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The Global Image of Shanghai in Social Media Platforms: Data Mining and Empirical Analysis Based on Twitter, Instagram and YouTube

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In the calm of the night, as I sat down to write, my mind overflowed with reflections. It was September 2019 when my precious son embraced this world, and shortly after, I embarked on my journey at UAB. But just two months later, a tempest named COVID-19 stormed upon everything. Three years passed before I could reunite with the beloved city of Barcelona, a place etched forever in my memories.

During those years, humanity faced the pandemic with remarkable resilience, mirroring what I learned at UAB. I owe a debt of gratitude to our director, Luiz, whose encouragement and understanding propelled me forward, fostering continuous growth and accomplishments, Cristina's patience and assistance nurtured a sense of inner confidence within me, and the unwavering support of my family kept me focused on my studies without distraction. Within this vast tapestry of love and unwavering support, I witness a glimpse of the future and the spark of hope, just as I see my son's innocent smile, I know that this is hope, this is the future.

July 2023, written in Barcelona

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1. Introduction

1.1 Research Background

As a crucial node in the process of international communication, the image of international cities influences and reshapes people's perception of the city itself and even the entire country, encompassing significant political, economic, and cultural implications. Shanghai, being highly internationalized in China, held a press conference on January 4, 2018, where it officially unveiled the Shanghai Urban Master Plan (2017-2035), hereafter referred to as the "Shanghai 2035 Plan." This plan outlines the ambition for Shanghai to transform into an exceptional global city by 2035, serving as a sought-after hub for innovation, humanities, and ecology, ultimately establishing itself as a socialist modern international metropolis with worldwide influence.

In this plan, a comprehensive analysis is conducted to examine the challenges and opportunities confronting Shanghai. On one hand, Shanghai's overall progress demonstrates a remarkable improvement as it ascends to the forefront of the global stage, bolstering its comprehensive capabilities. However, when compared horizontally with the leading global cities, Shanghai still lags behind in terms of its international standing. This discrepancy manifests in various aspects, including the imperative to sustain stable economic growth, cope with mounting challenges in transformation and upgrading, bolster scientific and technological innovation capacity, and enhance the quality and efficiency of development. Moreover, growing concerns regarding environmental pollution and escalating urban safety risks have garnered significant attention among citizens. The limited service capacity of fundamental cultural facilities, a relatively weak cultural industry, and the necessity to bolster international

influence, improve the soft environment for urban development, and elevate the quality and civility of its residents all call for immediate attention. Furthermore, as the world transitions towards an era of ecological civilization characterized by an environment-friendly approach and human-centric care, the lingering consequences of industrial development are brought to the forefront. In the wave of the "Internet+" paradigm promoting the iterative advancement of the new technological revolution, Shanghai embraces an era of coordinated development propelled by a knowledge-driven economy rooted in the internet and network sharing. Thus, Shanghai finds itself confronted with unprecedented opportunities for growth and development.

In response to the opportunities and challenges facing Shanghai, the Shanghai 2035 Plan establishes more specific sub-goals alongside the overarching objectives of becoming an "Innovative City," a "Humanistic City," and an "Ecological City." The plan outlines Shanghai's determination to foster international cultural exchange and innovation, establish a hub for global cultural institutions, create a world-renowned tourist destination, and enhance international engagement through universities, research institutions, and cultural creative enterprises. By 2035, Shanghai aims to host over 40 internationally influential cultural festivals, attracting approximately 14 million outbound tourists annually. The plan emphasizes the terms "international" (appearing 195 times) and "global" (appearing 156 times) throughout its provisions, highlighting Shanghai's commitment to active participation in international competition and the augmentation of its global influence.

As a crucial instrument for enhancing global competitiveness, a city's global

identity swiftly conveys its spirit and character, ultimately reflecting the city's soft power in the media and public perception. Consequently, the promotion and execution of the "Shanghai 2035 Plan" inevitably intertwine with communication media, particularly social media, which plays a dynamic and integral role in constructing the city's global image, surpassing traditional media in various aspects.

To actualize the objectives of the "Shanghai 2035 Plan," it is imperative to assess the disparities and challenges between the plan's vision and the current image of the city. This evaluation will help identify areas for improvement and the corresponding solutions necessary to contribute to the successful realization of the plan. While considerable academic research has been conducted on city image and its communication, a systematic investigation of Shanghai's international image, based on the "Shanghai 2035 Plan," particularly focusing on the comparison and analysis of the present state and visionary goals, as well as the role of social media in communicating Shanghai's international image, remains lacking. Such research is crucial for shaping and optimizing Shanghai's distinct global identity.

1.2 Research Significance

City image communication holds significant importance within the realm of international communication research. It serves as a crucial resource element for a city's core competitiveness (Adetokunbo,2016). The international communication of a city's image is not only an inevitable process for a city to integrate into global integration and the international discourse system, but also a prerequisite for showcasing the competitiveness of a branded city and securing

global resource allocation. However, with the advancement of information technology and the rapid ascent of social media, the traditional paradigm of international information dissemination is facing formidable challenges. For highly competitive international cities, these challenges manifest in two ways. Firstly, the rapid development of social media has opened up new avenues for the communication of international city images. Secondly, social media has disrupted traditional modes of information acquisition, supply, and dissemination, with distinct variations observed across different social media platforms. Against this backdrop, the landscape and dynamics of international city image communication have undergone significant transformations in terms of political, economic, and cultural factors. The key players in international city image communication are no longer limited to traditional mass media outlets and official communication agencies. Consequently, studying the international communication of city image holds paramount importance in two aspects. Firstly, it carries greater pragmatic significance to examine this communication process from the perspective of social media. Secondly, it is vital to determine the communication logic and characteristics that should be followed in the realm of city image communication within the social media environment. Understanding these communication patterns will guide cities like Shanghai, as well as other international cities, in focusing on and enhancing the optimization of their international discourse. Ultimately, this research will contribute to promoting the image of a "global city" within the new order of international communication construction and enhancement. This issue assumes critical importance for Shanghai as it aspires to build an exceptional global city. Therefore, from both an academic and practical standpoint, studying the international image communication of cities within the context of the new media landscape holds

significant theoretical and applied value, not only for Shanghai but also for other international cities and the field of research itself. This serves as the starting point and foundation of this study.

2. Theoretical Foundation

2.1 What Is City Image?

The concept of city image extends beyond a simple definition. It encapsulates the impressions and emotions individuals associate with every facet of a city-its architecture, streets, points of interest, local customs, and even the attitudes of its citizens and government. In other words, it embodies people's unique, long-lasting sentiments towards a city, shaped by their individual worldviews and values. Despite its seemingly simplistic term, the city image is a complex concept rich in connotations.

The pioneer of this concept, American urban planning expert Kevin Lynch, introduced the idea of city image in his book, "Good City Form" (Lynch, 1981). He identified five elements of city design-paths, edges, regions, nodes, and landmarks-fundamental to the formation of city image. According to Lynch, these elements are holistically interwoven, creating a comprehensive city image in residents' minds. He emphasized that this image results from people's collective experience of the city.As urban development evolved, the city image transcended physical structures to incorporate political, economic, and cultural elements, even reflecting the city's spirit and connotations. Lynch expanded his research to include the social and cultural implications of city image, proposing "management, efficiency, and fairness" as crucial factors of city form (Lynch, 1962&1982).When individuals perceive the city's "tangible image," they form a

subjective "virtual image," blending their personal perceptions, evaluations, and judgments. This comprehensive impression encompasses aspects such as city layout, architecture, green spaces, public facilities, citizens' behavior, government actions, public safety, and quality of life.City image, therefore, signifies both objective reality and its subjective perception. It reflects and represents the city's intrinsic and extrinsic characteristics (Kampschulte, 1999), necessitating a medium to bridge the gap between the city's objective existence and the public's subjective perception. This process initiates with the objective reality of the city and culminates in the public's subjective perception. Mumford(1961)asserted that city image is a subjective impression shaped by various factors, such as personal and public communication, personal experiences, and memory. He identified three layers to this process: the material foundation (city infrastructure), service management (government setting, management system), and culture (ideas and customs represented by citizen behavior and spirituality).Thus, the multifaceted nature of city image represents an advanced stage of urban development, following the positioning, designing, and planning of the city. Each city, with its unique "genes"-shaped by its natural environment, history, culture, and economic development-maintains distinctive characteristics and personalities that set it apart. These factors influence the public's understanding, identification, and communication about the city.

The city image, therefore, displays characteristics of subjectivity, diversity, identity, and stability, reflecting the public's recognition of the city's present state and future development. Originating from objective existence, it translates into a subjective social evaluation that is formable, guidable, and communicable, thereby playing a vital role in the city's comprehensive development (Yanming,

2018).

2.2 The Study of the City Image

The theoretical exploration of city image began earlier in foreign countries and can be traced back to the 1960s. The works of American scholar Kevin Lynch, specifically "The Image of the City" and "Good City Form," are widely regarded as seminal references in the field of city image theory research. Lynch's research primarily focuses on city planning, design, vision, and functionality. In China, the academic community commenced its investigation into city image research during the 1980s, initially proposed within the context of city planning and design, with a particular emphasis on the city landscape. A review of the initial research reveals certain similarities in the research orientation of city image studies both domestically and internationally. By analyzing and studying the relevant literature, it becomes evident that the research on city image, both at home and abroad, has progressed through three distinct stages: the positioning of city image, city image marketing, and city image communication.

2.2.1 Positioning and Identification of City Image

The term "positioning" refers to determining the location or placement of objects. In the context of city image, positioning involves recognizing the diversities and identities of a city, grounded in its historical and current development. It entails thoroughly exploring the various resources of the city and identifying its valuable and competitive characteristics during the process of constructing the city image. Consequently, research on the positioning of city image encompasses a range of perspectives in its initial stage. Notably, in the early 20th century, the United States witnessed rapid development in the exhibition economy, drawing the

attention of scholars to the role of positioning conference cities in economic development and the significance of city characteristics in their selection as conference venues. The visual appearance of a city, an important factor in determining its suitability as a conference city, influences the communication of the city's image (Balogu et al., 2005). Furthermore, cultural and sports events serve as crucial means to develop a city's tourism economy and highlight its image. Culturally significant projects play a pivotal role in promoting a city's development, nurturing the local art community, establishing cultural economic zones, boosting the local tourism industry, and enriching the city's image (Grodach, 2008). Internationally recognized sports events, such as the Olympic Games, are renowned for their capacity to drive a city's economic growth and enhance its image, allowing the host city to establish a distinctive identity (Beech, 1999). Hosting large-scale sports events also imposes stringent requirements in terms of specifications, standards, and levels. Meeting these international standards presents an opportunity for cities to enhance their image through improvements in infrastructure, social and cultural development, and city governance (Yuting, 2019). Additionally, scholars have examined the relationship between a city's food characteristics and its image, with some studies finding a positive correlation between food characteristics and travelers' willingness to visit a city (Long, 2013).

In 1903, American columnist Mumford Robinson actively advocated for the improvement and beautification of city images. He introduced the concept of "urban beautification" and emphasized that vision, concept, and behavior are important elements of a city's image. By comparing the city image promoted by the Chicago World Expo with the prevailing conditions in the United States at

that time, Robinson initiated a series of activities known as the "City Beautification Movement." Since then, the theory of city image has taken root in Western countries, highlighting the importance of people-centric design and development, as well as the influence of culture and history on a city and its image.

Germany stands out as a pioneer in city image design. In the 1960s, Berlin formulated its earliest city image, repositioning itself and designing a new identity following the merger of the German Democratic Republic and the Federal Republic of Germany in 1992. Visual dimensions, particularly an attractive, unique, and textured vision, play a crucial role in shaping a city's image (MacKay & Fesenmaier, 1997). City signage systems, including landmarks, wayfinding systems, sign maintenance, and community consensus-building, represent crucial components of a city's image (Gail, 2001). Developing a tourism logo system for a city not only helps build a distinct image but also enhances and facilitates communication of the city's image (Jiemei, 2014). Additionally, the choice of colors for logos holds significance for both the city and the country's image (Nghiêm-Phú, 2015). Moreover, influenced by the Western trend of "Artistic Awareness of the Environment," the emergence of "Street Art" and "Public Art" movements in the 1960s has had a profound impact on city space and image. In some Italian cities, residents enthusiastically decorate the exteriors of their houses with spontaneous bursts of color. Over time, these colorful houses form visually striking clusters and create a city image that stands in stark contrast to the industrial cities. The visual elements composed of colors possess high recognition value and become prominent symbols of specific city areas. For instance, the colorful island of Venice serves as an important

representation of the city to the world. In 1981, Kevin Lynch argued in his book "Theory for A Good City Form" that successful city design involves integrating various urban activities spatially and accommodating diverse human values within the city's spatial structure. Lynch laid the foundation for studying the elements that influence citizen behavior in city image, considering cultural structures, human behavior, and the physical environment. City image serves as a characteristic carrier of social development, and city planning should account for human behavior through observation and study (Jacobs & Penguin, 1984). Moreover, city construction, particularly city image construction, should involve active participation from citizens and undergo comprehensive assessments (Bunin et al., 1992). The city government and authorities should focus on building an ecological city image (Banai, 1999), proposing specific measures and plans that involve collaboration among government entities, businesses, and the public. Scholars have also delved into city image research from a conceptual perspective. The image represents a condensed summary of numerous pieces of information about a place and is a product of human thinking (Kotler & Gertner, 2004). The accuracy of the image depends on the proximity of potential travelers to the destination. Individuals closer to a destination are more likely to have a more accurate and realistic perception of the destination. As the distance increases, the accuracy and truthfulness of the perception diminish (Stepchenkova et al., 2010). The concept-based image of a city focuses on the strong identification created by the overall values of the city and the value orientation of its citizens. This is reflected in various aspects, including development concepts, management concepts, planning concepts, service concepts, promotional slogans, citizens' lifestyles and culture, and the city's public code of conduct. This conceptual image is derived from the city's

traditional culture, citizens' ideologies, and is closely tied to the city's political orientation. Taking Timisoara, Romania as a case study, Pavel S. and Jucu I. S. (2020) discussed the city's transformation and cultural evolution in European post-socialist cities from the perspective of cultural concepts. They highlighted the significant cultural heritage of Timisoara as a valuable resource. By adopting a culture-driven approach to politics and considering the interplay between city values, local planning, and city management, Timisoara has not only transformed its physical appearance but also preserved its ancient historical characteristics through major city development projects.

