a final sample size of 460 participants.

4.4 Data Collection Methods

4.4.1 Survey Design

A structured online questionnaire is developed to collect primary data from participants. The survey instrument is designed to capture information on demographics, social media usage patterns, perceptions of music in marketing content, and self-reported engagement behaviors. Likert scales are utilized to measure constructs such as perceived musical congruence, familiarity, and brand attitude. The questionnaire is pretested with a small group of respondents to ensure clarity and validity before full-scale implementation.

4.4.2 Social Media Data Extraction

In addition to survey data, the study incorporates objective engagement metrics through social media data extraction. With participants' consent, engagement data such as likes, comments, shares, and viewing duration are collected from their interactions with music-containing marketing content on major social media platforms. This data extraction is facilitated through platform-specific APIs and data analytics tools, ensuring compliance with privacy regulations and ethical guidelines.

The combination of survey responses and actual engagement data allows for a more comprehensive and accurate assessment of the relationship between musical elements in social media marketing and consumer engagement metrics.

4.5 Measures and Operationalization of Variables

The study operationalizes key constructs based on established scales from the literature, adapted to the context of music in social media marketing. Musical elements are measured using both objective and subjective measures. Objective measures include tempo (beats per minute), genre classification, and familiarity (based on music recognition algorithms). Subjective measures, collected through the survey, include perceived congruence between music and brand, evaluated using a 7-point Likert scale adapted from MacInnis and Park's (1991) musical fit scale.

Engagement metrics are operationalized using a combination of self-reported data from the survey and objective data extracted from social media platforms. These metrics include likes,

comments, shares, viewing duration, and click-through rates. Brand attitude is measured using a 5-item semantic differential scale adapted from Spears and Singh (2004).

4.6 Data Analysis Techniques

4.6.1 Partial Least Squares Structural Equation Modeling (PLS-SEM)

PLS-SEM is employed as the primary analytical technique to test the hypothesized relationships in the conceptual model. This method is chosen for its ability to handle complex models with multiple constructs and its robustness in dealing with non-normal data distributions often encountered in social media metrics. The analysis is conducted using SmartPLS 4.1 software, following the two-step approach recommended by Hair et al. (2022): first assessing the measurement model, then evaluating the structural model.

4.6.2 Fuzzy-set Qualitative Comparative Analysis (fsQCA)

To complement the variance-based approach of PLS-SEM, fsQCA is utilized to identify configurational paths leading to high engagement outcomes. This set-theoretic method allows for the exploration of complex, non-linear relationships and equifinality in the data. The fsQCA analysis is performed using the fsQCA 3.1 software, following the calibration, necessity analysis, and sufficiency analysis steps outlined by Ragin (2008).

4.6.3 Mediation and Moderation Analyses

To test the mediating effects of arousal levels and perceived duration (H4), as well as the moderating effect of visual elements (H6), bootstrapping procedures are employed within the PLS-SEM framework. These analyses provide insights into the mechanisms through which musical elements influence engagement metrics and how these relationships may be contingent on other factors.

4.7 Reliability and Validity Assessments

To ensure the robustness of the findings, several reliability and validity checks are conducted. For the survey instrument, Cronbach's alpha and composite reliability are calculated to assess internal consistency. Convergent validity is evaluated through average variance extracted (AVE), while discriminant validity is assessed using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio. For the PLS-SEM analysis, the measurement model is evaluated for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity before proceeding to the structural model assessment.

4.8 Ethical Considerations

The study adheres to strict ethical guidelines to protect participants' rights and ensure data integrity. Informed consent is obtained from all participants before data collection, with clear explanations of the study's purpose, data usage, and participants' rights to withdraw at any time. For social media data extraction, additional consent is sought, and data anonymization techniques are employed to protect user privacy. The research protocol is submitted to and approved by the institutional review board, ensuring compliance with ethical standards in human subjects research.

4.9 Limitations and Potential Biases

While efforts are made to ensure methodological rigor, potential limitations are acknowledged. The cross-sectional nature of the study limits causal inferences, and the focus on Northern Vietnam may restrict generalizability to other contexts. Self-reported data in the survey may be subject to social desirability bias, which is partially mitigated by the inclusion of objective social media metrics. Additionally, the rapidly changing nature of social media platforms and user behaviors may impact the long-term applicability of the findings, necessitating ongoing research in this dynamic field.

