

Analysis of Online Public Opinion on Ecological Issues in Guangxi Based on the LDA Model

Risheng Chen, Jingjing Wu

School of Foreign Languages, Guilin University of Technology, Guilin, Guangxi, 541000, China

Abstract

As ecological issues become increasingly severe, public attention and discussions on environmental protection topics have been widely spread through online platforms. This paper focuses on the online public opinion regarding water pollution issues in Guangxi, using video comments from Douyin and Bilibili as the data source. The LDA model is employed to extract the opinion topics, and sentiment analysis tools are used to explore the differences in public emotional tendencies. The study finds that there is little difference in the proportion of positive emotions in the comments on Douyin and Bilibili, while the proportion of negative emotions on Douyin is significantly higher than on Bilibili. Douyin comments tend to express emotions in a more sensational manner, while Bilibili comments place more emphasis on rational discussion and in-depth analysis. The study suggests that factors such as user age, platform comment mechanisms, information dissemination speed, and platform algorithms could be the possible causes of the differences in public opinion tendencies between the two platforms. The paper also discusses the impact of policy factors, media factors, and public participation on online public opinion and provides corresponding suggestions to guide opinion regulation bodies in managing online public sentiment.

Keywords

Online Public Opinion; Water Pollution; LDA Model.

1. Introduction

1.1. Research Background and Significance

As a fundamental national policy of China, ecological and environmental protection plays a crucial role in ensuring the green, healthy, and sustainable development of ethnic minority regions (Liao & Li, 2017). Guangxi serves as a vital ecological barrier in China, boasting unique biodiversity and abundant natural resources (Guo, 2024). However, in recent years, due to factors such as agricultural expansion, excessive mining, and tourism development, the quality of the ecological environment has been continuously declining, and ecological issues have become increasingly prominent. These challenges not only threaten the stability of local ecosystems but also pose severe risks to regional economic development and residents' quality of life.

According to the 55th Statistical Report on China's Internet Development released by the China Internet Network Information Center, 2024 marks the 30th anniversary of China's full access to the global Internet, with the number of Internet users reaching 1.108 billion and an Internet penetration rate of 78.6% [3]. In the digital era, online public opinion analysis has emerged as an innovative research method in the social sciences. Leveraging big data technologies, it can capture public attention on environmental issues, emotional tendencies, and topic distributions, providing essential decision-making references for ecological governance. Driven by mainstream social platforms such as Weibo, Douyin, Bilibili, and Kuaishou, online public opinion has profoundly influenced public perceptions and attitudes toward social issues. These

platforms not only serve as entertainment hubs but have also gradually evolved into key arenas for public opinion expression and societal discussions (Chen & Huang, 2018). As a leading short-video platform, Douyin caters to the social, entertainment, and informational needs of diverse age groups, reflecting both its broad public reach and the complexity of its user base (Sun & Wu, 2025). With a powerful algorithm-driven recommendation system, Douyin can swiftly disseminate trending topics to a vast audience, generating significant public opinion influence. Although Bilibili initially focused on entertainment and anime culture with limited public engagement, its content has diversified in recent years. In particular, discussions on social issues have gained traction, attracting a growing number of young users to participate.

Given the differences in user demographics between Douyin and Bilibili, a comparative analysis of these two platforms holds substantial practical and academic significance. By analyzing data from these platforms, this study effectively captures how users from different age groups and cultural backgrounds engage with ecological issues, revealing public attitudes, emotional tendencies, and cognitive depth regarding environmental concerns. In Guangxi, a region rich in natural resources, discussions surrounding ecological issues may be particularly prominent. Online public discourse not only reflects societal awareness of ecological problems but also serves as a valuable reference for government agencies and environmental organizations. A deeper understanding of public concerns and demands can facilitate more effective ecological problem-solving, contributing to sustainable development and environmental governance.