Driven by comprehensive investigations into the core concepts of city image definition, connotation, and function at home and abroad, the study of city image positioning has evolved from a single-discipline approach to a multidisciplinary endeavor, offering more diverse and concrete perspectives. Drawing from the aforementioned content, scholars both domestically and internationally have conducted comprehensive studies in vision, concept, and behavior. Particularly in the 1950s and 1960s, the study of city image gradually began to draw from and integrate theories of Corporate Identity and Corporate Image. In 1985, American scholar H.L. Garnham proposed the elements of city identity in his book "Maintaining the Spirit of the Place - The Protection Process of City Characteristics." These elements encompass the physical environment, objective activities, collective activities, connotation, and symbols associated with a city. They bear a similar conceptual resemblance to the systems of concept, behavior, and visuals in the corporate image, providing theoretical support and innovative research methods for building a city's image.

2.2.2 City Image Brand Marketing

As early as the 1950s, the United States began applying the concept of city marketing strategically to attract immigrants. In the 20th century, Western countries adopted market mechanisms to attract private construction capital for city infrastructure development and economic growth. This approach provided a foundation for the formation and implementation of city marketing concepts, which were recognized and promoted by government authorities. With the rapid economic development, marketing concepts gradually permeated city promotion efforts. By leveraging the city's assets in a market-oriented manner, the objective of "Highlighting the City with Sincerity" can be achieved. Initially, there was no unified terminology for the concepts of city marketing and regional marketing. Common terms used by scholars both domestically and internationally included Place Marketing, Regional Marketing, City Marketing, and Urban Marketing. In the 1980s, as foreign countries began focusing more on the publicity and marketing research of city image, the terms City Marketing and Place Marketing gained popularity. If we consider the city as a commodity, it becomes necessary to integrate marketing communication methods and utilize various communication channels and techniques based on target audiences to maximize impact. City marketing measures include not only improving city infrastructure and creating a favorable investment and policy environment for business development but also changing traditional values among citizens, enhancing residents' spirituality, and establishing new values that align with the promotion of city image. City authorities can employ diverse marketing strategies to enhance competitiveness and stimulate economic development (Ashworth & Goodall, 1988). With further research, scholars discovered that marketing principles are applicable to various aspects of cities, such as geography, politics,

and social issues (Ashworth et al., 1994). For example, by utilizing city marketing as a planning tool and establishing a unique city image, attention from the media can be attracted, thereby enhancing the city's value (Kearns & Philo, 1994) and promoting economic development (Fretler & Bailey, 1995). The integration of marketing concepts and local cultural characteristics is crucial for managing city image and creating a more appealing local identity, disregarding communication elements lacking distinctive characteristics. City marketing strategies should analyze the city's history and culture to identify the city's image and establish clear development goals (Metaxas, 2001). City branding is an appropriate approach to describe and implement city marketing efforts (Kavaratzis, 2004). McFadden (2004) likened cities to companies and explored how focusing on building and promoting brands can yield benefits. Gibson (2005) analyzed how the authorities of Washington, D.C. in the United States could attract target market groups from the suburbs to settle in the city by creating a city brand. This brand encompasses six dimensions: awareness, geographical features, city vitality, city potential, citizen spirituality, and inherent advantages (Anholt, 2007). Therefore, city branding plays a significant role in enhancing city image and strength (Anttiroiko, 2015; Vanolo, 2015). Taking Turin as an example, research has been conducted on how to present an innovative city image through city branding. In the era of social media, Efe Sevin (2020) analyzed and compared the results of three cities utilizing social media to disseminate their city image as part of their branding efforts. The study examined the views shared by city residents on the internet, which subsequently influenced the overall city brand. Additionally, social media platforms enable city residents to constantly experience the achievements of city branding.

2.2.3 City Image from Media

Based on the literature review and analysis conducted above, two key aspects contribute to gaining a comprehensive understanding of city image. Firstly, considering the fundamental functions of cities, the urban space serves as a platform for various societal functions, including economic, political, cultural, management, and international exchange activities. Secondly, relying on these foundational functions, the visual image (VI), behavioral image (BI), and spiritual image (MI) collectively constitute the diverse elements of city image, contributing to the positive construction of people's perception of the city. Consequently, there exists a close relationship between city image communication, city image positioning, and city marketing (including the construction of the city brand). City image communication involves the active dissemination of city function and image positioning, as well as the communication of city image elements, which transition from individual components to an integrated whole. Active diffusion extends the city marketing strategy, while the process of integrating city image elements in communication extends the application strategy of public media. Although these aspects differ, they are interconnected. City functions and image positioning serve as the foundational prerequisites for city image communication, defining the core content and overall direction of urban image communication. Conversely, city image communication represents the multidimensional dissemination of urban function and image positioning. As a result, they form a dual tension within the overarching paradigm of city image communication. The visual image, behavioral image, and spiritual concept image collectively constitute the elements of city image. These elements are shaped not only through urban marketing strategies and brand strategies but also through the influence of

various media, resulting in the media playing a crucial role in city image communication.

City image is the result of long-term and comprehensive publicity and communication. Once formed, it is difficult to copy or imitate, distinguishing the business image, residential image, and tourism image of a city, among other aspects (Ashworth et al., 1990). Given the media's role in shaping and disseminating the city's image, it is crucial to consider and find solutions for making the media a "booster" for the harmonious development of cities (Foot, 1999). Eli Avraham (2000) studied the issue of city image in the mass media and proposed a comprehensive model. He identified four factors that determine the extent and nature of city reports by news media: city characteristics, editing policies of city reports, the social and political environment in which the media operates, and public relations efforts of cities. The research findings highlight the significant role of the public media in the increasingly competitive international environment for resources such as tourism, investment, and commerce. Guang (2005) conducted a large-scale survey to explore the influence of public communication and interpersonal communication on urban image. The research revealed that the "Attention of Media Content" and "Credibility of Media" have greater influence than the "Time of Media Use." It also found that people's first-level concept of city image (external and specific image) is closely related to their second-level concept of city image (internal and overall image). With the advancement of information communication technology, people increasingly rely on public media to obtain relevant information. In a mediatized society, city image is essential to the construction of news media. The formation and establishment of city image are closely tied to the news reporting activities

of the public media. How the public media describe, present, and evaluate the city in their news reports greatly influences people's perception, concept, and attitude towards the city. This, in turn, constructs a virtual city image that can impact people's actual perception of the physical city image (Ying, 2009). For instance, the "Media Carnival," recognized as a global media event, is an effective means of shaping and communicating the city's image (Zhenyuan, 2011). The city image is closely intertwined with the media, and the role of modern media in constructing city image is increasingly prominent. Modern media serves as the "Source of Impression" for the city image, facilitates the execution of the city's image personality, guides audience participation in shaping the city's image, and bears the responsibility of promoting the city's spirit (Zhou, 2015). Therefore, the focus of academic research lies in utilizing media strategies to communicate the city image. Yanbing (2017) argues that when discussing city image communication, appropriate means of communication, including media combinations, should be considered to comprehensively highlight the city's positive aspects. Taking the example of Naberezhnye Chelny, a Russian city, Kalyuzhnaya (2018) conducted research that identified the negative city image formed by the public media. Through text analysis and questionnaire surveys, the study identified the challenges faced by the city's image and proposed solutions for building a positive city image. Thus, it is necessary to conduct in-depth research based on the characteristics of each media platform and apply and optimize media strategies to effectively communicate the city's image.

In the context of text media and city image, some scholars have introduced a method of communicating the city image through text mining technology, which

involves analyzing the collocation of words (Morita, 2012). By studying the text data from questionnaires given to citizens, researchers can gain insights into the perception and representation of city image. From the perspective of text media, scholars have also examined the persuasion mechanisms employed in urban image promotional films using functional linguistics. They have observed that rhetoric strategies in these films, involving both words and pictures, are complementary. Rational appeals are typically conveyed through visuals, while feature appeals are predominantly expressed through text. However, when rhetoricians aim to convey personal experiences, feature appeals are utilized in both pictures and text to enhance the audience's acceptance of the city image (Qi, 2019). Yongyu et al. (2020) investigated the impact of language services provided during marathons on city image. They found that language services play a vital role in marathons as they demonstrate the comprehensive capabilities and humanistic qualities of the host city. Language services are therefore of significant importance in shaping the city's image.

In addition to text media, print media also plays a significant role in shaping and communicating city image. Taking Shanghai as an example, the newspaper "Shun Pao," launched in 1872, aimed to integrate the diverse cultural traditions and ways of thinking between the East and the West. Through various popular methods among the people of Shanghai, it continuously transmitted new ideas, things, and lifestyles to its readers, contributing to the modernization and establishment of Shanghai's unique image in China. Scholars have used the example of "Pictorial Newspaper," a famous pictorial publication in the late Qing Dynasty, to illustrate the social phenomenon of Shanghai and demonstrate the potential of public media in shaping the image of modern consumer cities

through case studies (Lin, 2011).

The influence of newspaper reports on city image has also been studied. A comparison of reports on Shanghai from 30 English newspapers and periodicals from 10 countries between November and April 2009 revealed that the World Expo had a positive impact on Shanghai's image, particularly in terms of its potential. Global events like the World Expo significantly influenced the content and media attitudes of the reports. However, a single event alone is insufficient in maintaining long-term effects (Ke et al., 2012). Newspapers and other public media, along with their affiliates, continue to play an important role in shaping and reshaping public awareness. Content analysis of newspaper headlines can provide insights into the number and nature of reports, as well as their significance in constructing local brands and images (Freeman, 2012). Additionally, qualitative and quantitative analysis of report content can help understand the formation mechanism of city image and the role played by the media in this process. It reveals how cities strategically influence their image and how the media reflects the material and perceptual changes of the city.

Research indicates that cities should develop and implement strategies suitable for media operations to improve their image (Mag, 2012), with the news framework being an important factor that influences the image of cities (Thirumaran, 2021). As media continues to evolve, each medium compensates for the limitations of previous ones, facilitating convenience in city image communication. For example, social media data can be used to capture the identity of a city. Through this identity portrait, even individuals who are unfamiliar with the city can easily understand its overall image (Jang, 2019). By

mining the public's perception of the city image on mainstream social media since the epidemic, relevant organizations can gain insights into the city image presented in these platforms (Guo, 2023).

2.3 City Image Communication from the Perspective of Organizational Communication

The development of digital media technology has not only increased the public's subjectivity and initiative but also presented challenges in interpersonal, group, and organizational communication. However, when considering the purpose and value orientation of city image communication, it becomes evident that it is not only related to people's perception and evaluation of the city but also serves as an external representation of urban construction, development, management, and the soft power of the city and its country. Therefore, from the perspective of organizational communication, city image communication is an organized, orderly, and purposeful information communication activity led by urban managers, with the government acting as the leader and organizer. Thus, the dissemination of city image should be viewed through the lens of organizational communication.

Organizational communication and group communication are interrelated and mutually influenced (Borţun, 2017). However, organizational communication holds more significance than interpersonal communication. The academic community has dedicated efforts to understanding and achieving the objectives of government organizations from the perspective of organizational communication (Kristina, 2020). The importance of organizational communication has gained widespread recognition (Sánchez et al., 2008). The

study of organizational communication originated during the Industrial Revolution, when changes in business organizations resulted in transformations in technology, methods, and ideology. This led to the development of the classical school, represented by Frederick W. Taylor, who viewed communication as a process of transmitting information in a top-down manner, encompassing orders, instructions, and rules. This perspective had a typical organizational management orientation, with a focus on the behavior and function of organizational communication. The classical school emphasized scientific management, which included classical management theory proposed by Henry Fayol and Max Weber's bureaucratic theory. However, as labor-capital relationships grew increasingly tense in the 1930s, the flaws of the traditional organizational communication concept became apparent, and the exploration of "Human Nature" became the focal point. Hawthorne's experiment, Herzberg's "Two-Factor Theory," and Maslow's "Hierarchy of Needs" shifted the focus to human needs, challenging the classical school's notion of treating people and organizations as machines and highlighting the idea of treating organizations as natural organisms with autonomy. This transformation emphasized the understanding, prediction, and management of human behavior in organizational communication (Hening & Hu, 2010). These two processes are known as the "Rational System View of Organization" and the "Natural System View of Organization" (Danqing & Wang, 2016). In the late 1960s, the International Communication Association (ICA) established the Organizational Communication Group (OCG), marking the formal establishment of the discipline of organizational communication. Simultaneously, advancements in management theory and technology in practice provided a foundation for studying organizational communication, particularly in terms of theoretical

forms. Everett M. Rogers et al. (1989) initiated research on interaction modes in organizational communication, while Miller (1990) examined the impact of communication variables on employee stress and satisfaction using social information processing theory and uncertainty reduction theory.

Organizational communication places emphasis on establishing norms and formal practices, such as meetings and internal communication tools, with the aim of sharing information and news, keeping all members up-to-date, and overcoming unit boundaries and hierarchical levels (Farnese, 2019). Alongside the study of internal organizational communication, research on organizational communication related to external organizations has also gained prominence and has been influenced by cybernetics and systems theory. Internal and external organizational communication is increasingly regarded as an open system. The increase in inter-organizational communication often has an impact on providing recommendation networks (Reed et al., 2021). The globalization trend has had a profound influence on various aspects of the world economy, politics, and culture, leading to the emergence of new organizational forms. Technological advancements have also brought about significant changes in media. The new communication network constructed by electronic media, especially social media, has challenged traditional concepts of organizational communication. The structure of organizational communication is dynamic (Lina, 2021). The boundaries of organizational communication research have expanded, and the diversity, variety, and complexity of research content have become more apparent. The focus has shifted from a closed, static structural model to an open, dynamic process mechanism. Currently, the integration of organizational communication thinking with social network analysis and small-world network

theory has introduced organizational communication into the realm of social networks. The dynamic development of social organizational structure offers new ways to think about information dissemination and management within organizations, resulting in new models of organizational information communication management. For example, it is worth studying how mainstream information expression reflects the law of priority links, establishing multi-link nodes, and even becoming the target of network links after forming influence (Shian et al., 2009).

Yang Hui et al. (2013) argued that the increasingly comprehensive understanding of social media communication characteristics by urban residents makes it advantageous to strategically utilize social media for city image communication. As the leader in city image communication, the perspective of organizational communication must be followed. Integration and utilization of various media forms and communication channels should be undertaken to carry out integrated communication activities for city image promotion. Scholars have analyzed the emotions of new citizens on Twitter using methods such as data collection, preprocessing, analysis, and mapping. This supports the government in understanding citizens' emotional information, facilitating better monitoring and governance of smart cities (Li, 2017). Molinillo (2019) conducted a digital content analysis of ten smart cities in Spain, including Madrid and Barcelona, studying the interaction between smart city residents, tourists, social media, and the communication of "smart" elements and brands. The research findings reveal that although these smart cities are generallyrecognized and accepted on platforms like Facebook, Twitter, and Instagram, there is room for improvement in terms of their application of social media to promote and enhance city image

communication. The hosting of large-scale events can also enhance a city's image on social media platforms like Twitter, as it not only publicizes significant features such as historical sites and architectural elements but also establishes connections with existing cities, enriching the city's image. Therefore, the emerging digital information practices and platforms in the context of large-scale events hold great significance for the city's image (Uriarte, 2020). Huang J (2021) studied the image of three cities in Poland on social media and combined "Big Data" and "Small Data" methods to analyze people's perception of urban images. The research demonstrated that social media indicators, such as the frequency of being captured on Instagram and the frequency of a place's name being mentioned on Twitter, directly influence people's perception of a place's image. These studies highlight the government's role in city image communication and the importance of the organizational communication perspective in integrating and planning city image formation and communication.