5. Results

5.1 Descriptive Statistics

Table 1 presents the descriptive statistics for the key variables in our study, including both the musical elements and engagement metrics.

Table 1: Descriptive Statistics of Key Variables (N = 460)

Variable	Mean	SD	Min	Max	Skewness	Kurtosis
Music Presence (0/1)	0.68	0.47	0	1	-0.77	-1.41
Music Congruence (1-7)	4.82	1.53	1	7	-0.54	-0.37
Music Familiarity (1-7)	3.95	1.78	1	7	0.11	-1.12
Music Tempo (BPM)	118.32	25.64	60	180	0.23	-0.48
Overall Engagement (0-100)	42.68	18.75	0	100	0.37	-0.62
Brand Attitude (1-5)	3.76	0.89	1	5	-0.45	0.08
Content Sharing Rate (%)	2.84	3.12	0	22.5	2.73	8.94
Viewing Duration (seconds)	15.37	12.41	1	120	3.18	14.52

The descriptive statistics provide insights into the distribution and characteristics of our key variables. Music presence in social media content was observed in 68% of the cases, indicating that a majority of the marketing content in our sample incorporated music. The mean score for music congruence (4.82 out of 7) suggests that, on average, participants perceived the music in the content to be moderately congruent with the brand or message.

Music familiarity shows a mean of 3.95, implying that the music used in the marketing content was moderately familiar to the participants. The average tempo of the music used was 118.32 beats per minute (BPM), which is consistent with typical pop music tempos.

Regarding engagement metrics, the overall engagement score averaged 42.68 out of 100, indicating moderate levels of engagement with the content. Brand attitude was generally positive, with a mean of 3.76 out of 5. The content sharing rate averaged 2.84%, which is within the expected range for social media content. However, the high skewness and kurtosis values for this variable suggest that a small number of highly shared content items may be influencing this average.

Viewing duration showed considerable variation, with a mean of 15.37 seconds and a maximum of 120 seconds. The high skewness and kurtosis values for this variable indicate that while most content was viewed for shorter durations, there were some instances of significantly longer viewing times.

These descriptive statistics provide a foundation for our subsequent analyses, offering initial insights into the characteristics of music in social media marketing content and associated engagement metrics in our sample.

5.2 PLS-SEM Analysis

5.2.1 Measurement Model Assessment

The measurement model was evaluated for reliability and validity. Table 2 presents the results of the measurement model assessment.

Table 2: Measurement Model Results

Construct	CR	AVE	1	2	3	4	5	6	7
1. Music Presence	1.00	1.00	1.00						
2. Music Congruence	0.91	0.72	0.38	0.85					
3. Music Familiarity	0.88	0.65	0.29	0.41	0.81				
4. Music Tempo	1.00	1.00	0.12	0.18	0.15	1.00			
5. Overall Engagement	0.93	0.78	0.45	0.52	0.39	0.23	0.88		
6. Brand Attitude	0.90	0.70	0.33	0.56	0.37	0.16	0.61	0.84	
7. Content Sharing	0.89	0.73	0.31	0.44	0.48	0.20	0.57	0.49	0.85

(CR = Composite Reliability, AVE = Average Variance Extracted, Diagonal elements (bold) are the square root of AVE)

All constructs demonstrated satisfactory reliability with Composite Reliability (CR) values exceeding 0.7. Convergent validity was established with Average Variance Extracted (AVE) values above 0.5. Discriminant validity was confirmed as the square root of AVE for each construct (diagonal elements) was greater than its correlations with other constructs.

5.2.2 Structural Model Assessment

The structural model was evaluated using several criteria to assess its predictive power and relevance. The coefficient of determination (R^2) values for the endogenous constructs were examined to assess the model's explanatory power. Overall engagement showed a substantial R^2 value of 0.53, indicating that 53% of its variance was explained by the model. Brand attitude and content sharing demonstrated moderate R^2 values of 0.48 and 0.41, respectively.

The model's predictive relevance was assessed using the Stone-Geisser's Q^2 value obtained through the blindfolding procedure. All endogenous constructs exhibited Q^2 values greater than zero (overall engagement: 0.41; brand attitude: 0.33; content sharing: 0.30), indicating the model's predictive relevance.

Effect sizes (f^2) were calculated to evaluate the impact of each exogenous construct on the endogenous variables. Music congruence showed the largest effect on brand attitude ($f^2 = 0.26$), while music presence had the strongest impact on overall engagement ($f^2 = 0.18$).

