

sector will decrease, while the share of labor in the financial and other social service sectors (tertiary industry) will further increase.

The higher the power distance, the more emphasis is placed on the hierarchy system, leadership authority, and subordinates' obedience. This will lead to the prevalence of bureaucracy in the organization and a lack of vitality.

The "official-oriented" mindset is not conducive to decision-making efficiency and innovation efficiency. The pursuit of nepotism and kinship relationships will lead to rent-seeking behavior, which affects decision-making; the pursuit of relationships with colleagues will form informal organizations, and overly close relationships are likely to form exclusive rigidity, making the organization complacent and unable to accept new members, which reduces the organizational identification of new members and is more detrimental to the innovation efficiency of the organization. Therefore, if enterprises want to pursue long-term development, they should try their best to avoid such an "official-oriented" phenomenon within the organization.

Among the non-material incentive factors, job authorization, meeting development needs, liking the work, and work recognition have a positive impact on employees' organizational identification. This verifies the conclusion that non-material incentives are more effective than material incentives in ensuring personal efforts.

Funding

Innovation Team Project of Liaoning University of Science and Technology: "Smart Economy Practice and Innovation Team." Undergraduate Innovation and Entrepreneurship Training Program Projects: "Research on the Application of Big Data Analysis Tools" and "Zhice Quantitative Investment Studio." Teaching and Research Project: "Research on the Path of AI-Enabled Undergraduate Education and Teaching Reform Based on the Needs of Liaoning's Revitalization and Development (LKJY202510)." Teaching Reform Project: "Research and Practice on the Evaluation of Digital Talents in Application-Oriented Universities (LNKJ202412)."

Disclosure statement

The authors declare no conflict of interest.

References

- [1] CNKI, 2022, Liaoning Statistical Yearbook (Electronic Version).
- [2] Barnard CI, 2019, Organization and Management, Translated by Zeng Lin et al. China Renmin University Press, Beijing, 45–96.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Logic of “Viral Popularity” and the Development Path of “Sustained Popularity” in Influencer Cities

Danqi Liu*

Northwest Normal University of Tourism, Lanzhou, Gansu, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the advent and continued development of the internet era, influencer cities have leveraged the internet’s power for rapid marketing, resulting in a swift rise to fame and a substantial influx of attention and traffic. In the face of such “overnight wealth and fame”, the primary challenge lies in preventing the transient nature of popularity and the potential lack of long-term sustainability, while simultaneously promoting enduring prosperity and fostering the high-quality development of the cultural and tourism industry. It is argued that sustained success can be achieved by influencer cities through strategies such as creating unique and immersive tourism experiences for visitors, enhancing infrastructure, facilitating upstream and downstream linkages, empowering technological advancements, and improving accessibility.

Keywords: Influencer cities; “Viral Popularity” logic; “Sustained Popularity” path; Cultural and tourism industry

Online publication: October 29, 2025

1. Introduction

In the context of the rapid development of mobile internet, cities such as Zibo, Harbin, and Tianshui have experienced meteoric rises, capturing widespread attention through their “overnight success” and “strong breakout.” These cities not only provide pathways for advancing digital marketing models in local cultural and tourism industries but also inject new vitality into urban development, thereby promoting the high-quality growth of the urban cultural and tourism sector ^[1]. By leveraging digital marketing strategies and the powerful dissemination capabilities of social media platforms, these cities have rapidly propelled their unique cultural identities, traditional cuisines, and tourism resources to national and even global recognition, generating significant social and economic impact. This phenomenon not only represents an innovative approach to the digital transformation of local cultural and tourism industries but also provides fresh momentum for urban brand building, economic growth, and cultural communication. However, the popularity of internet-famous cities is often short-lived. While increased traffic can quickly raise a city’s profile, maintaining sustained popularity and effectively

converting traffic into long-term economic benefits and cultural influence remains a central challenge for these cities. Therefore, the key to transitioning from “viral fame” to sustained recognition lies in the implementation of precise marketing strategies, the fostering of cultural innovation, and the advancement of industrial development to continuously shape and enhance the city’s competitiveness.

The phenomenon of a city’s “viral success” arises from the interplay of several factors. From a media communication perspective, the widespread use of new media platforms, particularly short video and social media platforms, provides an efficient avenue for the rapid dissemination of urban culture. Through the broad distribution of information and the stimulation of emotional resonance, these platforms quickly attract substantial attention, thereby enhancing the visibility and social recognition of the city’s brand. Simultaneously, internet-famous cities typically rely on their unique resource endowments, including rich historical and cultural heritage, distinctive local cuisines, and attractive tourism resources, which serve as key drivers in attracting visitors and public interest. Furthermore, government policy support and an optimized business environment provide strong backing for the cultural and tourism industries of these cities. While the short-term surge in traffic can swiftly raise a city’s profile, the challenge lies in sustaining this momentum and converting it into long-term economic growth amidst intense market competition.

This research seeks to explore the developmental path of internet-famous cities from “viral fame” to “sustained recognition.” Initially, the underlying logic behind how these cities achieve “viral fame” will be analyzed, focusing on how they leverage new media communication, resource advantages, and favorable business environments for rapid growth. Subsequently, in light of the challenges faced by these cities, this paper will propose specific pathways for promoting “sustained development”, with a focus on strategies such as refining urban cultural intellectual property (IP), enhancing deep visitor experiences, and optimizing industrial chains. The greatest challenge faced by internet-famous cities is the difficulty in maintaining sustained popularity, as traffic is often difficult to convert into lasting economic benefits. Capturing “traffic” and increasing “retention”, transforming “viral fame” into “long-term success”, and leveraging the network effect to build true urban competitiveness represent a long-term and complex task. This paper aims to examine the underlying logic of “viral fame” and the developmental trajectory toward “sustained success” in internet-famous cities, with the objective of offering recommendations for their long-term growth.

2. The underlying logic of influencer cities’ “viral popularity” and breaking out of their regional boundaries

2.1. The strong promotion of new media and the emergence of synergistic marketing strategies

Zibo barbecue, Harbin frozen pears, and Tianshui spicy hot pot, the latest “top trending” sensations, are just a few examples of a phenomenon that consistently captures public attention. These influencer cities have effectively utilized new media platforms, such as Douyin and Kuaishou, to promote local specialty foods and leisure cultures, thereby attracting a large number of tourists ^[2]. The advent of the new media era and technological innovations has reshaped the media ecosystem, meeting the diverse audiovisual needs of the public and enabling the rapid dissemination of urban culture, while also fostering new growth in the cultural and tourism economy. It is essential for influencer cities to leverage the comprehensive power of multi-form, multi-channel, and multimedia communication. Synergistic marketing, with its strengths in scene-based, interactive, and emotional communication, has garnered significant attention and played a critical role in promoting the cultural appeal of

these cities ^[3]. Taking Harbin as an example, the Heilongjiang Provincial Department of Culture and Tourism, after assessing the situation, adopted several measures to initiate cross-regional and cross-platform joint marketing efforts. This initiative fostered close cooperation among local cultural and tourism departments. Through promotion by influencers and well-known figures on social media and short video platforms, Harbin's frozen pears and ice-and-snow tourism were successfully spotlighted on the internet. In sparking a cultural tourism boom, the city's marketing efforts must align with market demand trends and ensure these trends are accurately integrated into the supply and promotion of cultural tourism products. This alignment is crucial for influencer cities to "go viral" and break free from their regional confines.

2.2. Deepening cultural heritage and showcasing resource endowment advantages

The rise to fame of Zibo is closely linked to its long-standing barbecue culture, while Rongjiang's breakout is attributed to the deep-rooted popularity of its "village super league." Harbin's success is grounded in its unique ice and snow tourism, and Tianshui has gained immense popularity due to its distinctive spicy hot pot. However, relying solely on local specialty foods and recreational activities is insufficient to generate such widespread enthusiasm among the public. Taking Rongjiang as an example, the integration of sports into local cultural and tourism resources has created a novel model for rural revitalization, combining "cultural tourism + sports" for innovative development. The "village super league", with its highly approachable and engaging event style, has attracted numerous tourists. During these events, Rongjiang showcased its rural cultural resources, allowing visitors to experience intangible cultural heritage, traditional costumes, and local cuisine from various ethnic groups. Additionally, the production of the "village super league" mascot and handmade "village super ox" crafts has provided employment and income growth for over 2,000 rural women, promoted the inheritance of intangible cultural heritage crafts, and successfully stimulated the local tourism industry. As demonstrated in this case, the rich tourism resource endowment and deep cultural heritage serve as the foundation for influencer cities to "go viral" and transcend their regional boundaries.

2.3. Improved business environment and stimulated market vitality

The report from the 20th National Congress of the Communist Party of China emphasized that "creating a first-class market-oriented, rule-of-law, and international business environment" is a critical requirement for achieving high-quality development ^[4]. Consequently, in recent years, local governments have positioned the improvement of the business environment as the "lifeline" for high-quality development. Efforts have been made to establish market-oriented, rule-of-law, and international business environments, with the goal of promoting high-quality economic and social development, thereby providing a solid foundation for the cultural and tourism market.

Taking the newly emerging influencer city of Tianshui as an example, in the first quarter of 2024, the city welcomed 12.37 million tourists, with total tourism revenue reaching 7.163 billion RMB, reflecting a year-on-year increase of 45.3% and 44.4%, respectively. Tianshui has established an efficient operational model through comprehensive services, full-process coordination, and the integration of all necessary elements. From top-level government decision-making and quality control to businesses responding to market demands with high-quality products and services, a collaborative effort has been made to foster a favorable business environment and maintain a welcoming atmosphere. This collective force has enabled the city to capitalize on the opportunity for "overnight wealth and fame." In addressing major public events, the efficient collaboration between the government and the market, the strengthening of a sense of community, the proactive creation of a "first-class"

business environment, and the stimulation of the cultural and tourism market's vitality are essential factors in ensuring that influencer cities can "go viral" and transcend regional boundaries ^[5].

2.4. Extending and enhancing the value chain with a human-centered approach

The "human-centered" concept emphasizes the prioritization of human interests and well-being to ensure the respect and realization of human dignity and rights. This principle is also applicable to the cultural and tourism industry. In advancing the high-quality development of the tourism sector, the most crucial factor is the "people." All efforts should be centered around "people." The rise of influencer cities is closely tied to the collective efforts of both the government and the people, with online and offline services functioning in tandem. Taking Tianshui as an example, following the sudden popularity of spicy hot pot, government departments swiftly responded by implementing a series of measures to enhance convenience for tourists, including ensuring food safety, improving accommodation, and optimizing transportation. The government adopted a "customer-first" approach, ensuring that "whatever the tourists desire, the government will provide." This comprehensive upgrade to the tourism service chain-spanning food, accommodation, transportation, sightseeing, shopping, and entertainment-created an experience in which visitors felt "treated like family." This not only stimulated tourists' desire to purchase and share their experiences but also further promoted the city's positive online visibility. This human-centered approach serves as the driving force behind influencer cities' ability to "go viral" and transcend regional boundaries ^[6].

3. Implementation path for the "sustained popularity" development of influencer cities

3.1. Refining the city's thematic image and creating distinct cultural IP

Culture is the soul of a city. A deep understanding of a city's history, traditions, regional cultural characteristics, and contemporary values is essential for refining and innovatively presenting the city's thematic image. By creating unique cultural intellectual properties (IP), influencer cities can establish the "vitality" required for their sustained development. Chengdu, one of the earliest influencer cities, has continuously promoted intangible cultural heritage, such as Sichuan opera face-changing and Sichuan embroidery, at cultural landmarks like Du Fu Thatched Cottage, Kuanzhai Alley, and Jinli. The city has also organized events, such as the Chengdu International Panda Festival and the Lantern Festival, which have successfully attracted numerous tourists and showcased Chengdu's unique cultural identity. Through these efforts, Chengdu has crafted a distinctive cultural tourism image, preserved and innovated its historical culture, and activated its contemporary appeal, facilitating the transformation from "viral popularity" to "sustained success."

3.2. Enhancing visitors' in-depth experiences and creating emotional resonance

A city may quickly rise to fame due to a moment of "serendipitous success", but once the online hype subsides, the attention from tourists often diminishes as well. The key to the sustained popularity ("sustained success") of influencer cities lies in providing tourists with profound emotional value and fostering deep emotional connections. "Superficial" interactions, such as "sightseeing in passing", do not create a strong emotional bond between tourists and the city, and may lead to a rapid decline in tourists' impressions, ultimately affecting their willingness to revisit. Therefore, enabling visitors to engage more deeply with the city and strengthening their experiences and connections with it is an essential strategy for influencer cities to convert "traffic" into "retention."

For example, Xi'an utilizes technologies such as AR and VR to vividly present the Terracotta Army, the Big Wild Goose Pagoda, and museum artifacts. Additionally, the city hosts events like the Tang Dynasty Night City light show and the Hui Muslim Street Food Festival to provide visitors with unique cultural tourism experiences, thereby enhancing the city's competitiveness. Providing visitors with profound and distinctive travel experiences is crucial for the sustained success of a city. Local cultural, culinary, and tourism resources should be thoroughly explored and packaged by municipal cultural and tourism departments to maintain and enhance tourists' emotional engagement and the city's lasting impression.

3.3. Promoting collaborative efforts and regulating market order

To guide influencer cities toward the path of "sustained popularity" and to enhance the quality and efficiency of the cultural and tourism industry, it is essential to strengthen the collaborative efforts among governments, businesses, and communities in order to establish a well-regulated and orderly market environment. Accordingly, governments should plan cultural and tourism industry projects, optimize urban spatial layouts, and leverage online trends to create distinctive tourist destinations. Businesses should improve the supply of innovative tourism products and enhance comprehensive supporting services for tourism. Communities should integrate local cultural resources, create volunteer service platforms, and promote increased participation and engagement in cultural and tourism activities. A collaborative development system for the cultural and tourism industry, characterized by complementary advantages and shared benefits, should be established. Regulating market order is the cornerstone of building such a collaborative system and fostering the prosperous development of the cultural and tourism industry. Decisive actions must be taken to address market chaos, improve law enforcement coordination, implement targeted corrective measures, and strengthen policy support in order to create an exemplary cultural and tourism market.

3.4. Promoting collaborative efforts and regulating market order

To guide influencer cities toward the path of "sustained popularity" and to enhance the quality and efficiency of the cultural and tourism industry, it is essential to strengthen collaborative efforts among governments, businesses, and communities in order to establish a well-regulated and orderly market environment. Accordingly, governments should plan cultural and tourism industry projects, optimize urban spatial layouts, and leverage online trends to develop distinctive tourist destinations. Businesses should improve the supply of innovative tourism products and enhance comprehensive supporting services for the tourism sector. Communities should integrate local cultural resources, establish volunteer service platforms, and foster increased participation and engagement in cultural and tourism activities. A collaborative development system for the cultural and tourism industry, characterized by complementary advantages and shared benefits, must be established. Regulating market order serves as the cornerstone for building such a collaborative system and promoting the prosperous development of the cultural and tourism industry. Urgent actions should be taken to address market chaos, enhance law enforcement coordination, implement targeted corrective measures, and strengthen policy support to create an exemplary cultural and tourism market.

3.5. Keeping up with product market trends and deepening technological empowerment

To provide tourists with a richer and more diverse cultural and tourism experience, cities should fully explore local cultural resources to lay a foundation for the development of a wide range of cultural and creative products.

A comprehensive consideration of the development and construction of the cultural and tourism industry chain and value chain is essential, employing a systems-thinking approach to address existing gaps in cultural and creative product development ^[7]. In this process, modern technologies should be integrated to fully leverage tools such as big data, cloud computing, virtual space development, and artificial intelligence, enabling the creation of innovative experiential models for the city's diverse culture. At the same time, precise coordination between online and offline consumer markets is necessary to maintain a consistent supply of products that meet the needs of emerging mainstream tourist groups seeking expanded travel offerings ^[8]. For example, in Xi'an, the Shaanxi History Museum has continuously enhanced its reputation by curating and showcasing valuable historical artifacts, further solidifying the city's status as the capital of thirteen ancient dynasties. The museum employs advanced technologies for the preservation of cultural relics and the construction of historical sites, consistently demonstrating the culture of the pre-Qin period and the grandeur of the Tang dynasty. By fostering innovation and utilizing technology to support relic restoration, exhibition curation, and the development of cultural and creative products, Xi'an continues to unlock the synergistic potential of cultural and tourism integration.

4. Future prospects

With the continuous advancement of digital technologies and the increasing diversification of social and cultural demands, the long-term development of so-called internet-famous cities relies not only on short-term surges in online traffic but also on systematic upgrades in cultural depth, industrial structure, and resource coordination. The transition from "instant fame" to "sustained popularity" marks the progression of urban cultural and tourism industries toward high-quality development and offers a new paradigm for enhancing global urban competitiveness.

First, the in-depth exploration of cultural heritage and brand identity serves as the primary driver of the enduring appeal of internet-famous cities. Historical traditions must be systematically integrated with modern innovations to create distinctive cultural intellectual properties (IPs) that reinforce civic identity and emotional resonance. The incorporation of technologies such as Virtual Reality (VR) and Augmented Reality (AR) enables the design of immersive cultural experiences, which not only strengthen tourists' emotional attachment to cities but also increase repeat visitation and facilitate the long-term dissemination of urban brands.

Second, the establishment of a collaborative cultural-tourism ecosystem is essential for achieving sustained popularity. Effective coordination among governments, enterprises, and civil society is required to optimize policy environments and promote the integration of cultural, tourism, technological, and economic sectors. By constructing comprehensive industrial chains and service systems, internet-famous cities can attract substantial traffic during the initial phases of popularity, while simultaneously securing long-term economic and social benefits through improved service quality, diversified tourism products, and enriched user experiences. Such synergies ultimately ensure the sustainable development of the cultural and tourism industry.

Moreover, technological empowerment and intelligent management will play pivotal roles in shaping the future trajectories of internet-famous cities. The widespread application of big data, cloud computing, and artificial intelligence facilitates the precise analysis of tourist preferences, enhances the operational efficiency of urban service infrastructure, and delivers personalized, technology-enabled experiences. The promotion of smart tourism further allows visitors to access information, plan routes, and complete transactions with greater convenience and efficiency, thereby strengthening urban competitiveness and attractiveness.

Finally, sustainable development forms the cornerstone of long-term prosperity. While advancing the rapid growth of cultural and tourism sectors, cities must simultaneously prioritize environmental protection and the rational use of resources to ensure balanced progress across economic, cultural, and ecological dimensions. The adoption of green development strategies and the integration of eco-tourism with sustainable tourism not only reinforce the economic and cultural influence of cities but also safeguard environmental sustainability, generating a virtuous cycle of growth.

In conclusion, the future development of internet-famous cities will be driven by innovation, rooted in culture, supported by technology, and guided by collaborative governance. Only through continuous innovation and sustained cultural investment can such cities transform short-term popularity into enduring prosperity, thereby shaping modern urban brands with robust international competitiveness.

Funding

This research was funded by the project of Gansu Province “Innovation Star” Fund Project (Grant No. 2023KYZZ-S202) and the project of Northwest Normal University Postgraduate Scientific Research Fund Project (Grant No. KYZZS2025201).

Disclosure statement

The author declares no conflict of interest.