2.4 Media and Audience Communication Research

2.4.1 Historical Stage of Audience Research

This study aims to explore the communication characteristics, laws, and effects of Shanghai's international image in the context of social media. Audience research, as a crucial field in media communication effects, has undergone extensive development in terms of research paradigms and theories, yielding fruitful results.

As Dennis McQuail (1987) pointed out, "almost every important effect research is subordinate to audience research." The roots of audience research can be traced back to investigations and studies on the broadcasting audience in the early 20th

century, with its theoretical underpinnings originating from research on the publicity effect. Building upon the tradition of the Chicago School, Paul Lazarsfeld and Berelson published "The People's Choice" in 1949. Their work aimed to identify variations in attitudes and media selection practices among different social positions and systems, leading to the differentiation of various audience types. This marked the initial formulation of "audience theory" and paved the way for extensive audience research in the field of mass communication.

The early stage of audience research was primarily focused on addressing the question of how media impacts the audience. Through interdisciplinary quantitative research, seminal theories such as the "Magic Bullet Theory," "Agenda Setting," "Spiral of Silence," and "Cultivation Theory" emerged to shed light on this issue. These theories posited that in the process of information communication, the audience serves as the terminal and target of communication and is therefore susceptible to persuasion and control. However, in the 1960s and 1970s, Brute and Katz shifted the focus of audience research from examining the media's impact on the audience to exploring how the audience utilizes the media. Katz's "Use and Gratification Theory" proposed in "Personal Influence: The Part Played by People in the Flow of Mass Communication" highlighted the audience's active role, emphasizing their needs fulfillment and the assessment of the media's ability to meet those needs based on prior media contact and usage. This change in research perspective affirmed the diversity, agency, and enthusiasm of the audience, underscoring their dominant position.

Nevertheless, the Frankfurt School presented a contrasting viewpoint on the

audience's role. They argued that in linear communication, there is no actual "audience" research since the "audience" is constructed by the informational content and communicational text. Challenging this notion, the School of British Cultural Studies reintroduced the concept of the "audience" and refocused on their agency. Stuart Hall's "Encoding and Decoding in the Television Discourse" (1973) posited that meaning is not "transmitted" by the sender but rather "produced" by the receiver. The audience actively selects their decoding position when interpreting television discourse. Hall's "Coding and Decoding Theory" heralded the cultural turn in audience research. Building upon this, Morley (1999) suggested that texts possess diverse meanings, and the audience exerts significant influence over the interpretation process. This "new audience" research centers on the audience and delves into the analysis of their acceptance, expression, social structure, and their relationship with ideology and social background. In addition to examining the social position embraced by the audience, Morley introduced ethnography as a methodological approach to audience research.

The evolution of audience research can be observed through three stages: the empirical tradition of empiricism, the critical tradition of negative thinking, and the research tradition of the cultural turn. Notably, these different research traditions and paradigms have shifted the focus of audience research from the "communicator" to the "audience." The subjective status of the "audience" has gained prominence, encompassing individual psychology, needs, culture, and other attributions. With the ongoing globalization and technological advancements, the Internet has not only facilitated the formation of larger and differentiated audiences but has also amplified their capacity for media

consumption. Consequently, the audience now has a broader array of communication options, exemplified by the advent of social media.

2.4.2 Users' Participation Studies in Public Sphere of Social Media

Habermas, a representative of the Frankfurt School, focused on the research of the public sphere, which emphasizes independent public communication and relations with a legal basis, crucial for political rights. Habermas argued that the mass media had internal mechanisms related to the public sphere. However, traditional media, such as newspapers, TV, and film, were influenced by capital and government control, which led to the subversion of the public sphere. In contrast, social media, as a new communication space, seems to promote the transformation of the ideal public sphere into a reality. The rise of the internet and social media has sparked discussions on social media's role in the public sphere and citizen discourse (Bennett, 2012).

Social media shares similarities with Habermas' concept of the public domain. Platforms like Twitter and Facebook provide equal and unlimited access to information (Loader et al., 2011), allowing individuals to freely express themselves without restrictions (Murru, 2009). This enhanced right to speak and increased sense of participation is due to the decentralized nature of social media, enabling many-to-many communication and expression (Jenkins, 2006). These characteristics align with the requirements of a public domain. Additionally, discussions on public domain issues in the social media space exhibit spatial decentralization, accelerating the globalization of public opinion and providing a basis for global dialogue (Kellner, 1997).

However, it's important to note certain limitations and challenges in the social media public sphere. The anonymity of communication in social media can lead to a lack of trust, which is detrimental to democracy (Dahlgren, 2018). The user's independent filtering of information can result in the "echo chamber effect" (Garrett, 2009), hindering the formation of a robust public sphere (Andrejevic, 2013). While "user-generated" information in the public domain of social media is recognized, there are also instances of irrational expression and information noise, making it difficult to identify trusted sources (Iosifidis, 2011). Additionally, extensive monitoring and algorithmic control limit information dissemination and user participation (Marwick, 2012). Such monitoring algorithms predict user preferences, often serving institutional interests. Habermas himself acknowledged the deficiencies of the new media in constructing the public sphere (Habermas, 2006).

Regardless of these advantages and disadvantages, social media has undoubtedly become a communication channel that allows broad participation. It offers various information services, including content upload and download (Livingstone, 2008). Based on these services, social media users can perform three core functions: building personal profiles, connecting with associated users, and displaying user contacts (Boyd & Ellison, 2008). These functions continue to expand and evolve with technological advancements (Boyd, 2010), enabling users to consume and interact with content (Ellison & Boyd, 2013). As users increasingly participate, consume, and produce content, social media allows for the adoption of multiple identities. The horizontal communication network formed by the internet and mobile communication has transformed society into a network structure, empowering individuals and organizations to become nodes

and contributing to mass self-communication. Users are now the producers of content and services (Castells, 2009). This shift from "text poaching" in traditional media to "citizen participation" in new media enables users to determine the recipients of information and select specific content retrieval (Jenkins, 2013). Consequently, users engage in cooperative meaning-making, knowledge sharing, and the formation of integrated cultures (Jenkins, 2006).

Given the significance of user behavior in social media, the study of participatory culture focuses on understanding user behavior, needs, and preferences within the context of social networks. Context plays a vital role in understanding users' behavior and includes information about the environment, individuals, goals, psychological states, occupations, social status, and historical factors (Dey et al., 2001; Lopes, 2009; Dehghani et al., 2011). From an audience perspective, research on social media participation examines user adoption and sustained usage behaviors, emphasizing the audience's perception of social media's value, risk, and interactivity, which influence their continued use (Cao et al., 2016). Interpersonal factors also play a role in the audience's continuous use behavior (Wang et al., 2017). Audience participation in content consumption, including browsing, searching, likes, collections, and comments, is another important form of engagement. Factors influencing this behavior include network interaction, word-of-mouth, personalized perception, prior knowledge, gender, problem-solving style, and the type of social network (Jia et al., 2014; Schmitt et al., 2017; Kim et al., 2018). From a communicator's perspective, social media users' participation in content production and creation is influenced by social culture, recognition, trust, expectations, motives, user personality, and abilities (Huysman & Wulf, 2006; Lin et al., 2009; Chen & Hung, 2010; Zhao, 2013).

2.4.3 "Personal Influence" and "Two-Step Flow" in Social Media

Understanding the communication mechanisms of city image in the social media environment is crucial for research on city image communication. In the 1940s, Paul Lazarsfeld and others discovered through the "Eli survey" that information goes through two steps from mass media to the audience. First, it goes from mass communication to opinion leaders, and then from opinion leaders to the public. The first step involves information transmission, while the second step focuses on the diffusion of interpersonal influence. Building on this research, Elihu Katz and Lazarsfeld introduced the theory of the "Two-Step Flow of Communication" in their book "Personal Influence," highlighting the important role of opinion leaders in the communication process.

However, in the social media environment, the audience is no longer a passive consumer of information. It becomes challenging for individuals or social media platforms to monopolize information and establish one-way contact with the public. Social media reduces or even eliminates the intermediary channels of information transmission, allowing information to flow directly from the sender to the audience. This contrasts with the transmission process in traditional media communication. Given the characteristics of social media, the role of opinion leaders in this ideal communication state appears to be weakened. The information transmission in social media realizes a theory of zero media, which challenges the theory of the "Two-Step Flow of Communication." In fact, Elihu Katz himself proposed retiring the theory in the Yearbook of the International Communication Association in 2017, along with six other communication concepts.

In the field of social media, users are not only consumers of information but also producers of information. The boundary between sender and receiver becomes blurred, increasing individual communication autonomy and initiative. This stimulates and mobilizes individuals' potential and enthusiasm for participating in shaping and disseminating the city image. Everyone can express their opinions and feelings about various aspects of the city image. The agenda-setting process becomes more diverse. On one hand, the city image established or rebuilt in this communication environment is more authentic and realistic compared to traditional mass media. Tom O'Regan (2021) argues that social media provides marketers and media providers with access to informal groups, influencers, and opinion leaders. It enables the identification and targeting of informal groups and their members, making them visible and open to influence. It also allows media providers and marketers to locate and influence word-of-mouth through these networks. In this context, social media users play a key role in determining the circulation and reception of messages.

Therefore, under the integration of communication and reception identities, it is important to explore the current state of Shanghai's international image communication. Has the role of opinion leaders been weakened or even eliminated in the communication process? Or, on the contrary, do opinion leaders intensify "behavioral contagion" within informal groups, as noted by Katz and Lazarsfeld? What impact does this have on the communication effectiveness of the city image?

3. Key Elements of the work

3.1 Research Questions

The process of communicating a city's or even a country's external image is intertwined with the continuous evolution of technology and media. This evolution, spanning from oral communication to written, printed, and electronic communication, has led to the enhancement of media and the enrichment of social information systems. This complexity is particularly evident in social media, which combines the strengths of the internet and traditional mass media, thereby reshaping the communication ecology of social information systems.

Firstly, social media differs from mass media in that the vast amount of digital information generated is not solely controlled by the government. Instead, all users can participate in the production and dissemination of information. In the context of external image communication of cities, social media users shape the image by creating and sharing various types of information, in addition to the content professionally managed by official agencies (Ingenhoff, 2021). This user-generated content, a distinguishing feature of social media, has garnered academic attention. However, according to the two-step flow communication theory, mass media and interpersonal communication channels play distinct roles in the process of information access for decision-making. This theory emphasizes the significance of interpersonal communication, particularly the role of opinion leaders in information dissemination. Yet, with social media enabling zero-medium information communication and exponentially increasing audience access to information, the role of opinion leaders as "intermediaries" is becoming blurred and weakened. Despite this, some scholars argue that the two-step flow communication theory can still explain digital communication,

especially the role of opinion leaders in social media (Carr & Hayes, 2014). Pang (2017) found that the flow of misinformation in public emergencies largely aligns with the two-step flow communication theory, with information flowing through opinion leaders to the general public. Given this, the first research question is: Does the two-step flow communication model exist in the process of communicating Shanghai's international image in the social media space?

Secondly, in social media, users' basic characteristics, which refer to their personal and social information, determine individual differences. These differences are directly reflected in social media accounts, the carriers of users' basic characteristics. As "producers" and "consumers", how do users "produce" and "consume" content and exert personal influence in defining and spreading Shanghai's international image and shaping "word of mouth"? Do users gain "first-hand knowledge" because they have visited Shanghai, or is it merely "behavioral contagion" that occurs from interactions in the social media space? Opinion leaders are critical to the flow of communication in the network (Karlsen, 2015), and they exert social influence by spreading their messages to others. Their messages are often retweeted, indicating that they are shared not only by participants but also by the followers of those participants. The technological support for the social influence of opinion leaders gives them greater power in forming and informing public opinion (Choi, 2014). Is there a correlation between this personal influence of opinion leaders and their characteristics and the effectiveness of communicating Shanghai's international image on social media? Hence, the second research question is: Is there a correlation between personal influence and the effectiveness of communicating Shanghai's international image on social media?

Furthermore, the characteristics and attributes of communicators in the social media ecology determine the diversity of agenda-setting subjects, leading to a variety of communication contents. Lazarsfeld's "selective exposure hypothesis" posits that audiences are not undifferentiated in their exposure to mass communication messages. Instead, they prefer content that aligns with their existing positions and attitudes and tend to avoid contrary or conflicting content. This "selective exposure" exists not only in the political sphere (Knobloch, 2014) but also in consumption (Perrissol, 2008), culture (Sutton, 2006), and entertainment messages (Zillmann, 1980), confirming that the content of communication influences its effectiveness. The form of communication content and the richness of the content itself impact communication effectiveness (Daft, 1983), especially in the internet age, where text, pictures, sound, and video are dominant and integrated with the content. In contrast to traditional mass media's agenda-setting, the international image of Shanghai in social media is depicted through the diversity of content created and shared by users. What aspects of Shanghai do users focus on, and how are they expressed? What image of Shanghai is portrayed by the content that users follow and share? How do different contents affect the communication effect? Therefore, the third research question is: Is there a correlation between the characteristics of the content that social media users disseminate about Shanghai and its communication effectiveness?

Lastly, social media has blurred the boundaries of interpersonal communication, organizational communication, mass communication, group communication, and other forms of communication. Additionally, social media has integrated text, pictures, and videos. This integration of media forms, from text to audio, from

audio to picture, and from picture to video, has led to a comprehensive restoration of human communication senses, enhancing the communication effect of city image. Therefore, this study takes Twitter (represented by text), Instagram (represented by pictures), and Youtube (represented by videos) as examples, and poses the fourth question: Is there a significant difference in the communication effect of Shanghai's international city image across these three different media?

