

From the Perspective of Computational Communication: A Study on the Dynamics of Online Public Opinion in the Comment Sections of Weibo Regarding the 315 Gala (2021-2025)

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Abstract

This study takes the comment sections of blue-V media official accounts related to the "3·15" Gala on Weibo from 2021 to 2025 as research samples. By comprehensively applying methods such as word cloud analysis, sentiment computation, IP location correlation, and topic categorization, it systematically explores the evolution of netizens' comment content, dynamic emotional characteristics, regional sentiment differences, and location-based topic preferences over the five-year period. Integrating theories from computational social science and communication studies, the research reveals a diachronic shift in consumer rights protection public opinion "from physical infringement to digital infringement." It also identifies regional patterns such as "relatively moderate sentiment in eastern regions, more pronounced negative sentiment in central and western regions, and divergent regional topic concerns." The findings provide data support and practical pathways for the dynamic optimization of market supervision policies, including differentiated regulation, sentiment-oriented response, and precise reaction to regional issues.

Keywords

3·15 Gala; consumer rights protection public opinion; word cloud analysis; sentiment analysis; IP location; regulatory optimization

1. Introduction

1.1. Research Background

The "14th Five-Year Plan for Modernizing Market Regulation" emphasizes integrating technologies like big data and AI to build a scientific and efficient regulatory system. As the digital economy deepens, online retail sales grew to 15.5 trillion yuan in 2024, yet consumer disputes have grown in complexity, with complaints about live-streaming sales and digital products increasing significantly. This shift has moved rights protection primarily online, making social media a central channel for

public expression and appeals.[1]

Current consumer rights public opinion shows three emerging trends: a shift from traditional to digital infringement, with smart device complaints rising 57.2% in 2024; younger demographics, notably post-90s and post-00s, consistently representing over 70% of rights protectors; and clear regional variations, such as digital disputes in the east versus traditional issues in central and western regions.[2] These developments demand multidimensional approaches including longitudinal tracking, sentiment quantification, and regional correlation—areas where a systematic analytical framework remains underdeveloped.

1.2. Research Significance

1)Theoretical Significance: This study is the first to incorporate IP-based location data into consumer rights sentiment analysis, establishing a comprehensive "time-sentiment-region" framework using five-year longitudinal data, extending Huang Wei' s spatiotemporal fluctuation metrics and providing empirical support for Wang Junyang' s classification of social protest issues within the consumer domain.

2)Practical significance: The research findings can directly serve the "Smart Regulation" goal proposed in the "14th Five-Year Plan for Market Regulation Science and Technology Development". By identifying the evolution of annual high-frequency issues (such as software complaints about new energy vehicles accounting for 22.4%), regional sentiment differences, and issue attention preferences, it can provide dynamic and precise policy optimization basis for regulatory authorities, and enhance the ability to govern the source of consumer disputes.

1.3. Research Approach and Framework

This paper adopts a research path of "data drive-multidimensional analysis-policy mapping": First, collect data from the Weibo comment sections of the 3·15 Gala from 2021 to 2025, using word cloud analysis to track content evolution. Second, quantify annual emotional changes through a sentiment computation model. Then, conduct regional difference analysis combined with IP location information. Finally, correlate five types of topic categories to reveal attention preferences. The research framework covers three levels: "phenomenon description-mechanism analysis-countermeasure suggestion," forming a complete closed loop of public opinion research.

2. Literature Review

2.1. Current Status of Consumer Rights Public Opinion Research

Existing research predominantly employs static analysis of single events or platforms, focusing on short-term impacts such as corporate crisis response, while lacking long-term tracking of recurring issues. [3] Despite the normalization of digital infringement and diversified consumer appeals-including emerging challenges

like algorithmic discrimination—current studies provide insufficient exploration of these evolving trends.

2.2. Progress in the Application of Social Media Sentiment Analysis

Sentiment analysis has evolved from early methods to deep learning models, yet its application in consumer rights protection remains limited. Current research focuses mainly on short-term public fluctuations and lacks long-term trend analysis, with little empirical evidence linking sentiment to tangible outcomes such as the 14.9% increase in economic recovery in 2024. Studies often treat the public as a single entity, ignoring emotional differences among age or regional groups. Although some research addresses group polarization mechanisms, it fails to reveal emotion differentiation patterns in the specific context of consumer rights.

