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Research on the Dissemination Model of the Shanghai Metaverse Based on Bilibili Videos

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Abstract

With the continuous development of Virtual Reality (VR), Augmented Reality (AR), and blockchain technologies, the concept of the "Metaverse" has rapidly become a focal point of societal attention since its emergence in 2019. Gaining an in-depth understanding of the dissemination pathways of the Metaverse among the public and conducting systematic science communication and education are crucial for promoting its healthy development. This study takes the Bilibili (B 站) platform as its research field, collecting and analyzing 678 video entries related to the "Shanghai Metaverse" from 2019 to 2025. Utilizing Lasswell's "5W" communication model and integrating Social Network Analysis (SNA), the research conducts an in-depth investigation across five dimensions: communicators, content, channels, audience, and communication effects. The findings reveal that current Metaverse communication content suffers from significant homogenization; communicators are predominantly individual users, with low participation from official institutions and professional organizations; audience feedback is largely neutral or lacking substantive commentary; and the overall communication effectiveness exhibits a declining trend. This study aims to unveil the stage-specific characteristics of Shanghai Metaverse dissemination from a quantitative perspective, providing scientific communication recommendations for government agencies, technology platforms, and educational institutions to support the healthy and orderly development of the Metaverse.

Keywords

Metaverse, Communication, Bilibili

1. Introduction

In recent years, the "Metaverse", as an emerging amalgamation of digital technol-

ogies, has rapidly garnered significant attention from academia, industry, and the general public. Integrating cutting-edge technologies such as Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI), Digital Twins, and Blockchain, it is envisioned as a pivotal form of the next-generation internet. Particularly following the COVID-19 pandemic, the surge in demand for online social interaction and virtual engagement has further propelled the Metaverse from conceptualization towards practical implementation.

Within China, Shanghai, serving as a hub for technological innovation and a "pioneering zone for Metaverse development", has released a series of supportive policies in recent years, fostering the emergence of numerous Metaverse-related scenario applications. Concurrently, Bilibili, as a leading domestic video-sharing and content community platform, has become a vital conduit for Metaverse content dissemination due to its youthful user base, high interactivity, and knowledge-centric community ecosystem.

Existing research has primarily focused on content generation and dissemination strategies within User-Generated Content (UGC). For instance, Li (2024) explored the influencing factors of historical knowledge videos on Bilibili [1], while Li (2024) analyzed the audience reception mechanisms of cultural content on short video platforms. However, empirical research specifically targeting "Metaverse" communication remains relatively scarce. There is a notable lack of data-driven analysis based on social video platforms, let alone systematic research combining Lasswell's "5W Model" with Social Network Analysis.

Therefore, this study selects Shanghai, a representative location in Metaverse development, as its spatial dimension. Leveraging User-Generated Content (UGC) data from the Bilibili platform, key video metadata (including titles, timestamps, view counts, comment content, etc.) were collected using web scraping tools. An analytical framework based on Lasswell's "5W" model was constructed, and Social Network Analysis (SNA) methods were introduced to quantitatively delineate the structural characteristics and evolutionary pathways of Metaverse communication.

This research aims to address the following questions: 1) What constitutes the profile and characteristics of "Shanghai Metaverse" communicators on Bilibili? 2) What discourse themes and network structures emerge from the video content? 3) What are the audience's emotional reactions to such content? 4) What are the overall outcomes and limitations of the communication process? It is hoped that the findings will identify pain points and potential within the communication ecosystem, offering theoretical support and empirical evidence for communication improvements by governments, platforms, and content creators in the future.

2. Theory and Methodology

2.1. Lasswell's "5W" Communication Model

Lasswell's "5W" Communication Model is a foundational theory in the field of communication studies, proposed by Harold Lasswell in 1948. This model deconstructs

the communication process into five key elements: Who (Communicator), Says What (Message), In Which Channel (Medium), To Whom (Audience), and With What Effect (Effect). It facilitates a systematic analysis of communication behavior and its efficacy across different stages, and also provides substantial insights into the investigation of media message perception, affective evaluation, and interaction-based identification [2]. While applicable to traditional mass communication, the model is also adaptable to research on User-Generated Content (UGC) dissemination on digital platforms. Particularly on short video platforms, communicators—ranging from individual creators and corporate accounts to media outlets and government units—influence the cognition and attitudes of specific groups through diverse content packaging and channels. The "5W" model aids researchers in clarifying the chain of responsibility and value within communication acts, providing a structured analytical pathway for empirical research. This model offers a systematic framework for understanding and analyzing communication phenomena.