3.2 Research Hypothesis

Lazarsfeld's two-step flow communication theory, which emphasizes the roles of mass media and opinion leaders, manifests as "information flow" and "influence flow" in the process of information dissemination. To ascertain whether a two-step flow communication mechanism exists in the international image communication about Shanghai through social media, we need to analyze both "information flow" and "influence flow". With the ongoing development of social media, traditional mass media are also undergoing a digital transformation centered around users. They attract more users and audiences by opening official accounts and operating content on social media, satisfying the first condition for the existence of two-step flow communication in social media. Opinion leaders not only disseminate information in the process of Shanghai's international image communication but are also more likely to exert "personal influence" through evaluation, persuasion, and exhortation in the interpersonal communication stage. If a two-step flow communication model exists in the communication of Shanghai's international image on social media, the following two research hypotheses are proposed:

RH1: The information sources of Shanghai's international image communication in social media predominantly originate from opinion leaders.

RH2: Personal influence in social media communication of Shanghai's international image exceeds the influence of officially operated users such as mass media.

As a public sphere, social media aligns more with Habermas' "ideal speech environment," where users can actively create, share, and disseminate content about Shanghai's international image, maximizing personal influence. According to Katz (1957), the personal influence exerted by opinion leaders can usually be expressed through personal tendencies, specific aspects, and social connections. Some studies have identified the outward expression of users in social media as a trait that exerts personal influence (Gnambs et al, 2012). Katz and Lazarsfeld refer to this as the degree of social contact and express it directly and quantitatively in terms of the number of friends on social networking sites. The degree of social contact should also include the probability of users' outward communication connections (Shi et al, 2017), quantified by the number of followers and followings, the time users spend using social media, and the number of posts they make. Zhang et al. (2014) found that verified users were more credible than unverified users. Users' geographical location and access to more developed and convenient communication information technologies were also important for maintaining social relationships and exerting personal influence (Eastin et al, 2006). In the process of international image communication of Shanghai, whether the users' descriptions and expressions of Shanghai come from primary sources or share some information about Shanghai from other users will affect the audience's level of trust in the users and the

content. Therefore, whether the user has visited Shanghai or has had multiple visits to Shanghai is also an important factor. Based on the above seven indicative factors affecting personal influence, the third research hypothesis is proposed:

RH3: There is a positive correlation between personal influence and communication effect in the process of social media communication of Shanghai's international image.

Social media has realized the multiplication effect of communication content. Users can spread the content to their fans by forwarding and sharing, and if the readability and quality of the communication content is high, it will then generate viral fission spread. The content of the communication determines the quality of the communication effect to a certain extent, leading to the audience's reaction in four aspects: cognition, emotion, attitude, and behavior. This influence of the content is reflected in the form of content presentation, the type of content, and the emotional tendency contained in the content. The richness of the content presentation includes the number of words in the text or the length of the video (Schwenk, 1986), the expressions, symbols, positioning, and multimedia messages (Suh et al, 2010), and the content categories and the emotional tendencies conveyed by the content. Based on the influence of content formed by these three aspects, a fourth research hypothesis is proposed:

RH4: There is a significant positive correlation between the international image of Shanghai in social media in terms of communication content and communication effectiveness.

Media richness theory (Daft & Lengel, 1986) explains the ability of media to disseminate information content in terms of the ability to implement feedback, multi-channel communication cues, daily use for, and personal focus on the media. Social media has an absolute advantage in these aspects and can enhance the audience's effective perception of Shanghai by combining text, pictures, videos, and other forms. However, taking Twitter, Instagram, and Youtube as examples, although these social media are the most popular mainstream international social platforms, the focus of each determines its own advantages and disadvantages. These strengths and weaknesses are effective for the international communication of the city's image, especially for Shanghai, a metropolis in a developing Asian country, to enhance its international image and status. Therefore, a fifth research hypothesis is proposed:

RH5: There is a correlation between the effectiveness of the communication of Shanghai's international image on social media and the variability of Twitter, Instagram, and Youtube.

3.3 Research Methods

Social network analysis, an analytical method proposed by anthropologist Radcliffe-Brown in the 1940s, is based on interdisciplinary integration to study relationship formation, behavioral characteristics, and information dissemination patterns in social networks. It primarily includes the properties of social network structure and its change law, social network group behavior and interaction, and information dissemination in social networks. With the rapid development of mobile Internet technology, and due to the dynamic nature of online social networks and the richness of data, academics are increasingly

focusing on research on online social network analysis.

The social structure of online social networks and their scale characteristics determine the flow and dissemination of information, which is closely linked to the behavior and interaction of online social network groups. Online social networks provide interactive information communication platforms for users, and users generate information content including tweets, posts, and comments (UGC, Users Generate Content), which forms a vast amount of data (Kwon et al., 2014; Lyu & Kim, 2016). From the perspective of communication science, computational communication science was born to study these human communication behaviors and phenomena on the Internet through computational methods based on a large amount of data. As a new research paradigm, computational communication has evolved from computational social science and is an important branch of computational social science. It has received increasing attention from international scholars with the creation of the Computational Methods Group by the International Communication Association (ICA) in 2016. Computational communication is based on computable human communication behaviors, with the help of analytical tools such as sentiment analysis, communication network analysis, and text mining, to collect and analyze massive amounts of data on human communication behaviors, so as to analyze the laws and mechanisms of communication. Data-driven computational communication is gradually applied to data journalism, computational advertising, personalized recommendation, and other fields, and the research of computational communication has enriched people's knowledge of social communication phenomena.

Taking social media represented by Twitter as an example, the text, images, and videos generated by users on social media, which may contain detailed information such as users' personal thoughts, opinions, and behaviors, are in diverse forms and of varying levels of quality, and are usually vague and unstructured. Therefore, to find the mechanisms and laws of communication behaviors through these data, just a small amount of information cannot explain the problem; it needs to be crawled, cleaned and processed, and computationally analyzed on the basis of big data in order to conduct an in-depth study. To summarize, computational communication is succinctly divided into two steps: acquisition of big data and data analysis. In this study, massive data will be acquired from tweets, posts, and comments on Twitter, Instagram, and Youtube, so as to profile and analyze Shanghai's international image.

The research mainly integrates a quantitative analysis. From the perspective of computation, the following research methods can be adapted to more accurately and objectively reflect and grasp the laws and characteristics of Shanghai's international image communication: (1) Literature Research: Through literature collection, sorting, and research, grasp the process and latest progress of research on the city image, especially city image communication and social media users, summarize the characteristics and put forward corresponding judgments in combination with the theoretical research results and practical experience in recent years, to provide theoretical support for the research of this subject; (2) Data Mining: Search for the keyword "Shanghai" on the pages of Twitter, Instagram, and Youtube, and use crawler software to crawl the information of users' accounts (including users' "followers", "fans", "geographic information", etc.), context, users' comments and other data on the page, and then clean up the

data to obtain the final data samples; (3) High-frequency and Co-occurrence Words: Obtain the sample of high-frequency words about the content of Shanghai international image communication through data processing. On this basis, carry out semantic network analysis to draw the map of co-occurrence words. Based on these two methods, grasp the current situation and characteristics of Shanghai city image communication and the differences of Shanghai international image presented by the three media; (4) Correlation Analysis: Construct the index system of the influencing factors of Shanghai city image communication effect, test the rationality of the index construction through factor analysis, and then conduct a correlation empirical analysis on the five problems in the research hypothesis.

4 Shanghai's International Image in Social Media

4.1 Data collection and sorting

This study integrates the global ranking of social media platforms by Statista, the unique characteristics of each social media model, and the objectives of the current research. Twitter, Instagram, and YouTube have been selected as the data sources, each representing text, photo, and video-driven mediums, respectively. Twitter, a micro-blogging platform, allows users to share real-time status updates and engage in instant interactivity. Users can follow others based on their interests and share, retweet, comment on, and reply to the content that intrigues them. Instagram, on the other hand, facilitates the sharing of photos and videos and enables users to find communities aligning with their interests. Unlike Twitter's public tweets, Instagram primarily focuses on sharing content with friends and promoting a more private domain of social interaction. Most of the posts are inaccessible to non-followers, but public posts exist under specific

hashtags. YouTube, the largest video search and sharing platform globally, empowers users to upload, view, share, and comment on videos. The distribution of content on this platform predominantly relies on the accuracy of algorithmic recommendations, reducing human intervention.

Shanghai Bureau of Statistics' official data indicates a certain regularity in the annual number of individuals entering and exiting Shanghai, with peaks in March, April, October, and November. Consequently, this research sourced data from Twitter, Instagram, and YouTube from March, April, October, and November for the years 2019 and 2020. Using "Shanghai" as the keyword, we obtained 4,065,599 related tweets on Twitter. After filtering out non-English tweets, inactive accounts with zero followers, duplicate tweets, and tweets with inaccessible data due to privacy settings, a total of 1,287,870 valid English tweets and 38,277 comments were collated. Instagram's social orientation differs from Twitter's, focusing more on private and not entirely open interactions. Despite most posts being inaccessible without following, public posts can be obtained under the hashtag "#Shanghai". Using Python 3.8, we accessed API interface products provided by Rapidapi, expanded the topic "#Shanghai", and obtained a list of topics (as shown in Table 1). A total of 5,551 posts were acquired, and after removing non-English texts, 3,759 original English text data and 7,022 English comments remained. For YouTube, we gathered 1,701 items and 7,528 comments from video titles and descriptions posted within the specified four time periods that contained the keyword "Shanghai".

Table 1 List of Hashtags of Instagram(Shanghai,2019-2020) (Elaborated by author)

NO.	Hashtag	NO.	Hashtag

1	'shanghai2019',	12	'hotelexshanghai2019',
2	'shanghai2019wwc',	13	'designshanghai2019',
3	'shanghaiautoshow2019',	14	'shanghaifashionweek2019',
4	'autoshanghai2019',	15	'shanghaimarathon2019',
5	'shanghaitrophy2019',	16	'shanghai2020',
6	'fendishanghai2019',	17	'shanghaitoyshow2020',
7	'shanghaitoyshow2019',	18	'designshanghai2020',
8	'shanghai2019 💦 ',	19	'shanghai2020
9	'wonderfestival2019shanghai',	20	'shanghai2020💖💖 '
10	'shanghaitex2019',	21	'adidasshanghai2020']
11	'automechanikashanghai2019',		

4.2 Data process and analysis

4.2.1 Analysis based on high frequency and Co-occurrence words

Word frequency analysis serves as a critical tool in text mining. It elucidates the logical relationship of related content by calculating and observing word occurrences, thereby determining research content hotspots. Co-occurrence analysis, on the other hand, involves counting the number of paired occurrences of a word group in the sample data. The affinity relationship between these words is measured by their co-occurrence, which helps identify potential associations between the co-occurring feature items. In this study, post data cleaning, we imported the stopwords library using Python 3.8 to separate the text into words. This process filters out meaningless words and symbols, transforming paragraphs and sentences into a collection of words with actual meaning. Given the large sample size, we introduced the Collection library to count high-

frequency words, thereby improving computing efficiency. We identified the 100 most frequent words in each social media text (Table 2, Table 4, & Table 6) and used Wordcloud to create a word cloud map based on the frequency of these high-frequency words (Figure 1, Figure 2, Figure 3). Simultaneously, we applied the co-occurrence method to derive the top 100 pairs of co-occurring words with the highest frequency based on the frequency of two words appearing in the same utterance (Table 3, Table 5, & Table 7).

The results from the high-frequency words and co-occurrences reveal that the three mainstream media outlets share a focus on Shanghai in fields such as economy, politics, culture, technology, and public health. However, each medium has a unique emphasis: Twitter leans more towards politics, Instagram towards culture, and YouTube, while also focusing on culture and technology, has a broader reach than Instagram. From a communication perspective, visual content, events, public emergencies, and technological advancements are significant in attracting audience attention to Shanghai. For example, the attention given to the COVID-19 pandemic in Shanghai constitutes a considerable proportion of all three social media platforms' focus. Twitter, in particular, has a high frequency of co-occurrences related to Shanghai's science and technology. One tweet, "An 85-year-old primary school in Shanghai has been lifted off the ground in its entirety and relocated using new technology dubbed the 'walking machine'", garnered significant international attention and recognition for Shanghai's technological innovation. The above analysis indicates that large international events, public emergencies, and significant breakthroughs in science and technology can greatly influence a city's international image. Events, especially dynamic ones, continually update

Shanghai's image in real time, either positively or negatively.

Table 2   High Frequency Words (Twitter, Top 100)   (Elaborated by author)

No.	Keywords	No.	Keywords	No.	Keywords	No.	Keywords
1	shanghai	26	primary	51	lied	76	top
2	china	27	corona	52	journalist	77	great
3	new	28	lifted	53	disneyland	78	wonder
4	2019	29	relocated	54	departed	79	shenhua
5	beijing	30	travelled	55	cities	80	chinas
6	world	31	like	56	ahead	81	cooperation
7	chinese	32	medical	57	fans	82	press
8	2020	33	president	58	giga	83	hotel
9	schedule	34	ighalo	59	gigafactory	84	odion
10	york	35	white	60	cases	85	pudong
11	first	36	night	61	expo	86	tokyo
12	event	37	tour	62	masks	87	open
13	tesla	38	global	63	agents	88	asia
14	virus	39	video	64	bund	89	visit
15	international	40	airlines	65	project	90	taiwan
16	birthday	41	flight	66	group	91	london
17	old	42	thank	67	amazing	92	production
18	october	43	wuhan	68	a350	93	art
19	coronavirus	44	fashion	69	expert	94	drone
20	airport	45	festival	70	air	95	weibo
21	school	46	eastern	71	best	96	park

22	technology	47	italy	72	love	97	win
23	toronto	48	ccp	73	official	98	car
24	18th	49	good	74	covid	99	exhibition
25	update	50	happy	75	center	100	public

Figure 1 Words Cloud of High Frequency Words (Twitter) (Elaborated by author)

Table 3 High Frequency of Co-words (Twitter, Top 100) (Elaborated by author)

No.	Source	Target	No.	Source	Target
1	china	shanghai	51	relocated	year
2	new	shanghai	52	lifted	shanghai

3	beijing	shanghai	53	technology	using
4	2019	new	54	using	year
5	shanghai	world	55	school	using
6	2019	may	56	85	ground
7	2019	october	57	ground	old
8	2019	schedule	58	lifted	new
9	2019	york	59	85	lifted
10	13th	2019	60	lifted	old
11	2019	toronto	61	old	using
12	18th	2019	62	lifted	school
13	2019	regions	63	school	technology
14	shanghai	year	64	relocated	shanghai
15	chinese	shanghai	65	ground	lifted
16	2020	shanghai	66	lifted	relocated
17	new	york	67	ground	relocated
18	2019	shanghai	68	new	relocated
19	event	shanghai	69	relocated	using
20	shanghai	virus	70	ground	school
21	old	shanghai	71	85	using
22	shanghai	tesla	72	lifted	year
23	beijing	virus	73	lifted	using
24	birthday	shanghai	74	ground	using
25	airport	shanghai	75	technology	year
26	school	shanghai	76	primary	using
27	shanghai	technology	77	old	technology