2.3. Research on IP Location and Regional Differences in Public Opinion

IP location information provides a new perspective for studying the regional characteristics of public opinion. Huang Wei, in his research on measuring the temporal and spatial fluctuation of online public opinion, confirmed that the regional attributes of physical space affect the expression of public opinion in information space through the role of "mutual inductance coupling." This finding provides a theoretical basis for the IP location analysis in this study.[4] However, existing research has two limitations: First, it mostly focuses on major emergencies, lacking specialized discussion in the consumer field. Second, regional division is relatively rough, failing to conduct refined analysis combined with differences in consumption structure.

2.4. Basis for Research on Consumer Rights Issue Classification

Topic classification forms the foundation of public opinion research, yet existing systems in consumer rights protection—such as those based on products and services—fail to adequately address digital-era issues like algorithmic infringement or reflect regional disparities in complaints. [5] To overcome these limitations, this study constructs a dynamically adaptive five-category topic system, informed by existing frameworks and five years of public opinion data.

3. Research Questions and Research Design

3.1. Research Questions

R1: What is the content evolution trend in the Weibo comment section of the 3·15 Gala from 2021 to 2025? (Diachronic analysis based on word clouds)

R2: How has the emotional tendency of netizens' comments related to the 3·15 Gala changed dynamically over the five years? (Longitudinal comparison based

on sentiment computation)

R3: Are there differences in the emotional tendencies of comments from netizens of different IP locations? Which regions have more positive/negative emotions? (Correlation analysis between IP location and sentiment)

R4: Do netizens from different IP locations have different attention preferences for the five types of consumer rights issues? What are the core issues of concern for each location? (Matching analysis between IP location and topic classification)

3.2. Research Design and Data Sources

1) Research Methods

Word Cloud Analysis: Use the Python jieba word segmentation tool to segment the comment content each year, generate annual word clouds, and identify content evolution trends through changes in high-frequency words.

Sentiment Analysis: Based on the Bert sentiment dictionary, and this study selected 500 comments for positive and negative sentiment scoring to further improve the dictionary, calculate the proportion of various emotions each year, and compare the emotional dynamics over five years.

Topic Classification Coding: Refer to existing research and the key exposure points of the 3·15 Gala to divide comment content into five categories: product feature discussion, service quality evaluation, emotional expression, user experience feedback, and policy and regulation discussion. Complete classification through dual coding (Kappa coefficient ≥ 0.85 , ensuring reliability), then correlate with IP location to analyze attention preferences.

2) Data Sources and Selection

Target Platform and Sample Scope: Select the comment sections of posts related to the 3·15 Gala from "blue-V media official accounts" on Weibo (e.g., CCTV News, People's Daily, etc.) to ensure sample authority and representation of public opinion.

Time Span: March 15, 2021, to March 20, 2025 (covering the public opinion cycle "before-during-after" each year's 3·15 Gala to avoid short-term public opinion bias).

Data Collection and Cleaning: Collect comment content, interaction data (number of likes, replies), user IP location, and publication time through Python crawler tools; after removing advertisements and duplicate content, finally retain 9,926 valid samples (about 1,985 per year on average).

4. Empirical Analysis Results (Heading 4)

4.1. Analysis of Comment Content Evolution Trend from 2021 to 2025 (R1)

1)2021: Prominent Pain Points in Rights Protection Amid Explosive Growth of Online Consumption (see Figure 1)

Amid the digital economy's rapid growth, online consumption expanded explosively in 2021, yet supporting services and regulations lagged behind, highlighting a

growing mismatch between new consumption models and outdated safeguards.



Figure 1. Word Cloud Map for 2021

2)2022: Food Safety Issues Triggered High Social Concern (see Figure 2)

The 2022 “soil-pit pickled vegetables” incident, emerging amid the food industry’s post-pandemic recovery, exposed unsafe corporate practices and sparked public demand for stricter oversight and higher penalties to ensure food safety.



Figure 2. Word Cloud Map for 2022

3)2023: Evolution of Fraud Methods and Rise of Emotional Consumption in New Consumption Scenarios (see Figure 3)

The rise of social platforms and live-streaming has made emotional consumption a growing market hotspot, but also a new breeding ground for fraud, raising public concern about new types of consumer infringement.

er-standard products and services and support a more robust rights protection system through "woodpecker-style" supervision.



Figure 5. Word Cloud Map for 2025

6) Overall Evolution Trend

Between 2021 and 2025, the evolution of consumer comments reflects broader social developments—including digital economic growth, shifting livelihood needs, and consumption upgrades. The focus of public discourse has progressed from basic rights protection and food safety incidents to preventing new types of infringement and emphasizing higher quality and corporate responsibility during economic recovery. This shift illustrates a fundamental change in public concern: from the availability of consumption options to the quality and safety of consumption experiences and protections.