2.2. Research Methods and Data Collection

Social Network Analysis (SNA) is a quantitative methodology used to investigate social structures and their internal relationships. Based on graph theory, it is commonly employed to examine metrics such as relationship strength, centrality structures, and network density. In recent years, SNA has been widely applied in social media research and topic diffusion studies. In this research, SNA is primarily used for textual analysis of video content [3]. Regarding data collection, this study employed Python scripts to scrape data from Bilibili. Using the search keyword "Shanghai Metaverse", 678 video entries published between January 1, 2019, and May 22, 2025, were collected. The dataset encompasses nine fields: video title, publication time, view count, like count, favorite count, coin contribution count, description, comment content, and publisher information. Furthermore, the GooSeeker [4] text processing tool was utilized for word segmentation and the construction of a keyword co-occurrence matrix to facilitate subsequent content network analysis.

3. Analysis of Shanghai Metaverse Video Data on Bilibili

3.1. Communicator Analysis

The first Metaverse video identified, titled "Metaverse Shanghai City VR Virtual Reality Virtual City Virtual Community Virtual Showroom", was published by the company "BlueView Tech Metaverse" on March 12, 2019. From March 12, 2019, to May 22, 2025, the annual distribution of videos retrieved using the keyword "Shanghai Metaverse" is as follows: 1 (2019), 1 (2020), 83 (2021), 305 (2022), 192 (2023), 79 (2024), and 17 (2025-partial year). This trajectory indicates that Metaverse communication experienced phases of inception, growth, and subsequent decline. Analysis identified five primary types of communicators: Public Service Institutions, Media, Education, Companies, and Individuals. Individual communicators constituted the largest proportion at 62%, with some potentially acting as prox-

ies for companies (disseminating company products/services under a personal identity). The remaining four categories each held relatively smaller but comparable shares, collectively accounting for 38%. Table 1 details the communicator types, representative examples, and illustrative content examples.

Table 1. Examples of communication institutions and contents.

Entity Type	Publisher Name	Content Example (Translated)
Public Service Institution	Shanghai Science and Technology Museum Official Account	Breaking! 2024 Shanghai Science Festival Opens: Premier Metaverse Scientist Red Carpet Show Debuts
	Shanghai Dalai Time Museum	Did Americans Explore the Metaverse in 1970? "Infinite Mirage" Outshines VR Effects
	Shanghai Pudong Science Fiction Association	The 5th Shanghai Science Fiction Film & TV Industry Forum: AI Empowering the Metaverse
Media	DVBCN	2023 Digital Intelligence China Tech Week: Global Metaverse Conference Shanghai Successfully Concluded!
	Jinse Finance	Shanghai Announces First Batch of Major Metaverse Application Scenario Construction Achievements (10 Projects)
	Five Star Sports Info	Tri-Screen Interaction (TV, New Media, Metaverse): Shanghai Virtual Sports Open Pioneers New Sports Formats
Education	Vocational Education Focus	Shanghai Nanhu Vocational & Technical College Successfully Selected for First Batch of Municipal Major Metaverse Application Scenarios
	Shanghai Feifan Continuing Education Institute	Shanghai Game Design Training School—Leveraging UE Engine Advanced Features to Create Unique Metaverse Experiences
	Boli Education	[BOLI Youth Science & Tech Session 7: Sun, June 16th] Shanghai Weekend: Exploring the Metaverse & Data Elements
Company	Lanjing Tech Metaverse	Autostereoscopic 3D, Virtual Reality, Large-Scale VR, Metaverse, Digital Twin
	Unity	2023 Unity Technology Open Day Shanghai·Dark Horse Special Session—"Theater of Tomorrow"
	Huanshen Technology	Pudong Tech Firm—Huanshen Tech Focuses on VR "Software & Hardware": Entering the Metaverse Without "Simulation Sickness"
Individual	Individual	Autostereoscopic 3D + Interactive Play = Super Space-Time Cube #Shanghai Metaverse Experience Pavilion
	Shenhuo Fashion	Shanghai ic Mall: Enjoy a Multi-Universe Christmas Journey
	AMVR Shanghai Direct Sales	Sales of VR equipment, etc.

3.2. Content Analysis

The titles and descriptions of all 678 videos were integrated to form the content corpus. Using the GooSeeker text analysis tool, the corpus underwent word segmentation, automatically generating a co-word matrix. Subsequent visualization analysis of this matrix via SNA software, applying filters for word frequency > 3 and co-occurrence links > 2, yielded the Shanghai Metaverse video content co-word network (Figure 1). Link thickness corresponds to co-occurrence frequency. The analysis reveals that the primary foci within the videos are Digital Twins and Digital Collectibles (NFTs), Metaverse Cultural Tourism, Libraries, and the relationship between the Metaverse and Artificial Intelligence.