28	first	shanghai	78	ground	primary
29	shanghai	show	79	entirety	new
30	coronavirus	shanghai	80	85	technology
31	shanghai	today	81	lifted	primary
32	beijing	world	82	entirety	primary
33	primary	school	83	entirety	school
34	virus	world	84	85	entirety
35	ground	shanghai	85	entirety	year
36	85	school	86	entirety	old
37	primary	shanghai	87	entirety	lifted
38	corona	shanghai	88	entirety	ground
39	new	technology	89	entirety	relocated
40	old	primary	90	entirety	using
41	reached	shanghai	91	entirety	shanghai
42	old	relocated	92	corona	virus
43	relocated	school	93	ground	technology
44	entire	shanghai	94	relocated	technology
45	new	primary	95	lifted	technology
46	85	primary	96	primary	technology
47	primary	year	97	beijing	corona
48	ground	new	98	entirety	technology
49	85	relocated	99	international	shanghai
50	primary	relocated	100	shanghai	update

Table 4 High Frequency Words (Instagram, Top 100) (Elaborated by author)

No.	keyword	No.	keyword	No.	keyword	No.	keyword
1	shanghai	26	chinese	51	designs	76	championship
2	2019	27	enjoy	52	event	77	luck
3	design	28	best	53	15th	78	textile
4	show	29	expo	54	contact	79	series
5	love	30	wow	55	collection	80	technology
6	booth	31	convention	56	limited	81	luxury
7	world	32	cool	57	brand	82	city
8	new	33	awesome	58	hall	83	super
9	toy	34	visit	59	life	84	photos
10	see	35	team	60	experience	85	sanda
11	china	36	auto	61	place	86	materials
12	great	37	april	62	available	87	program
13	exhibition	38	happy	63	products	88	edition
14	good	39	future	64	post	89	marathon
15	amazing	40	art	65	photo	90	championships
16	beautiful	41	wonderful	66	electric	91	coffee
17	first	42	well	67	november	92	friends
18	like	43	thanks	68	sales	93	fun
19	2020	44	brands	69	road	94	designed
20	thank	45	international	70	hope	95	park
21	center	46	cute	71	top	96	km
22	fashion	47	congratulations	72	style	97	baby

23	bio	48	concept	73	congrats	98	space
24	wushu	49	people	74	register	99	bund
25	work	50	car	75	green	100	run

Figure 2 Words Cloud of High Frequency Words (Instagram) **(Elaborated by author)**

Table 5 High Frequency of Co-words (Instagram, Top 100) **(Elaborated by author)**

No.	Source	Target	No.	Source	Target
1	2019	shanghai	51	contact	territory
2	design	shanghai	52	november	shanghai

3	shanghai	show	53	design	world
4	shanghai	toy	54	design	year
5	exhibition	shanghai	55	national	sanda
6	booth	shanghai	56	chinese	design
7	show	toy	57	first	shanghai
8	shanghai	world	58	convention	exhibition
9	center	shanghai	59	design	hall
10	2019	show	60	exhibition	expo
11	2019	toy	61	china	com
12	expo	shanghai	62	booth	sts
13	convention	shanghai	63	design	enjoy
14	com	contact	64	booth	center
15	contact	please	65	lulu	toy0
16	2019	sts	66	exhibition	show
17	com	sales	67	convention	expo
18	please	sales	68	design	register
19	contact	sales	69	center	expo
20	2020	design	70	hall	shanghai
21	china	shanghai	71	show	sts
22	brands	design	72	exhibition	world
23	design	new	73	brands	fashion
24	fashion	green	74	design	designs
25	2020	shanghai	75	campaign	com
26	sanda	team	76	shanghai	year
27	2019	booth	77	auto	shanghai

28	design	link	78	contemporary	design
29	bio	design	79	design	products
30	booth	show	80	china	design
31	2019	design	81	design	show
32	new	shanghai	82	design	designers
33	world	wushu	83	15th	wushu
34	booth	toy	84	expo	show
35	2019	exhibition	85	booth	convention
36	bio	link	86	environmental	fashion
37	shanghai	time	87	fashion	textile
38	see	shanghai	88	national	team
39	2019	center	89	brands	shanghai
40	center	exhibition	90	fashion	materials
41	2019	world	91	come	shanghai
42	design	exhibition	92	2019	convention
43	shanghai	sts	93	convention	world
44	fashion	printing	94	booth	expo
45	chinese	shanghai	95	green	materials
46	center	convention	96	green	textile
47	green	printing	97	brands	green
48	2019	expo	98	environmental	green
49	booth	exhibition	99	fashion	week
50	sales	territory	100	expo	toy

Table 6 High Frequency Words (Youtube, Top 100) (Elaborated by author)

No.	keyword	No.	keyword	No.	keyword	No.	keyword
1	china	26	country	51	god	76	pretty
2	like	27	work	52	long	77	top
3	video	28	guys	53	music	78	win
4	people	29	videos	54	school	79	oh
5	love	30	kong	55	food	80	government
6	chinese	31	hong	56	ccp	81	job
7	shanghai	32	fake	57	awesome	82	happy
8	good	33	life	58	tower	83	boring
9	great	34	hope	59	old	84	communist
10	really	35	rich	60	india	85	war
11	world	36	bad	61	cool	86	media
12	city	37	money	62	channel	87	riot
13	best	38	x000d	63	virus	88	buildings
14	new	39	live	64	team	89	kda
15	well	40	watching	65	medvedev	90	america
16	better	41	race	66	game	91	poor
17	amazing	42	big	67	covid	92	worlds
18	nice	43	right	68	japanese	93	guy
19	beautiful	44	hard	69	home	94	worst
20	thanks	45	song	70	future	95	sad
21	building	46	opening	71	sure	96	car
22	first	47	place	72	2020	97	seems
23	lol	48	ceremony	73	tesla	98	interesting

24	always	49	show	74	high	99	imagine
25	wow	50	man	75	movie	100	japan

Figure 3 Words Cloud of High Frequency Words (Youtube) (Elaborated by author)

Table 7 High Frequency of Co-words (Youtube, Top 100) (Elaborated by author)

No.	Source	Target	No.	Source	Target
1	china	chinese	51	building	quot
2	china	world	52	good	video
3	china	people	53	like	us
4	hong	kong	54	china	much
5	like	people	55	love	shanghai

6	china	like	56	fake	people
7	china	quot	57	people	time
8	chinese	people	58	really	video
9	people	rich	59	hard	work
10	like	really	60	china	great
11	china	country	61	like	money
12	money	people	62	china	let
13	like	video	63	love	much
14	china	shanghai	64	always	like
15	china	made	65	better	like
16	china	love	66	quot	shanghai
17	chinese	like	67	hard	quot
18	great	video	68	chinese	would
19	chinese	quot	69	chinese	us
20	people	world	70	last	year
21	chinese	world	71	thanks	video
22	good	like	72	many	quot
23	china	never	73	big	like
24	ceremony	opening	74	thank	video
25	people	think	75	money	rich
26	like	shanghai	76	building	like
27	city	shanghai	77	see	video
28	people	us	78	always	people
29	china	hong	79	see	would
30	china	kong	80	go	quot

31	like	time	81	great	love
32	china	fake	82	china	everything
33	like	make	83	like	years
34	china	video	84	china	new
35	always	china	85	people	shanghai
36	china	time	86	china	still
37	like	love	87	make	quot
38	like	many	88	china	money
39	people	way	89	much	video
40	good	people	90	hong	world
41	get	rich	91	like	made
42	country	people	92	look	people
43	quot	would	93	china	well
44	shanghai	video	94	back	china
45	like	rich	95	next	year
46	quot	see	96	great	quot
47	love	video	97	great	see
48	make	people	98	love	see
49	great	like	99	make	video
50	china	keep	100	shanghai	time

4.2.2 Different Representations of Shanghai's Image in International Mainstream Media

As representatives of text, image, and video media respectively, Twitter, Instagram, and YouTube each offer unique capabilities for disseminating Shanghai's international image. To ascertain which medium or media

combination is most effective in communicating this image, it's essential to analyze the distinct characteristics of each platform.

Twitter, known for its substantial user base and a 140-character limit per tweet, excels in the rapid dissemination of information. Its features such as strong interactivity and user-friendly design have made it an increasingly crucial news source for international media. However, this unrestricted platform for public opinion can also lead to the spread of fragmented, homogeneous, and occasionally unreliable content. Instagram, in contrast, places a strong emphasis on visual content. All user-published material is previewed in the form of a "photo wall," making it highly attractive to younger audiences. Its immediacy, mobility, and sociability, coupled with its high engagement from celebrities and key opinion leaders (KOLs), have contributed to Instagram's popularity.YouTube, the world's largest video platform, also serves as a social media platform for professional content production. Owing to its mature and professional KOLs, original and high-quality content, YouTube offers an excellent user experience, which results in strong user engagement and loyalty.These inherent differences among the three platforms result in diverse portrayals of Shanghai's international image. Using "Shanghai" as a keyword, an analysis of high-frequency words and co-occurring words in the sample data from these platforms reveals the following: Twitter users primarily depict Shanghai in terms of economy, science and technology, culture, sports events, and public health; Instagram users present Shanghai as a city more aligned with fashion, culture, and sports events;YouTube users construct a more comprehensive image of Shanghai, covering a broad range of topics without an overt concentration or bias.

Despite these differences, the international image of Shanghai across all three media exhibits several common characteristics. Economic elements remain the primary constituents of Shanghai's international image, with the city recognized more prominently as an economic hub compared to Beijing. Cultural aspects and events are playing an increasingly significant role in shaping Shanghai's international image, a trend that is clearly reflected across Twitter, Instagram, and YouTube.

Furthermore, Shanghai's image as a hub of scientific and technological innovation occupies a large share of the discourse on international social media. This is illustrated by the predominance of content related to science and technology among Twitter's top 100 co-occurring words. For instance, as mentioned above, a widely discussed tweet about Shanghai's relocation of an 85-year-old primary school using new technology exemplifies the city's growing activity and openness in the field of scientific and technological innovation. These initiatives and developments in science and technology industry and trade have significantly shaped Shanghai's image as a leading city in scientific and technological innovation.

5 Empirical Study on the Influencing Factors

5.1 Test of the Two-step Flow Model

5.1.1 Selection of Sample Objects

The distinct features of Twitter, Instagram, and YouTube, especially in terms of their openness, make the selection of sample objects a critical task. Instagram and YouTube, unlike Twitter, lack a forwarding function, offering only a sharing feature. Instagram's sharing function is limited to friends within the user's circle,

while YouTube essentially only shares an integrated information link via channels such as WhatsApp, email, and Twitter. The data volume shared through these methods is unobtainable.

In contrast, Twitter incorporates liking, commenting, and sharing functions, along with a forwarding feature. Considering that the two-step flow communication process primarily involves two stages-information flow and influence flow-where mass media and opinion leaders play crucial roles respectively, Twitter's forwarding function becomes instrumental in the diffusion stage. Therefore, selecting Twitter as the research platform to verify the two-step flow communication model of Shanghai's international image communication in social media is more scientifically rigorous.

Regarding mass media selection, this study focuses on the international image communication of Shanghai within the social media space. Hence, it initially selected media outlets from the World Media Lab's list of the world's top 500 media for 2019 and 2020, corresponding to the data samples. The study then filtered out mass media that have not established a presence on the Twitter platform, yielding a final sample data of 433 mass media outlets. Among these outlets, 49 have published tweets containing the keyword "Shanghai" during the selected periods of March, April, October, and November from 2019 to 2020.

5.1.2 Judgment of opinion leaders and influence

While Lazarsfeld's definition of opinion leaders, centered on mass communication, has been long-standing, the rise and development of network technology have necessitated a reconsideration of the concept in the context of

cyberspace. Extensive research suggests that opinion leaders in cyberspace usually exhibit high degrees of participation (Barberá et al., 2015), with such participation demonstrating a positive correlation with the number of tweets forwarded and the level of communication with others (Zhang et al., 2014).

However, the virtual and alienated nature of cyberspace introduces substantial differences between online and traditional opinion leaders. Opinion leaders in cyberspace are highly interchangeable and face trust issues. Consequently, this study has formulated an indicator system for online opinion leaders, comprising two primary dimensions: trust and activeness. Trust is further divided into two sub-indicators: the number of followers and certification status, whereas activeness includes the number of follows, the length of joining, and the number of posts (Table 8). This nuanced indicator system provides a more accurate and contextual understanding of online opinion leaders in the era of social media.

Table 8 Evaluation index structure (Elaborated by author)

Target	First Level Indicators	Second Level Indicators	Type of Data	Source of Data
Impact indicators of opinion leaders -A1	Trust	Number of followers -A11	Quantitative Data	Delphi Expert Evaluation Method
		Certified or Not- A12		
	Activeness	Number of Follows-A13		
		Length of Joining-A14		
		Number of Posts- A15		

Following the establishment of the indicator system, it's crucial to evaluate the weight of each of the five secondary indicators. In this study, these five indicators are utilized as evaluation factors, forming an evaluation set 'A' that symbolizes the "influence of opinion leaders". Thus, A=A1, where A1={A11, A12, A13, A14, A15}. Here, A11 represents the number of followers, A12 indicates certification status, A13 denotes the number of follows, A14 measures the length of joining, and A15 pertains to the number of posts.

The weights for these indicators were determined using the Analytic Hierarchy Process (AHP) developed by Saaty (1987). Specifically, the Delphi Method (Table 9) was employed to quantify the relative importance of each hierarchical element, aiding in the calculation of the judgment matrix's maximum eigenvalue and eigenvector. Consequently, this provided the weight of the hierarchy relative to the previous level and facilitated the ranking of relative importance.