4.2. Dynamic Analysis of Sentiment in Comments (2021-2025) (R2)

As shown in Table 1, a score of 0.5 represents a neutral sentiment—with values approaching 0 indicating a more negative stance. The mean sentiment scores across these five years were all significantly below 0.5, which demonstrates that the overall sentiment tendency of comments remained relatively negative during the 2021-2025 period.

Table 1. Detailed table of the mean and standard deviation of emotional scores for each year

Year	Mean	Standard Deviation
2021	0.178694	0.024486
2022	0.178277	0.019052
2023	0.181972	0.021754
2024	0.180387	0.019318
2025	0.179281	0.021264

From 2021 to 2025, the mean sentiment values remained consistently within a narrow range of 0.178 – 0.182, indicating stable yet overall negative sentiment throughout the period. The slightly higher mean in 2023 (0.181972) and lower value in 2022 (0.178277) reflect yearly variations in negativity intensity. Standard deviation was highest in 2021 (0.024486), showing dispersed sentiment, and lowest in 2022 (0.019052), suggesting more consistent negativity among commentators. These subtle fluctuations may be linked to annual events and social conditions, underscoring the need for enterprises and institutions to address underlying public concerns.

4.3. Correlation Analysis Between IP Geographic Location and Comment Sentiment Tendency (R3)

As shown in Figure 6, based on the description of experimental results visualized in the Chinese map, we can conduct an analysis from dimensions including IP geographic location (divided by administrative divisions such as provinces and autonomous regions), comment negative scores, and the number of comments posted. The total score is set at 50, where a higher score indicates more negative comments; meanwhile, a redder color represents a larger number of comments posted.

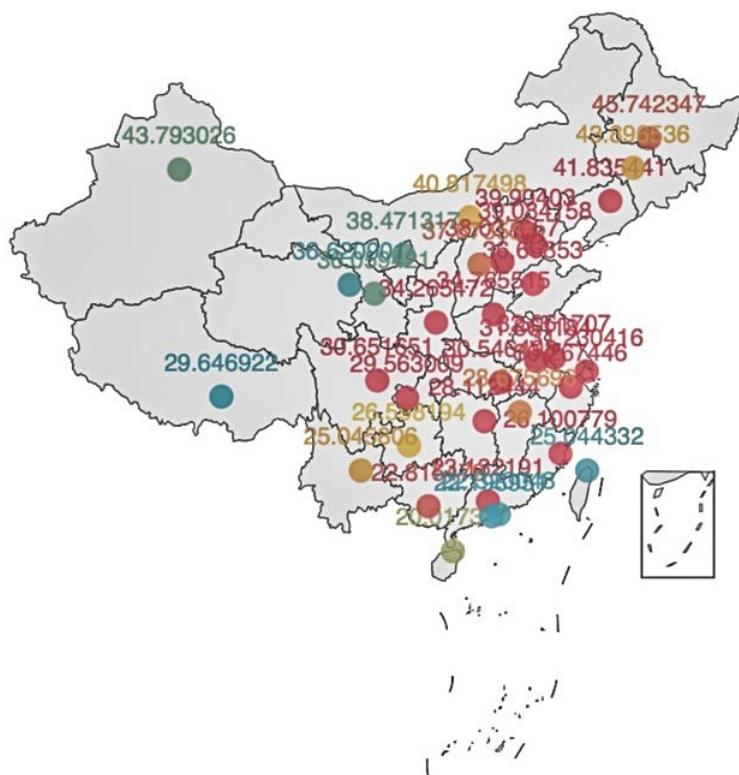


Figure 6. The correlation graph between IP location and comment sentiment tendency

Negative sentiment scores vary significantly across regions—for example, Xinjiang

shows a notably high score of 43.79—yet no clear spatial pattern emerges, indicating that localized issues rather than regional traits primarily drive negative expressions. Eastern regions post substantially more comments, but this volume does not correlate strongly with higher negativity, reflecting diverse sentiment tendencies amid higher digital activity. These findings highlight the need for region-specific analysis of topic content to identify root causes of dissatisfaction and tailor public response strategies accordingly..

4.4. Correlation Analysis Between IP Geographic Location and Attention Preference for the Five Types of Topics (R4)

As shown in Figure 7, eastern regions such as Zhejiang, Guangdong, and Beijing show stronger attention to product characteristics and policy discussions, with Beijing reaching around 0.35 in policy focus due to its political centrality. In contrast, central and western provinces like Henan and Sichuan exhibit higher concern with service quality and emotional expression, likely influenced by their traditional service industries and relational social culture. Notably, Hainan demonstrates a particularly high concentration on service quality evaluation—approximately 0.30—reflecting its reliance on tourism where service standards directly impact visitor experience and economic development. These patterns reveal clear regional variations in consumer topic attention shaped by local economic structure and social characteristics.