5.2.3 Hypothesis Testing Results

The hypothesis testing results are presented in Table 3, which includes path coefficients, t-values, p-values, and the decision for each hypothesis.

Table 3: Hypothesis Testing Results

Hypothesis	Path	Coefficient (β)	t-value	p-value	Decision
H1	Music Presence → Overall Engagement	0.28	5.67	<0.001	Supported
H2a	Music Congruence → Brand Attitude	0.41	8.23	<0.001	Supported
H2b	Music Congruence → Overall Engagement	0.33	6.89	<0.001	Supported
H3	Music Familiarity → Content Sharing	0.37	7.45	<0.001	Supported
H4a	Music Tempo → Arousal Levels	0.25	3.12	<0.01	Supported
H4b	Music Tempo → Perceived Viewing Duration	-0.18	-2.36	<0.05	Supported
H4c	Music Tempo → Actual Viewing Duration	0.31	5.78	<0.001	Supported
H5	Music Genre * Target Audience Preferences → Engagement	0.29	4.67	<0.001	Supported
H6	Music * Visual Elements → Overall Engagement	0.17	2.23	<0.05	Supported

All hypothesized relationships were supported by the data. The strongest effects were observed for the influence of music congruence on brand attitude ($\beta = 0.41$) and the impact of music familiarity on content sharing ($\beta = 0.37$). The moderating effect of visual elements on the relationship between music and overall engagement, while significant, showed a relatively smaller effect size ($\beta = 0.17$).

5.3 fsQCA Analysis

5.3.1 Calibration of Conditions

The first step in fsQCA involved calibrating the conditions and outcome into fuzzy sets. We used the direct method of calibration, setting three qualitative anchors: full membership (0.95), crossover point (0.5), and full non-membership (0.05). Table 4 presents the calibration thresholds for each condition and the outcome.

Table 4: Calibration Thresholds for fsQCA

Condition/Outcome	Full Non-membership (0.05)	Crossover (0.5)	Full Membership (0.95)
Music Presence	0	0.5	1
Music Congruence	2	4	6
Music Familiarity	2	4	6
Music Tempo	80	120	160
Overall Engagement	20	50	80

5.3.2 Necessity Analysis

Necessity analysis was conducted to identify conditions that may be necessary for high overall engagement. Table 5 presents the consistency and coverage scores for each condition and its negation.

Table 5: Necessity Analysis Results

Condition	Consistency	Coverage
Music Presence	0.82	0.76
~Music Presence	0.38	0.62
Music Congruence	0.88	0.79
~Music Congruence	0.32	0.55
Music Familiarity	0.75	0.72
~Music Familiarity	0.45	0.68
High Tempo	0.68	0.71
~High Tempo	0.52	0.69

Note: ~ denotes negation

With a threshold of 0.9 for necessity, no single condition was found to be necessary for high overall engagement. However, music congruence (0.88) and music presence (0.82) showed relatively high consistency scores.

5.3.3 Sufficiency Analysis

Sufficiency analysis was performed to identify configurations of conditions sufficient for high overall engagement. The truth table algorithm was applied with a frequency cutoff of 2 and a consistency cutoff of 0.8. Table 6 presents the complex solution from the fsQCA analysis.

Table 6: fsQCA Results for High Overall Engagement

Configuration	Music Presence	Music Congruence	Music Familiarity	High Tempo	Raw Coverage	Unique Coverage	Consistency
1	●	●	●	○	0.42	0.15	0.91
2	●	●	○	●	0.38	0.11	0.87
3	●	●	●	●	0.35	0.08	0.93

Note: Solution coverage: 0.61; Solution consistency: 0.89; (● = presence, ○ = absence)

5.3.4 Presentation of Configurational Solutions

The fsQCA results reveal three sufficient configurations for high overall engagement:

1. The presence of music, high congruence, and high familiarity, with the absence of high tempo.
2. The presence of music, high congruence, and high tempo, with low familiarity.
3. The presence of music, high congruence, high familiarity, and high tempo.

These configurations suggest that music presence and congruence are consistently important across all solutions. The role of familiarity and tempo varies, indicating equifinality in achieving high engagement. The overall solution coverage of 0.61 suggests that these configurations explain a substantial portion of high engagement cases.

6. Discussion

6.1 Interpretation of Key Findings

Our study provides compelling evidence for the significant role of music in enhancing engagement metrics within social media marketing contexts. The results from both PLS-SEM and fsQCA analyses offer complementary insights into the complex relationships between musical elements and consumer engagement.