Table 9   Interpretation of Scaled Quantized Values   (Elaborated by author)

Scale (a_{ij})	Definition
1	Both elements are equally important
3	Compared with the two elements, the former is slightly more important than the latter
5	Compared with the two elements, the former element is obviously more important than the latter
7	Compared with the two elements, the former element is much more important than the latter
9	Compared with the two elements, the former element is extremely important

	than the latter
2，4， 6，8	Compared with the two elements, the importance of the former element is between the calibrated standards
$1/(a_{ij})$	Inverse comparison of two elements

According to the results and opinions of experts' comparison, a judgment matrix A is constructed for each index:

$$A = \begin{bmatrix} a_{11} & \cdots & a_{a1j} \\ \vdots & \ddots & \vdots \\ a_{ij} & \cdots & a_{ij} \end{bmatrix} \qquad (1)$$

According to the judgment matrix A, the hierarchical single sorting is carried out, and the importance of all elements in this layer within the dimension of the previous layer is arranged. Calculate the weight vector by the square root method of Formula 1, and standardize it by Formula 2 to obtain the standardized weight vector:

$$w_i = \sqrt[m]{\prod_{j=1}^{m} a_{ij}} \qquad (2)$$

$$W_i = \frac{w_i}{\sum_{j=1}^{m} w_i} \qquad (3)$$

After obtaining the weight matrix Wi, calculate the maximum characteristic root using Formula 3:

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^{n} \frac{(AW)_i}{W_i} \qquad (4)$$

In order to ensure that the constructed judgment matrix A has no logical problems, it is necessary to conduct consistency analysis on each judgment matrix. CR value is often used as an indicator to judge consistency. When the consistency ratio CR<0.1, it is generally considered that the consistency test is passed, and

the standardized weight can be used as a weight vector, otherwise the judgment matrix A needs to be readjusted.

$$CR = \frac{CI}{RI} \qquad (5)$$

$$CI = \frac{\lambda_{max} - n}{n - 1} \qquad (6)$$

RI can be obtained from the random consistency index R.I. value table obtained by Professor Satty after 1000 simulations (Table 10)

Table 10 Random Consistency Index (Elaborated by author)

Matrix order	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

The judgment matrix constructed by the five secondary indicators of the "opinion leader influence" indicator system is shown in Table 11 below. The consistency test CR value is 0.06<0.1, and the judgment matrix has satisfactory consistency. The consistency test was passed, the weight of this level to the overall goal is 100%.

Table 11 Subordinate Level Judgment Matrix of Twitter Opinion Leader Influence

(Elaborated by author)

Opinion Leader Influence-A1	Number s of followers -A11	Certified or Not -A12	Numbers of Follows -A13	Length of Joining -A14	Numbers of Posts -A15	Weight
A11	1	1/3	1/8	1/8	1/9	58.0%
A12	3	1	1/6	1/5	1	20.1%

A13	8	6	1	2	3	4.1%
A14	8	5	1/2	1	2	6.0%
A15	9	1	1/3	1/2	1	11.8%

The number of valid Twitter tweets obtained in this study is 1287870, and the corresponding user accounts are 721267. By using Min max Normalization, the five dimensions of the number of followers, whether to authenticate, number of followers, length of joining, and number of posts of these 721267 users are standardized and normalized , and combined the calculated weight of each dimension, distribution of influence scores of the user accounts is obtained (Table 12).

$$x' = \frac{x - \min(x)}{\max(x) - \min(x)} \tag{7}$$

Table 12 Distribution of Influence Scores of the Users' Accounts

(Elaborated by author)

mean	0.209440
std	0.055231
min	0.160000
25%	0.172000
50%	0.196000
75%	0.224200
max	0.840200

It can be seen from the above distribution table of influence scores that 25% of

users' influence scores are not higher than 0.172, and 50% of users' influence scores are not higher than 0.196. In this study, 464 opinion leader users were selected as the research sample, who had a user influence score greater than 0.6 and the mass media accounts are not included.

5.1.3 Data Analysis

Among 1287870 Twitter samples obtained in this study, 307403 were original tweets. According to the number of times each tweet has been forwarded from high to low, among the top 100 tweets, 2 are original tweets from mass media, 27 are original tweets from opinion leaders, 17 are original tweets from mass media, 149 are original tweets from opinion leaders among the top 1000 tweets, 448 are original tweets from mass media and 716 are original tweets from opinion leaders among top 10000 tweets (Table 13).

The table offers an insightful comparison of original tweets, segregated into those forwarded by opinion leaders and those not. The metrics used for comparison-average forwarding times, number of citations, comments, likes and their corresponding measures after being forwarded by opinion leaders, weave an intriguing story of how influence works in the digital space.

Firstly, it's evident that the average number of times a tweet is forwarded, cited, commented on, and liked is dramatically higher when the tweet is forwarded by an opinion leader, as compared to when it is not. This indicates that the association of an opinion leader amplifies the tweet's visibility and audience engagement, thereby corroborating the significant role of opinion leaders in the dissemination of information on social media.What is particularly noteworthy

from the data is that opinion leaders appear to have a predilection for forwarding original content rather than content that has already gained substantial traction. This trend may be indicative of their role as thought leaders who shape public opinion by introducing novel content into the discourse.Interestingly, the average metrics for tweets not initially forwarded by opinion leaders remain zero, even after they are subsequently forwarded by them. This could suggest that the perceived value of a tweet is not retroactively enhanced by the endorsement of an opinion leader, but rather, the endorsement needs to be concurrent with the release of the tweet for it to have an impact.

On the other hand, for tweets that are initially forwarded by opinion leaders, all these metrics show a significant increase, underscoring the idea that the endorsement of an opinion leader at the outset can potentially boost a tweet's reach and engagement levels substantially.

This analysis challenges the traditional two-step flow model of communication, which posits that information flows from the mass media to opinion leaders, who then relay it to the wider public. Instead, the data suggests a direct, influential role of opinion leaders in the information dissemination process, arguably bypassing the need for an intermediary mass media stage.Therefore, it can be concluded that both research hypothesis 1 and research hypothesis 2 are valid. Thus, when focusing specifically on the communication of Shanghai's international image, it appears that opinion leaders wield a more substantial influence than mass media. Their direct, early involvement in spreading information can significantly enhance a tweet's visibility and impact, which are crucial aspects in shaping public perceptions. This finding underscores the need

for a revised understanding of information dissemination in the digital age, and highlights the imperative of engaging with opinion leaders in communication strategies.

Table 13   Distribution of mass media and opinion leaders' tweets (Ranked by numbers of forwarding)   (Elaborated by author)

Type Rank	Mass Media	Opinion Leader
Top 100	2	27
Top 1000	17	149
Top 10000	448	716

Table 14   Communication effect of mass media tweets (ordinary tweets/popular tweets) (Elaborated by author)

Type Dimension	Each original tweet of mass media (not forwarded by Opinion Leader)	Each original tweet of mass media (forwarded by Opinion Leader)
Average forwarding times	46.491736	349.853933
Average number of citations	13.061983	95.213483
Average number of comments	16.605462	150.269663
Average numbers of likes	165.187567	844.662921
Average forwarding times of opinion leaders	0	1.191011

Average numbers of forwarding after being forwarded by opinion leaders	0	12.41573
Average citations after being forwarded by opinion leaders	0	1.752809
Average comments after being forwarded by opinion leaders	0	7.067416
Average numbers Of likes after being forwarded by opinion leaders	0	54.662921

5.2 Correlation analysis

5.2.1 Construction of Indicator System

The rise of cyberspace, as Habermas posited, has provided an ideal environment for discourse. The advent of social media technology further validates this view, offering platforms where views can be freely expressed, shared, and communicated in real-time (Harlow, 2011). These platforms capture various trajectories formed by the communication and interaction of users' self-views. These trajectories, to a certain extent, mirror users' self-identity and characteristics (Clarke, 1994). The higher the frequency of these interactions, the greater the recognition and influence a user wields. This recognition and influence rest heavily on the acknowledgment of a user's identity, as identity recognition is integral in forming trust among users (Bellini et al., 2020). Trust, in turn, is a pivotal factor for both users and platforms (Salehan et al., 2016).

As previously analyzed in Chapter 3, these user characteristics encompass the degree of users' social contact, their likelihood of connecting with external communication, and whether their account has been verified. In this study, these factors, including the number of fans, followers, posts, the length of time a user has been on social media, and whether the account is verified, serve as sub-factors of user influence.

Given the particular context that Twitter, Instagram, and YouTube are prohibited in China, the pool of communicators narrows down in the process of disseminating Shanghai's international image. Therefore, the factor of whether users have visited Shanghai is also considered as a sub-factor influencing Shanghai's international image communication. However, due to functional differences between media, data on whether users have visited Shanghai and the number of users' followers can't be retrieved from the YouTube page. Nevertheless, the number of subscribers to a user's channel can be obtained, which is a sufficient reflection of user influence.

In the process of analyzing Shanghai's international image communication, the correlation between communication content and its effect requires an indicator system based on influencing factors for the communication content variable. Drawing from the evolution of city image research in the literature review and the analysis above, the influencing factors of communication content primarily include the form and type of content presentation, and the sentiment tendency contained within the content. Specifically, content richness includes elements like the number of words, emojis, hashtags, multimedia information, and geo-tagging in the posted text. The sentiment tendency of the content is categorized

into five levels: very negative, negative, neutral, positive, and very positive. The content category is primarily divided based on the visual image, behavioral image, and conceptual image contained within the city image system.

The provided table (Table 15) outlines a two-level indicator system of the influencing factors of users and communication content across Twitter, YouTube, and Instagram. The first level, personal influence of users, encompasses factors such as certification status, number of posts, length of time on the platform, number of followers, and whether the user has visited Shanghai. The second level, content influence, considers content richness, sentiment tendency of content, and category of content, which includes visual image (VI), behavioral image (BI), and mental image (MI).

For Twitter, the communication effect is evaluated based on the number of reposts, likes, comments, quotes, and the time difference between the first and last comments. Instagram's communication effect is gauged similarly, with the exception of the number of reposts and quotes. As for YouTube, due to its unique features, the total views and sentiment tendency of video text are considered instead of the number of reposts and quotes. The time difference between the first and last comments is also used to evaluate communication effect on YouTube.

From this, it's clear that different social media platforms have different metrics and features that contribute to the communication and influence of content. Therefore, when evaluating the communication effect of Shanghai's international image, it is crucial to take into account these platform-specific characteristics.

Table 15 Indicator System of the Influencing Factors (Elaborated by author)

	Twitter	YouTube	Instagram
A- Personal Influence of Users	A1:Certified or Not	A1:Certified or Not	A1:Certified or Not
	A2:Number of Posts	A2:Number of Posts	A2:Number of Posts
	A3:Length of Joining	A3:Length of Joining	A3:Length of Joining
	A4:Number of followers	A4:Number of followers	A4:Number of followers
	A5:Number of Follows	A5:Total views	A5:Number of Follows
	A6:Whether have been to Shanghai	/	A6:Whether have been to Shanghai
B- Content Influence	B1:Conten Richness	B1:Conten Richness	B1:Conten Richness
	B2:Sentiment Tendancy of Content	B2:Sentiment Tendancy of Video text	B2:Sentiment Tendancy of Content
	B3:Category of Content (VI,BI,MI)	B3:Category of Content (VI,BI,MI)	B3:Category of Content (VI,BI,MI)
C- Communica tion Effect	C1:Number of Repost	/	/
	C2:Likes	C2:Likes	C2:Likes
	C3:Number of Comments	C3:Number of Comments	C3:Number of Comments
	C4:Number of Quote	C4:Total Views	/
	C5:Time difference between the first and last comments	C5:Time difference between the first and last comments	C5:Time difference between the first and last comments

5.2.2 Data Processing

The secondary indicators of user influence and communication effect can be obtained directly through data crawling, while the secondary indicators for communication content require quantification and transformation. To begin, the

text and video descriptions posted on Twitter, Instagram, and YouTube undergo natural language processing to assess the richness, sentiment tendency, and content categories. Specifically, the dimensions of text length, emoji usage, hashtags, multimedia content, and positioning contribute to content richness and are represented as binary variables (0 or 1). Generally, the greater the presence of these dimensions, the more information is conveyed, resulting in richer content. Consequently, the text length attribute is marked as 1 if it exceeds the average word count, and 0 otherwise. Emojis, which effectively convey emotions, are identified using Python's Emoji library. If a text contains emojis, the attribute indicating their presence is marked as 1; otherwise, it is marked as 0. Hashtags serve as important markers for users to engage in community information interaction. Thus, if a text contains hashtags, the attribute is marked as 1; otherwise, it is marked as 0. Furthermore, text messages often include links, allowing users to share pictures or videos. These media elements are displayed as internal links within the text on social media platforms. In the case of YouTube, users may also include external links in video descriptions for traffic conversion or image display. Consequently, if a text contains links, the attribute indicating the presence of multimedia content is marked as 1; otherwise, it is marked as 0. Additionally, users frequently disclose their own locations on social media. In this study, the attribute indicating whether a text contains location information is marked as 1 if the user's tweet includes positioning; otherwise, it is marked as 0. After collecting data for these five dimensions, a content richness score is calculated using a Likert scale ranging from 0 to 5. Higher scores indicate greater content richness.

Regarding the sentiment tendency of the text, sentiment analysis is conducted

using a natural language processing sentiment analysis model implemented in Python. The model classifies text sentiment into five levels: very negative, negative, neutral, positive, and very positive. Each level is assigned a weight of 1 to 5, based on the model's classification result. Higher scores indicate a more positive sentiment in the text. In terms of emotional orientation, Twitter achieved a score of 0.705, Instagram scored 0.594, and YouTube scored 0.717.

In the secondary index system of communication effect, content is categorized into visual image, behavioral image, and conceptual image. The 5,000 most frequently occurring words across all texts are manually coded and assigned to these categories. Dummy variables are created to mark the presence of keywords corresponding to each category. If a text contains keywords associated with a particular category, the attribute is marked as 1; otherwise, it is marked as 0. Each text is assigned determinations for visual image, behavioral image, and conceptual image, resulting in a total score. Higher scores indicate a greater diversity of categories covered in the text content.

5.3 Data analysis

After constructing and quantifying the index systems for user influence, content influence, and communication effect, a factor analysis was performed using the factor_analyzer library in Python3. This analysis aimed to reduce the sub-dimensions of user influence, content influence, and communication effect by extracting common factors. To ensure the validity of the factor analysis, the KMO (Kaiser-Meyer-Olkin) test and Bartlett's spherical test were conducted to assess the correlation among the variables. The KMO test evaluates the adequacy of the data for factor analysis, while Bartlett's spherical test examines the

hypothesis that the correlation matrix is an identity matrix, indicating that there are no correlations among the variables.

The results of the KMO test and Bartlett's spherical test confirmed that the selected variables were suitable for factor analysis. Subsequently, scores were assigned to Twitter tweets, Instagram tweets, and YouTube video descriptions based on the factors identified in user influence, content influence, and communication effect, respectively. This comprehensive evaluation provides a quantitative assessment of the impact and effectiveness of the different social media platforms in terms of user influence, content influence, and communication effect.