1.2. Research Status

Currently, there is a wealth of research on online public opinion conducted by scholars both domestically and internationally. For instance, Wang Xiwei et al. (2018) used the topic of the "Ya'an Earthquake" on Sina Weibo as a data source and employed social network analysis methods to explore the dissemination pathways and network structures of online public opinion regarding natural disasters in the new media environment. Li Yanling et al. (2025) analyzed Weibo discussions on the "7.20" Henan Zhengzhou catastrophic rainfall event, focusing on the thematic evolution of public opinion across different life cycle stages of emergencies and how shifts in public sentiment influenced topic evolution. Zeng Ziming and Chen Siyu (2023) collected Weibo posts related to virus mutation discussions, utilizing the LDA model to extract latent topics and keywords from different stages of public opinion, analyze topic evolution trends, and construct the BEBA model to examine sentiment characteristics and evolutionary patterns at various stages of public opinion. Resch et al. (2018), using earthquake-related discussions on Twitter in the United States as a case study, proposed a novel method combining the LDA topic model and spatiotemporal analysis to assess disaster footprints and damage, providing timely information support for disaster management. Bruno Takahashi et al. (2015), from the perspective of public opinion dissemination, analyzed Twitter's crucial role during typhoon events in the Philippines. From these studies, it is evident that current research on online public opinion predominantly focuses on public health emergencies and sudden natural disasters, with relatively limited exploration of ecological issues. Moreover, media platforms for public opinion analysis differ significantly across regions—domestic research primarily relies on Sina Weibo, while international studies favor Twitter. Thus, this study focuses on online public opinion regarding ecological issues in Guangxi, using Douyin and Bilibili as data sources to extract the key topics related to "Guangxi water pollution." By comparing the emotional trends across these two platforms, this study aims to analyze the underlying causes, summarize the influencing factors of online public opinion on ecological issues, and propose relevant recommendations.

2. Overview of Ecological Issues in Guangxi

2.1. Characteristics of Ecological Resources in Guangxi

Located in southern China, Guangxi possesses a unique geographical position and diverse topographical conditions, forming a rich and distinctive ecological resource system. Renowned for its picturesque landscapes, Guangxi features an abundance of mountains, hills, rivers, and lakes. The extensive distribution of karst landforms further distinguishes Guangxi from other regions in China. The province's karst topography has given rise to striking natural phenomena such as stone forests, caves, and underground rivers, which not only contribute to its breathtaking scenery but also foster a rich network of hydrological resources. With an intricate river system that includes major waterways such as the Gui River and the Li River, Guangxi enjoys an ample water supply that sustains local ecosystems while supporting agricultural irrigation and urban water consumption.

Guangxi also boasts a high forest coverage rate, with vast expanses of primary and secondary forests. These forests play a vital role in maintaining ecological balance, regulating climate, and sequestering carbon, while simultaneously providing habitats for a diverse range of flora and fauna. As one of China's key biodiversity hotspots, Guangxi is home to numerous rare plant and animal species, as well as unique microbial communities. This biodiversity not only serves as an invaluable resource for scientific research but also generates significant economic and social value in areas such as tourism and ecological conservation.

Beyond its ecological richness, Guangxi's natural resources hold considerable cultural and societal significance. With a long history and a diverse ethnic cultural background, Guangxi seamlessly integrates its natural landscapes with cultural heritage, forming a distinctive "mountain-water culture." This cultural essence is deeply embedded in local traditions, daily life, and festive celebrations, further reinforcing ecological conservation and sustainable resource utilization. In recent years, Guangxi has actively promoted green and sustainable development, capitalizing on its abundant natural resources and strong ecological advantages to achieve remarkable progress in eco-tourism and ecological agriculture (Guo, 2024). By developing green tourism and ecological agriculture, Guangxi not only enhances the protection of its natural environment but also leverages its ecological resources to drive economic growth and social benefits.

2.2. Major Ecological Issues in Guangxi

Despite its abundant ecological resources and unique natural environment, Guangxi faces increasingly severe ecological challenges due to rapid economic and social development, as well as intensified human activities. In recent years, the acceleration of industrialization and urbanization in Guangxi has resulted in the direct discharge of large volumes of untreated industrial and domestic wastewater, leading to severe water pollution in certain areas (Zhao & Huang, 2014). The deterioration of river and lake water quality not only affects the safety of residents' drinking water but also poses a threat to aquatic organisms and the entire ecosystem. In addition to water pollution, air pollution and soil contamination have also adversely impacted the local ecological environment. In some industrial zones and densely populated urban areas, the concentrations of suspended particulate matter and hazardous gases are relatively high, posing risks to public health and ecological balance. Although Guangxi maintains a high forest coverage rate, the long-term overexploitation of forest resources has led to serious ecological consequences. Large-scale deforestation of natural forests to cultivate fast-growing eucalyptus plantations has disrupted vegetation structures and weakened ecological functions. This has resulted in the degradation of forest vegetation and has jeopardized the stability of mountain ecosystems (Tang, 2010). The degradation of forest resources has reduced the stability of regional ecosystems, weakening the forests' functions in

carbon sequestration, windbreaks, desertification prevention, and soil and water conservation. Guangxi is also one of the regions in southwestern China frequently affected by natural disasters (Zhao & Huang, 2014). Due to the effects of climate change, extreme weather events such as heavy rainfall, floods, and droughts have become more frequent. For instance, in June 2024, torrential rains triggered the largest flood in Guilin since 1998, causing urban waterlogging, the closure of tourist attractions, and the suspension of train and high-speed rail services. This not only endangered lives and property, destroyed farmland and residential areas, but also led to the discharge of large amounts of agricultural pollutants and domestic waste into water bodies, exacerbating water pollution. On the other hand, prolonged droughts have resulted in water shortages, further affecting the survival conditions of flora and fauna within the ecosystem. The increasing frequency of extreme weather events underscores the growing impact of climate change on Guangxi’s ecology, with long-term and far-reaching consequences for its ecosystems.