References

- [1] Ye Y, Li S, Chen L, et al., 2024, Analysis of the Causes and Development Suggestions of the Network Red City Circle: Taking Zibo, Harbin, and Tianshui as Examples. *Journal of Management and Social Development*, 2024(1): 5. <https://doi.org/10.62517/jmsd.202412505>
- [2] Gao H, 2020, Thoughts on Marketing Strategies of Internet-famous Scenic Spots under the Background of New Media. *Economic Forum*, 2020(8): 46–51. <https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CDFD&filename=CDZGY202008049>
- [3] Li X, 2021, Red Culture and Tourism Industry: Dilemmas and Paths of Cultural Tourism Integration. *Academic Exchange*, 2021(7): 119–129. <https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CDFD&filename=CDZGY202107119>
- [4] Tang W, Tosun C, Mohamed EA, et al., 2024, The Influence of Social Media Usage and Perceived Government Market Orientation on Travel Intention to an Internet Celebrity City: Exploring the Mediating Effects of Place Attachment and Perceived Value. *Behavioral Sciences*, 2024(14): 8. <https://doi.org/10.3390/bs14080123>
- [5] Zhang N, Ma R, 2023, The Impact of Business Environment Optimization on the High-Quality Development of Manufacturing Enterprises. *Journal of Jinan University (Social Sciences Edition)*, 33(1): 87–100. <https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CDFD&filename=CDZGY202301087>
- [6] Feng X, 2024, Exploring Innovative Paths for the High-Quality Integration Development of Local Cultural Tourism. *People’s Forum*, 2024(7): 99–103. <https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CDFD&filename=CDZGY202407099>
- [7] Sun J, 2023, New Trends and Directions in the Development of the Cultural Tourism Industry. *People’s Forum*,

2023(9): 98–102. <https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CDFD&filename=CDZGY202309098>

- [8] Zhang G, Li S, 2024, Research on the Symbolic Construction and Translation of Internet Celebrity Urban Memory in the Video Era. *Philosophy & Ideology Research*, 2024(4): 1. <https://doi.org/10.37420/J.PIR.2024.005>

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Local Governments Explore the Path System of High Quality Development of Social Organizations—A Grounded Theory Analysis Based on Local Government Policy Documents

Zeyu Yang^{1,2}, Xijing Huang^{1,2,3*}

¹Department of Social Work, Faculty of Arts and Social Sciences, Hong Kong Baptist University, Hong Kong 999077, China

²Faculty of Humanities and Social Sciences, Beijing Normal-Hong Kong Baptist University, Zhuhai 519087, China

³Mengzi Digital Industry Investment and Development Co., Honghe 651400, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In today's context, the high-quality development of social organizations plays a crucial role in social governance and public service provision. This paper focuses on the policy texts of local governments in fostering the development of social organizations, and employs the grounded theory approach to analyze the pathways of local governments in exploring the high-quality development of social organizations by coding and analyzing 36 local policy documents with the NVivo12 software. The study constructed a five-dimensional progressive model of "Foundation—Capacity—Power—Collaborate—Value", which starts from the Institutional Safeguard System, Organizational Development Foundation Capacity Building, Performance-Driven Incentives, Strategic Synergy Value Network, and Socialized Governance Participatory Mechanisms. Based on these elements, the study comprehensively explains the internal logic and policy path of the high-quality development of social organizations. This study aims to provide a theoretical basis and practical guidance for promoting social organizations to better participate in social governance and achieve sustainable development, and at the same time, reveals the limitations in the research process and illuminates the direction for further research.

Keywords: Social organizations; High-quality development; Grounded theory; Local governments; Policy documents

Online publication: October 29, 2025

1. Introduction

As the modernization of social governance advances, the strategic value of social organizations, as the main body of multiple governance, is becoming more and more prominent ^[1-2]. Policies such as China's Opinions on Strengthening the Normative Construction of Social Organizations have made clear the orientation of high-

quality development, and the supporting measures of local governments have covered areas such as registration management and financial support. However, the systematic path research is still insufficient.

Established literature focuses on NGO functions and challenges: Islam reveals that Bangladeshi NGOs promote community development through education and health projects; Becerikli and Koroglutake take Antakya as an example to highlight the coordinating advantages of NGOs in local economic and environmental development^[3-4]. In terms of the role of government, Vander Zaag analyzes the contradiction between funding dependence and independence of NGOs in Canada, while Otsuki summarizes that Brazilian NGOs face the difficulty of coordinating the interests of multiple parties in sustainable development^[5-6]. At the level of theoretical research, Aldashev and Navarra quantitatively analyze the global distribution and functions of NGOs, confirming their efficacy in bridging the gap in public services; Kelly criticizes the traditional evaluation system and proposes that NGOs need an outcome-process evaluation framework; Hakkarainen reveals the cultural conflicts and resource dilemmas of NGO-business cooperation^[7-9].

Existing studies mostly focus on single factors and lack a systematic analysis of the construction of a high-quality development system driven by policies. The text is divided into six parts: research background, problem formulation, research design, model construction, path analysis, and conclusion outlook, aiming to reveal the law of policy-driven social organization development.

2. Objectives

There are three limitations in the current research: first, insufficient excavation of the institutional logic implicit in local government policy texts (e.g., Hudson did not compare the effects of different political environments on NGO advocacy effectiveness); second, weak research on dynamic mechanisms (e.g., Miraftab did not track the adaptive strategies of emerging NGOs^[10-11]. Additionally, Bebbington did not deeply analyze the strategies of practices in transition); and third, the absence of a cross-case systematic framework (e.g., Miraftab did not utilize the method of cross-case study to deeply analyze the development of social organizations)^[11-12]. Based on the above policy background and the current state of theoretical research, this paper raises the following questions:

How is the path system of high-quality development of social organizations constructed under the guidance of local government policies?

What is its internal logic and interrelationship?

3. Analytical perspectives and research design

3.1. Analytical perspective: Policy instrument perspective

This study builds a policy instrument framework for NGO high-quality development. Employing grounded theory, it maps policy spectrums and optimizes application paths, advancing NGO-policy nexus understanding. Huang et al. demonstrate NGOs' role in China's nuclear policy shifts via goal-instrument analysis, so this research method has been proven to be feasible in the study of NGOs' development^[13].

3.2. Research methodology: Grounded Theory

Grounded Theory (GT) is a method of refining concepts, categories, and theories through in-depth analysis, avoiding preconceived assumptions and enhancing the explanatory power of research^[14-15]. Nwauche and Flanigan use this method to analyze the barriers to the participation of South African nonprofit organizations (NGOs) in

social development planning and analyze the deep-rooted factors hindering the effective participation of NGOs in policy making through in-depth interviews ^[16]. Ultimately, they find that a shortage of resources, ineffective government-society communication, and weak organizational capacity are the core constraints. Finally, it provides insights for enhancing the effectiveness of NGO policy participation.

3.3. Data collection

Policy texts were retrieved via “local government + social organization + development” keywords from PKULaw, LegalStar, and 31 provincial government or civil affairs portals. After screening irrelevant documents, 36 policies were retained (**Table 1**).

Table 1. *Partial policy documents*

| Number | Policy documents | Year of issuance |
|--------|---|------------------|
| 1 | Notice on Strengthening the Construction of Social Organizations and Promoting High-Quality Development in Zibo City | 2023 |
| 2 | Notice on Printing and Distributing the Implementation Measures for Social Organization Development Support Projects in Shandong Province (Trial) | 2020 |
| 3 | Guiding Opinions on Strengthening Party Building and Promoting High-Quality Development of Social Organizations in Yantai City | 2023 |
| | | |
| 34 | Measures for the Management of Special Funds for Social Organization Development Support in Shandong Province | 2021 |
| 35 | Guiding Opinions of Dongying City on Party Building Leading Social Organizations to Help Ecological Protection and High-quality Development in the Yellow River Basin | 2022 |
| 36 | Changzhou City Supporting Measures for Promoting the High-Quality Development of Social Organizations | 2023 |

4. Research process and modelling

4.1. Open coding

Open coding involved importing 36 policy documents into NVivo12, with 26 coded via node functions and 10 reserved for theoretical saturation. To mitigate researcher bias, line-by-line analysis was identified as key policy measures for coding units ^[17–18]. Iterative text comparison and synonym merging generated 77 initial concepts, subsequently categorized into 32 clusters through axial coding (**Table 2**). This rigorous process ensured conceptual validity while aligning with grounded theory principles of emergent category development.

Table 2. *Example of open coding results*

| Subcategory | Initial concept | Examples of source material |
|---------------------------------|--------------------------------------|---|
| Government Purchase of Services | Government Project Procurement | Social organizations participate in government public service project procurement, as stipulated in “Implementation Measures for Supporting Social Organization Development through Government Purchase of Services” (Kunming City) |
| | Service Procurement Standards | Government procurement service standards and regulations, including “Procedural Provisions for Social Organizations to Participate in Civil Affairs Policy Formulation and Evaluation” (Shanghai) |
| | Project Directory Dynamic Management | Dynamic management of government function transfer and public service purchase catalog projects, as outlined in “Implementation Measures for Promoting High-Quality Development of Social Organizations” (Zibo City) |

Table 2 (Continued)

| Subcategory | Initial concept | Examples of source material |
|-------------------------------|---------------------------------------|---|
| Credit Administration | Credit Rating Standards | Social organizations establish credit rating standards, as specified in “Guidance on Strengthening Party Building and Promoting High-Quality Development of Social Organizations” (Shandong Province) |
| | Red-Black List Management | Establishment of credit rating and preferential policy linkage system, including red-black list management mechanisms |
| | Credit Commitment Disclosure System | Credit commitment system and information disclosure platform for social organizations |
| Rural Revitalization Support | Rural Revitalization Special Funds | Social organizations rural revitalization plan and 2025 village formation projects + characteristic brands, as supported by “Rural Revitalization Special Funds” |
| | Poverty Alleviation Special Funds | Social organizations “double hundred poverty alleviation” action special funds, as outlined in poverty alleviation policies |
| | Thousand Villages Action | “Thousand villages social organizations help rural areas” special action, promoting rural development |
| Digital Construction | Smart City Digital Platform | Smart city digital platform construction, as part of digital transformation initiatives |
| | Declaration Information Platform | Social organizations online declaration digital service system, improving service efficiency |
| | Intelligent Service Matching System | “Smart service” cross-border integration system construction, enhancing service capabilities |
| | Mobile Service Platform | Social organizations mobile convenient service system, as mentioned in digital construction policies |
| Evaluating of Incentives | Rating Assessment Incentive Mechanism | Social organizations rating assessment incentive fund allocation (5A=3, 4A=0.6, 3A=0.3), as specified in assessment standards |
| | Rating Fund Allocation Mechanism | Establishment of rating incentive fund allocation system (3A and above), promoting quality improvement |
| | Rating Assessment Standards | Rating assessment incentive standards (3A=1, 4A=2, 5A=4), encouraging organizational development |
| Incubation Support | Incubation Operation Support | Social organizations incubation operation fund allocation (municipal: 60,000 yuan, county: 30,000 yuan), as supported by incubation policies |
| | Incubation Base Fund Support | Social organizations incubation base construction fund support, promoting organizational growth |
| | Incubation Service Support | Social organizations incubation service operation support, enhancing service capabilities |
| Party Building Support | Party Building Special Funds | Party building fund support, as outlined in “Guidance on Strengthening Party Building and Promoting High-Quality Development of Social Organizations” |
| | Party Organization Special Funds | Social organizations party organization special funds (3000 yuan), supporting party building activities |
| | Party Building Guidance System | Party guidance personnel/party building personnel guidance system, strengthening organizational leadership |
| Industry Integration Services | Industry Chain Collaborative Platform | Industry association promotion and industry chain collaborative service platform, as mentioned in industry integration policies |
| | Industry Chain Collaborative Platform | Industry cluster industry chain collaborative service platform, promoting collaborative development |
| | Industry Chain Service Support | Industry chain “chain leader” special fund support, encouraging industry integration |

4.2. Axial coding

Axial coding synthesized 32 open categories through policy text analysis, revealing intrinsic linkages. Iterative refinement generated 14 higher-order concepts (e.g., Political Leadership and Industry Chain Integration). These were clustered into five dimensions: Institutional Safeguard System, Organizational Development Foundation Capacity Building, Performance-Driven Incentives, Strategic Synergy Value Network, and Socialized Governance Participatory Mechanisms. This hierarchical coding constructed a policy-driven framework, mapping how governance structures (e.g., carrier construction) interact with incentive systems (e.g., performance orientation) to shape organizational evolution. The process adhered to grounded theory principles, ensuring theoretical coherence between micro-level policy elements and macro-level developmental logic ^[19]. Results are systematized in **Table 3**.

Table 3. *Axial coding results*

| Core category | Main category | Subcategory |
|---|----------------------------|--|
| Institutional Safeguard System | Political Leadership | Party Building Support, Standardization of Party Building, Branding of Party Building |
| | Operational Norms | Internal Governance, Financial Management, Standardized Construction |
| | Behavioral Constraints | Credit Administration |
| Organizational Development Foundation Capacity Building | Carrier Construction | Incubation Support, Integrated Incubation, Rural Revitalization Support |
| | Human Capital | Cultivation of Talent, Talent Incentives, Human Resources Norms |
| | Technology-Enabled | Digital Construction |
| Performance-Driven Incentives | Performance-Oriented | Evaluating of Incentives, Quality Assessment, Brand Development |
| | Service Innovation | Government Purchase of Services, Service Model Innovations, Service Network Building |
| | Quality Control | Quality Control, Project Monitoring |
| Strategic Synergy Value Network | Industry Chain Integration | Industry Integration Services, Innovation Ecosystems, International Expansion |
| | Space Linkage | Regional Collaborative Networks, Coordinated Development Network |
| | Policy Focus | Incentives For Sustainable Development, Cultural Heritage Support, Industry-Oriented Cultivation |
| Socialized Governance Participatory Mechanisms | Channel Construction | Democratization of Decision-Making |
| | Governance Tools | Monitoring of Policy Effectiveness |

4.3. Selective coding and model construction

Selective coding identified the “Foundation—Capacity—Power—Collaborate—Value” five-dimensional system as the core category. Iterative analysis synthesized prior categories, articulating dimensions: Institutional Safeguards, Capacity Building, Performance Incentives, Strategic Synergy Networks, and Participatory Governance. The narrative begins with central or provincial policy formulation (e.g., Civil Affairs mandates), progresses through dimension-specific mechanisms (e.g., carrier construction for capacity, industry integration for synergy), and culminates in a dynamic model where institutional frameworks enable performance-driven empowerment, fostering collaborative value creation. This model delineates how hierarchical governance (political leadership) interacts with grassroots participation (socialized mechanisms) to drive organizational.

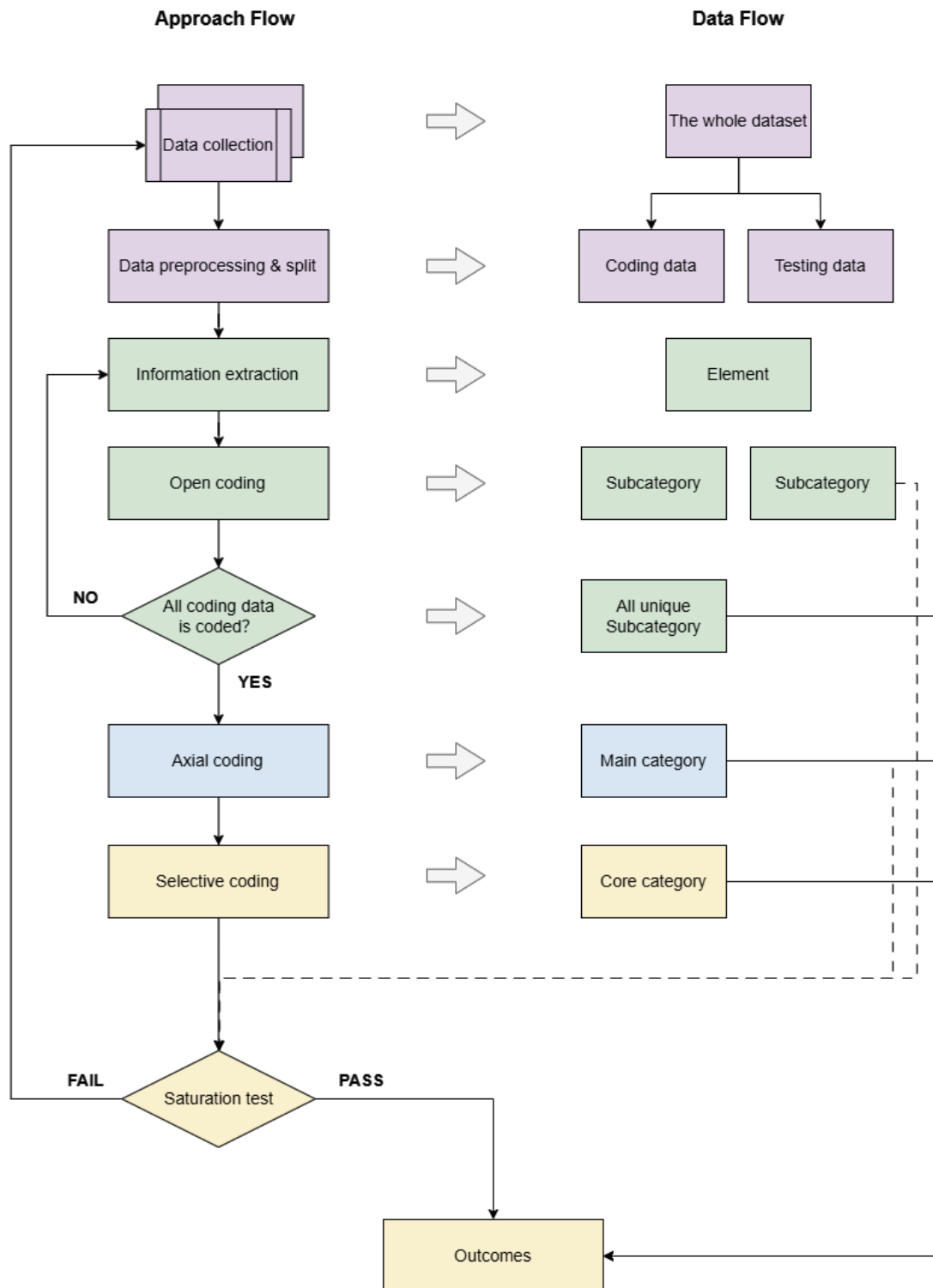


Figure 1. Framework of the Grounded Theory (GT) approach

4.4. Theoretical saturation test

To ensure the completeness and reliability of the theoretical model constructed, a theory saturation test was conducted. In this process, in accordance with the general practice of Grounded Theory, this paper continued to code, conceptualize, and categorize the 10 policy documents set aside; no new concepts and categories

were refined, and no new logical links emerged between the categories. After many iterations of testing and revision, it was finally determined that the theoretical model had reached saturation and was able to reflect more comprehensively and accurately the pathway system of local governments exploring the high-quality development of social organizations (**Figure 2**).