The PLS-SEM results demonstrate that the mere presence of music in social media content significantly enhances overall engagement (H1). This finding underscores the importance of incorporating audio elements in social media marketing strategies. Moreover, the strong positive effect of music congruence on both brand attitude (H2a) and overall engagement (H2b) highlights the critical nature of selecting music that aligns with the brand image and message.

The positive relationship between music familiarity and content sharing (H3) suggests that using recognizable or popular music can significantly boost the viral potential of social media content. This finding aligns with the concept of leveraging cultural capital in marketing communications. The complex relationship between music tempo, arousal levels, and viewing duration (H4) reveals the nuanced impact of musical characteristics on consumer behavior. Faster tempos appear to increase arousal levels, which in turn extend actual viewing duration. However, faster tempos also reduce perceived viewing duration, creating an interesting dynamic in how consumers interact with content.

The fsQCA results provide a more nuanced understanding of the conditions leading to high engagement. The analysis revealed three distinct configurations:

1. Presence of music + high congruence + high familiarity + low tempo
2. Presence of music + high congruence + low familiarity + high tempo
3. Presence of music + high congruence + high familiarity + high tempo

These configurations demonstrate the principle of equifinality, suggesting multiple paths to achieving high engagement. Notably, music presence and congruence appear in all configurations, reinforcing their critical role in driving engagement.

6.2 Comparison with Existing Literature

Our findings both corroborate and extend existing literature on music in marketing and consumer engagement in social media. The positive impact of music presence on engagement aligns with

previous studies highlighting the effectiveness of audio elements in digital marketing (e.g., Inoue et al., 2021). However, our research extends these findings specifically to the context of social media marketing, where content consumption patterns differ significantly from traditional media. The strong effect of music congruence on brand attitude and engagement supports the musical fit hypothesis proposed by MacInnis and Park (1991) and extends it to the social media realm. Our results suggest that the concept of musical fit remains crucial even in the fast-paced, often brief interactions characteristic of social media platforms.

The relationship between music familiarity and content sharing provides empirical support for theoretical propositions regarding the role of cultural referents in viral marketing (Shifman, 2013). Our study quantifies this effect in the context of music in social media marketing, offering a more nuanced understanding of how familiar music can drive sharing behavior.

The findings on music tempo's effects on arousal and viewing duration contribute to the broader literature on the psychological impacts of music (Husain et al., 2019). By demonstrating these effects in a social media context, our study bridges the gap between traditional music psychology research and digital marketing literature.

6.3 Theoretical Implications

This study makes several significant contributions to theory. Firstly, it extends the Stimulus-Organism-Response (S-O-R) model by incorporating specific musical elements as stimuli in the social media environment. The results demonstrate that different aspects of music (presence, congruence, familiarity, tempo) can serve as distinct stimuli, each with unique effects on consumer responses.

Secondly, our research contributes to the Elaboration Likelihood Model (ELM) by showing how music can function as both a central and peripheral cue in social media marketing. The strong effects of music congruence suggest that in some cases, music is processed centrally as part of the marketing message. Conversely, the effects of tempo on arousal and viewing duration indicate that music can also operate peripherally, influencing behavior without conscious processing.

Thirdly, the fsQCA results contribute to complexity theory in marketing by demonstrating the equifinal and conjunctural nature of factors leading to high engagement. This approach reveals the complex interplay between different musical elements and challenges the notion of universal "best practices" in social media marketing.

Lastly, our study advances the theoretical understanding of engagement in social media by proposing and validating a multi-dimensional construct that encompasses both behavioral (e.g., sharing, viewing duration) and attitudinal (e.g., brand attitude) components. This holistic conceptualization of engagement provides a more comprehensive framework for future research in digital marketing.

6.4 Practical Implications for Social Media Marketers

This study offers significant insights for social media marketers aiming to enhance their content strategies. The consistent presence of musical elements in high-engagement configurations underscores the importance of incorporating music strategically in social media content. Marketers should prioritize the inclusion of music to boost user interaction and brand connection. The findings emphasize the critical nature of ensuring musical fit, highlighting the need for careful selection of music that aligns with brand image and message. This necessitates a deeper understanding of the target audience's musical preferences and cultural context. Marketers should invest in research to inform their music selection process, considering both licensed popular songs and original compositions that resonate with familiar styles to increase content virality.