Given the interwoven ecological challenges, Guangxi urgently needs to implement scientific and effective governance measures. The internet serves as a crucial channel for the government to listen to public concerns. Through social media platforms such as Douyin and Bilibili, the public can rapidly disseminate videos and information related to ecological issues, creating a public opinion aggregation effect. Public attention and expressions of concern regarding ecological problems not only foster widespread social discussions but also drive governmental and corporate actions. For instance, certain videos on Douyin exposing environmental pollution have sparked strong reactions, with netizens sharing their experiences and concerns about environmental issues in the comment sections, demanding improvements in environmental protection measures. The widespread dissemination and feedback of online public opinion not only raise social awareness of ecological issues but also prompt relevant authorities to enhance their environmental policies and measures.

3. Research Design

3.1. Overview of the LDA Model

Latent Dirichlet Allocation (LDA) is a widely used topic modeling technique applied in text mining, sentiment analysis, information retrieval, and recommendation systems. It is particularly useful for processing large-scale text data, as it automatically extracts latent topics from documents, unveiling the underlying structure of textual information. LDA is an unsupervised learning algorithm based on Bayesian inference, aiming to derive topic distributions from a large corpus and assign a topic model to each document (Bleidm & Ngay, 2003). As illustrated in Figure 1, LDA assumes that each document consists of multiple topics, with each topic represented by a set of characteristic words. By hypothesizing the generative process among documents, topics, and words, LDA constructs a Bayesian framework to infer the topic distribution of each document. Through probabilistic inference, LDA ultimately assigns a topic distribution to each document and identifies a set of high-probability words for each topic, providing a structured representation of text data.

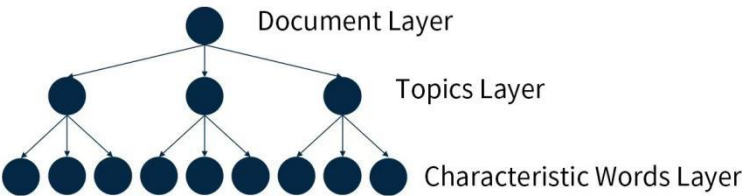


Figure 1: The LDA Model Structure

The strength of the LDA model lies in its ability to automatically uncover latent topics within texts, reducing the need for manual annotation while providing a systematic analytical framework. In the analysis of online public opinion on social media platforms, LDA helps researchers extract core issues and key information from large volumes of comments, identify different discussion topics, and analyze public sentiment trends and focal points of concern.

3.2. Data Collection and Cleaning

This study collects comment data on the topic of "Guangxi Water Pollution" from Douyin and Bilibili using web scraping techniques in a Python 3.13 environment. The data collection period spans from 2021 to 2024, covering comments from relevant videos posted during this timeframe. The collected data fields include user ID, comment timestamp, and comment content. Given the difference in data volume across platforms, approximately 53,000 words of comment data will be extracted respectively from Douyin as well as Bilibili for analysis.

To improve the accuracy and effectiveness of text mining (Yang, Wang, & Hou, 2019), data cleaning is required after data collection. This study employs Python 3.13 and PyCharm as the primary tools for data preprocessing, following these steps:

Removing irrelevant or non-analyzable data – Eliminating fields such as usernames, timestamps, emojis, and special characters.

Storing valid comments – The cleaned comments are saved as text files in UTF-8 format for further processing.

Building a stopwords list – A stopwords list is created in UTF-8 format to remove high-frequency but meaningless words during analysis.

Text segmentation – Jieba and Pandas libraries are downloaded for word segmentation.

Executing segmentation – The segmentation code is executed in PyCharm, with necessary parameter adjustments, to generate structured text data for LDA topic modeling.

3.3. Data Processing and Application

Once text segmentation is complete, the LDA topic modeling code is run using PyCharm, with the scikit-learn and pyLDAvis libraries downloaded for model implementation. Necessary parameters are modified before executing the code to obtain topic modeling results.

4. Characteristics of Online Public Opinion on Guangxi's Ecological Issues

4.1. Selection of Topic Numbers

Figures 2 and 3 illustrate the changes in perplexity and coherence scores with varying topic numbers for Douyin and Bilibili, respectively.