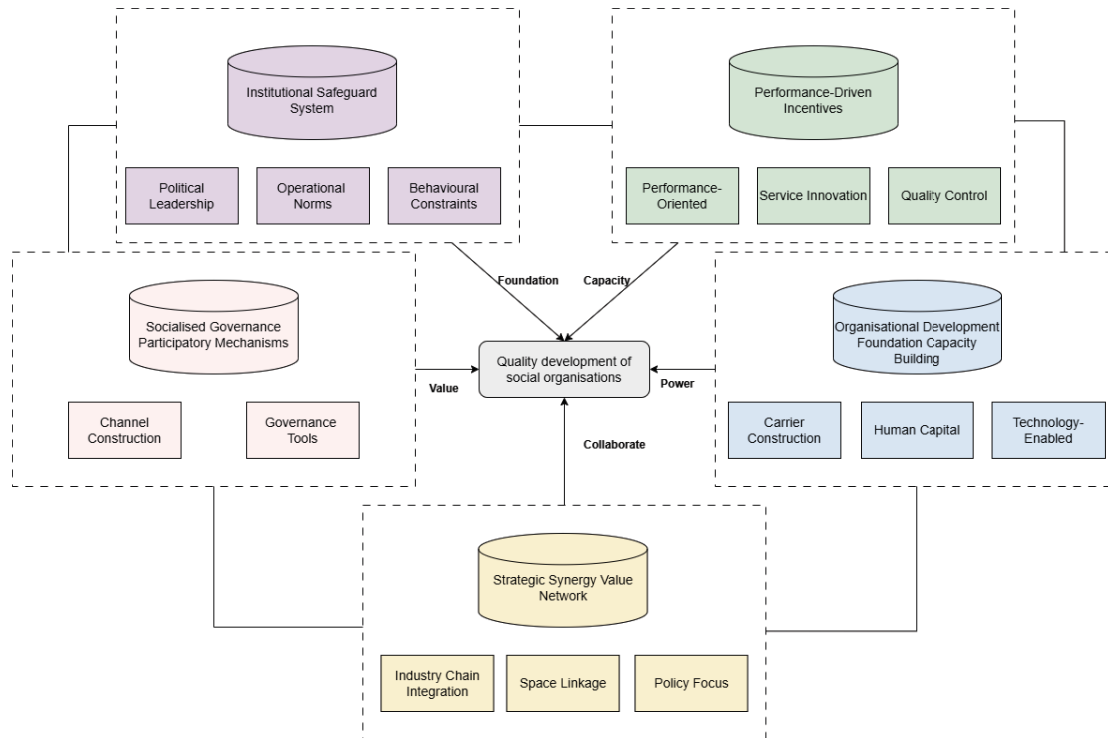


Figure 2. *Model construction*

5. Model interpretation and pathway system analysis

5.1. Institutional safeguard system (Foundation)

Serving as the bedrock for the high-quality development of social organizations, the institutional safeguard System solidifies their foundation through three core components: Political leadership, operational norms, and behavioral constraints. Political leadership works by party building support (requiring setting up party groups and activities), Standardization of party building (setting rules for ideas and procedures), and branding of party building (building a good reputation for party values). This ensures party groups guide social organizations correctly.

Operational norms make sure organizations follow clear rules. For example, internal governance uses councils and supervisory boards to improve fair decision-making. Financial management controls how money is used and checked to keep finances safe and clear. Standardized construction sets quality standards for services and daily work.

Behavioral constraints focus on credit administration. This means collecting credit data, sharing it publicly, and punishing dishonest actions. It rewards good behavior and stops bad behavior to keep organizations trustworthy.

These three parts connect party leadership with practical rules. Party groups guide big decisions, while financial checks and member participation keep organizations responsible. Credit systems also push organizations

to follow socialist values. Together, they create a clear, rule-based environment where organizations work properly under China's governance system.

In summary, an institutional safeguard system composed of political leadership, operational norms, and credit constraints provides a stable and predictable environment for social organizations to grow. However, an external "safety net" alone is insufficient. On this solid institutional foundation, the logical next step for policy is to focus on actively cultivating the internal core competencies and professional management skills of these organizations. This is precisely the central task of the next dimension in the model: Organizational development foundation capacity building (capacity).

5.2. Organizational development foundation capacity building (Capacity)

Built upon this stable institutional foundation, this dimension systematically enhances the inherent strengths of social organizations. It builds their capacity through three main strategies: Carrier construction, human capital, and technology-enabled methods.

Carrier construction focuses on Incubation support as it allocates workspaces, equipment, and project resources within specialized bases. It constructs integrated incubation frameworks that tie into rural revitalization support, aiding NGOs in solving rural challenges.

Human capital forms the systems of the developed talent through cultivation of talent (training and workshops), talent incentive (higher remuneration and enhanced career progression), and human resources norms (formulated norms guiding personnel management).

Simultaneously, technology-enabled alterations further the digital construction requirement of the NGOs' use of big data and AI ^[20]. Finally, this achievement that services are better, work is faster, and the coverage of the population is constantly expanding can be realized.

This is a combination of physical assets, such as the incubation centers, people investments, such as the training systems, and technology upgrades, such as online service platforms. For instance, automated systems alongside AI-powered chatbots mentorship aids new NGOs to grow, and fair rewards retain skilled workers while enhancing service quality through smart tools ^[21–23]. These initiatives make certain vital goals, like aiding rural regions or integrating advanced technology into routine tasks, thoroughly work on. Through systematic investments in carriers, talent, and technology, the core capacities of social organizations are significantly enhanced. At this point, they possess the potential to deliver high-quality services and engage in public sector competition. More importantly, to effectively translate this "potential" into sustained social action and measurable outcomes, a performance-driven incentives (power) system becomes essential. It empowers organizations through external validation and rewards, ensuring their developmental trajectory remains aligned with the public interest.

5.3. Performance-driven incentives (Power)

This dimension is designed to empower organizations through effective rewards and accountability. Hence, the authors label it "Power." It allocates these performance-driven incentives primarily through two mechanisms: being performance-oriented and encouraging service innovation.

Performance-oriented and service innovation. With the evaluating of incentives system, the NGO's operation, service quality, and social value have to pass their markers" holistic evaluation grade check. Monetarily rewarding them or assigning them favorable priority undertakings to improve their brand development are some of the rewards for exemplary output.

For service innovation, the government's purchase of services pays NGOs to provide specialized public services. It also supports service model innovations (e.g., teaming with businesses) and service network building to connect groups and improve services.

Quality control uses two tools: Project monitoring tracks service work using data tools, and regular checks fix problems. This system mixes competition (e.g., performance rankings) with new ideas (like digital tools). For example, funding depends on results, and training helps NGOs try creative solutions.

In summary, strict quality assessment rules, government service buying, and teamwork networks create a flexible system. This makes NGOs both follow rules and try new ideas, improving services while staying efficient. Guided by performance incentives, a group of efficient, innovative, and reputable social organizations emerges, having not only improved their service quality but also gained greater resources and recognition. As these successfully empowered organizations mature, the limitations of operating in isolation become apparent. To tackle pressing complex social problems and achieve economies of scale, they must move beyond their organizational boundaries to build a Strategic Synergy Value Network (Collaborate), thereby enabling a leap from individual growth to ecosystem-wide prosperity.

5.4. Strategic synergy value network (Collaborate)

Once organizations are empowered with developmental momentum, the strategic synergy value network guides them to collaborate. It encourages a shift from isolated operations to collective success through three pillars: Industry chain integration, space linkage, and policy focus.

First, Industry integration services encourage innovation ecosystems by connecting schools, businesses, and research groups. International expansion compels non-governmental organizations and other similar entities to join forces with foreign partners in order to optimize global philanthropy.

As the second step, space linkage forms regional collaborative networks. This entails that NGOs partner with governments, businesses, and other stakeholders in order to mobilize resources within regions to establish coordinated development networks.

Thirdly, in policy focus, incentives for sustainable development (such as funding green projects), cultural heritage support (saving traditions through digital means), and industry-oriented cultivation (mentoring for particular sectors) are integrated.

Through this network, NGOs assume a central role. For instance, the industry chain integration enables prompt response to market demands by NGOs. AI tool applications are tested in innovation ecosystems. Gaps between urban and rural services are addressed in regional collaborative networks. Joint project tax exemptions and defined partnership regulations can become additional policy support. This aligns NGO objectives with national cultural preservation and green competency promotion plans.

This strategic network effectively connects previously disparate social organizations, government bodies, businesses, and research institutions into a powerful and synergistic force. This networked collaboration not only amplifies the impact of individual entities but, more importantly, it creates the conditions for them to participate systemically in deeper levels of social governance. The model's final stage, socialized governance participatory mechanisms (value), is built upon this collaborative foundation, providing the institutionalized channels and tools for organizations to convert their professional capacity and network resources into tangible public value and governance efficacy.

5.5. Socialized governance participatory mechanisms (Value)

Ultimately, social organizations realize their final social value through participatory mechanisms. This is achieved through a combination of channel construction and governance tools, which enable them to deeply engage in the co-creation of public value.

Channel construction devises diverse methods of NGO decision-making participation, including policy advising, community consultations, and multi-group cooperation. It also streamlines information dissemination between the government and NGOs.

At the same time, governance tools use new methods like third-party policy checks. This lets NGOs act as independent watchdogs in monitoring policy effectiveness. NGOs use their skills to check if policies work well and suggest improvements, which also increases their voice in governance.

These two parts work together and form a collaborative force. Specifically, channel construction helps NGOs connect people's needs to government actions through fixed channels (e.g., discussion meetings). Governance tools turn NGOs into quality checkers using clear evaluation rules. To illustrate, digital surveys let citizens share opinions easily, while data tools measure policy impacts. Of note, monitoring of policy effectiveness is not just about watching; it pushes governments to improve policies and lets NGOs help shape rules.

6. Conclusion

This study analyzes 36 local policy documents through Grounded Theory and constructs a five-dimensional model of “Foundation—Capacity—Power—Collaborate—Value” to reveal the policy logic of local governments in fostering social organizations: first, the institutional guarantee system is constructed through political leadership, normative operation and constraining mechanism to consolidate the foundation of development; second, the organizations’ basic capacity is strengthened by carrier construction and human and technical inputs; and ultimately, the organizations are motivated by effectiveness. Finally, through the linkage of efficiency incentives, strategic synergy, and governance participation mechanisms, a closed-loop path from efficiency improvement to value creation is formed.

Admittedly, there are three limitations in the study: insufficient sample coverage may affect the representativeness of the conclusions, the risk of subjective bias in the Grounded Theory approach, and it is necessary to conduct in-depth research on the interaction mechanism of the dimensions and practical issues.

In the future, some optimized suggestions should be recommended. To be specific, comparative research should be adopted to explore cross-regional policy models to enhance adaptability. Empirical methods should be combined with the current method to assess the effectiveness of policy implementation. In addition, the research on the synergy mechanism between social organizations, the government, and the market, with a focus on the mechanism of resource integration, distribution of power and responsibility, and coordination of interests, should be deeply paid attention to. It can provide theoretical support and practical solutions to promote the construction of a modernized social governance system.

Funding

Honghe Prefecture Eighth (2025) Philosophy and Social Sciences Planning Project: Data-Driven Evaluation and Innovative Practices for High-Quality Development of Social Organizations in Honghe Prefecture in the New Era (Project Number: 2025SH-30).

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Wan Q, Du W, 2022, Social Capital, Environmental Knowledge, and Pro-Environmental Behavior. *International Journal of Environmental Research and Public Health*, 19(3): 1443. <https://doi.org/10.3390/ijerph19031443>
- [2] Xian M, Zhao C, Zhou Y, 2022, From Bureaucratic Coordination to a Data-Driven Model: Transformation and Capacity Building of Community-Based Prevention and Control of Public Health Events. *International Journal of Environmental Research and Public Health*, 19(14): 8238. <https://doi.org/10.3390/ijerph19148238>
- [3] Islam MR, 2017, Non-governmental Organizations and Community Development in Bangladesh. *International Social Work*, 60(2): 479–493. <https://doi.org/10.1177/0020872815574133>
- [4] Becerikli K, Koroglu BA, 2017, The Role of NGO's in Improving Local Capacity and Local Development; The Case of Antakya. *Planlama-Planning*, 27(2): 129–140. <https://doi.org/10.14744/planlama.2017.28290>
- [5] Vander Zaag R, 2013, Canadian Faith-based Development NGOs and CIDA Funding. *Canadian Journal of Development Studies*, 34(2): 321–347. <https://doi.org/10.1080/02255189.2013.792726>
- [6] Otsuki K, 2010, Sustainable Development Interfaces: A Case of NGO Intervention in a Frontier Settlement in Para. *Novos Cadernos Naea*, 13(1): 135–154.
- [7] Aldashev G, Navarra C, 2018, Development NGOs: Basic facts. *Annals of Public and Cooperative Economics*, 89(1): 125–155. <https://doi.org/10.1111/apce.12188>
- [8] Kelly LM, 2022, Worthwhile or Wasteful? Assessing the Need for a Radical Revision of Evaluation in Small-sized Development NGOs. *Development in Practice*, 32(2): 201–211. <https://doi.org/10.1080/09614524.2021.1937540>
- [9] Hakkarainen M, 2020, Towards Private Sector Collaboration in Aid Practice: Internal Challenges Faced by Development NGOs. *Development in Practice*, 30(5): 575–585. <https://doi.org/10.1080/09614524.2020.1758037>
- [10] Hudson A, 2002, Advocacy by UK-based Development NGOs. *Nonprofit and Voluntary Sector Quarterly*, 31(3): 402–418. <https://doi.org/10.1177/0899764002313005>
- [11] Miraftab F, 1997, Flirting with the Enemy—Challenges Faced by NGOs in Development and Empowerment. *Habitat International*, 21(4): 361–375. [https://doi.org/10.1016/S0197-3975\(97\)00011-8](https://doi.org/10.1016/S0197-3975(97)00011-8)
- [12] Bebbington A, 1997, New States, new NGOs? Crises and Transitions among Rural Development NGOs in the Andean Region. *World Development*, 25(11): 1755–1765. [https://doi.org/10.1016/S0305-750X\(97\)00066-1](https://doi.org/10.1016/S0305-750X(97)00066-1)
- [13] Huang C, Yang C, Su J, 2021, Identifying Core Policy Instruments Based on Structural Holes: A Case Study of China's Nuclear Energy Policy. *Journal of Informetrics*, 15(2): 101145. <https://doi.org/10.1016/j.joi.2021.101145>
- [14] Sallay V, Klinovszky A, Csuka SI, et al., 2021, Striving for Autonomy in Everyday Diabetes Self-management-qualitative Exploration via Grounded Theory Approach. *BMJ Open*, 11(12): e058885. <https://doi.org/10.1136/bmjopen-2021-058885>
- [15] Tong H, Qiu F, Fan L, 2022, Characterising Common Challenges Faced by Parental Caregivers of Children with Type 1 Diabetes Mellitus in Mainland China: A Qualitative Study. *BMJ Open*, 12(1): e048763. <https://doi.org/10.1136/bmjopen-2021-048763>
- [16] Nwauche S, Flanigan ST, 2022, Challenges to Nonprofit Organization Participation in Social and Development Policy Planning in South Africa. *Nonprofit Policy Forum*, 13(2): 119–139. <https://doi.org/10.1515/npf-2021-0049>
- [17] Alzawad Z, Lewis FM, Walker A, 2022, Parents' Challenges beyond the Pediatric Intensive Care Unit: Fraying at the Seams while Balancing between Two Worlds, Home and Hospital. *Children (Basel, Switzerland)*: 9(2): 267. <https://doi.org/10.3390/children9020267>

doi.org/10.3390/children9020267

- [18] Tayebwa E, Gatimu SM, Kalisa R, et al., 2023, Provider and Client Perspectives on the Use of Maternity Waiting Homes in Rural Rwanda. *Global Health Action*, 16(1): 2210881. <https://doi.org/10.1080/16549716.2023.2210881>
- [19] Li J, Wen K, Zhang B, et al., 2023, Influence Analysis and Promotion Countermeasures of Green Finance Policy in China—Traceability Based on Grounded Theory and Validation Using the csQCA Method. *PloS One*, 18(5): e0285862. <https://doi.org/10.1371/journal.pone.0285862>
- [20] Sinha P, 2017, AI-Powered Chatbots for Customer Service: Enhancing Customer Experience and Reducing Costs. *JETIR*, 4(12): 587–594.
- [21] Casheekar A, Lahiri A, Rath K, et al., 2024, A Contemporary Review on Chatbots, AI-powered Virtual Conversational Agents, ChatGPT: Applications, Open Challenges and Future Research Directions. *Computer Science Review*, 2024(52): 100632. <https://doi.org/https://doi.org/10.1016/j.cosrev.2024.100632>
- [22] Jean G, 2024, Mentorship Reimagined: Using AI-Powered Chatbots for Inclusive Mentoring. *The Chronicle of Mentoring and Coaching Journal*, 8(3): 189–195. <https://doi.org/10.62935/4p5cxu>
- [23] Neumann AT, Arndt T, Kobis L, et al., 2021, Chatbots as a Tool to Scale Mentoring Processes: Individually Supporting Self-Study in Higher Education [Brief Research Report]. *Frontiers in Artificial Intelligence*, 2021(4): 1–7. <https://doi.org/10.3389/frai.2021.668220>

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

On Leveraging Multi-Agent Models in Countermeasures for Deepfake Detection and Mitigation: A Comparative Analysis of Social Media Platform Strategies

Yuanyuan Liu¹, Yu Zhang¹, Jicheng Sun^{2*}

¹School of Foreign Studies, China University of Petroleum (East China), Qingdao 266580, China

²School of Foreign Studies, Shandong University of Technology, Zibo 255000, China

*Corresponding author: Jicheng Sun, jichengsun@sdut.edu.cn

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: The proliferation of deepfake content on social media in recent years has posed significant threats to both individual and societal security. Consequently, devising effective countermeasures to curb the spread of deepfake information has become a critical challenge for social media platforms worldwide. This study aims to explore the propagation dynamics of deepfake information and evaluate the efficacy of various countermeasures by constructing a multi-agent model that integrates the SIR epidemiological model with the BA scale-free network theory. The research focuses on three distinct social media platforms in China—Douyin, Weibo, and Bilibili—as case studies. Through a series of simulation experiments, we compare the propagation patterns of deepfake content and analyze the performance differences of various countermeasures. The results indicate that, in terms of preventing the dissemination of deepfake information, the “preemptive defense” mechanism (exemplified by Douyin) proves to be the most effective in limiting the spread of deepfakes and ensuring timely counteractions. In contrast, the “post-verification” framework (exemplified by Weibo) is particularly effective in enhancing immunity against deepfake content. However, countermeasures based on self-media strategies that emphasize “emotion, viewpoints, and stances” (exemplified by Bilibili) demonstrate higher infection rates, weaker immunity, and longer response delays. The findings of this study offer valuable insights for developing more efficient and adaptive information governance strategies.

Keywords: Social media; Deepfake; Multi-agent; Simulation

Online publication: October 29, 2025

1. Background

In recent years, the rapid advancement of artificial intelligence (AI) technologies has led to an exponential growth in AI-generated content (AIGC) across various platforms, including social media and video-sharing websites.

AIGC encompasses multimodal content created by AI technologies, such as marketing materials, articles, product descriptions, images, audio, and videos ^[1].

According to incomplete statistics, the volume of deep synthetic content on internet platforms has increased exponentially, with a significant proportion comprising deepfake information ^[2]. Deepfake technology is based on “Generative Adversarial Networks” (GAN), a deep learning technique that enables the creation of hyper-realistic digital fakes in images, videos, and audio ^[3].

The creation of personalized and eye-catching misinformation can mislead public judgment, destabilize society, and contribute to the stigmatization problem on social media ^[4]. In Western countries, generative AI has been exploited maliciously to disseminate false political information, fabricate news, manipulate public opinion, and disrupt national elections, thereby negatively impacting political stability ^[5].