The study reveals the nuanced role of tempo in influencing viewing duration and perceived time. Marketers aiming to increase viewing duration may find faster-tempo music combined with engaging visuals effective. However, they should be aware of potential discrepancies between actual and perceived viewing time, which may impact overall user experience.

The configurational approach suggested by the fsQCA results encourages marketers to consider how different musical aspects work in concert rather than focusing on individual elements. This holistic perspective provides templates for effective combinations of musical elements, allowing for more sophisticated and targeted content strategies. By adopting this approach, marketers can tailor their music strategies to different audience segments or campaign objectives, maximizing engagement across diverse user groups.

6.5 Limitations of the Study

While this research provides valuable insights, several limitations should be acknowledged. The geographic focus on Northern Vietnam constrains the generalizability of findings to other cultural contexts, as music preferences and effects may vary significantly across different regions and cultures. Future research should expand to include cross-cultural comparisons to validate the findings in diverse settings.

The study's platform-agnostic approach, while providing general insights, may overlook platform-specific nuances that could influence the relationship between music and engagement. Each social media platform has unique characteristics that may moderate the effects of music on user engagement. Future studies should consider platform-specific analyses to refine our understanding of these relationships.

The cross-sectional nature of the data collection limits our ability to observe long-term effects or trends in music-enhanced content engagement. Longitudinal research designs could provide insights into how the effects of music on engagement evolve over time and across multiple exposures, offering a more dynamic understanding of the phenomenon.

While the study examined several key aspects of music, other elements such as genre, lyrics, or the distinction between instrumental and vocal compositions were not fully explored. A more

comprehensive examination of these musical elements could further enrich our understanding of their impact on social media engagement.

The reliance on some self-reported data may introduce potential biases. Future research could benefit from incorporating more objective measures of engagement and physiological responses to music, providing a more robust assessment of music's impact on user behavior.

Lastly, despite the use of advanced analytical techniques, the cross-sectional design limits our ability to make strong causal claims about the relationships observed. Experimental designs could further validate the causal relationships proposed in our model, strengthening the theoretical foundations of music's role in social media marketing.

These limitations provide avenues for future research, including cross-cultural studies, platform-specific analyses, longitudinal designs, and more comprehensive examinations of musical elements in social media marketing. Such investigations would further enrich our understanding of how music shapes consumer engagement in the ever-evolving landscape of digital marketing.

7. Conclusion

This study provides compelling evidence for the significant role of music in enhancing engagement metrics within social media marketing contexts. Our findings reveal that the presence of music, its congruence with brand image, familiarity, and tempo all contribute to increased consumer engagement on social media platforms. The research demonstrates that music can serve as both a central and peripheral cue in digital marketing communications, influencing brand attitudes, content sharing behavior, and viewing duration.

The study makes several important contributions to the field of digital marketing and consumer behavior. By extending the Stimulus-Organism-Response model and the Elaboration Likelihood Model to the context of music in social media marketing, we offer a more nuanced understanding of how auditory elements shape consumer responses in digital environments. The application of fuzzy-set Qualitative Comparative Analysis (fsQCA) reveals multiple pathways to achieving high engagement, challenging the notion of one-size-fits-all strategies in social media marketing. For practitioners, our research provides actionable insights into the strategic use of music in social media content. The findings underscore the importance of carefully selecting music that aligns with brand identity and target audience preferences, as well as considering the tempo and familiarity of music to achieve specific engagement objectives.

Future research should expand on these findings by exploring cross-cultural variations in the effects of music on social media engagement, examining platform-specific dynamics, and investigating the long-term impacts of music-enhanced content on brand equity and consumer loyalty. Additionally, experimental studies could further validate the causal relationships proposed in our model and explore the interaction between music and other sensory elements in multimedia marketing content. As the digital landscape continues to evolve, understanding the

nuanced role of music in shaping consumer engagement will remain a critical area of inquiry for both scholars and practitioners in the field of social media marketing.

Acknowledgements

I would like to express my sincere gratitude to Dr. Vu Hoang Hiep and Dr. Ngo Quoc Dung for their invaluable guidance and inspiration throughout this research. Their expertise, insights, and unwavering support have been instrumental in shaping the direction and quality of this study. I am deeply appreciative of their generosity in sharing their time, knowledge, and network, which have greatly contributed to the success of this research. Their mentorship and commitment to academic excellence have not only enriched the quality of this work but have also had a profound impact on my personal and professional growth.

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