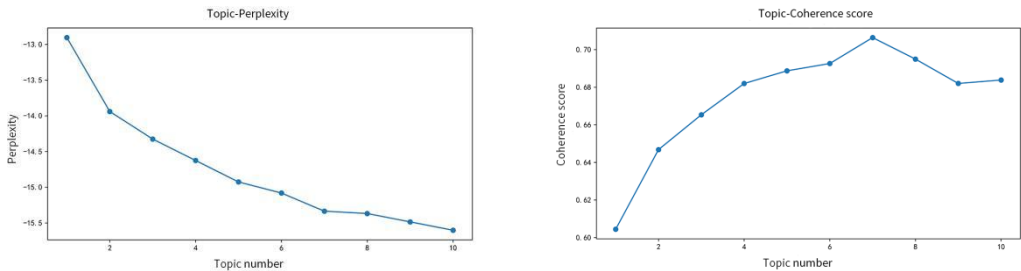


Figure 2: Changes in Perplexity and Coherence Score for Douyin

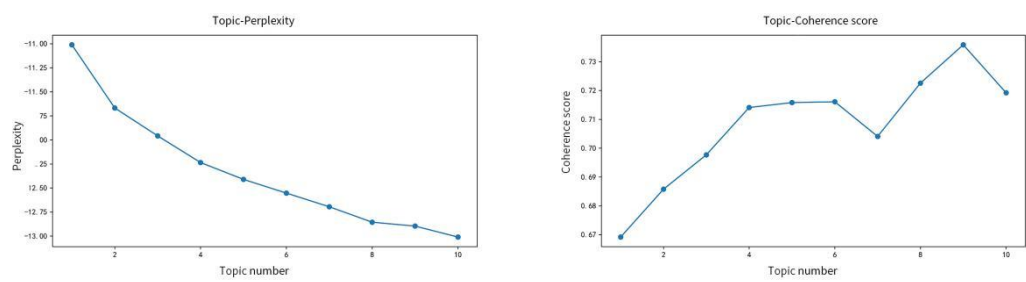


Figure 3: Changes in Perplexity and Coherence Score for Bilibili

As shown in Figure 2, the coherence score reaches its peak when the topic number is set to 7 for Douyin. Similarly, Figure 3 indicates that the highest coherence score for Bilibili is achieved at 9 topics. Therefore, the optimal number of topics is determined to be 7 for Douyin and 9 for Bilibili.

4.2. Topic Discovery in Online Public Opinion on Guangxi’s Ecological Issues

To visualize the results of topic modeling, pyLDAvis was used to generate bubble charts. The X-axis (PC1) and Y-axis (PC2) represent the mapping of topics onto a two-dimensional space using multidimensional scaling. This visualization allows for the observation of similarities and differences between topics. Each bubble represents a topic, and the distance between bubbles reflects their semantic similarity—the closer they are, the more similar the topics; conversely, greater distances indicate greater differences. The size of each bubble corresponds to the frequency of the topic in the dataset, with larger bubbles indicating a higher proportion of documents associated with that topic. As shown in Figures 4 and 5, the topics exhibit both distinctions and overlaps.

Finally, a locally deployed deepseek-r1:8b model was used to identify keywords in each topic and assign topic labels. The identified topics related to online public opinion on water pollution from Douyin are presented in Table 1, including social opinion, social supervision, corporate responsibility, sewage discharge, corruption, social responsibility, and misconduct. The topics from Bilibili are summarized in Table 2, covering rural sewage management, water pollution, public safety, water pollution management, public sentiment, environmental supervision, water source protection, wastewater treatment, and technical approaches.