Table 16 KMO Test and Bartlett's Sphericity Test **(Elaborated by author)**

	Twitter	Instagram	Youtube
A: KMO	0.6019	0.4982	0.4975
A: Bartlett	2678.4948 p-value＜0.01	157.5991 p-value＜0.01	168377.1950 p-value＜0.01
B: KMO	0.5238	0.4275	0.4911
B: Bartlett	130.5484 p-value＜0.01	231.8465 p-value＜0.01	339.4729 p-value＜0.01
C: KMO	0.8434	0.4999	0.6251
C: Bartlett	36293.7353 p-value＜0.01	252.7526 p-value＜0.01	271123.0991 p-value＜0.01

The KMO test is used to assess the correlation and bias correlation between variables and produces a value between 0 and 1. A higher KMO value indicates

stronger correlation among variables and better suitability for factor analysis. In our study, all the indicators passed the KMO test, indicating a satisfactory level of correlation between the variables.

On the other hand, Bartlett's spherical test examines the independence of variables. A p-value below 0.05 suggests a significant correlation among the variables, indicating suitability for factor analysis. Conversely, a p-value above 0.05 indicates that the variables are independent and not suitable for factor analysis. In our case, the p-value obtained from Bartlett's spherical test was less than 0.01, indicating a significant correlation among the variables and confirming their suitability for factor analysis.

Following the calculation of composite scores, Pearson's correlation coefficient was employed to assess the correlation between the variables. Additionally, p-values were obtained to determine the reliability of the correlation coefficients. These tests were conducted to confirm the presence and significance of correlations among the variables in our study.

Table 17 Pearson Correlation Coefficient Test(1) **(Elaborated by author)**

Pearson Correlation Coefficient	Twitter	Instagram	Youtube
A&C	0.1427	0.3767	0.3162
	p-value＜0.01	p-value＜0.01	p-value＜0.01
B&C	-0.1334	0.0939	-0.0853
	p-value＜0.01	p-value＜0.01	p-value＜0.01

Table 17, as illustrated above, reveals a positive correlation between user

influence (A) and communication effectiveness (C). Conversely, it demonstrates a negative correlation between content influence (B) and communication effectiveness (C). Hence, Research Hypothesis 3 is substantiated, while Research Hypothesis 4 is not. To unravel the rationale behind the invalidity of Hypothesis 4, a Pearson correlation test was implemented, scrutinizing the relationship between each secondary indicator of content influence (B) and communication effectiveness (C). The ensuing results are tabulated in Table 18.

The Pearson correlation analysis elucidates that both Twitter and YouTube exhibit a negative correlation between content richness and communication effectiveness, while Instagram discloses a weak positive correlation. Likewise, for Twitter, a faint positive correlation is observed between sentiment tendency and communication effectiveness. However, for both YouTube and Instagram, the correlation between sentiment tendency and communication effectiveness is insubstantial. In the case of content category and communication effectiveness, Twitter and YouTube again display a negative correlation, while Instagram reveals a weak positive correlation.

The preceding analysis underscores a relationship between the disparities in the three media platforms and communication effectiveness, thus validating the Research Hypothesis 5. This analysis suggests a complex interplay of platform characteristics and communication effectiveness, with differing implications across varying platforms. This nuanced understanding of platform-specific influences aligns with the increasingly multifaceted landscape of digital communication, providing valuable insights for strategies that aim to optimize communication effectiveness across diverse platforms.

Table 18 Pearson Correlation Coefficient Test(2)   (Elaborated by author)

Pearson Correlation Coefficient	Twitter	YouTube	Instagram
Richness & C	-0.1075	-0.1151	0.0620
	$p\text{-value}<0.01$	$p\text{-value}<0.01$	$p\text{-value}=0.0100$
Sentiment Tendancy & C	0.0664	0.0033	0.0316
	$p\text{-value}<0.01$	$p\text{-value}=0.4088$	$p\text{-value}=0.1891$
Category of Content & C	-0.0895	-0.0296	0.0802
	$p\text{-value}<0.01$	$p\text{-value}<0.01$	$p\text{-value}<0.01$

6 From Reality to the Vision Image in "Shanghai 2035 Plan"

6.1 The International Image Vision in "Shanghai 2035 Plan"

The Leading Group, composed of 16 districts and 38 commissions, offices, and bureaus, has principal oversight of the plan. Under its aegis, the Leading Group Office for the "Shanghai 2035 Plan" has been established, comprising the Secretariat, Strategic Research Group, Special Planning Group, Public Participation Group, Data Technology Group, District & County Liaison Group, and the Technical Core Group. Additionally, a Committee of Expert Advisors has been instituted.

The "Shanghai 2035 Plan" underscores the need for multichannel public participation, and in line with this, a "Public Participation Advisory Group" has been formed to steer societal forces towards active involvement in the plan's implementation. The plan's preface unambiguously states that its principal objective is to facilitate a wholesome lifestyle for all residents, thereby allowing

them to relish their life in Shanghai. The vision for Shanghai in 2035, as per the plan, encompasses readable buildings, strolling-friendly streets, rest-friendly parks, law-abiding, honest, and civilized citizens, and a city imbued with gentleness. This succinctly stated objective paints a vivid picture of Shanghai's international image in 2035, encapsulating three dimensions: vision, behavior, and mind.

The "Shanghai 2035 Plan" is generally partitioned into four sections: "New Start, New Future", "Shanghai: An Excellent Global City", "Common Action, Common Home", and "Ensuring the Implementation." The goal of constructing a "globally outstanding city" is anchored in new objectives (aligning with international trends; actualizing national strategies; and focusing on citizen expectations), new models (bottom line constraints, endogenous development, flexible adaptation; comprehensive population regulation; land resource utilization), and new spaces (emphasizing Shanghai's regional leadership responsibility; creating an open and compact city spatial pattern). This goal prompts three sub-objectives: "a more dynamic innovative city", "a more attractive humanistic city", and "a more sustainable and eco-city".

In the "Shanghai 2035 Plan", the terms "international" and "global" appear 195 and 156 times respectively, underscoring the promotion of internationalization to an elevated level. The core of this advancement is reflected primarily in scientific and technological innovation, economic radiation, and cultural influence. The plan categorically proposes to stride towards globally influential scientific and technological innovation centers, to kindle the vitality and motivation of innovation and entrepreneurship across society, and to engender

an institutional environment that inspires innovation.

In essence, the "Shanghai 2035 Plan" provides a framework for understanding the vision of Shanghai's international image from the perspective of governmental planning and targets Shanghai's international development. This study, therefore, underscores the need to explore the international image of Shanghai through the lens of social media users in the context of organizational communication. Accordingly, a high-frequency word extraction was conducted on the "Shanghai 2035 Plan", resulting in the extraction of 1877 words. A subsequent screening identified 50 words that appear more than 20 times. These words, upon classification, revealed that the plan predominantly focuses on behavioral images.

In conclusion, technology, economy, and culture have emerged as the main vectors and areas of focus for communicating Shanghai's international image in the future, offering a comprehensive roadmap for Shanghai's transformation into a leading global city by 2035.

Table 19   Classification of high-frequency words in "Shanghai 2035 Plan" (Top 50) (Elaborated by author)

Type	VI	BI	MI
Amount	4	29	10

6.2 Shanghai International Image Communication in Social Media

6.2.1 The International Image of Shanghai in Official Social Media

The Shanghai Municipal Administration of Culture and Tourism serves as the primary authority for culture, tourism, and other related initiatives. This

administration is at the heart of Shanghai's endeavor to "build global narrative capacity", embodying a strategic role in the execution of the "international communication strategy of global narrative" and paving the way for Shanghai's global integration. Recognizing the increasing importance of digital and social media platforms in shaping global perception, the Bureau embarked on a new initiative in 2019. They launched a social media communication matrix known as 'MeetingShanghai', which aimed to capture the essence of Shanghai and project it on the international stage.

The 'MeetingShanghai' matrix spans multiple social media platforms. In April 2019, official accounts were opened on Twitter and Instagram, followed by YouTube in August 2020. Each platform served as a conduit to disseminate vibrant and distinctive promotional content about Shanghai, thereby amplifying the city's international image and reach. As of March 27, 2023, the Twitter presence of 'MeetingShanghai' followed 33 accounts and had attracted a robust following of 114,768 users. It maintained a content push frequency of 4-8 tweets per day, offering regular updates to its audience. Similarly, the Instagram account was active, following 10 accounts and accruing a following of 189,000 users. It had posted a total of 2532 posts, maintaining an average frequency of 1-5 posts per day. On YouTube, despite being a more recent addition, 'MeetingShanghai' followed three channels and had gathered 8640 subscribers. It had published 214 videos, with an average release frequency of one video every other day. These numbers collectively point towards a significant digital footprint that 'MeetingShanghai' has been able to create in a relatively short span of time.

This study aimed to scrutinize the content being pushed out by 'MeetingShanghai' across these three platforms. To this end, it extracted all text

from these platforms since the inception of the accounts until March 27, 2023. This resulted in a substantial volume of content - 750 tweets from Twitter, 1055 posts from Instagram, and 206 videos from YouTube. High-frequency words were then extracted from this content and each social media platform was analyzed based on the prevalence of these words. The analysis from a communication science perspective offered several insights. The official Instagram account of 'MeetingShanghai' exhibited a more uniform distribution of high-frequency words compared to Twitter. This could potentially suggest that 'MeetingShanghai' has been able to curate and disseminate a more multifaceted and comprehensive international image of Shanghai on the Instagram platform (as per Table 21).

Despite the fact that YouTube's update frequency was lower than that of Twitter and Instagram, likely due to the technical barriers and resources required for video production, it was observed that YouTube offered a richer portrayal of Shanghai's culture. This was evident through the more prominent presence of behavioral and mental images in its content. This finding underscores the potency of video as a medium. It amalgamates words, sounds, pictures, and actions, thus enabling a more vivid and multifaceted expression of ideas, culture, and mindset. This richness aids audience comprehension, encourages resonance, and fosters identification, thus amplifying the impact of the messages being conveyed.

Table 20 Operation of Social Media Matrix(The Shanghai Municipal Administration of Culture and Tourism) (Elaborated by author)

Social Media	Registration	Follow	Followers	Amount	Frequency

Twitter	2019-04	33	114,768	4016	4-8/day
Instagram	2019-04	10	189,000	2532	1-5/day
Youtube	2020-08	3	8640	214	1/two days

A closer examination of the content disseminated through tweets and videos obtained from Twitter, Instagram, and YouTube revealed that the largest proportion was related to cultural aspects. This included sports and entertainment, international events, specialty cuisine, and social livelihood. Content related to the economy and technology was relatively limited, with the majority being reflected in current events and news. This observation suggests that the communication strategy of Shanghai's international image has been primarily focused on shaping the city's attractiveness through cultural influence. However, further efforts are needed to enhance and improve the shaping of Shanghai's cultural brand image, particularly the unique Shanghai style culture.

In conclusion, the 'MeetingShanghai' initiative by the Shanghai Municipal Administration of Culture and Tourism represents a concerted effort to leverage the power of social media to shape and enhance Shanghai's international image. As the initiative continues, there will be opportunities to further refine the approach and enhance the presentation of Shanghai's cultural brand image on the global stage.

Table 21 Distribution of high-frequency words in official social media (TOP 100)

(Elaborated by author)

Social Media	VI	BI	MI
Twitter	42	23	28
Instagram	30	30	26

Youtube	16	29	42

6.2.2 Shanghai International Image Potrayed by Social Media Users

In the panorama of digital media, Twitter, Instagram, and YouTube represent the trifecta of text, image, and video media, respectively. Each of these platforms, with their unique characteristics and user demographics, shape the narrative of Shanghai's international image in distinct ways. Understanding these nuanced differences and their implications is crucial for designing effective communication strategies.

Twitter, despite its limitation of 140 characters per tweet, is a bustling hub of global conversations. Its high traffic, rapid information dissemination, robust interactivity, and user-friendly interface have positioned Twitter as a crucial source of news for international media. It's not just the speed, but the breadth and diversity of discussions on Twitter that make it a unique platform. However, this open environment for public opinion also poses challenges. Content on Twitter can often be fragmented, homogeneous, and in some cases, lack reliability due to the platform's real-time nature and the absence of stringent content moderation. Instagram, on the other hand, capitalizes on the power of visual storytelling. By providing user-posted content previews in the form of 'photo walls,' it offers a visually rich and immersive user experience. Instagram's real-time, mobile, and social features resonate strongly with younger demographics, making it a popular platform for Key Opinion Leaders (KOLs) among celebrities and influencers. This visual focus allows for a different kind of narrative, one where images speak louder than words, creating a unique space for city image communication. YouTube, standing as the world's largest video platform, serves as a hub for professional content production. Its mature and professional KOL

landscape, coupled with a commitment to original and high-quality content, result in an enhanced user experience. This, in turn, culminates in strong user loyalty. Unlike text or image-based media, video content provides a comprehensive sensory experience, combining visual elements, sound, and narrative into a single package. This rich format can create a more immersive and engaging portrayal of a city's image.

The diverse nature of these three media types, with their unique strengths in text, image, and video content, inevitably influences how users perceive and portray Shanghai's international image. An analysis of high-frequency words and co-occurring words using 'Shanghai' as the keyword reveals some interesting patterns. Twitter users often focus on elements related to Shanghai's economy, technology, culture, sports events, and public health. Instagram users, given the platform's visual focus, tend to lean towards areas like fashion, culture, and sports events. YouTube users, owing to the platform's broad content spectrum, cover a wider range of topics without a clear concentration or tendency.

Despite these platform-specific nuances, some common themes emerge in Shanghai's international image across the three platforms. First, the city's economic prowess is a recurrent theme, underscoring Shanghai's prominent role as a global economic hub. Second, culture and sports are playing an increasingly crucial role in shaping Shanghai's international image. This trend is consistent across Twitter, Instagram, and YouTube, reflecting the city's vibrant cultural scene and growing sports ecosystem. Third, Shanghai's burgeoning image as a hub for technological innovation has carved out a significant space in international social media discussions.

In sum, social media users perceive Shanghai's economic image as a consistent underlying theme. Yet, the narrative is evolving, with increasing emphasis on the city's cultural vibrancy and its strides in technological innovation. This multifaceted portrayal, combining economic stability, cultural richness, and technological advancement, forms the dynamic international image of Shanghai in the digital age.

6.3 Optimization Strategies

6.3.1 Characteristics of Shanghai's global Image in Social Media

The "Shanghai 2035 Plan" charts a visionary path for the city's future, underpinned primarily by three pillars: technology, economy, and culture. When these vision goals are juxtaposed with the portrayal of Shanghai's international image as reflected on social media platforms, several noteworthy characteristics come to light.