Current research on countering deepfake content on social media primarily focuses on social risks and legal regulations, identification and detection methods, and intervention strategies. **Figures 1 and 2** display 286 studies on the dissemination of deepfakes in social media, published between 2018 and June 2024 ^[6]. Among these, research on social risks and legal regulation is generally strategy-oriented, conducting qualitative studies on social risks, governance pathways, and multi-party collaboration ^[7-9]. In contrast, research on identification, detection, and intervention methods is more technology-oriented, focusing on optimizing detection models and improving dataset performance through quantitative research ^[10-11].

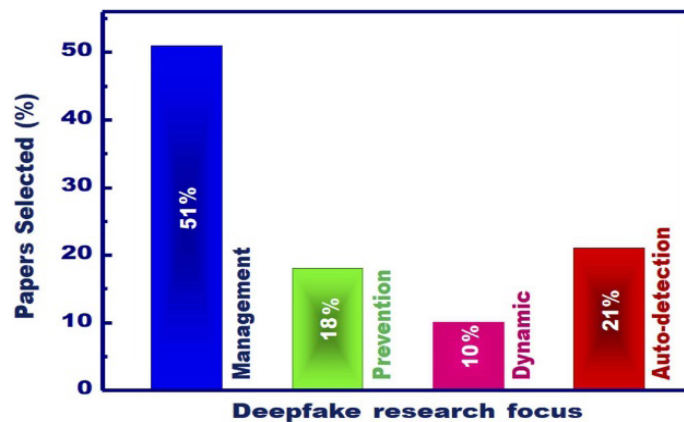


Figure 1. Selected papers with a focus on research ^[6]

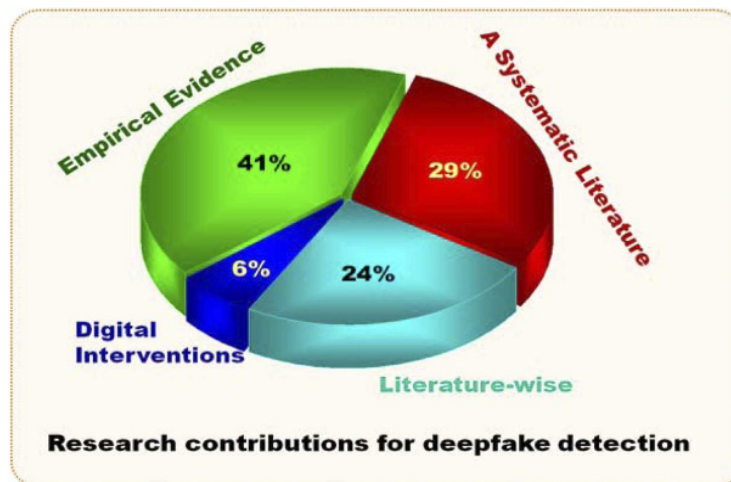


Figure 2. Research types of selected papers ^[6]

In conclusion, the current research on quantitative analysis of countermeasures against deepfakes on social media reveals significant gaps, thereby limiting the use of scientific and objective methods to assess the effectiveness of these countermeasures. To address this research gap, the study will conduct simulation experiments and effectiveness evaluations of both the propagation and countermeasures of identical deepfake content across different social media platforms. The ultimate goal is to optimize existing countermeasures and develop solutions to address the prevailing challenges in this domain.

2. Model construction

Social media deepfake countermeasures require hierarchical governance, comprising three components: system behavior, structure, and environment^[3]. The system structure represents a relatively stable, goal-aligned element organization, while system behavior encompasses agent interactions (including needs, motives, stimuli, goals, and feedback) that achieve functional objectives. The system environment includes all external interacting factors^[12].

This study employs Agent-Based Modeling (ABM) to simulate emergent user behaviors, as ABM effectively reveals macroscopic effects from individual behaviors in complex adaptive systems^[13]. Individual users are abstracted as agents to analyze the effectiveness of the platform against deepfake propagation.

Network Structure: Social media networks exhibit BA scale-free properties, characterized by a power-law degree distribution—most nodes have low degrees, while a few have high degrees^[14]. This study uses BA scale-free networks to simulate real social media environments^[15].

Propagation Behavior: Deepfake information spreads “virally”^[16]. The SIR epidemiological model categorizes nodes as S (susceptible), I (infected), or R (immune/recovered), effectively modeling information diffusion on networks^[9].

Considering user diversity, interaction heterogeneity, and relationship complexity, the modeling approach follows “Agent-Based Modeling of Weibo Group Event Propagation” (**Figure 3**)^[17].

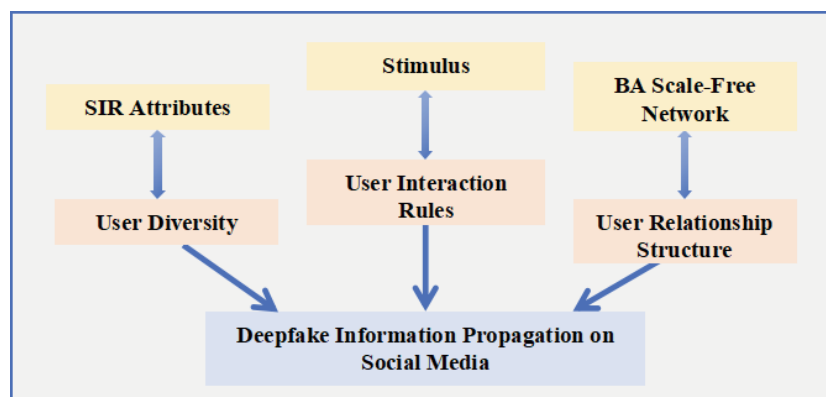


Figure 3. Deepfake information propagation model on social media

3. Simulation experiment

This study employs an ABM model integrating the SIR model with BA scale-free networks to evaluate deepfake countermeasures across social media platforms, using the “Xiamen Representative Bai Jie” deepfake case.

Three platforms with distinct strategies were examined:

Douyin: Preemptive defense with AI-generated content alerts, posting restrictions, and virtual human live-streaming controls.

Weibo: Post-verification via official rumor refutation accounts and third-party co-governance platforms.

Bilibili: Emotion-driven countermeasures leveraging anti-fraud creators and rapid recommendation algorithms to question and expose deepfakes.

Data were collected from all three platforms and simulated using NetLogo 6.3.0.

3.1. Data collection

Data collection employed a “dual snowball” sampling method^[17]. First, event-related keywords were used to retrieve all relevant posts within the specified timeframe across platforms. Second, activities such as reposting, quoting, and replying were tracked to capture missed keyword-related content. Third, all posts from identified users during the event period were collected to ensure comprehensive coverage.

Given the limited deepfake videos (mean = 3), K-shell decomposition for influence calculation was unnecessary. Table metrics (followers, favorites, likes, reposts, and comments) represent aggregated values for fake and debunking videos across platforms. View counts for Douyin and Weibo were estimated via sampling due to data unavailability.

Table 1. Propagation data of deepfake videos involving “Xiamen Representative Bai Jie”

| Number of fake videos | Platform | Favorites | Likes | Reposts | Comments | Views |
|-----------------------|----------|-----------|-------|---------|----------|--------|
| 2 | Douyin | 2 | 48 | 5 | 1 | 8,000 |
| 2 | Weibo | 0 | 1512 | 364 | 2227 | 50,000 |
| 1 | Bilibili | 15 | 196 | 81 | Banned | 18,000 |

Table 2. Propagation data of debunking videos involving “Xiamen Representative Bai Jie”

| Number of debunking videos | Platform | Favorites | Likes | Reposts | Comments | Views |
|----------------------------|----------|-----------|-------|---------|----------|---------|
| 7 | Douyin | 7 | 5280 | 4 | 44 | 40,000 |
| 4 | Weibo | 0 | 6441 | 128 | 420 | 100,000 |
| 2 | Bilibili | 205 | 6793 | 128 | 378 | 56,000 |

Note: Likes = likes + 10× coins; Weibo favorites = 0 (feature unavailable); Total fake content impressions ≈ 1.16 million

3.2. Parameter settings

Parameters for initial outbreak scale, virus check frequency, and transmission/recovery/resistance opportunities were derived from platform data.

Notably, the virus check frequency represents the intervals at which infected nodes are monitored and managed within the simulation framework. In the context of computer viruses and information dissemination models, fixed inspection frequencies are often employed to simulate the cyclical scanning or monitoring actions undertaken by defense mechanisms. This experiment was fixed at 10 to ensure temporal consistency and simulation stability across platforms.

The parameter delineating transmission opportunity signifies the propensity for deepfake information to spread within a social network. The Propagation Opportunity (PO) is computed as follows:

$$PO = 10 * \frac{Likes + Favorites + Comments + Shares}{Impressions} \quad (1)$$

User interactions (likes, favorites, comments, shares) indicate propagation potential ^[9]—normalization by impressions controls for user base variance. The amplification factor (×10) reflects empirical evidence that false information spreads more rapidly than debunking content ^[17].

The Recovery Opportunity (RO) refers to the likelihood that users will recover from an infected state after being exposed to debunking information. RO is calculated as follows:

$$RO = \frac{Likes + Favorites + Comments + Shares}{Impressions} \quad (2)$$

In formula (2), the debunking video interactions measure penetration and user acceptance ^[18]. Similarly, equation (2) normalizes the interaction volume by impressions to ensure consistency and equitable evaluative criteria. It is noteworthy to acknowledge that, in contrast to false information, debunking content often encounters impediments characterized by “delayed initiation and diminished attention.” No amplification is applied, reflecting lower engagement with corrective content ^[19].

The BA scale-free network with 100 initial nodes balances scale-free properties with computational efficiency. Resistance Opportunity (ReO) is given by:

$$ReO = \frac{Number\ of\ Debunking\ Videos * Impressions}{100 * Number\ of\ Fake\ Videos * Impressions} \quad (3)$$

The video ratio reflects the quantitative advantage of debunking information ^[20]. Impressions are adjusted for exposure impact; division by 100 scales the results appropriately.

3.3. Model execution

Substitute the data from **Table 1–2** into Formula 1–3 to determine the initial value. The results are shown in **Table 3**.

Table 3. Initial values for the ABM deepfake information propagation model

| Virus check frequency | PO (%) | RO (%) | ReO (%) | Initial degree distribution |
|-----------------------|--------|--------|---------|-----------------------------|
| 10 | 7 | 13.3 | 17.5 | 100 |
| 10 | 8.2 | 7 | 40 | 100 |
| 10 | 9.3 | 13.4 | 6.2 | 100 |

Based on the initial values provided in Table 3, the data were then input into the deepfake information propagation model, and simulation experiments were conducted using NetLogo. The experimental results are detailed below:

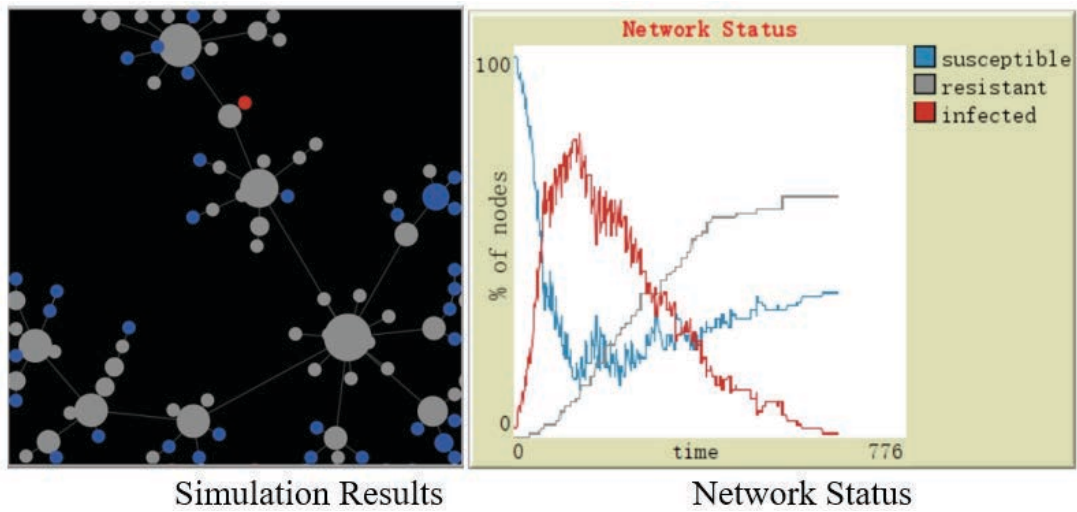


Figure 4. Simulation of deepfake information propagation on Douyin

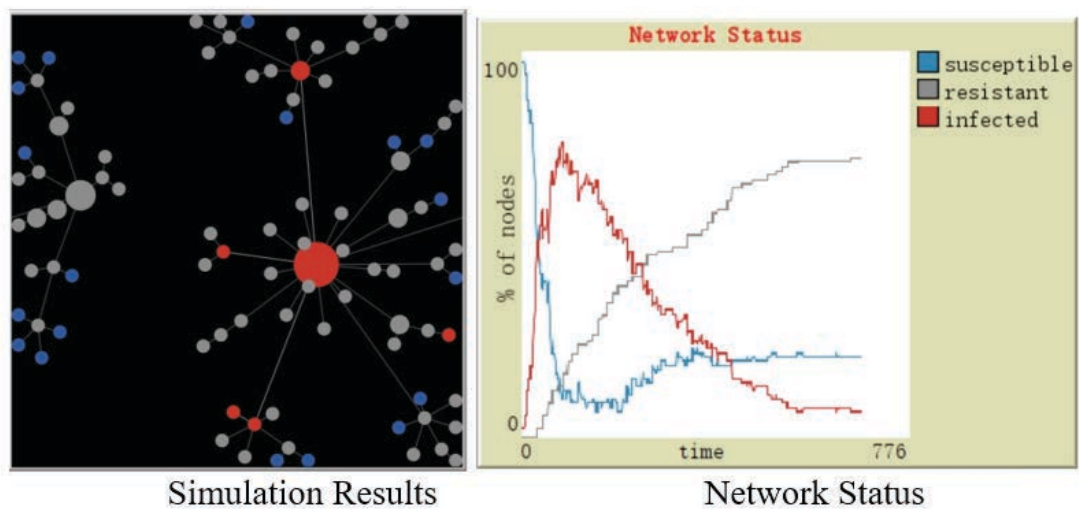


Figure 5. Simulation of deepfake information propagation on Weibo

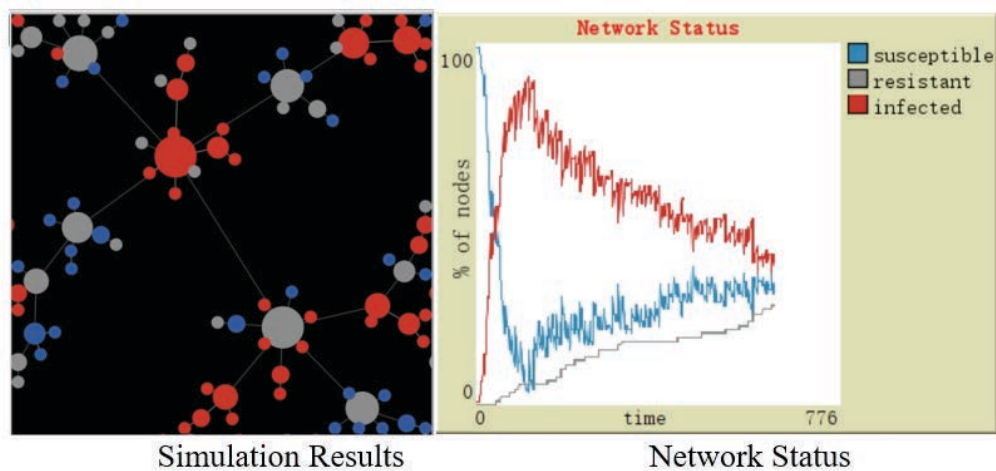


Figure 6. Simulation of deepfake information propagation on Bilibili

4. Results and Discussion

4.1. Results

The simulation experiment results indicate that the structure of various countermeasure systems significantly affects their response speed and effectiveness in mitigating the spread of deepfake information. The specific analysis is as follows:

- (1) Number of Infections and Propagation Control: By comparing the peaks of the red curves, it is observed that the number of infections is lowest on the Douyin platform, whereas the peak is highest on Bilibili. Furthermore, from the endpoints of the red curves, it is evident that Douyin was the fastest to reduce the infection value to the minimum, achieving timely control of deepfake propagation. In contrast, Weibo demonstrates moderate control effectiveness, while Bilibili exhibits the slowest control effects.
- (2) Trends in Immune Population: The trend of the gray curve indicates that Weibo and Douyin exhibit strong immunity. However, Bilibili, which employs an “emotional stance” countermeasure strategy, exhibits lower immunity and slower growth despite having a smaller susceptible population, resulting in a faster short-term spread of deepfake information. Overall, its effectiveness is inferior to the other mechanisms.
- (3) Analysis of Susceptible Population Characteristics: By comparing the lowest points of the blue curves representing the susceptible population, it is found that Weibo’s countermeasure strategy results in the shortest feedback time, quickly reducing the susceptible population to a minimum. Douyin and Bilibili follow behind. However, in subsequent stages, the susceptible population on all three platforms demonstrates slight increases before eventually leveling off.
- (4) Final Node Distribution: When deepfake propagation reached a stable state across the three platforms, the study counted the number of agents with different attributes, specifically the SIR nodes in the simulation experiment (**Figure 7**). The results show that Douyin has the fewest susceptible individuals and the most immune individuals; Bilibili has the most susceptible individuals and the fewest immune individuals; Weibo has the highest number of immune individuals.

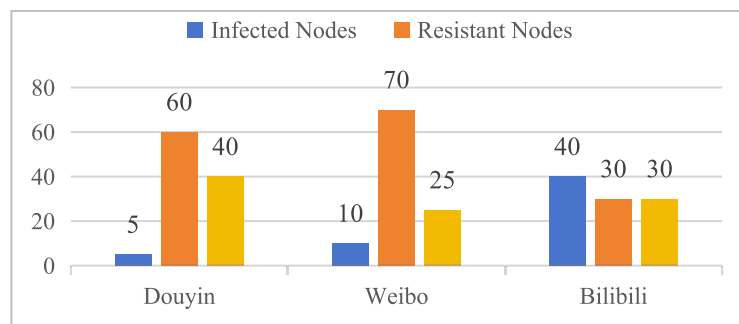


Figure 7. Final node distribution across platforms (100% Normalized)

The peak infection rate, time proportion, final infected nodes, final resistant nodes, and final susceptible nodes for deepfake information propagation are summarized as follows (**Table 4**):

- (1) The Douyin platform demonstrates the least extensive dissemination of deepfake content, coupled with the most expedited recovery process, with a short feedback delay time.
- (2) The Weibo platform was the first to achieve immunity to deepfake information, with the highest proportion of user base that eventually develops resistance against such content.
- (3) The Bilibili platform exhibits a notably elevated infection rate and the weakest efficacy in developing

immunity, accompanied by a longer feedback delay time.

Table 4. Peak infection rates and final node statistics

| Platform | Peak infection rate (%) | Time proportion (%) | Final infected nodes (%) | Final resistant nodes (%) | Final susceptible nodes (%) |
|----------|-------------------------|---------------------|--------------------------|---------------------------|-----------------------------|
| Douyin | 70 | 20 | 5 | 60 | 40 |
| Weibo | 70 | 15 | 10 | 70 | 25 |
| Bilibili | 90 | 10 | 40 | 30 | 30 |

4.2. Discussion

Effectiveness of the “Preemptive Defense” Strategy: The Douyin platform, using a “preemptive defense” countermeasure structure, demonstrated significant advantages in terms of the number of infections, recovery speed, and feedback delay time. It indicates that early technical alerts and warning systems can effectively mitigate the further spread of misinformation. The “preemptive defense” structure outperforms alternative countermeasure mechanisms in terms of both efficiency and efficacy.