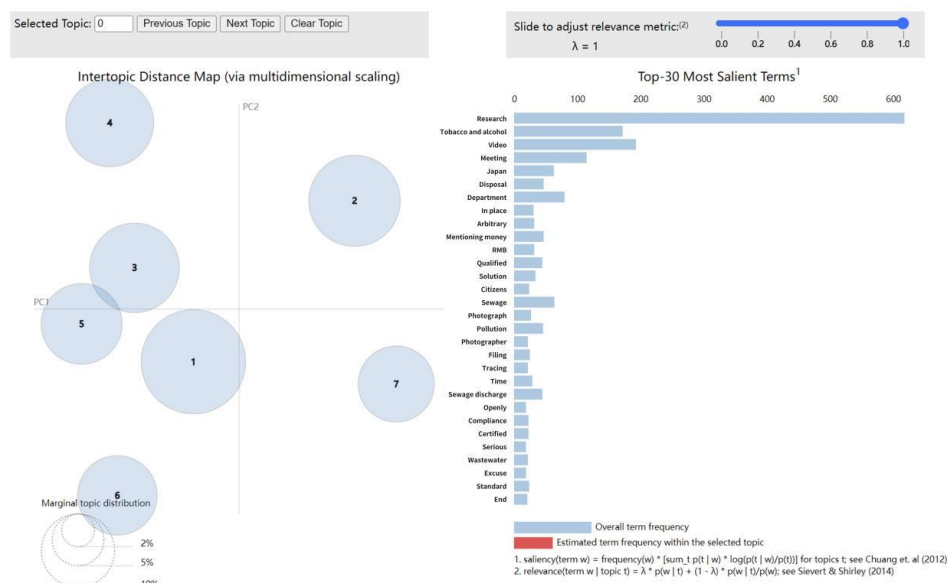


Figure 4: pyLDAvis Visualization of Douyin Data

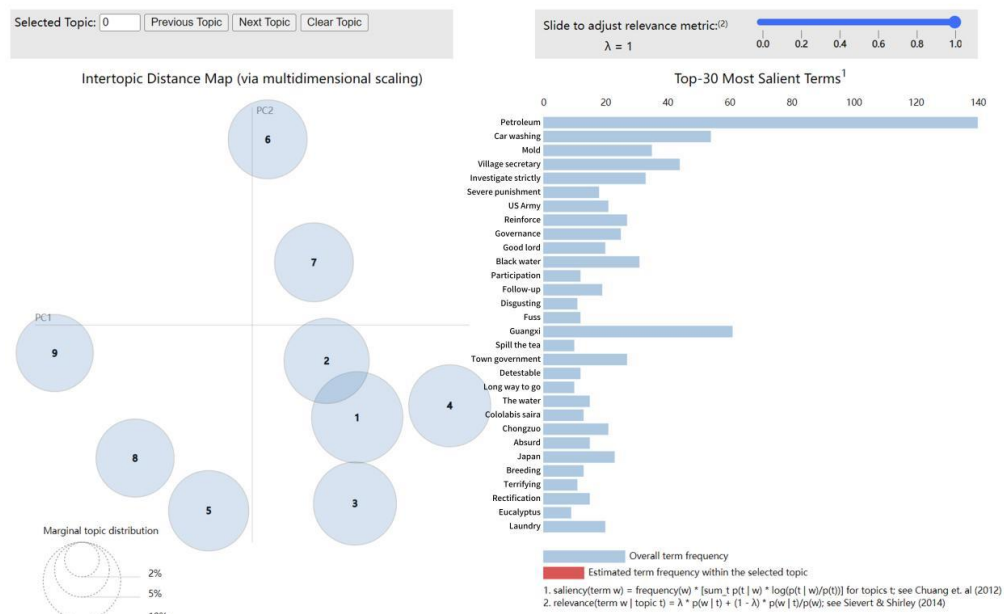


Figure 5: pyLDAvis Visualization of Bilibili Data

Table 1: Topics of Water Pollution Comments on Douyin

Topic	Topic Label	Keywords
Topic1	Social Opinion	Research, Ordinary people, Sentencing, Reason, Exposure, News, Video, Department, Deal seriously, Meeting, Influence, Rumor, Unit, Report, Citizens
Topic2	Social Supervision	Tobacco and alcohol, RMB, Pay , Fine, Qualified, Snapshot, Severe punishment, Tip-off, Legal Inspection, Coverage, Sewage, Public, Compliance, Life
Topic3	Corporate Responsibility	Video, Department, Research, Pollution, Photograph, Certified, End, Rain, Protection fee, Environmental protection, Compliance, Emission, Illegal discharge, State-owned enterprise, Enterprise
Topic4	Sewage Discharge	Japan, Sewage, Sewage discharge, Emission, Filing, Standard, Wastewater, Monitoring, Drinking, Water quality, Investigation, Nuclear discharge, Environmental protection, Law, Destruction
Topic5	Corruption	Disposal, Arbitrary, Solution, Tracing, Reason, Bribery, Discussion, Stance, Admission, Delaying, Time, Settlement, Negotiation, Life, Mentioning money
Topic6	Social Responsibility	Meeting, Citizens, Excuse, Tax payment, Exposure, Farmers, Research, Sentencing, Punishment, Silt, Compliance, Straw burning, Sewage discharge, Environmental protection, Discharge to sea
Topic7	Misconduct	In place, Qualified, Unlucky, Upstream, Openly, Scapegoating, Drainage, Guangxi, Unsupervised, Leakage, Secretly, Severe punishment, Pollution, awesome, Straw burning