To further capture nuanced narratives, we propose a supplemental qualitative analysis of the top 50 viewed videos (top 7.4% by view count). Preliminary observations suggest three recurrent narrative frameworks: 1) Techno-utopianism (emphasizing inevitable technological progress); 2) Critical pragmatism (discussing hardware/ethical constraints); 3) Commercial instrumentalism (prioritizing product promotion). Future research should conduct systematic coding to quantify these patterns and identify gaps in socioeconomic governance discourse.

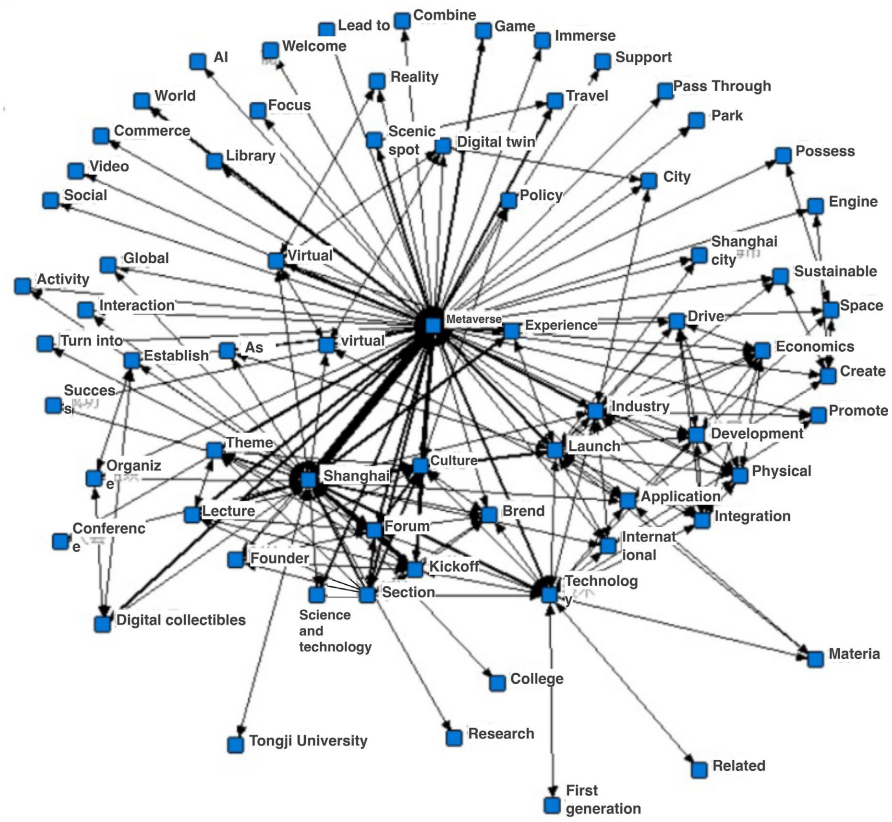

Figure 1. Co-Word network of Shanghai Metaverse video content.

3.3. Channel Analysis

All video data in this study were collected from Bilibili. This platform, characterized

by its strong community attributes, "danmu" (bullet comment) culture, and young user demographics, has become a significant channel for disseminating virtual reality and technology content in recent years. Bilibili's algorithm-driven recommendation system and culture of secondary creation (remixes, parodies, etc.) also offer greater potential for the diffusion of Metaverse content and avenues for creative expression.

Compared to short video platforms like Douyin (TikTok) and Kuaishou, which predominantly feature fragmented entertainment content, Bilibili's videos tend to be more knowledge-oriented and structured [5]. This characteristic is more conducive to presenting and explaining the complex issues surrounding the Metaverse. However, it is also noted that technology videos on Bilibili face a certain "dimensional barrier" to dissemination: community layers are heavily solidified, making it difficult for content to break out beyond specific interest groups and achieve broader reach.

Furthermore, the study found that some Bilibili Metaverse videos are cross-posted [6] to other social platforms like Weibo and Xiaohongshu (rednote), enabling multi-channel coordinated dissemination. Future research could further explore the impact of "multi-platform dissemination mechanisms" on Metaverse communication effectiveness to enhance the integrated analysis of dissemination pathways.