Immunity of the “Post-Verification” Strategy: The Weibo platform’s adoption of a “post-verification” mechanism, incorporating third-party oversight and fact-checking procedures, facilitated a rapid emergence of immunity and a rapid enhancement of user immunity over a relatively short time. Although the initial immune response was slightly slower compared to Douyin, Weibo eventually achieved the highest level of user immunity, highlighting the critical role of verification and correction mechanisms in managing deepfake information.

Limitations of the “Emotional Stance” Strategy: In contrast, Bilibili’s countermeasure strategy, which relied on “emotional stance”, was the least effective. Despite having a smaller susceptible population, Bilibili exhibited a higher infection rate, lower immunity effectiveness, and prolonged feedback delay times. These results indicate that relying solely on self-media recommendation algorithms and emotional interactions is insufficient to curtail the spread of deepfake content and may lead to delayed immunity. Instead, a multifaceted approach is essential for developing comprehensive strategies to address the challenges posed by the dissemination of deepfake information.

Dynamic Interactivity of Media Countermeasures: Overall, the countermeasures employed by social media platforms exhibited strong dynamism and openness. The varying effectiveness of different combinations of countermeasures across platforms underscores the importance of considering platform structure, user behavior, and external regulatory environments in their design. Therefore, when devising countermeasures for social media platforms, a multi-layered, multi-strategy, comprehensive approach should be adopted.

In summary, media countermeasures operate within an open and dynamic energy field, with their effectiveness contingent upon the interaction between system structure, behavioral patterns, and the external environment. This study innovatively applies the agent-based modeling (ABM) approach to the study of deepfake countermeasures, revealing that the structure of countermeasure systems significantly influences the response speed and efficacy of managing deepfake content. Quantitative analysis indicates that the “preemptive defense” structure achieves the fastest suppression of spread, while the “post-verification” structure demonstrates robust immunity.

Funding

This study was supported by the Humanities and Social Sciences Project Grants by the Ministry of Education of China (24YJAZH094) and 2025 General Program of the National Social Science Fund of China (25BXW099).

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Wu J, Gan W, Chen Z, et al., 2023, AI-Generated Content (AIGC): A Survey. arXiv, accessed on October 2, 2025. <https://arxiv.org/abs/2304.06632>
- [2] Tsinghua University Institute for Artificial Intelligence, 2022, Top 10 Trends in Deep Synthesis. Retrieved on October 2, 2025, <https://www.digitalelite.cn/h-nd-3039.html>
- [3] Cai S, 2020, The Technical Logic and Legal Changes of Deepfake. *Political and Legal Review*, 2020(3): 131–140.
- [4] Dash B, Sharma P, 2023, Are ChatGPT and Deepfake Algorithms Endangering the Cybersecurity Industry? A Review. *International Journal of Engineering and Applied Sciences*, 10(1): 4–5.
- [5] Chen Y, Wang W, 2023, From “Immediate Implementation” to “Gradual Improvement”: Constructing the Governance System of Generative AI. *E-Government*, 2023: 15–27.
- [6] El-Sayed Atlam M, Malik Almaliki G, Ghada Elmarhomy, et al., 2025, SLM-DFS: A Systematic Literature Map of Deepfake Spread on Social Media. *Alexandria Engineering Journal*, 2025(111): 446–455.
- [7] Wang G, Zhang Z, 2024, Characteristics, Risks, and Countermeasures of Deepfake Technology. *New Media and Network*, 1(2): 40–51.
- [8] Zhang X, Wang R, Ma Y, 2024, Challenges, Opportunities, and Strategies in Fake Information Governance Under the AIGC Context. *Information Science*, 1–23, accessed on October 2, 2025, <https://link.cnki.net/urlid/22.1264.G2.20241111.1002.024>
- [9] Zhao L, Wang J, Cheng J, et al., 2012, Rumor Spreading Model with Consideration of Forgetting and Remembering Mechanisms in Social Networks. *Physica A: Statistical Mechanics and its Applications*, 391(7): 2444–2453.
- [10] Sadiq S, Aljrees T, Ullah S, 2023, Deepfake Detection on Social Media: Leveraging Deep Learning and FastText Embeddings for Identifying Machine-Generated Tweets. *IEEE Access*, 2023(11): 95008–95021.
- [11] Khan AA, Chen YL, Hajje F, et al., 2024, Digital Forensics for the Socio-Cyber World (DF-SCW): A Novel Framework for Deepfake Multimedia Investigation on Social Media Platforms. *Egyptian Informatics Journal*, 27(1): 1–12.
- [12] Mao H, 2013, Core Elements of the Cross-Strait Dialogue System, thesis, Fujian Normal University.
- [13] Jiang S, Han Z, 2011, Agent-Based Modeling Methods in Complex Systems Research. *Journal of the University of Shanghai for Science and Technology*, 33(2): 124–129.
- [14] Pan J, Shen H, Chen Z, 2018, A Model of Group Event Microblog Propagation Based on Agent and K-Core Decomposition. *Information Science*, 36(2): 125–131.
- [15] Sun R, Luo W, 2014, Rumor Spreading Model in Scale-Free Networks with Non-Uniform Propagation Rates. *Complex Systems and Complexity Science*, 11(3): 6–11.
- [16] Liu C, Chen M, 2023, User Perception and Interaction Behaviors of False Information Based on Cue Utility Theory: Focused on Deepfake Information. *Journal of Information Science*, 42(10): 96–104.

- [17] Vosoughi S, Roy D, Aral S, 2018, The Spread of True and False News Online. *Science*, 359(6380): 1146–1151.
- [18] Zhao L, Wang J, Chen Y, et al., 2012, SIHR Rumor Spreading Model in Social Networks. *Physica A: Statistical Mechanics and its Applications*, 391(7): 2444–2453.
- [19] Friggeri A, Adamic L, Eckles D, et al., 2014, Rumor Cascades. *Proceedings of the Eighth International AAAI Conference on Weblogs and Social Media*, 101–110.
- [20] Granell C, Gomez S, Arenas A, 2013, Dynamical Interplay Between Awareness and Epidemic Spreading in Multiplex Networks. *Physical Review Letters*, 111(12): 128701.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Process Philosophy Interpretation of Chinese-style Modernization: Theoretical Innovation and Practical Path Research

Xiong Tian^{1*}, Wen Li²

¹Hainan Vocational University of Science and Technology, Haikou 571126, Hainan, China

²Hebei University, Baoding, Hebei, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: As the core carrier of the new form of human civilization, Chinese modernization is essentially a systematic process of dynamic evolution in a complex space-time field. Based on Engels' process theory and Marxist dialectics, this paper systematically explains the philosophical basis and practical path of Chinese modernization. The research shows that the new development pattern has realized the transcendence of the dynamic balanced modernization paradigm, the whole process of people's democracy has reconstructed the political modernization process, and the new national system has demonstrated the advantages of institutional modernization. The three together build a development paradigm with Chinese characteristics. This study provides a process philosophy perspective for understanding the theoretical innovation of Chinese-style modernization, and also provides a Chinese solution for the reform of the global governance system.

Keywords: Process philosophy; Chinese-style modernization; New development pattern; The whole process of people's democracy; The new national system

Online publication: October 29, 2025

1. Introduction

Process philosophy is an important philosophical trend of thought in the 20th century. Its core essence is to regard "process" as the basic unit of reality, emphasizing that things show their essential attributes in dynamic generation and interconnection. Engels' process theory puts forward that "the world is not a collection of immutable things, but a collection of processes" ^[1]. This philosophical proposition provides a profound theoretical footnote for Chinese modernization. Chinese-style modernization has created a new form of human civilization. It is not a preset fixed model, but a dynamic process of continuous adjustment in the tension between globalization and localization. From the perspective of process philosophy, this paper regards the new development pattern, the whole process of people's democracy, and the new national system as the three core practical fields of Chinese-

style modernization, aiming to reveal the philosophical implications and practical logic of Chinese-style modernization and fill the theoretical gaps in existing research.

2. New development pattern: modernization paradigm of dynamic balance

The research on the dynamic balance of the “new development pattern” in the process of Chinese-style modernization is essentially a theoretical deconstruction of the systematic adjustment of the modernization development paradigm in the complex space-time field. The philosophical implication of this paradigm is not only reflected in the transcendent breakthrough of the traditional modernization path, but also in the practical wisdom of reconstructing the driving force of development in the tension between globalization and localization. From the perspective of development stage theory, the proposal of the new development pattern marks that China’s modernization process has entered a new stage with high-level independent innovation as the core feature. Its essence is the systematic transcendence of the “dependent development” model by building an economic cycle system based on domestic demand-driven and supported by independent innovation, to achieve the strategic transformation from “technology following” to “innovation leading.” This transformation is not a simple economic structure adjustment, but a systematic change involving productivity transition, economic system reconstruction, and development path innovation. The core meaning is to form a modern development model with endogenous resilience through the two-way interaction between supply-side structural reform and demand-side management.

The practical logic of the new development pattern is essentially the governance art of achieving dynamic equilibrium under multiple constraints. The dialectical relationship between domestic and international dual circulation is not only reflected in the strategic coordination at the macro-policy level, but also in the differentiated adaptation at the regional development level. The differences in the performance of each province in the new development pattern actually reflect the adaptive choice of the dual-cycle path in different development stages: the eastern developed regions focus on innovation-driven and global value chain climbing, while the central and western regions focus on domestic demand expansion and industrial gradient transfer. This dynamic balance of inter-regional functional complementarity requires the construction of a multi-level and networked innovation ecosystem - not only to break the institutional barriers of factor flow, but also to activate the vitality of market players through “supply-demand” bilateral reforms, and finally form a modern economic system with an innovation network as the hub and regional coordination as the support.

The dialectical thinking of Marxist philosophy provides a fundamental methodological support for the construction of a new development pattern. The application of the contradiction analysis method is reflected in the dual grasp of the driving force and constraints of development. On the one hand, the expansion of domestic demand is taken as the main aspect of the contradiction, and the dynamic balance between supply and demand is realized through the benign interaction between consumption upgrading and industrial upgrading. On the other hand, with the supply-side structural reform as the breakthrough point, the structural contradictions are solved through the dual drive of technological breakthrough and institutional innovation. The unity of the two-point theory and the key theory not only follows the basic principle of “social existence determines social consciousness”, but also highlights the practical wisdom of “mutual transformation of primary and secondary contradictions.” The introduction of the space-time analysis framework further reveals the strategic depth of the new development pattern by grasping the historical opportunity of the reconstruction of the global industrial chain, to achieve a smooth transition of intergenerational replacement in the time dimension, and to build a three-

dimensional network of regional coordination in the spatial dimension.

As an important dimension of the new development pattern, regional coordinated development is essentially a systematic correction of the imbalance of modern development. The strategic transformation from unbalanced development to balanced development requires not only the optimization of spatial layout through new urbanization and urban agglomeration construction, but also the cultivation of industrial chain clusters to enhance regional competitiveness. The deep logic of this transformation is to solve the problem of resource mismatch under the “core-periphery” structure through institutional innovation and policy coordination, and to realize the Pareto improvement of factor flow. The boost of consumer demand and the cultivation of the industrial chain constitute a two-way enabling cycle mechanism in this process: the former releases the potential of domestic demand through the reform of income distribution and the equalization of public services, and the latter enhances regional resilience through technology spillover and the industrial correlation effect, which together constitute the power source of regional coordinated development.

The ethical adjustment of social vitality and order constitutes the deep value dimension of the new development pattern. The breakthrough of Chinese-style modernization to the Western discourse system is not only reflected in the transcendence of economic indicators, but also in the reconstruction of the ethics of modernization development through the construction of a collaborative mechanism between individual vitality and collective order, to achieve the organic unity of community vitality and social order. This ethical adjustment requires not only the protection of the innovation freedom of market players at the micro level, but also the maintenance of social fairness and justice at the macro level; it not only emphasizes the standardization of market behavior through the construction of the rule of law, but also pays attention to the cohesion of social consensus through cultural identity. In this process, the modernization of the national governance system and governance capacity has become a key variable to balance vitality and order. The essence of the dynamic balance of the new development pattern is the systematic innovation of the modern development paradigm in the interweaving of multiple logics. The deep implication of its theoretical logic lies in the reconstruction of the dynamic mechanism of development through the dialectical thinking of Marxist philosophy; the core essence of the practical logic is to achieve spatial balance through regional coordinated development; the fundamental direction of value logic is to achieve social harmony through ethical adjustment. To achieve this dynamic balance, it not only needs the dual guarantee of strategic concentration and institutional resilience, but also relies on the synergy of market mechanism and government role, and finally forms a modern development path with Chinese characteristics.

3. People’s democracy in the whole process: The procedural innovation practice of political modernization

The procedural justice innovation of the whole process of people’s democracy in the process of Chinese-style modernization is essentially the systematic reconstruction of the democratic governance paradigm in the space-time field. Its philosophical implication is not only reflected in the transcendent breakthrough of the traditional democratic model, but also in the practical wisdom of realizing people’s subjectivity in the context of localization. This kind of innovation is neither a simple system transplantation nor a mechanical path imitation, but a system reconstruction based on the essential characteristics of Chinese-style modernization. By constructing a democratic participation mechanism covering the whole chain of political life, the dialectical unity of democratic form and democratic essence is realized in the dimension of procedural justice. Its deep logic lies in the fact that the people-

centered value orientation runs through the whole process of democratic operation, which not only breaks through the formal limitations of Western “electoral democracy” but also transcends the abstract dilemma of “right-based democracy” and forms a democratic development path with Chinese characteristics.

The practical innovation of people’s democracy in the whole process is first reflected in the space-time extensibility of democratic participation. This extensibility is not only reflected in the full-cycle coverage of the political process, but also in the full-field coverage of the participants. By constructing a closed-loop mechanism of democratic election, consultation, decision-making, management, and supervision, the people can continue to participate in all aspects of national governance, such as legislation, administration, and justice, and form institutionalized and normalized democratic practice. For example, the system design of the people’s proposal collection system and the grass-roots legislative contact point is essentially to expand the physical space and institutional space of democratic participation through institutional innovation, so that democratic practice can break through the time and space constraints of the traditional election cycle. The essence of this whole process participation is to realize the dynamic coupling of people’s will and state will through the dual guarantee of system supply and program design.

The systematic integration of the system constitutes another dimension of the innovation of the people’s democratic procedural justice in the whole process. The people’s congress system forms an organic whole with the systems of regional ethnic autonomy and grass-roots mass autonomy, and constructs a multi-level and three-dimensional democratic system network. This kind of institutional coordination not only guarantees the universality of democratic rights but also ensures the scientific nature of democratic decision-making through legal procedures. Taking the “Acceptance of Complaints” mechanism as an example, the system design of “Acceptance of Complaints” and “Response in All Fields” not only realizes the immediate response to the people’s demands, but also transforms public opinion into policy output through institutionalized channels, forming a closed-loop transmission of “public opinion-policy-governance.” The scientific nature of this institutional system is to transform the Marxist concept of democracy into an operational institutional practice, which not only avoids the procedural idling of the Western democratic system but also transcends the one-dimensional decision-making of the traditional governance model.

The advancement of the rule of law constitutes the institutional guarantee for the innovation of people’s democratic procedural justice in the whole process. By incorporating the operation of democracy into the rule of law, it not only ensures the order of democratic practice but also prevents the risk of power alienation. The essence of judicial democratic practices, such as the people’s jury system and the people’s supervisor system, is to realize the socialized checks and balances of judicial power through system design, so that the people’s supervision power can be substantively carried within the framework of the rule of law. The deep logic of this rule of law is to restrain the boundary of democratic operation through institutional rigidity, which not only guarantees the proper exercise of democratic rights but also prevents democratic practice from falling into a state of disorder. In this process, the rule of law is not only the guarantee mechanism of democratic operation, but also the value benchmark of the legitimacy of democratic procedures. The substantive return of democratic value is the core of the innovation of people’s democratic procedural justice in the whole process. This return is not only reflected in the institutional confirmation of the people’s dominant position, but also in the practical test of democratic effectiveness. By constructing the paradigm of “right-ability democracy”, the people’s democracy in the whole process not only guarantees the realization of the system of people’s participation rights and supervision rights, but also improves the substantive efficiency of people’s democratic participation through capacity building. The essence of this value

return is to break through the capital logic constraints of Western democratic systems, so that the operation of democracy can get rid of capital manipulation and return to the people's standard. In this sense, the whole process of people's democracy is not only the innovation of system form, but also the remodeling of democratic values.

The structural contribution to Chinese-style modernization constitutes the practical coordinates of the innovation of the justice of the people's democratic procedure in the whole process. This contribution is not only reflected in the systematic improvement of national governance capacity but also in the continuous release of social vitality. Through the institutional practice of the whole process of people's democracy, China has realized the governance transformation from capital logic to people's logic, which not only avoids the governance failure under the Western democratic system but also transcends the efficiency bottleneck of the traditional governance model. The deep logic of this transformation lies in the construction of an organic unified mechanism between the will of the people and the will of the state through the innovation of democratic procedures, so that national governance has both institutional rigidity and democratic vitality. In this process, the whole process of people's democracy not only provides institutional support for Chinese-style modernization, but also contributes Chinese wisdom to the development of world democratic politics ^[2].

The essence of the procedural justice innovation of the whole process of people's democracy is the systematic reconstruction of the democratic governance paradigm in the space-time field. Its philosophical connotation is not only reflected in the profound grasp of the essence of democracy, but also in the creative transformation of democratic practice. This kind of innovation not only enriches the realization form of people's democracy, but also improves the operation quality of people's democracy, and opens up a new development path of people's democracy in the dimension of procedural justice.

4. New nationwide system: Adaptive practice of institutional modernization

The adaptive process characteristics of the new national system in the process of Chinese-style modernization are essentially the systematic adjustment of the institutional governance paradigm in the space-time field. Its philosophical meaning is not only reflected in the creative transformation of traditional institutional resources but also in the practical wisdom of achieving dynamic balance in complex governance scenarios. This kind of adaptability is neither a simple repair of the existing system, nor a mechanical transplantation of the Western governance model, but a system reconstruction based on the essential characteristics of Chinese-style modernization. Through the construction of a governance mechanism of government, market, and social co-governance, the dialectical unity of concentrating on major events and stimulating market vitality is realized in the dimension of institutional efficiency. Its deep logic lies in the fact that institutional resilience runs through the whole process of governance, which not only breaks through the rigid constraints of the traditional planning system but also transcends the fragmentation dilemma of the Western governance model, forming an institutional innovation path with Chinese characteristics.

The adaptability of the new national system is first reflected in the inheritance and transcendence of historical logic. This system not only continues the institutional gene of the socialist system of "concentrating on major events", but also realizes the transformation and reconstruction of the institutional paradigm under the conditions of the socialist market economy. Its core innovation lies in the realization of systematic changes in the way of resource allocation, the structure of participating subjects, the strategic support system, and the benefit distribution mechanism through the dual mechanism of "mobilization-activation-routine." For example, in the scenario of

“neck” technology research and major public crisis governance, the new national system not only plays the core role of the government in strategic planning and resource co-ordination, but also activates the innovation vitality of market players and the participation kinetic energy of social organizations by building a government-led, market-driven, and socially coordinated governance network, forming a multi-agent collaborative governance synergy. This mechanism innovation not only adapts to the development law of the market economy, but also provides institutional guarantees for the realization of major national strategic objectives.