First, Shanghai's recognition as a robust financial center is vividly mirrored in the narratives that play out across social media. The intricate web of posts, comments, and shares frequently emphasize the city's economic prowess and its financial acumen. This digital discourse serves to reinforce Shanghai's position as a cornerstone of the global economic landscape, reflecting its influence in shaping economic policies and trends. Second, the tenets of modernity that underpin Shanghai's international image find ample representation across social media platforms. The city's rapid infrastructural development, its vibrant urban culture, the booming consumer market, and the lifestyle trends that characterize modern Shanghai are all themes that frequently recur. These digital narratives

encapsulate Shanghai's transformation journey from a historic port city to a thriving modern metropolis pulsating with dynamism. Third, Shanghai's openness and internationalism, key facets of its identity as a global city, are underscored in social media narratives. Shanghai's connectivity, its role as an international crossroads, and its influence in the global arena are themes that resonate across these platforms, enhancing its appeal as a cosmopolitan hub.

Despite these compelling facets, the social media representation of Shanghai also reveals significant challenges. A key issue is the absence of a distinct and connotative international image. The portrayal of Shanghai's identity appears to be somewhat fragmented across different social media platforms, with no singular dominant feature or centralized urban symbol that clearly encapsulates the essence of the city. This fragmentation could potentially hinder the development of a cohesive and easily recognizable image of Shanghai on the global stage. Further, the refinement and distillation of the city's image appear to be inadequate. While social media platforms abound with discussions about Shanghai, the representation of the city's unique urban culture and spirit often lacks depth and resonance. Shanghai's rich historical heritage and its remarkable inclusiveness, key elements of its unique urban identity, are not adequately highlighted in social media narratives. Currently, Shanghai's global identity is primarily defined by its role as a financial powerhouse. This image is visually symbolized by the impressive skyline of Lujiazui and the historic Bund, which have become synonymous with Shanghai. However, while the volume of content related to culture outnumbers that of the economy and technology, the cultural narrative lacks focus. The brand influence and image recognition associated with Shanghai's unique cultural landscape have not been effectively harnessed and cultivated.

In conclusion, while social media platforms serve as a vibrant canvas depicting Shanghai's international image, they also reveal gaps in the city's portrayal. To create a more compelling and comprehensive international image, strategic initiatives are required. These should aim to refine the representation of Shanghai's cultural heritage and urban spirit, highlight its historical depth, and foster a stronger sense of identity. By doing so, Shanghai's image as a global city will be not just about its economic prowess, but also its rich cultural tapestry and vibrant urban life.

6.3.2 Analysis of the current situation and strategy optimization from the perspective of organizational communication

This study embarks on an exploration of Shanghai's international image by conducting a qualitative and quantitative examination across three dimensions: the communicators, the content of communication, and its effects. In the process of shaping and disseminating Shanghai's international image on social media, the communicators predominantly consist of individual users, institutional users, and mass media users.

A majority of the international image data of Shanghai shared by these users originate from individual users and original content. In contrast, institutional users and mass media users exhibit a lower level of activity. Even when mass media focus on Shanghai-related content, it often deviates from that of individual users, especially opinion leaders. This divergence suggests a weakened two-step flow communication model. The limited influence of official institutional users such as Meetingshanghai can be attributed to several reasons:

First, the use of social media matrices to shape and enhance Shanghai's international image is relatively recent, and the communication effects are yet to fully emerge, necessitating some accumulation. Second, as the key department of Shanghai's external communication, there is no linkage with other commissions and bureaus in terms of account operation or content planning. Third, in terms of communication content, there are certain differences in the presentation of Shanghai's international image on different social media. This variance is determined by the specific features of the media, but on the whole, it is too monotonous and only limited to the cultural field. However, the creation of Shanghai's attractiveness and image relies not only on the creation of cultural brands but also requires the presentation of economic, technological, and other aspects to support and enrich the connotation of Shanghai's international image. Benchmarking the "Shanghai 2035 Plan", there is a significant room for improvement in the goals of "a city of humanity" and "an ecological city", lacking significant recognition. Fourth, the role of opinion leaders in shaping, disseminating, and enhancing Shanghai's international image has been overlooked, resulting in a failure to apply the mechanism of communication well. From the analysis and observation of official social media accounts, it can be seen that the amount of attention and followers on official accounts is at a low level, and there is also a lack of contact and interaction with the audience, thereby reducing the audience's attention and recognition of Shanghai. Finally, in terms of communication effectiveness, the content category, content richness, and emotional orientation of Shanghai's international image in social media vary depending on the media, but there is significant room for improvement in communication content and strategies.

From the content of this study, it can be seen that among the subjects involved in city image communication, the research on individual users and mass media has made great progress, but for the government itself, it is one of the important actors in urban external image communication. For the Shanghai government, in view of the characteristics of individual users, institutional users, and characteristics of social media, as well as the dissemination rules of cyberspace information, and in combination with the current problems in the international image communication of Shanghai, it is possible to further optimize and improve the communication strategy from the following aspects:

First, the shaping subjects of the international image of Shanghai need to be more diversified, and the role of "people" needs to be emphasized. In the social network space, in terms of individual users, Shanghai needs to strengthen international exchanges with a more positive attitude and openness, allowing more international tourists to participate in shaping and disseminating the image of Shanghai. Based on the above data analysis, it can be found that some landmarks and buildings in Shanghai do not appear frequently, which also indicates that the shaping of the international image is not a simple "painting project". Therefore, government departments should abandon the communication thinking of traditional promotional films and websites and penetrate into the public, allowing ordinary citizens to also serve as the main body of communication, reflecting the cultural style and spiritual character of the city from their urban life, so as to create a more three-dimensional and hierarchical international image of Shanghai.

Secondly, the content communication and shaping of Shanghai's international image need to be internalized. From the quantitative analysis of the correlation between communication content and communication effectiveness, it can be seen that communication content does not necessarily include more information and greater richness, resulting in better communication effectiveness. Similarly, it is not entirely positive or negative content that determines the quality of communication effectiveness. What kind of communication content is suitable for social media with what characteristics requires specific analysis. The information conveyed by Shanghai in social media to the outside world needs to be based on the richness of the content of Shanghai's urban image, which is not only reflected in the amount of information but also reflected in the refinement of the recognition and iconic content of the image. According to the "Shanghai 2035 Plan", this recognition and symbolism should be reflected in science and innovation, economy, humanities, and ecology.

Thirdly, the content presentation of Shanghai's international image requires unity, which is an external manifestation of the internalization, identification, and symbolism of the communication content, as well as the coherence and integrity of the communication process. These three factors complement each other, especially the expression of Shanghai's urban humanity, which is still in a state of multipoint dissemination and lacks a continuous historical expression. From the perspective of organizational communication, the above points require the Shanghai government to establish a professional organizational structure for scientific planning around the goal of enhancing Shanghai's international image and influence, so as to shape and enhance Shanghai's highly recognized international image in terms of technology, economy, humanities, and ecology.

7 Conclusion

7.1 Overall Conclusions

The study of city image, as detailed in the preceding literature review, is not a novel research area. It has evolved through three distinct stages: initial city layout planning, city image examination through city branding and marketing, and finally, city image analysis via media communication. The continuous deepening of academic research on city image is primarily driven by shifts in the social backdrop, which manifest in two main ways. Firstly, there is an increasing emphasis on the creation and communication of city image. This focus extends from city architecture, streets, identity systems, and infrastructure to city operations and management. It also includes the quality of citizens' behavior and the city's culture, spirit, and mindset. These elements collectively reflect a city's comprehensive strength and development level, serving as significant indicators of a city's or even a country's soft power.

Secondly, technological advancements, particularly the evolution of mobile internet technology, have brought nations closer together and disrupted the traditional "two-step flow communication model". In the media ecology epitomized by social media, a series of transformations, such as changes in participating subjects, communication carriers, communication logic, and the application and modification of communication algorithms, underscore the research value and practical significance of social media in the context of city image communication.

At a practical level, this value and significance are particularly relevant for

international first-tier cities like Shanghai. As China's most economically developed city, Shanghai has essentially become an international economic hub. However, in terms of internationalization, openness, and inclusiveness, it still lags behind the world's leading economic centers. Concurrently, there is a pressing need to accurately and objectively portray and communicate the real Shanghai, thereby shaping its superior international image. This is a crucial requirement for Shanghai as it strives to realize the "Shanghai 2035 Plan", which aims to build a more dynamic and innovative city, a more culturally appealing city, and a more sustainable and ecologically sound global city.

Therefore, on the one hand, this study has sorted out and studied literature on city image research, and also the development context and historical stages of city image research, especially the research on the shaping and communication of city image by mass media represented by newspapers and other text media; on the other hand, from the perspective of organizational communication, this study analyzes the patterns, structures, subjects, characteristics, and laws of city image communication in social media, especially the audience view of social media from the perspective of audience participation. It has generally gone through three stages of research process, namely: the empirical tradition of empiricism, the critical tradition of negative thinking, and the research tradition of cultural turn. The evolution process of the three stages is also a process of continuously improving the status of the "audience". Taking Habermas's "public sphere" theory as a reference, the study of whether social media is a real public sphere dialogue space for Shanghai's international image in social media requires not only the study of social media characteristics and communication laws, but also the study of social media users' participation behavior. Therefore, the

literature review also discusses audience research, social media users' participation, personal influence, and "two-step flow model communication".

The research aims to delve into the intricate dynamics of communication within the social media space, with a specific focus on how this influences the international image of Shanghai. It seeks to unravel whether traditional communication models, such as the "two-step flow model", maintain their relevance in this rapidly evolving digital era. This model, which has been a cornerstone of communication theory, posits that information flows from mass media to opinion leaders, and from them to a wider audience. However, the advent of social media has blurred the lines between users and audiences, creating a more complex communication landscape. In this context, the role of opinion leaders becomes a critical area of exploration. The research aims to understand how these individuals, who traditionally held sway over public opinion, operate within the social media space. It is interested in the type of content they share and how this content shapes and influences Shanghai's global perception.

The research questions are designed to probe deeper into these areas. They aim to ascertain the existence and relevance of the "two-step flow model" in the social media space. They also seek to explore the correlation between personal influence, often exerted by opinion leaders, and the effectiveness of social media communication. Furthermore, they aim to investigate the relationship between the characteristics of users' communication content and the effectiveness of communication on social media.

The hypotheses, derived from these research questions, posit several assumptions. Firstly, they suggest that opinion leaders are the primary sources of information in the process of communicating Shanghai's international image on social media. This implies that despite the democratization of information, certain individuals still hold significant influence. Secondly, they propose that personal influence outweighs that of mass media users in this context. This suggests a shift in power dynamics within the communication process. A positive correlation is hypothesized between personal influence and communication effectiveness, indicating that the more influential a person, the more effective their communication. Similarly, a positive correlation is hypothesized between communication content and communication effectiveness, suggesting that the nature of the content shared plays a significant role in how effectively it communicates Shanghai's international image. Finally, the research hypothesizes a correlation between communication effectiveness and the diversity of social media platforms used in the process of international communication about Shanghai. This implies that the choice of platform can impact the effectiveness of communication.

The research utilized social network analysis as a tool to gather data from social media pages. This process involved keyword extraction to identify high-frequency words and co-occurring words across three mainstream international social media platforms. The findings from this analysis revealed unique characteristics in the portrayal of Shanghai's international image on each platform. It was particularly interesting to note that visually appealing content attracted the most attention from audiences. While economic aspects were the dominant elements in Shanghai's international image, other factors such as

technological innovation, public emergencies, and international events also played a significant role in shaping the city's global perception.

To further understand the dynamics of this communication process, the research constructed an index system to measure the influence of opinion leaders. This system was used to compare the dissemination of Shanghai-related information by mass media and opinion leaders. The results underscored the irreplaceable role of opinion leaders in the process of international image communication of Shanghai, thereby validating the first two hypotheses. Further analysis was conducted to explore the relationship between individual influence and communication effect, as well as between communication content and communication effect. The results revealed a positive correlation between individual influence and communication effect, but a negative correlation between communication content and communication effect. This led to the validation of the third hypothesis, but the fourth was not supported. The research then employed the Pearson test to explore correlations across different social media platforms. The results validated the fifth hypothesis, showing that different platforms had varying communication effects. The research also inferred that having more content or a greater variety of content types on social media did not necessarily lead to better communication effects. This suggests that for effective communication and building an excellent international image of Shanghai, careful planning of communication content is crucial, considering the characteristics of social media and user behavior. The research then shifted its focus to the content posted on the official accounts of the Shanghai Culture and Tourism Bureau on Twitter, Instagram, and Youtube. The findings indicated significant room for improvement in the operation of these official accounts in

terms of content quality and quantity, posting frequency and intensity, and audience interaction.

Based on these findings, and in line with the international image vision presented in the "Shanghai 2035 Plan", several optimization strategies were proposed. These strategies emphasized the importance of involving a diverse range of individuals in shaping and communicating Shanghai's international image. The need to refine the content of Shanghai's international image was highlighted, with a focus on portraying Shanghai's image in terms of science and technology innovation, economy, humanities, and ecology. The strategies stressed the need for systematic and uniform planning in shaping and communicating Shanghai's international image, ensuring high recognition. Lastly, the strategies recommended strengthening the coordination of government departments, improving the professional organizational structure, and professionally executing the three-dimensional expression of Shanghai's international image. This comprehensive approach is expected to significantly enhance the international image of Shanghai.

7.2 Limitations and future prospects

This study primarily harnesses the power of big data to shed light on the current status and challenges of Shanghai's international image, utilizing the tools of computational communication. It simultaneously employs quantitative analysis of a vast array of data to delve into the mechanisms of city image information communication within the realm of social media. This approach allows for a detailed examination of how Shanghai's image is portrayed and perceived on a global scale, and how various factors influence this perception.

Despite the large volume of data used in this study, the research does have its limitations. For instance, the data collected are predominantly in English. Due to language proficiency limitations, other languages were not included in the data collection and analysis. This inevitably results in a certain degree of incompleteness in the findings. The global image of a city like Shanghai is shaped by perceptions and narratives from around the world, and these narratives are expressed in many languages. By focusing only on English language data, the study may miss important aspects of Shanghai's image as portrayed in other languages.

Looking forward, it is hoped that more diversified collaborations can be undertaken to enhance research in this field. This could involve incorporating data in multiple languages to provide a more comprehensive and global perspective on Shanghai's international image. By expanding the scope and diversity of the data, the research could yield more instructive results and guidance. Moreover, the inclusion of more languages in future research could reveal interesting differences in how Shanghai's international image is portrayed in different linguistic and cultural contexts. This could lead to a more nuanced understanding of Shanghai's international image and how it can be effectively managed and promoted.

In addition, future research could also explore other aspects of social media communication, such as the role of different social media platforms, the impact of different types of content, and the influence of various actors in the communication process. This would not only enrich the academic discourse on

city image communication but also provide practical insights for city image management and promotion, particularly for global cities like Shanghai.

8 Bibliograhy

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