Table 2: Topics of Water Pollution Comments on Bilibili

Topic	Topic Label	Keywords
Topic1	Rural Sewage Management	Village committee, Village secretary, Murky, Villagers, Town government, Dry season, Water cutoff, Water fees, Pollution, Guangxi, Environmental protection, Sewage, Tap water, Rural, Well water
Topic2	Water Pollution	Car washing, Tap water, Red, Laundry, Rust, Pipeline, Color, Daily, Flood, Water body, Chemical plant, Black and smelly, Investigation, Rusty, Solution
Topic3	Public Safety	Petroleum, Mold, Guangxi, USA, Japan, Absurd, Frightening, Source, Wastewater, Qinzhou, Fuyang, Rumor debunking, Odor, Tap water, Report
Topic4	Water Pollution Management	Solution, Eucalyptus, Water pipes, Fine, Sewage, Tap water plant, Sewage discharge, Rain-sewage separation, Internal, Diversion, Pipeline, Water connection, Crude oil, Follow-up, Village
Topic5	Public Sentiment	Disgusting, Detestable, Guangxi, Liuzhou, Get rich, Toxic, Stinky gutter, Investigation, Brain, Hometown, Happiness, Black, Stench, Disbelief, Originally
Topic6	Environmental Supervision	Governance, Sewage, Spill the tea, Long way to go, Water source, Pollution, Groundwater, Accountability, Tap water pipes, Environment, Coal washing plant, Town government, Sewage discharge, Nuclear radiation, Protection
Topic7	Water Source Protection	Severe punishment, Qualified, Mineral water, Heavy rain, Soil erosion, Water source area, Country, Environmental protection, Enterprise, Effort, Attention, Biochemical crisis, Interests, Pristine, Geography
Topic8	Wastewater Treatment	Rectification, Terrifying, Reason, No rain, Guangxi, Sewage, Sewage discharge, Pollution, Black, Coal mine, Liquid, Dosage, Feedback, Capacity, Wastewater treatment
Topic9	Technical approaches	Enhancement, Expert, Geological exploration, Technology, Biology, Factory, Sewage, Rising water, River water, Harmless, Recycling, Filtration, Stage, Sludge, Separation

A comparative analysis of the topics and keywords discussed by users on both platforms reveals some commonalities, particularly regarding accountability for pollution sources and criticism of systemic deficiencies. For example, Douyin's Topic 3 (Corporate Responsibility) and Bilibili's Topic 6 (Environmental Supervision) highlight the public's persistent focus on pollution perpetrators. Similarly, Douyin's Topic 4 (Sewage Discharge) and Bilibili's Topic 3 (Public Safety) use keywords such as "Japan," "United States," "source," and "wastewater", reflecting nationalistic sentiments and concerns over pollution sources.

From Table 1, it is evident that Douyin users tend to discuss water pollution issues from a socio-political perspective, focusing on public opinion dynamics, regulatory conflicts, and corruption. In Topic 1 (Social Opinion), high-frequency words like "sentencing," "exposure," and "rumors" indicate skepticism toward government transparency in handling pollution incidents, alongside widespread irrational information dissemination. Topic 5 (Corruption) features

words such as “bribery,” “delaying,” and “settlement”, revealing public suspicions of power-money transactions in grassroots governance, indirectly criticizing local law enforcement inefficacy. These themes suggest that Douyin users are more engaged in the social ramifications and power game surrounding pollution incidents, often expressing distrust toward both government and corporations through emotional discourse, as evidenced by terms like “unlucky” and “awesome”, which has obvious adversarial narrative characteristics.

In contrast, Bilibili users focus on technical approaches and systemic solutions for pollution control, demonstrating greater professionalism and constructiveness. Topic 1 (Rural Sewage Management) includes words such as “village committee,” “water fees,” and “well water”, pointing to concerns over rural infrastructure shortcomings. Topic 9 (Technical Approaches) contains terms like “geological exploration,” “harmless,” and “separation”, showing the depth of user groups' cognition of pollution treatment technology. Topic 7 (Water Source Protection) incorporates interdisciplinary terms such as “soil erosion” and “pristine ecology”, implying that some participants possess knowledge in environmental sciences. Although Topic 5 (Public Sentiment) includes negative expressions like “disgusting” and “Stinky gutter”, they often co-occur with terms such as “investigation” and “hometown”, indicating a blend of emotional expression and rational appeals.

4.3. Sentiment Analysis

Using GooSeeker's sentiment analysis tool, we processed comment data on water pollution from Douyin and Bilibili, obtaining the respective sentiment distribution results. As shown in Figures 6 and 7, on the Douyin platform, positive sentiment accounts for 29.33%, negative sentiment for 25.61%, and neutral sentiment for 45.06%. In contrast, on Bilibili, positive sentiment accounts for 27.96%, negative sentiment for 17.55%, and neutral sentiment for 54.49%. This indicates that while the proportion of positive comments on both platforms is relatively close, Douyin exhibits a significantly higher percentage of negative comments compared to Bilibili.