The integration of theoretical logic constitutes the deep support for the adaptability of the new national system. This system integrates theoretical resources such as neoclassical economics, new institutional economics, and development economics, and conducts creative dialogues with China’s unique political logic, governance logic, and value orientation to build an institutional analysis framework with localized characteristics. In the field of scientific and technological innovation, through the coordination mechanism of “promising government and effective market”, the new national system not only follows the resource allocation law of market economy, but also plays the leading role of government in strategic orientation and system supply, so as to realize the institutional breakthrough of key core technology research. The essence of this theoretical integration lies in the transformation of Marxist state theory into operational governance practice, which not only avoids the discourse hegemony of Western theory but also transcends the path dependence of the traditional governance model.

The contextualization of practical logic is a realistic representation of the adaptability of the new national system. This system shows the institutional resilience to deal with complex governance tasks through strategic adjustment in different governance scenarios. In the practice of poverty alleviation, the new national system realizes the precise delivery of resources and the effective implementation of policies by constructing a governance system that is coordinated by the central government, responsible by the province, and implemented by the city and county. In epidemic prevention and control, the efficient mobilization ability and resource allocation efficiency are demonstrated by constructing an emergency mechanism of unified command, hierarchical responsibility, and coordinated linkage. These practical cases show that the new national system can dynamically adjust the governance strategy according to the nature and characteristics of the governance task, which not only maintains the stability of the system but also realizes the flexibility of the strategy. The optimization of institutional logic constitutes the internal driving force for the adaptability of the new national system. By constructing a collaborative mechanism of “effective market and promising government”, people can realize the transformation of institutional advantages to governance efficiency ^[3]. In the governance fields of promoting high-quality development, achieving common prosperity, and promoting harmonious coexistence between man and nature, the new national system forms a superposition effect of institutional efficiency by integrating political advantages, competitive advantages, collaborative advantages, and strategic advantages. The continuous strengthening of this institutional advantage not only guarantees the stability of the national governance system but also improves the adaptability of the governance capacity, so that the new national system shows strong institutional resilience in the complex environment of century-old changes and century-old epidemics.

The essence of the adaptive process characteristics of the new nationwide system is the systematic reconstruction of the institutional governance paradigm in the space-time field. Its philosophical implication is not only reflected in the creative transformation of institutional tradition, but also in the creative development of governance practice. This adaptability not only enriches the institutional form of national governance but also improves the operational quality of national governance and opens up a new development path of national governance in the dimension of institutional efficiency. Through the inheritance of historical logic, the integration

of theoretical logic, the scene of practical logic, and the optimization of institutional logic, the new national system provides a solid institutional support for Chinese-style modernization, and also contributes the Chinese wisdom of national governance to the world.

5. Conclusion

The practice of process philosophy of Chinese modernization not only enriches the era connotation of Marxist process theory, but also provides a new perspective for global modernization theory, and lays a practical foundation for building a community of shared future for mankind. It is not only the innovation of the development mode, but also the change of the civilization paradigm. Its core value is to prove that modernization is not a single path. Developing countries can explore the modernization path with their own characteristics according to their own historical culture and realistic national conditions.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Engels, 2009, Ludwig Feuerbach and the End of Classical German Philosophy, in Selected Essays of Marx and Engels: Volume 4. People's Publishing House, Beijing, 261–313.
- [2] Huang F, Zhao CF, 2025, The Identification Concept of the Whole Process of People's Democracy and its Structural Evolution. Zhejiang Academic Journal, 2025(3): 136–144. <https://doi.org/10.16235/j.cnki.33-1005/c.2025.03.003>
- [3] Zhou W, Li JL, 2023, New National System and Chinese Modernization. Exploration of Economic Issues, 2023(6): 1–10. <https://doi.org/JJWS.0.2023-06-001>

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on the Path of ESG-driven Development of the Silver-haired Economy by Chinese Characteristic Enterprises

Shijie Lin¹, Pan Ai Xi Wang^{2*}

¹Master degree, University of Murcia, Murcia 30005, Spain

²Weifang Yuechi Pension Service Company, Weifang 262100, Shandong, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the continuous acceleration of China's aging population process, in the context of global sustainable development, the Chinese characteristic enterprise ESG practices that meet the needs of China's local sustainable development are closely linked to the booming silver-haired economy. This paper deeply studies the correlation between the Chinese characteristic enterprise ESG and the silver-haired economy. It elaborates on the localized characteristics of ESG in China and the development trend of the silver-haired economy, as well as the role that Chinese characteristic enterprise ESG plays in the silver-haired economy. Using the SWOT analysis method and the ESG model, it systematically expounds the proactive promotion path of integrating Chinese characteristic enterprise ESG into the silver-haired economy. Combining the achievements of outstanding ESG silver-haired economy enterprises in China and the feasible paths of advanced silver-haired economy countries abroad. It proposes practical and feasible paths for achieving sustainable development in the silver-haired economy in China.

Keywords: Sustainable development; Silver-haired economy; Chinese characteristic enterprise ESG; Elderly care industry

Online publication: October 29, 2025

1. Introduction

In recent years, starting from the United Nations' formulation of 17 sustainable development goals, to China's top-level policy initiatives such as new quality productive forces, common prosperity, the "Belt and Road Initiative", and rural revitalization, the ESG system has also entered an accelerated development stage in China.

ESG emphasizes the coordinated development of economy, environment, and society, and urges enterprises to shift from solely pursuing economic benefits to maximizing the comprehensive value of economy, society, and environment. This aligns perfectly with the series of important ideas proposed by the 20th National Congress of the Communist Party of China. High-quality development is the primary task for comprehensively building a modern

socialist country, and it is necessary to fully, accurately, and comprehensively implement the new development concepts of innovation, coordination, green development, openness, and sharing. To fully promote the Chinese-style modernization and advance the great rejuvenation of the Chinese nation. This is the new requirement for Chinese modern enterprises and their ESG in the new era, indicating a new direction and conferring new connotations.

With the development of the economy and society and changes in the population structure, a vast silver-haired economy market has emerged. The silver-haired economy covers multiple fields such as elderly care services, elderly products, health care, and financial insurance, and has great potential for development. The rise of the silver-haired economy is mainly driven by the acceleration of China's aging population process.

At this time, when the silver-haired economy is booming, Chinese enterprises practicing ESG concepts will systematically integrate Environment (Environmental), Society (Social), and Corporate Governance (Governance) with the characteristics of China's localization into the business chain of the silver-haired economy, which is conducive to the transformation and upgrading of the elderly care industry. While creating economic benefits, it actively responds to social concerns. It focuses on environmental sustainability, the harmony of social development, and the stability of corporate governance. Achieve the coordinated development of economic and social benefits ^[1].

2. Interpretation of Chinese characteristics of ESG in enterprises and the silver-haired economy

2.1. The connotation of Chinese characteristics of ESG in enterprises

Chinese characteristics of ESG in enterprises are based on the development stage, economic system, and cultural values of China's modernization process. They integrate the ESG concept proposed by the United Nations Principles for Responsible Investment (UNPRI), which focuses on environment (E), society (S), and governance (G), to form a localized social responsibility concept and practice system. ESG emphasizes the coordinated development of the economy, environment, and society, promoting enterprises to shift from solely pursuing economic interests to maximizing comprehensive value in economic, social, and environmental aspects. In terms of corporate (G) governance, it relies on the modern enterprise system led by the Party organization, improves the governance structure, strengthens internal control and risk management, incorporates ESG indicators into company performance evaluations, and enhances the strategic execution of ESG ^[2].

2.2. Characteristics of Chinese characteristics of ESG in enterprises

2.2.1. Harmony in diversity

This theory echoes the traditional Chinese thought of "harmony in diversity." The statement in "The Book of Rites: Music Record" that "music promotes harmony, while rituals emphasize differences. Harmony leads to mutual affection, and differences inspire mutual respect" reveals the dialectical relationship between commonality promoting recognition and differences stimulating respect. Constructing a Chinese characteristics ESG system requires balancing universality and uniqueness.

It emphasizes that enterprises should find a balance between commonalities and individualities in their strategic positioning — they should gain recognition from the market and stakeholders through similarities while forming competitive advantages through differences, achieving a dialectical unity of "seeking common ground" and "preserving differences", and weighing "differences" and "legitimacy" in strategic decisions. On

one hand, enterprises need to benchmark against international ESG standards to enhance global recognition and discourse capabilities; on the other hand, based on the characteristics of the socialist market economy and Chinese-style modernization, they should incorporate Chinese elements into ESG information disclosure, rating, and management systems. They should follow the international framework of sustainable development while integrating Chinese social responsibility practice features, such as rural revitalization and common prosperity, ultimately building an ESG model that is both globally compatible and locally adaptable, providing theoretical guidance for sustainable development and social responsibility fulfillment of enterprises.

2.2.2. Symbiosis and co-governance

The development of Chinese characteristics of ESG in enterprises is a systematic project involving multiple parties. It requires enterprises, rating agencies, policymakers, regulatory authorities, intermediary institutions, and consumers to build an ESG ecosystem. The interests of all participants are intertwined, and they need to jointly address economic, environmental, and social challenges while balancing rights and responsibilities. This is highly consistent with concepts such as Chinese-style modernization and a community with a shared future for mankind. Members of the Chinese characteristics ESG ecosystem form a close responsibility community, interest community, and value community. Their interactions go beyond traditional embedding and influence, presenting new features such as high-frequency interaction, regular mutual benefit, advanced co-evolution, and coordinated development.

2.3. Development potential and trend of the silver-haired economy

2.3.1. Development potential of the silver-haired economy

At present, the silver-haired economy is showing a booming trend, with a large market scale and rapid growth. The Blue Book of Silver-haired Economy: China's Silver-haired Economy Development Report, released in 2024, shows that China's current silver-haired economy market size is about 7 trillion yuan, accounting for about 6 percent of GDP. It is expected that the market size of the silver-haired economy will grow to 30 trillion yuan by 2035, with a compound annual growth rate of 15.7%.

In 2024, the State Council issued the Opinions on Developing the silver-haired economy and Improving the Well-being of the Elderly, explicitly supporting six areas, including health care, smart pension, culture, tourism, and health care, with targeted support from industrial funds worth 100 billion yuan. The market size of the silver-haired economy is expected to exceed 12 trillion yuan in 2025, with an annual growth rate of more than 15%. The number of people over the age of 60 in China has exceeded 320 million, accounting for 23 percent of the total population, making China the second-oldest in the world.

2.3.2. Development trend of silver-haired economy

In the future, the silver-haired economy will focus on diversified and personalized needs, take intelligent and scientific innovation as the driving core, take the combination of medical care and elderly care as the core service paradigm, and take the cross-border integration of industries as the development path, so as to comprehensively build a high-quality elderly care ecosystem covering product research and development, service supply and industrial coordination.

One is from the supply and demand side. On the demand side, the elderly group's demand for the quality, function, and customization of pension services, supplies for the elderly, and health care products is increasing

day by day, prompting enterprises to continuously increase investment in research and development and launch diversified products such as intelligent equipment for aging, high-end health care services, and personalized care schemes. On the supply side, cutting-edge technologies such as artificial intelligence, Internet of Things, big data and cloud computing are deeply integrated into the field of silver-haired economy, giving rise to innovative formats such as intelligent elderly care monitoring equipment, AI health management system and VR education classes for the elderly, realizing accurate matching and efficient access to services and providing more convenient, efficient and personalized service experience for the elderly.

Second, in terms of service mode, the combination of medical care and elderly care has become the mainstream development direction of elderly care services. Through resource integration and information sharing, medical institutions and elderly care institutions have built a full-cycle service chain integrating disease diagnosis and treatment, postoperative rehabilitation, long-term care, and life care. The government continues to increase policy support, improve the industry norms and standards system, and provide a solid guarantee for the healthy development of the combination of medical care and elderly care industry.

Third, at the level of industrial development, the silver-haired economy has accelerated through the industry boundary and is deeply integrated with tourism, culture, sports, education, and other industries, giving rise to innovative formats such as living and pension, intangible cultural heritage research for the elderly, and silver fitness events. These products and services not only greatly enrich the spiritual and cultural life of the elderly but also activate the huge market potential with innovative business models and promote the silver-haired economy to make steady progress in the direction of specialization, quality, and sustainability^[3]. With the acceleration of population aging and the upgrading of consumer demand, the silver-haired economy is ushering in unprecedented development opportunities.

3. Challenges and opportunities faced by the silver-haired economy in the background of ESG for enterprises with Chinese characteristics

While the silver-haired economy industry is booming, it needs to pay attention to many opportunities and challenges existing in the present and future. Opportunities and challenges are also two major elements of SWOT analysis, which is used to show the challenges and opportunities faced by the silver-haired economy in the background of ESG for enterprises with Chinese characteristics.

3.1. Challenge

Maintain green synergy and sustainable development in the context of ESG with Chinese characteristics. However, the development of the silver-haired economy industry still faces multiple challenges and needs continuous innovation and evolution.

3.1.1. The standard system needs to be improved

Up to now, a unified product and service standard system has not been established and improved in China's silver-haired economy field, and enterprises' ESG practices lack clear and standardized guidance. This lack of standards leads to a lack of reference in the process of ESG strategic planning, implementation, and effectiveness evaluation, making it difficult to accurately assess the sustainable development level of enterprises.

The elderly products in the market are uneven in quality control, safety indicators, aging design and other aspects, and the elderly service institutions lack unified standards in service content definition, service quality

control, charging and pricing mechanism and other aspects, which increases the difficulty for consumers to identify high-quality products and services, intensifies the vicious competition in the market, and hinders the benign development of the silver-haired economy industry.

3.1.2. Imbalance between supply and demand of professional talents

Silver-haired economy covers elderly care services, health management, financial planning, and other fields, and there is a strong demand for compound talents proficient in industry business and with ESG professional quality. However, there is a serious shortage of such talents in the current market, which has become a key bottleneck for Chinese enterprises to promote ESG practice. On the one hand, there are few college students training in such majors in colleges and universities, and only students majoring in elderly service and health care have biased employment concepts. Most of the students do not engage in pension and health care after graduation. Pension service employees are generally women majoring in medical nursing and retired and re-employed at older ages, with problems such as insufficient professional skills, weak service awareness, and a lack of systematic pension service skills training and ESG knowledge learning. On the other hand, internal ESG professionals do not have a deep understanding of the characteristics of the silver-haired economy business, so it is difficult to effectively integrate ESG concepts with the silver-haired economy business, thus affecting the quality of ESG practice and the development process of the silver-haired economy industry ^[4].

3.1.3. Insufficient attention of local governments

In the development of a silver-haired economy under the background of ESG, the structural contradictions at the three levels of policy implementation, capital supply, and cross-sector coordination have also become bottlenecks restricting its development. At the policy level, the Opinions on Developing the silver-haired economy and Improving the Well-being of the Elderly issued in 2024 has established the top-level design of improving supporting policies such as social security and fiscal and tax incentives. However, the obstruction of the landing of the “last mile” is still prominent, and the lack of implementation rules tailored to local conditions in some places makes it difficult for the policy dividend to play a full role. There is a lack of overall county planning and an urban-rural coordination mechanism in the field of rural elderly care, and there are blind areas of coverage of special services, such as meal assistance for the rural elderly and care for the left-behind elderly. The long-term care insurance system for the elderly population has been slowly rolled out across the country. The system of government-enterprise coordination and diversified sharing has not been fully established. In the capital security system, local finance has insufficient investment in pension infrastructure, and the accuracy of grassroots allocation is not good. In terms of cross-departmental collaborative governance, the contradiction between the multi-field integration demand of the silver-haired economy and the decentralized management mode has intensified. The rights and responsibilities of medical care, housing construction, civil affairs, and other departments are unclear, and resources are scattered in the transformation for aging, and the trans-regional service connection of living and elderly care is not smooth ^[5].

3.2. Opportunities

With the continuous development of ESG, with the support of government policies, the consensus of society, and the continuous improvement and development of social capital, the development of the silver-haired economy has many favorable opportunities.

3.2.1. Policy support and positive guidance

The national level's strategic attention to the issue of population aging has given rise to a series of precise policy combinations. In 2024, The General Office of the State Council issued the Opinions on Developing the silver-haired economy and Improving the Well-being of the Elderly, focusing on core areas such as innovative research and development of products for the elderly, improvement of the quality of elderly care services, and cultivation of new forms of business, and outlining a clear path for the development of the silver-haired economy. These policies not only build a sound institutional framework but also provide substantive support, such as tax incentives, financial subsidies, and convenient access for enterprises' ESG practices, helping enterprises grasp the opportunity of industrial upgrading while fulfilling their social responsibilities and realizing the coordinated growth of economic and social benefits ^[6-7].

3.2.2. Increased social attention to ESG

Social attention to the protection of the rights and interests of the elderly continues to rise, and consumers pay more and more attention to corporate image and social responsibility when choosing products and services. Enterprises that actively practice the ESG concept can not only win the trust of elderly customers by implementing a green operation mode, improving the employee care system, and improving the service refinement level in elderly care services, but also build a brand image with both temperature and responsibility by virtue of media communication and word-of-mouth effect. The display of this brand image will transform into a strong market appeal, attract more partners and resources, and promote the long-term development of enterprises.

3.2.3. Diversified development of social investment environment

In the process of promoting the development of the silver-haired economy, the participation of social capital has become a key driving force, and diversified capital participation is reshaping the development pattern of the elderly care industry. Public funds, private funds, and other market-oriented capital subjects, with flexible and diversified investment strategies and innovative models, deeply activate the driving force of industrial development and continue to provide stable and long-term "patient funds" for the pension industry. Private equity funds have a deep layout through "equity + industrial coordination". For example, China Life 10 Billion Fund explores the closed loop of "insurance + pension", and insurance capital turns to the combination mode of "direct investment + fund" and light assets. Although public funds are still in the exploratory stage, innovative products such as pension industry ETFs and REITs are gradually expanding the investment field. The diversified development of the social investment environment has injected continuous fresh blood into the high-quality development of the silver-haired economy.

4. The way for enterprises with Chinese characteristics to integrate ESG into the development of the silver-haired economy

4.1. Environment (E) dimension: Promote the development of the elderly care industry towards the direction of green ecology

With the continuous vigorous development of the silver-haired economy, it must be inseparable from the positive traction of green, low-carbon, and sustainable. Finally, the new model of resource-saving, environment-friendly and green, and low-carbon silver-haired economy will be realized. Promote the integration of elderly care facilities and health, vigorously realize a sustainable industrial chain of elderly products, and open up a new direction of

green and low-carbon medical care and circular economy. It is the top priority to promote the development of a silver-haired economy in the environmental dimension under the ESG of enterprises with Chinese characteristics.

4.1.1. Construction of elderly care facilities: Promote the integration of elderly care facilities and health

Elderly care facilities are an important part of the silver-haired economy, and it is crucial to integrate green concepts into the construction process. When investing in the construction of facilities such as elderly care communities and apartments for the elderly, the Enterprise strictly follows the green building standards and adheres to the basic concept of saving land, energy, and materials.

The pension communities built by China Life Insurance Company in many places can be regarded as a model of green pension facility construction. In its construction, a large number of environmental protection and energy-saving materials are used, and new thermal insulation materials are used in the external wall to effectively reduce indoor and outdoor heat transfer and reduce the energy consumption of air conditioning, heating, and other equipment. The Windows are made of double-insulated glass for sound insulation and thermal insulation. The community is widely equipped with solar panels to convert solar energy into electricity, which is used to supply lighting and hot water in some public areas of the community, realizing partial self-sufficiency in energy, greatly reducing dependence on traditional fossil energy, and reducing carbon emissions. Scientific planning of community greening, planting local suitable plants, beautifying the environment while adjusting the climate and purifying the air, and creating a comfortable, healthy, and low-carbon living environment for the elderly ^[8].