3.4. Audience Analysis

Audience analysis examines audience characteristics and feedback to understand their needs and reactions. Comments posted below videos provide the primary data source. Analysis of the collected 25,764 comments (averaging 38 comments per video) using GooSeeker for sentiment analysis revealed the following distribution: Positive comments constituted 46%, neutral comments 48%, and negative comments 6%. Positive comments generally expressed support for Metaverse videos but were often simplistic (e.g., "冲冲冲"—"Charge ahead!", "Wow"), lacking detailed or substantive critique. Neutral comments primarily involved discussions tangential to the video topics, such as the performance and price of VR equipment. Negative comments mainly questioned whether the videos depicted a "true" Metaverse, with gaming-related content being the most contentious aspect.

3.5. Effect Analysis

Effect analysis evaluates the impact of communication on audience cognition, attitudes, and behaviors, measuring communication effectiveness. Video metrics such as view count, likes, favorites, and coin contributions serve as proxies for assessing effect. For the 678 collected Shanghai Metaverse videos, the aggregate metrics are: Total Views: 42.6632 million, Total Favorites: 1.4892 million, Total Likes: 1.5623 million, Total Bookmarks: 0.8654 million, Total Coin Contributions: 87,000. Comparing these figures with a control group of 702 "Shanghai Artificial Intelligence" videos (retrieved via Bilibili search using "Shanghai Artificial Intelligence" as keyword during the same period: Jan 2019-May 2025), the dissemination effectiveness

for Shanghai Metaverse content is significantly weaker. Specifically, the view count of just the top 30 "Shanghai AI" videos by popularity exceeded the total view count of all "Shanghai Metaverse" videos. Deeper underlying reasons likely include: AI technology demonstrating stronger real-world applicability; the Metaverse facing high hardware barriers and limited experiential accessibility; and declining public interest following the initial hype cycle. The observed pattern of high view counts but low comment counts suggests a "high bounce rate", indicating users browse the content without engaging deeply.

3.6. Video Dissemination Rhythm and Lifecycle Analysis

To gain further insight into the dissemination dynamics of Shanghai Metaverse videos on Bilibili, this study adopted a "lifecycle" perspective, statistically analyzing publication times and subsequent interaction curves. The results indicate that the majority of a video's views and likes are concentrated within the first 7 days after publication, followed by a rapid decline. This pattern confirms that "instantaneous dissemination" remains the dominant mode on short video platforms.

A few videos published by institutions exhibited viewership peaks coinciding with "Metaverse policy announcements" or "major conferences," demonstrating an "event-driven" characteristic. This suggests that content creators should strategically time releases to align with significant technology news, industry policies, or festival themes to enhance the visibility and topic longevity of Metaverse content.

Additionally, a small number of videos experienced "secondary dissemination" (e.g., through re-uploads by the original UP 主, reposts, or edited clips) approximately one month after initial publication. However, such instances were rare, indicating that Bilibili currently lacks a well-developed "long-tail dissemination mechanism" specifically for Metaverse videos.

4. Research Limitations and Future Directions

While this study provides a systematic analysis of Metaverse videos on Bilibili, several limitations exist. Firstly, the research sample is confined to the keyword "上海元宇宙" (Shanghai Metaverse), omitting other geographical contexts and conceptual dimensions of the Metaverse. Secondly, the analysis is platform-specific (Bilibili only), precluding comparisons of dissemination pathways across platforms like Weibo or Douyin.

Future research could explore the following directions: 1) Expanding data sources to construct cross-platform communication comparison models; 2) Investigating the mechanisms of variation in Metaverse content dissemination under emerging trends such as AI algorithmic recommendation and virtual avatar broadcasting (Vtubers), thereby providing a stronger basis for theoretical development and policy formulation.

5. Conclusion

Employing Lasswell's "5W" communication model as its framework, this study

analyzed Shanghai Metaverse data on Bilibili, revealing several key findings. Firstly, the popularity of the Metaverse peaked in 2022 and 2023 but has shown a significant decline in the subsequent two years. This decline is attributed partly to the emergence of Generative AI diverting public attention, and partly to the realization that post-hype, the Metaverse's development still critically depends on advancements in enabling technologies (e.g., affordable and capable headsets, potentially contactless transmission), reduced computing costs, and increased processing speeds. Secondly, communicators are highly fragmented, failing to exhibit the Pareto Principle (80/20 rule), and audience feedback is limited, indicating low broad-based public engagement. Finally, video content predominantly focuses on Digital Twins, Digital Collectibles, and cultural tourism, often presenting relatively simplistic popular science explanations, with a noticeable scarcity of high-quality, in-depth content. As Shanghai's Metaverse development is representative of China's broader trajectory, this study suggests that China's Metaverse journey remains challenging. It is recommended that public institutions such as libraries, museums, and science associations significantly enhance the dissemination of both theoretical knowledge and practical applications of the Metaverse to foster its development.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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