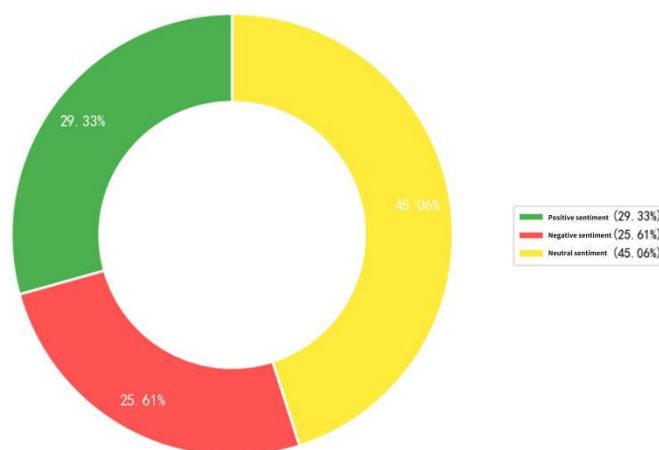


Figure 6: Sentiment Distribution of Water Pollution Comments on Douyin

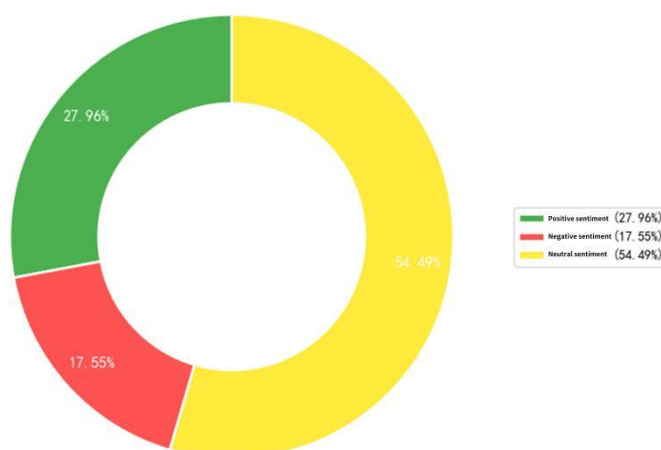


Figure 7: Sentiment Distribution of Water Pollution Comments on Bilibili

Several factors may contribute to this discrepancy:

User Demographics

According to Liu Yan (2024), Bilibili has a higher proportion of post-2000s and post-1990s users, making it a youth-centric, multicultural platform where users tend to adopt an analytical and critical perspective on ecological issues. While negative comments do exist on Bilibili, users are more inclined toward rational expression and often incorporate policy discussions or data analysis, resulting in a relatively lower proportion of negative sentiment. In contrast, Douyin has a larger share of users from lower-tier markets, where firsthand exposure to livelihood issues triggers more emotional responses.

Differences in Comment Mechanisms and Information Dissemination

The comment system and speed of information dissemination on the two platforms may also influence sentiment distribution. Douyin's 15-second short videos encourage fragmented information consumption and make it easier to amplify conflicts. When addressing serious topics like water pollution, users may resort to more extreme or exaggerated emotional expressions, leading to a higher percentage of negative comments. In contrast, Bilibili's longer videos (averaging 12 minutes) allow content creators to delve deeper into issues, fostering a more rational discussion environment.

Algorithmic Influence on Public Opinion

The recommendation mechanisms of both platforms also play a crucial role. Douyin's algorithm prioritizes content based on metrics such as click-through rate and completion rate (Wang & Huang, 2024). As a result, its traffic distribution system favors high-engagement content, making topics with strong emotional tags like "sentencing" and "corruption" more likely to go viral, sparking widespread discussion. Given Douyin's diverse user base, the presence of negative comments infused with emotional intensity is inevitable. Since 2020, Bilibili has been transitioning away from its traditional association with ACG content in an effort to establish itself as a knowledge-sharing platform. Currently, Bilibili features multiple content categories, with its "Knowledge" section being particularly prominent (Sun & Hu, 2025). This algorithmic weighting system prioritizes the visibility of professional content, such as "technical approaches" and "water source protection", catering to an audience that values content depth and quality. This creates a positive feedback loop, encouraging rational discussions over emotional reactions. Consequently, when confronted with negative news, Bilibili users are more likely to engage in objective reflection and discussion—though dissatisfaction is expressed, it tends to be more rational and measured, resulting in a lower proportion of negative comments.