4.1.2. Production of articles for the elderly: Promote the sustainability of articles for the elderly

The market size of geriatric products is huge, and promoting their sustainable production is of great significance to environmental protection. The purchase demand of the elderly is still inseparable from the imprint of the era of hard work — the consumption concept of “getting by” still exists. The vast majority of the elderly in the purchase of articles for the elderly, will be in the commodity at the same time choose durable, simple, simple process, reusable items ^[9].

4.2. Social (S) dimension: Provide a guarantee for the steady and long-term development of the silver-haired economy and industry

With the ever-changing demographic structure and the ever-clear social division of labor, children who work away from home every year are most concerned about their parents at home. The elderly in a family are increasingly the top priority of the family.

From the perspective of the social dimension, the biggest task of the silver-haired economy is to provide a strong guarantee for the silver-haired economy industry. The social dimension provides a guarantee for the silver-haired economy to meet the diversified needs of the elderly and promote the care of professional talents for the elderly group, which also provides a prerequisite guarantee for every small family to enjoy their home and everything.

4.2.1. Inclusive elderly care services and financial support: To meet the diversified needs of the elderly group

The core of the social responsibility of the silver-haired economy is to protect the basic rights and interests of the elderly and improve their quality of life. The government needs to promote inclusive elderly care services

through policy guidance, such as expanding assisted meal services for the elderly, developing embedded elderly care facilities in communities, and encouraging financial institutions to develop financial products suitable for aging. The banking industry can learn from the experience of the “three horizontal and three vertical” pension financial system, optimize service scenarios (such as online purchasing agents and family doctors) through digital technology, and reduce the service threshold. It is also necessary to strengthen the supply of rural elderly care services, explore the mode of “company + farmer” to develop rural living elderly care, and narrow the service gap between urban and rural areas. Financial institutions need to include inclusive financial indicators in ESG assessment. For example, Zijin Rural Commercial Bank supports the rural elderly group through “Jinling Benefiting Farmers Small Loan”, and inclusive small and micro loans account for 36% in 2024 ^[10].

4.2.2. Protection of employees’ rights and interests and talent cultivation: Consolidate the foundation of industrial development

The sustainable development of the silver-haired economy depends on a professional talent reserve and employee rights and interests protection. Enterprises need to establish a management system for aging employees. For example, in the 2024 progressive retirement reform policy, it is pointed out to provide a flexible retirement system for elderly workers and strengthen skills training for product development teams suitable for the elderly. The education side needs to promote the integration of industries, universities, and research institutes, support universities to set up more majors in gerontology and health services, and build training bases jointly with enterprises ^[11].

Social dimension Through the coordinated promotion of deepening inclusive services, co-construction of community ecology, and improvement of talent system, the silver-haired economy can achieve the three-dimensional development goal of “service fairness—industry resilience—intergenerational inclusiveness” in the social dimension.

4.3. Corporate governance (G) dimension: Promote the steady and long-term development of the silver-haired economy

4.3.1. Improve ESG report: Open up information disclosure and communication channels

Enterprises can systematically improve the transparency and synergy of sustainable development in the field of silver-haired economy by improving ESG report disclosure and deepening stakeholder communication. In terms of report disclosure, it regularly releases detailed reports covering the three dimensions of environment, society and governance, accurately quantifies environmental indicators such as energy consumption and waste discharge, comprehensively presents social achievements such as service satisfaction for the elderly and protection of employees’ rights and interests, deeply analyzes the governance achievements such as ESG management system construction and decision-making mechanism operation, and truthfully clarifies the achievement of goals and existing challenges. Improve the openness of ESG practices with standardized information disclosure.

Actively build diversified communication mechanisms, actively listen to the demands and suggestions of investors, consumers, government departments, social organizations and other stakeholders through forums, online interactive platforms and other channels, timely make professional responses and strategic adjustments to the concerns of all parties, build consensus through two-way interaction, and continuously strengthen the trust and support of all sectors of society for the ESG practice of silver-haired economy of enterprises. Inject lasting momentum into the sustainable development of the industry ^[9].

4.3.2. Risk optimization: Solve domestic and foreign problems

The silver-haired economy involves diversified fields such as medical care, finance, and real estate, and enterprises need to build a risk management system covering the whole life cycle. On the one hand, it is necessary to strengthen the supervision of the compliance of services for the elderly group, such as preventing improper sales in pension financial services and ensuring product transparency and suitability. Zijin Rural Commercial Bank optimized its risk identification ability through customer portraits and an intelligent post-loan system, and organized case prevention and warning education conferences to enhance employees' compliance awareness. On the other hand, environmental and social risks should be dealt with, such as the assessment of ecological carrying capacity in the development of health care communities. China Merchants Bank incorporated climate risks into the credit review process, explored transforming loans to support the decarbonization of traditional enterprises, and diversified risks through instruments such as green bonds and carbon-neutral pension plans^[12].

5. Analysis of typical cases of ESG in the development of the silver-haired economy abroad: A brief analysis of the development of Japan's silver-haired economy under the ESG background

Japan's silver-haired economy has always been at the forefront of the world. Compared with China, Japan is a country with a severe aging population. By 2024, the proportion of people aged 65 and above in Japan's total population will be 29.3%, while in China it will be 15.6%. Such a large proportion of the aging population naturally makes the development of the silver-haired economy a pillar industry in Japan's economic construction. Learning from the advantages and feasibility of Japan's silver-haired economy development under the ESG international background has positive significance for China's silver-haired economy under the ESG background. The following is an ESG (environment, society, corporate governance) analysis of Japan's silver-haired economy.

In the environmental (E) dimension, green buildings and sustainable design are respected. Japan widely adopts low-carbon technologies and sustainable materials in the construction of elderly care facilities. On the one hand, Mitsui Fudosan's high-end elderly care project, PARK WELLSTATE, uses a wooden building structure, which not only meets the seismic requirements but also promotes the goal of a zero-carbon society through the carbon fixation properties of wood. Moreover, this project integrates solar panels and rainwater recycling systems, reducing energy consumption by more than 30% compared to traditional buildings. In addition, the Japanese government provides research and development subsidies for smart elderly care equipment (such as energy-saving nursing beds and intelligent temperature control systems), encouraging enterprises to adopt environmentally friendly technologies. On the other hand, Japan focuses on resource recycling and waste management. Through a circular economy model, it improves the resource utilization efficiency of the elderly care industry. Elderly care institutions generally introduce biodegradable packaging materials and cooperate with communities to establish a recycling system for elderly care products. A nursing institution in Nakano Ward, Tokyo, has reduced the energy consumption of its day care center by 15% by optimizing the energy management system and reducing waste generation through recycling and reuse.

In the social (S) dimension, Japan attaches importance to promoting employment and labor force diversity. Japan encourages the employment of the elderly through policies to alleviate the shortage of labor. In 2022, the number of employed people aged 65 and above in Japan reached 9 million, accounting for 25.2% of the total employed population, with the employment rate of the 65–69 age group exceeding 50%. The government delays the age for receiving pensions (up to 75 years old) and provides re-employment training to encourage the elderly to

participate in industries such as retail and medical care. In addition, the employment rate of international students majoring in nursing is as high as 98%, filling the gap in nursing staff. In the field of elderly care institutions, Japan promotes the “cohabitation of the elderly and the young” model to facilitate intergenerational communication. For example, a composite elderly care institution in Osaka is adjacent to a kindergarten, allowing the elderly to participate in children’s activities and reducing their sense of loneliness. Moreover, the Japanese government encourages community residents to provide companionship services to the elderly through volunteer projects such as “time banks”, and the accumulated service time can be exchanged for future elderly care services.

In the corporate governance (G) dimension, Japan adheres to compliance management and transparency. The Japanese government plans to implement IFRS-based sustainable development reporting standards from 2025, requiring enterprises to disclose ESG information, including supply chain carbon footprints and employee diversity data. Elderly care enterprises need to regularly publish comprehensive reports, disclosing governance information such as care quality and employee training. For example, the Eurogroup in Japan’s elderly care institutions ensures the accuracy of data through third-party verification and discloses ESG performance to investors. In terms of pension funds, the Government Pension Investment Fund of Japan is a core driver of ESG investment. More than 90% of its managed assets of 162 trillion yen incorporate ESG factors. The Government Pension Investment Fund of Japan promotes the improvement of ESG performance of enterprises by passively tracking ESG-themed indices such as the FTSE Blossom Japan Index. Its ESG-related investment scale reached 3.5 trillion yen in 2022, driving the ESG disclosure rate of Japanese enterprises to 74.8% ^[13].

The ESG practices of Japan’s silver-haired economy are characterized by policy-driven, technology-enabled, and investment-synergized approaches. Through green buildings, inclusive employment, transparent governance, and long-term investment, the elderly care industry is promoted to develop in a sustainable direction.

6. Conclusion

The integration of ESG in Chinese enterprises with the silver-haired economy is an inevitable requirement of the times and holds significant strategic importance and broad prospects for development. By integrating the ESG concept with China’s development reality and the process of modernization, the silver-haired economy can not only meet the increasingly diverse needs of the elderly population, promote the sustainable development of the elderly care industry, but also enhance the happiness and sense of gain of the elderly, play an active role in addressing the issue of an aging society, and achieve a win-win situation in economic and social benefits.

In the future, with the continuous advancement of technology and the continuous transformation of social concepts, the integration of ESG in Chinese enterprises with the silver-haired economy will continue to deepen. New technologies such as artificial intelligence, big data, and the Internet of Things will bring more innovation opportunities to the silver-haired economy. Silver enterprises will also create more products and services that meet the needs of the elderly under the guidance of the ESG concept, integrating environmental, social, and corporate dimensions. The ESG practice experience of Chinese enterprises in the silver-haired economy field is expected to provide Chinese solutions and wisdom for the global response to the aging population issue.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Li YE, Gao C, 2025, Policy Changes and Optimization Strategies for the Synergistic Development of China's Elderly Care Services and Industry. *Academic Forum*, 48(2): 81–94. <https://doi.org/10.16524/j.45-1002.2025.02.004>
- [2] Li JH, Wu YB, Wu H, 2025, The Connotation and Path of High-quality Development of the silver-haired economy in the Context of Chinese-style Modernization. *Northwest Population*, published online, 1–13. <http://cnki2.699wx.cn/kcms/detail/62.1019.C.20250407.1053.002.html>
- [3] Yuan SM, 2024, Accelerating the Construction of a Chinese-style ESG System to Achieve High-quality and Sustainable Development. *State-owned Assets Report*, 2024(11): 1–2.
- [4] Li C, 2023, A Brief Analysis of the Design of Healthy Elderly Care Buildings under the Concept of Green Architecture. *China Building Decoration & Renovation*, 2023(7): 82–84.
- [5] Mao QR, 2025, A New Paradigm of Corporate ESG Practice: From Compliance to Strategic Integration. *China Business Review*, 34(1): 137–140. <https://doi.org/10.19699/j.cnki.issn2096-0298.2025.01.137>.
- [6] Wang FH, 2011, Design of Corporate Social Responsibility Evaluation Index System Based on Stakeholder Theory. *Annual Conference of the Financial and Cost Committee of the Chinese Accounting Society and the 24th Theoretical Seminar. Accounting College of Shandong Institute of Business and Technology*, 608–613.
- [7] China Life Insurance Company, 2024, China Life Insurance: Developing the Silver-haired Economy Industry to Meet Multi-level Health and Care Needs. *Urban Development*, 2024(5): 68–69.
- [8] Li JH, Wu YB, Wu H, 2025, The Connotation and Path of High-quality Development of the Silver-haired Economy in the Context of Chinese-style Modernization. *Northwest Population*, published online, 1–13. <http://cnki2.699wx.cn/kcms/detail/62.1019.C.20250407.1053.002.html>
- [9] Zhang XJ, 2025, Various Institutions Enter the New Track of the Silver-haired Economy. *Workers' Daily*, April 23, 2025, 4. <https://doi.org/10.28277/n.cnki.ngrrb.2025.002493>
- [10] Zhang BJ, Yang JW, Hu XY, et al., 2025, Research on the Impact Mechanism of Enterprise ESG Performance on New Quality Productivity: An Empirical Analysis Based on Resource-Based Theory. *Scientific Decision Making*, 2025(4): 104–123.
- [11] Chen L, 2025, Research on the Coupling Dilemma and Countermeasures between the Elderly Care Service System and the Silver-haired Economy. *China Management Informationization*, 28(8): 150–152.
- [12] Zhang YX, Jin SX, Chen T, 2025, Government, Market, and Technology Synergistically Driving the High-quality Development of the Silver-haired Economy: The Mechanism and Path of Development. *Price Theory and Practice*, published online, 1–6. <https://doi.org/10.19851/j.cnki.CN11-1010/F.2025.02.031>
- [13] Zhao N, 2025, Policy Orientation and Implications for the Development of Japan's Elderly Care Services under the Background of the Silver-haired Economy. *Social Security Research*, published online, 1–10. <http://cnki2.699wx.cn/kcms/detail/42.1792.F.20250411.1340.004.html>

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Analysis on Optimization Countermeasures of Dairy Enterprise Supply Chain Under the Background of Digital Intelligence

Dongdong Miao^{1,2,3,†}, Dexin Zhang^{3,4,†}, Jiaqi Tian^{3,4}, Jie Zhao^{2,3}, Zhiwei Chen^{3,4,*}

¹Hubei University of Technology, Wuhan 430068, Hubei, China

²Mengniu Dairy Tai'an Co., Ltd., Tai'an 271000, Shandong, China

³Shandong Dairy Technology Innovation Center, Zibo 255000, Shandong, China

⁴School of Agricultural Engineering and Food Science, Shandong University of Technology, Zibo 255000, Shandong, China

†These authors contributed equally to this work and share the first authorship.

*Author to whom correspondence should be addressed.

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In recent years, the dairy industry has faced challenges of rising costs and diversified demands, and digital intelligence transformation is the key to supply chain upgrading. Taking M dairy enterprise as an example, this study explores the role of digital transformation and proposes an optimization scheme centered on “bioactivity management.” It focuses on analyzing key technologies such as the Internet of Things (IoT), artificial intelligence (AI), blockchain, and automation: integrating IoT to realize full-chain activity monitoring, applying AI to improve prediction accuracy and flexible production scheduling, using blockchain to build a transparent traceability system, and incorporating bioactivity indicators into the core evaluation system. The research shows that the scheme not only provides a practical guide for M enterprise, but also its strategies have important reference significance for improving the supply chain efficiency of the industry, ensuring quality, and realizing sustainable development.

Keywords: Digital intelligence; Dairy supply chain; Internet of Things (IoT); Blockchain; Bioactivity management

Online publication: October 29, 2025

1. Introduction

With the accelerated digital transformation of the global economy, digital intelligence technologies are profoundly reshaping industrial operation models. As a key component of the food industry, the dairy industry is facing an increasingly complex market environment, fierce competitive pressure, and higher consumer requirements for food safety, quality traceability, and product diversification. The formation of dairy quality involves the collaboration of multiple links, such as breeding, processing, and sales. Therefore, building a full-process supply

chain management and quality collaborative control system has become the key to improving dairy quality and safety as well as industry competitiveness ^[1-2].

Supply Chain Management (SCM) takes the cross-organizational collaborative network as the carrier, and realizes systematic management from raw material procurement to terminal consumption by integrating logistics, information flow, and capital flow ^[3]. Digital Intelligence is driven by data as the core, combining technologies such as artificial intelligence, cloud computing, and the Internet of Things to promote the intelligent upgrading of business processes and decision optimization ^[4]. Driven by new intelligent technologies, the traditional supply chain management model has been difficult to adapt to the rapidly changing market environment. Dairy enterprises urgently need to optimize the supply chain through digital intelligence technologies to improve operational efficiency and market response capabilities. As a dynamic perception and intelligent interconnection network system, the Internet of Things has greatly improved the transparency and collaborative efficiency of the Dairy Supply Chain (DSC) through embedded systems and real-time data collection. It applies technologies such as Radio Frequency Identification (RFID), big data, and intelligent manufacturing to optimize production processes by providing real-time data and controlling operational processes in the supply chain ^[5].

2. Research status and challenges

Digital transformation has a profound impact on supply chain management. It covers the entire process from R&D, production, to marketing and logistics, emphasizing the seamless connection of various links to improve overall efficiency. Domestic scholars' research shows that digital transformation can reduce resource waste through information visualization and business collaboration, thereby enhancing supply chain efficiency ^[5-6]. Enterprises' fulfillment of digital responsibilities has a positive effect on commercial credit financing, and the implementation of digital strategies can effectively improve enterprise efficiency, reduce costs, and optimize production quality and efficiency. In addition, facing challenges in technology application and data security, enterprises need to strengthen infrastructure construction. Studies also point out that digital transformation has brought significant efficiency improvements, especially to non-state-owned enterprises and regions with a high degree of marketization. In the future, digital transformation will promote the improvement of supply chain transparency and performance, and further optimize collaboration through technologies such as big data and cloud computing ^[7]. These trends point to a more efficient and flexible supply chain ecosystem. In the digital intelligence transformation of dairy enterprises and related enterprises, foreign research on digital management models covers multiple key areas. Although the application of digital technologies has significantly improved the sustainability of the supply chain, technical complexity and talent shortage remain obstacles to implementation ^[8].

3. In-depth analysis and cause exploration of supply chain management

3.1. Analysis of pain points and difficulties in each link

Although the supply chain management of M dairy enterprise has reached the industry-leading level, its full-link operation still faces multi-dimensional systematic challenges. These pain points stem not only from the special attributes of the dairy industry, such as sensitivity to bioactivity and strict time constraints, but also from complex factors such as long industrial chains, many participating entities, and large environmental fluctuations. Furthermore, deep-seated contradictions between technical adaptability and organizational collaboration have been exposed in the process of digital transformation.

Milk source supply is the starting point of the dairy supply chain and one of the most unstable links ^[9]. For example, in North China, milk trucks need to detour multiple milk collection points every day, resulting in an average time of 34 hours from milking to canning. This time loss directly leads to the risk of microbial proliferation, and the average total number of colonies in raw milk increases. This forces the subsequent sterilization temperature to rise by 0.3°C, resulting in an increase in the loss rate of active substances such as lactoferrin to 15%. Therefore, the core difficulty of the dairy supply chain lies in the contradictory relationship between bioactivity preservation and logistics costs. Monitoring data shows that the temperature fluctuation in the loading and unloading links of low-temperature products reaches $\pm 3.5^{\circ}\text{C}$, leading to a decrease in the survival rate of active lactic acid bacteria from 98% at the factory to 72% at the terminal. Third-party logistics enterprises specializing in dairy transportation account for less than 20% of the industry. Most enterprises need to carry goods such as meat and seafood at the same time, resulting in mixed temperature zone settings of vehicles (such as the mixed use of -18°C freezers and 2°C refrigerated trucks), making it difficult to guarantee temperature control accuracy. **Table 1** shows the impact of temperature fluctuations in different cold chain links on dairy quality and the rate of increase in cargo damage costs.