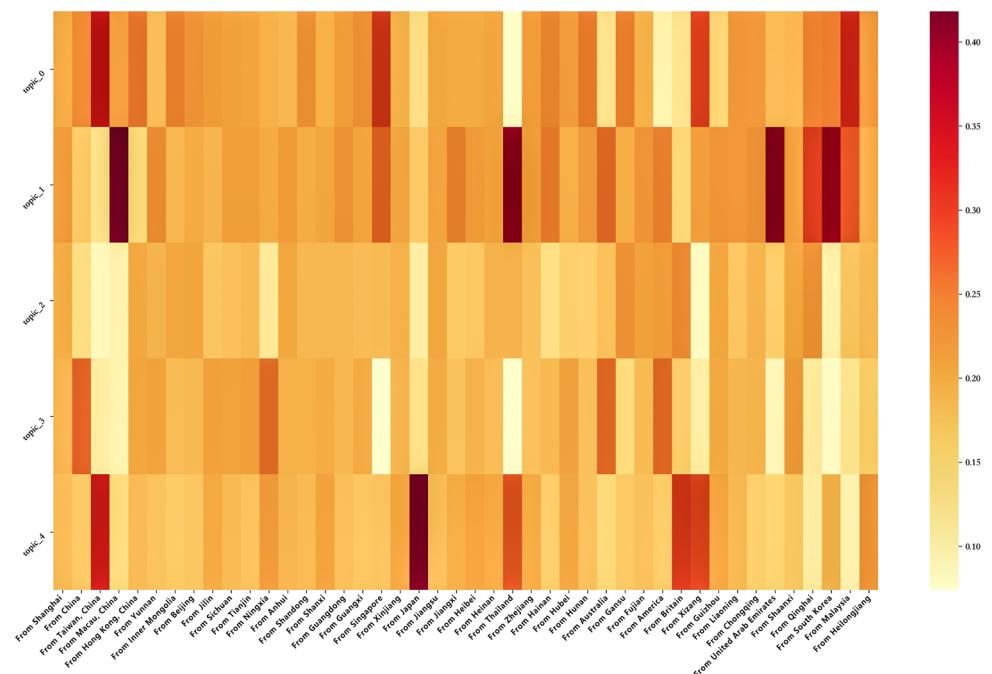


Figure 7. The correlation graph between IP location and comment sentiment tendency

5. Empirical Analysis Results

5.1. Core Research Conclusions

From 2021 to 2025, consumer rights protection topics shifted significantly from physical issues to digital infringements such as algorithmic discrimination and AI fraud. Public sentiment initially declined but briefly improved following policy interventions, though it rebounded as new forms of digital infringement emerged. Regionally, central and western areas showed stronger negative sentiment linked to traditional quality and service issues, while eastern regions responded more adaptively to digital challenges. Topic attention also varied geographically, with eastern provinces focusing more on digital and policy issues, central and western regions on traditional service quality, and Hainan emphasizing tourism-related service evaluation.

5.2. Dynamic Optimization Path for Regulatory Policies

Based on the evolution of consumer rights topics from physical to digital, regulatory priorities should be dynamically adjusted to address emerging issues such as AI and algorithmic discrimination through an annual mechanism updated with the latest complaint data. Regionally differentiated supervision must be implemented, focusing on traditional product quality in central and western regions and digital consumer protection in the eastern regions. Policy responses should align with sentiment dynamics, accelerating regulation during periods of high negativity and disclosing enforcement progress to guide public opinion. Finally, a region-topic database can help local authorities tailor efforts to provincial characteristics, such as enhancing tourism service mechanisms in Hainan.

5.3. Research Limitations and Future Prospects

1) Research Limitations

The data in this study was sourced solely from the comment sections of Weibo Blue V accounts. Influenced by the "curated comments" mechanism, the comment content may be selective and cannot fully represent the true opinions of all netizens. Additionally, IP geographic location data only covers the provincial level (not refined to prefecture-level cities), making it difficult to analyze public opinion differences in smaller geographic scopes with greater precision.

2) Future Prospects

In the future, data sources can be expanded to include multiple platforms such as Douyin and Xiaohongshu, collecting a wider range of content related to consumer rights protection to enrich the dataset. Simultaneously, combining more granular geographic data (e.g., prefecture-level city data) will enable deeper exploration of the "region-public opinion-policy" linkage mechanism. This includes investigating the characteristics of consumer rights protection public opinion in different prefecture-level cities and their interaction with local policies, providing a basis for formulating more precise regulatory policies.

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