5. Factors Influencing Online Public Opinion on Ecological Issues

5.1. Policy

An effective policy plays a crucial role in shaping the direction of online public opinion. Government environmental policies and governance measures not only directly influence public perception and attitudes toward ecological issues but also guide online discourse toward rational and constructive discussions through effective policy communication. The transparency and effectiveness of policy implementation determine public trust and satisfaction, which in turn impact the level of online discussion and the emotional tone of public discourse. Public opinion is not merely a collection of private statements, rather, it has an inherently public nature and continuously presents challenges to society (Li, 2024). In the realm of online public opinion, if the public perceives policies as ineffective or lacking transparency, negative sentiment may escalate, potentially leading to widespread social discontent. Therefore, the government must develop forward-looking, scientific, and transparent environmental policies while enhancing their enforceability and supervision mechanisms to positively shape online discourse. Specific policies could include strengthening environmental regulations to ensure legal enforcement, enhancing public environmental awareness through education, increasing funding for ecological conservation, and establishing efficient supervision mechanisms. In addition, publishing policy interpretations and real-time environmental reports can increase transparency and prevent unnecessary public panic caused by delayed or inaccurate information. By fostering positive public discourse, the government can promote a shared social consensus on ecological civilization, ensuring that policies serve as strong guiding forces in shaping online public opinion.

5.2. Media

In the digital age, the landscape of public opinion is increasingly complex (Yin, 2024). As the bridge of information dissemination, the media not only conveys relevant policies and regulations but also acts as a catalyst in the formation, spread, and evolution of public opinion. Consequently, the role and impact of media in shaping online discussions on ecological issues cannot be overlooked. Mainstream media remains a key producer and disseminator of information (Yang, 2024). The stance, depth, and selectivity of media coverage on ecological issues directly influence public perceptions and emotional responses toward environmental topics. Internet-based media, with its rapid dissemination and extensive reach, has become the dominant force in shaping public discourse. However, the rapid advancement of internet technologies has led to the proliferation of self-media, where unregulated actors—in pursuit of traffic and personal gain—sometimes spread misinformation. This not only disrupts the public's access to factual information but also poses a threat to public safety. To ensure responsible reporting on ecological issues, the media should uphold objectivity, fairness, and professionalism, avoiding sensationalism, biased reporting, or unverified information. Doing so prevents unnecessary public panic caused by misinformation while strengthening public trust in media sources, ultimately encouraging broader societal participation in environmental protection. Furthermore, positive media coverage should be leveraged to highlight environmental protection initiatives and achievements, showcase governmental and societal efforts in ecological governance, and promote correct environmental values among the public. By incorporating data visualization and interactive storytelling, the media can further enhance public engagement and awareness, facilitating more rational discussions within the online public sphere.

5.3. Public Participation

The public's engagement and discussions on ecological issues via online platforms reflect societal concerns and demands. Public opinion plays a crucial role in influencing policy

decisions and driving social action. The goals, modes of expression, and organizational forms of public participation in online discourse vary across different demographic groups, such as age and educational background (Yuan, 2023). Some users are prone to emotion-driven reactions, which may lead to excessive rhetoric or the spread of misinformation. This not only derails rational discussions but also exacerbates social anxiety and dissatisfaction regarding ecological issues. Therefore, the public should enhance self-discipline and cultivate a rational approach to expression—continuing to focus on ecological concerns while maintaining a balanced perspective in analyzing and evaluating issues. When encountering negative news related to environmental protection, the public should seek information from multiple sources to avoid extreme reactions caused by biased information. Additionally, individuals are encouraged to actively participate in environmental protection initiatives, support government and social organizations' ecological projects, and promote positive environmental values online. As digital citizens, individuals should adopt a heightened sense of responsibility when posting comments or sharing information to avoid misleading others or inciting unnecessary panic. When engaging in discussions on controversial issues, it is essential to respect diverse perspectives, maintain rational debate, and refrain from personal attacks or malicious criticism. Encouraging constructive discourse and intellectual exchanges fosters a more rational and productive online public opinion environment.

6. Conclusion

This study employs LDA topic model to reveal the differences in user concerns on Guangxi's water pollution issue between Douyin and Bilibili. The findings indicate that Douyin users focus more on public opinion and regulatory issues, whereas Bilibili users tend to discuss pollution control from a technical and professional perspective. Furthermore, sentiment analysis was conducted to examine emotional tendencies in user comments on Guangxi water pollution videos across both platforms. The results indicate similar proportions of positive sentiment on both platforms, but a significantly higher proportion of negative sentiment in Douyin comments compared to Bilibili. This disparity is primarily attributed to differences in user demographics, comment mechanisms, information dissemination speed, and platform algorithms. Additionally, this study explores the influence of policy, media, and public participation on online public opinion. It proposes that effective policy guidance, objective and impartial media reporting, and rational public engagement can foster constructive discussions and contribute to the resolution of ecological issues. However, this study has several limitations. The analysis was based on a limited data sample, focusing primarily on short-form video comments while lacking an examination of long-form discussions. Moreover, the study only applied topic modeling and sentiment analysis without employing more comprehensive public opinion analysis methods. Future research should address these limitations by expanding the dataset, incorporating long-text analysis, and adopting more extensive analytical frameworks to enhance the depth and comprehensiveness of the study.

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