Table 1. The impact of temperature fluctuations in cold chain links on dairy quality

| Links with temperature control failure | Temperature fluctuation range | Loss rate of active substances | Increase the rate of cargo damage costs |
|--|-------------------------------|--------------------------------|---|
| Trunk line transportation | $\pm 1.2^{\circ}\text{C}$ | 8% | 15% |
| Urban transfer | $\pm 3.5^{\circ}\text{C}$ | 26% | 40% |
| Terminal storage | $\pm 5.8^{\circ}\text{C}$ | 45% | 120% |

Generally, dairy enterprises have thousands of raw material suppliers, but the lack of a classified management mechanism leads to resource misallocation. For example, among packaging suppliers, strategic suppliers account for only 15%, yet their supplied sterile packaging directly affects product shelf life; in contrast, ordinary suppliers (such as carton manufacturers), which account for 60% of the total, consume 80% of the audit resources. This management imbalance has exacerbated the risk transmission effect. For instance, in 2022, an oil supplier suspended production due to environmental penalties, and the switching cycle for alternative suppliers reached 45 days, resulting in a production shutdown loss of over 100 million yuan for the high-end yogurt product line. In global procurement, geopolitical risks have been further amplified—Australian whey powder prices rose by approximately 40% due to changes in tariff policies, but the contract price-locking mechanism prevented dynamic adjustments to procurement costs, compressing the gross profit margin by 12 percentage points. **Table 2** shows the comparison of technical input and output among pastures of different scales.

Table 2. Comparison of technical input and output among pastures of different scales

| Pasture type | Mechanized milking rate | Daily milk production per cow (kg) | Colony control compliance rate | Annual investment return rate |
|---------------------------------|-------------------------|------------------------------------|--------------------------------|-------------------------------|
| Self-operated pasture | 100% | 32.5 | 99% | 18% |
| Cooperative large-scale pasture | 95% | 28.7 | 92% | 9% |
| Small and medium-sized pasture | 68% | 21.4 | 76% | -3% |

To sum up, the supply chain pain points of M dairy enterprise reveal three major structural conflicts in the dairy industry. Firstly, there is the conflict between bioactivity management and industrial efficiency goals. The requirement for preserving active substances in low-temperature dairy products (such as the total number of colonies $\leq 100,000$ CFU/mL) is inherently contradictory to the cost control of large-scale transportation, forcing enterprises to make a difficult trade-off between quality compromise and market contraction. Secondly, there is an imbalance between technological leapfrogging and organizational inertia. Although digital technologies have achieved data connection from pastures to factories, behaviors such as stockpiling, price undercutting, and information shielding in the distributor system have hindered the flow of real data across the entire chain. Finally, there is the tension between economies of scale and regional differences. The national network layout is difficult to adapt to the characteristics of regional markets, leading to sustained tension in the triangular relationship of “production-sales-inventory.”

3.2. Collection and analysis of relevant data

The supply chain data system of M dairy enterprise is built on a three-layer architecture of “Global Perception—Intelligent Hub—Decision Empowerment.” Through the in-depth integration of IoT, blockchain, and AI, it has achieved a full-chain data connection from raw milk in pastures to terminal consumption. Data collection covers the following four core dimensions.

(1) Bioactivity data at the milk source end: Real-time collection of cow health indicators (such as rumination frequency, body temperature fluctuation), milk production, and raw milk components (fat content, total number of colonies, somatic cell count) through cow collar sensors and milking equipment monitoring terminals. Each cow generates more than 500 data points per day on average. Combined with blockchain certification to ensure data immutability, a full-life-cycle database of “digital cows” is formed. (2) Dynamic efficiency data in the production link: The Manufacturing Execution System (MES) tracks the production line status in real time and records parameters such as Overall Equipment Efficiency (OEE), product changeover time, energy consumption, and water consumption. Taking the Ningxia factory as an example, the sensors of the UHT production line collect temperature and pressure data every 5 seconds, and optimize the sterilization parameters through edge computing, increasing the retention rate of lactoferrin activity by 7 percentage points. (3) Spatiotemporal trajectory data of cold chain logistics: Cold chain vehicle-mounted GPS and temperature-humidity sensors generate data streams such as logistics routes, temperature control compliance rates, and loading/unloading durations. (4) Multi-source feedback data of the consumer market: Integrate distributor Enterprise Resource Planning (ERP) orders, terminal POS scanning records, e-commerce platform reviews, and social media public opinion to build a demand forecasting matrix. The core data collection indicator system for the supply chain of M dairy enterprise is shown in **Table 3**.

Table 3. Core data collection indicator system for the supply chain of enterprise M

| Data category | Collection indicators | Technical means | Update frequency |
|------------------------|--|---|------------------|
| Milk Source Quality | Total Number of Colonies, Somatic Cell Count, Milk Production | IoT Sensors + Blockchain | Real-time |
| Production Efficiency | Overall Equipment Efficiency (OEE), Changeover Time, Unit Energy Consumption | Manufacturing Execution System (MES) + Edge Computing | Every 5 seconds |
| Cold Chain Reliability | Temperature Control Compliance Rate, Loading/Unloading Duration, Path Deviation Degree | GPS + Temperature-Humidity Sensors | Every 1 minute |
| Demand Fluctuation | Order Distortion Rate, Inventory Turnover Days | API Connection + AI Prediction Model | Every 15 minutes |

4. Optimization strategies and implementation plans

4.1. Strategic framework for digital intelligence transformation

The core of M dairy enterprise's digital intelligence transformation strategy lies in building a smart supply chain ecosystem driven by both "activity management" and "global collaboration." It reconstructs the value creation logic of the dairy industry through data connection—upgrading the traditional linear supply chain centered on cost control into an agile network with bioactivity retention rate as the core indicator. In terms of specific goal setting, M dairy enterprise focuses on three dimensions: bioactivity management, full-chain collaboration, and sustainable development. Relying on IoT and blockchain technologies, it realizes full-chain activity traceability of raw milk from milking to the consumer terminal, controls the total number of colonies, and increases the retention rate of core active substances such as lactoferrin by about 20 percentage points. The scientificity of this goal lies in the exponential characteristic of the dairy activity attenuation curve. Secondly, it builds a demand-driven dynamic response network, reducing the proportion of emergency production scheduling for fragmented orders such as community group buying by about 30%. This goal directly addresses the inherent contradiction of high loss in the dairy industry—the conflict between bioactivity timeliness and industrial efficiency, which needs to be resolved through the precise synchronization of the data clock and biological clock. Finally, at the level of sustainable development, it establishes a balance model between carbon emissions and economic benefits, covers 80% of cooperative pastures through "pasture carbon accounts", reduces the carbon emission intensity per ton of raw milk, and reshapes the economic feasibility of the green supply chain ^[10–13]. **Table 4** shows the digital intelligence transformation goal system of M dairy enterprise in the three dimensions.

Table 4. Digital intelligence transformation goal system of M dairy enterprise

| Dimension | Core indicator | Baseline level | Target value | Technical support |
|--------------------------|---|----------------|--------------|---|
| Bioactivity Management | Lactoferrin Retention Rate | 78% | 95% | Blockchain Traceability + Dynamic Temperature Control Algorithm |
| Full-Chain Collaboration | Proportion of Emergency Production Scheduling | 40% | 10% | LSTM Demand Forecasting Model + Flexible Production Line |
| Sustainable Development | Carbon Emission Intensity per Ton of Raw Milk | 1.2 tons | 0.8 tons | IoT for Manure Power Generation + Feed Optimization Model |

4.2. Supply chain optimization suggestions and continuous improvement

To achieve the above strategic goals, the corresponding relationship between resource allocation and organizational adjustment of M dairy enterprise is shown in **Table 5**.

Table 5. Corresponding relationship between resource allocation and organizational adjustment

| Strategic requirements | Resource allocation plans | Organizational structure innovations | Efficiency improvement indicators |
|--------------------------------|--|--|---|
| Precise Control of Bioactivity | Invest 500 million yuan to deploy optical sensors for milking robots | Establish Bioactivity Research Institute | Colony detection efficiency increased by 50 times |
| Response to Fragmented Orders | Build regional small and micro factories (single factory capacity: 5 tons/day) | Set up the Agile Factory Project Department | Cost of small-batch orders reduced by 35% |
| Full-Chain Data Connection | Construct blockchain data sovereignty pool | Establish Supply Chain Federated Learning Alliance | Inventory visibility error rate reduced to 2% |

The supply chain performance evaluation of M dairy enterprise should be centered on the “bioactivity retention rate.” The bioactivity management dimension focuses on the core value of dairy products, and real-time tracks indicators such as the total number of raw milk colonies (target $\leq 30,000$ CFU/mL), lactoferrin retention rate (target $\geq 95\%$), and cold chain temperature control compliance rate (± 0.5 °C fluctuation threshold) through IoT sensors. Aiming at the short shelf-life characteristics of dairy products, the timeliness and response dimension designs dynamic response indicators. It improves prediction accuracy by integrating dynamic factors such as social media public opinion and weather warnings, and increases the processing efficiency of small-batch orders by 40% relying on modular cellular production lines. For the cold chain breakpoint repair speed (AI dispatch response ≤ 15 minutes after temperature control exceeds the standard), the cargo damage rate is reduced through a three-level intelligent work order system. These indicators directly address the core contradiction of high loss in the dairy industry—the conflict between the timeliness of bioactivity and fragmented market demand, which needs to be accurately responded to through data-driven approaches ^[14–15].

5. Results and prospects

This paper conducts a systematic analysis of the supply chain management optimization of M dairy enterprise in the background of digital intelligence transformation. The research profoundly explores the uniqueness of the dairy supply chain that distinguishes it from other industries. Its core value lies in the effective control of the bioactivity of products (such as the activity retention of lactoferrin and probiotics), while it is restricted by inherent attributes such as strict time constraints, long structural chains, and diverse participating entities. It also accurately identifies key challenges commonly faced by the industry currently, such as cost pressure, quality risks, collaborative obstacles, and transformation barriers. The core innovation of M dairy enterprise is to establish “bioactivity management” as the value anchor and integrate it into the entire optimization process. It also innovatively incorporates key bioactivity indicators such as the “72-hour lactoferrin retention rate” into the core performance evaluation system. Through data mining and simulation analysis, the expected effectiveness of this framework in improving the efficiency, resilience, and sustainability of the enterprise’s supply chain has been verified.

Funding

Key R&D Program of Shandong Province (Major Scientific and Technological Innovation Project): Development and Industrialization Application of Key Technologies and Equipment for Intelligent Dairy Processing, Project No. 2023CXG010711.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Edwin O, Marco F, Wagura NS, 2025, Information Sharing in Agri-food Supply Chains: Insights from the Kenya Dairy Supply Chain. *Supply Chain Management: An International Journal*, 30(1): 127–143.
- [2] Wang Y, 2025, Smart Supply Chain Management Based on Internet of Things Identification Technology. *Industrial*

Innovation Research, 2025, (14): 48-50.

- [3] Kaushik I, Prakash N, Jain A, 2025, An AI-blockchain-assisted Smart Agriculture Framework for Enabling Secure and Efficient Data Transaction: A Hybrid Approach. *Knowledge and Information Systems*, preublish, 1–49.
- [4] Liu X, 2025, Optimizing Supply Chains in the Food and Beverage Industry through Digital Transformation. *Economics and Management Innovation*, 22(1): 28–34.
- [5] Kazancoglu Y, Pala MO, Sezer MD, et al., 2022, Circular Dairy Supply Chain Management through Internet of Things-enabled Technologies. *Environmental Science and Pollution Research International*, preublish, 1–13.
- [6] Giuseppe V, Giuseppe C, Fabrizio B, et al., 2022, Traceability Platform Based on Green Blockchain: An Application Case Study in Dairy Supply Chain. *Sustainability*, 14(6): 3321.
- [7] Song XD, 2023, Reflections on the Digital Supply Chain Finance Model in the Dairy Industry—An Investigation Based on the Case of J Brand Dairy Enterprise. *Modern Finance Guide*, 2023(8): 75–77.
- [8] Song H, Han MW, Yang YD, et al., 2025, Case Studies in the Field of Supply Chain Management: Review and Prospect. *Foreign Economics & Management*, 47(3): 137–152.
- [9] Liu YZ, Li ZH, 2025, The Supporting Role and Application Strategies of Cloud Computing Technology in the Digital Economy. *Industrial Innovation Research*, 2025(14): 30–32.
- [10] Li S, Kong X, Ianenko M, et al., 2025, The Impact of Digital Transformation on Enterprise Supply Chain Finance. *Finance Research Letters*, 2025(85): 107894.
- [11] Wei XH, 2024, Research on the Motivation and Effect of Industrial Chain Finance Implementation in Dairy Enterprises under the Background of the Digital Age, thesis, Anhui University of Finance and Economics.
- [12] Guo JZ, 2023, Research on the Selection and Distribution Optimization of Milk Source Suppliers for CG Company, thesis, Shenzhen University, <https://doi.org/10.27321/d.cnki.gszdu.2023.002776>
- [13] Lin JR, Lin MD, 2024, Analysis of Quality Control Measures of Core Enterprises in the Dairy Supply Chain. *Chinese and Foreign Food Industry*, 2024, (11): 125-128.
- [14] Kirilova EG, Vaklieva-bancheva NG, 2017, Environmentally Friendly Management of Dairy Supply Chain for Designing a Green Products' Portfolio. *Journal of Cleaner Production*, 2017(167): 493–504.
- [15] Guo YY, 2015, Research on Enterprise Supply Chain Management Strategies—Taking the Dairy Industry as an Example. *New Economy*, 2015(Z2): 84–85.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Issues and Solutions of Cultural Rupture in Ethnic Minority Village Planning

Zichen Zhao*, Chun Wang, Hui Luo

The College of Arts and Sciences·Kunming, Kunming, Yunnan, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Within this broader analytical framework, ethnic minority villages characterized as a complex system in which cultural inheritance and spatial patterns are substantially coupled—demonstrate value that extends beyond material forms to encompass their social structures and spiritual orders. Considering the nuanced nature of these findings, with the ostensibly accelerating pace of modernization, traditional villages tend to be increasingly exposed to what appears to represent the risk of cultural discontinuity, what seems to be generally indicated in the fragmentation of festivals and rituals, as well as the homogenization of residential patterns. These tendencies warrant further interpretive consideration, as they risk eroding local distinctiveness and disrupting cultural continuity. Given the complexity of these theoretical relationships, this paper selects Hani villages as a representative case, integrating ecological patterns, ritual spaces, and spatial planning practices to explore the holistic integration of culture and nature, as well as the reciprocal relationship between ritual and space. These findings highlight emerging patterns of cultural symbolization and spatial homogenization in contemporary village planning practices. Significantly, the paper proposes the holistic embedding and spatial integration of cultural elements, alongside collaborative and co-constructive mechanisms among multiple stakeholders. This approach aims to provide a viable pathway for cultural regeneration and spatial continuity within these evolving conceptual frameworks for ethnic minority villages—contributing to theoretically meaningful discourse.

Keywords: Ethnic minority villages; Cultural discontinuity; Spatial pattern; Planning strategies

Online publication: October 29, 2025

1. Introduction

Ethnic minority villages tend to serve as what appears to be the primary carriers of ethnic culture, having long developed what seems to be a distinctive pattern through the intricate interaction of natural environments and social cultures ^[1]. What appears particularly significant about these findings is how, taking Hani villages as an illustrative example, their spatial systems of “fourfold symbiosis” (forest-village-terrace-water system) embody not only ecological wisdom but also a profound collective identity and a discernible institutional order. Within this broader analytical framework, and given the complexity of these theoretical relationships, traditional villages

face a tangible challenge of cultural and spatial disconnection, under the dual impact of modernization and tourism development. This dynamic leads to the fragmentation of traditional rituals, festivals, and residential forms into isolated symbolic elements, increasingly detached from their original holistic cultural system. As a result, the continuity of the underlying cultural logic becomes significantly compromised. This paper aims to interpret, therefore, the potential formation mechanism of cultural discontinuity within ethnic minority villages, to summarize the existing challenges, and to propose what may represent viable solutions, in order to provide theoretical and practical support for the planning and research of ethnic minority settlements, which seems especially noteworthy in this analytical context.

2. Characteristics of ethnic minority villages

2.1. Holistic coupling of culture and nature

The formation logic of ethnic minority villages, particularly Hani villages, appears to tend to suggest what might be characterized as a substantial degree of coupling with the natural environment. A village appears to represent not merely a simple residential space but rather what seems to constitute an interactive system composed of multiple elements, including forests, water sources, terraced fields, and the settlement itself. Hani villages in southern Yunnan have typically maintained spatial patterns of “fourfold symbiosis” (forest-village-terrace-water system), in which forests conserve water sources, water sources irrigate terraced fields, terraced fields support agricultural production, and settlements are ostensibly built along the mountain slopes, tending to form a self-consistent ecological cycle. Within this broader analytical framework, nature not only tends to provide the conditions for survival but also appears to shape cultural order through discernible spatial patterns. What is especially noteworthy in this analytical context, considering the nuanced nature of these findings, is that taking the Hani village of Biaoshuiyan as an example, like most Hani settlements, is situated on the mountainside and follows natural contour lines in a terraced layout. While traditional Hani villages are characterized by a “fourfold symbiosis” of forest, village, terraced fields, and water system, Biaoshuiyan exhibits a distinctive evolution of this model. Its spatial organization is defined by the spectacular Biaoshuiyan Waterfall in the northwest. This landmark integrates with the surrounding old-growth forests to the north and west, the cascading terraced clusters of mushroom-roofed houses of the Hani people, the terraced paddies to the south and east, and the Taiping River flowing along its western boundary. Together, these elements form a unique “fivefold symbiosis”—a cohesive system comprising the waterfall, forest, village (mushroom houses), terraced fields, and water system—shaped by both the local natural environment and the Hani cultural practices. This configuration reflects a well-integrated spatial pattern in which water systems, terraced fields, mushroom houses, waterfalls, and forests mutually sustain one another, embodying what can be understood as the Hani philosophy of harmony between humans and nature. Notably, the sacred forest, traditionally protected from logging, not only performs essential ecological functions but also serves as a vital medium for preserving collective identity and cultural continuity—highlighting the broader significance of these findings. In this context, the integration of terraced fields and water systems sustains agricultural production while simultaneously functioning as a cultural symbol, thereby fostering a dynamic balance between Hani village life and nature. This pattern suggests that the natural coupling of ethnic minority villages represents both a dependency for production and daily life and a reflection of their underlying value system. From the macro-ecological level to the micro-spatial level, each dimension appears to suggest what seems to be the perception and integration of nature through culture, and what this coupling tends to indicate is that it largely

determines the wholeness and indivisibility of village culture ^[2].

2.2. Reciprocal relationship between ritual and space

Ethnic minority villages appear to generally weave rituals and social order into their spatial patterns, tending to suggest what might be characterized as a distinctive “ritual–space” interactive relationship. In Hani villages, what appears particularly significant about these findings is that specific nodes, such as the village gate, the Moqiu ground, the ritual house, and the village center, tend not to function merely as utilitarian spaces but appear to represent places where rituals and daily life seem to intimately intertwine. These spaces, given the multifaceted nature of this evidence, tend to appear to fulfill both practical purposes and also seemingly function as sites where social relations and cultural order tend to be witnessed and, importantly, reproduced. The village gate, from this particular interpretive perspective, is ostensibly not merely the physical boundary for entry and exit but predominantly also a ritual device that tends to delineate what appears to be a distinction between humans and spirits. The evidence suggests that the Moqiu ground, considering the nuanced nature of these findings, appears to function as what seems to be both a communal activity space and arguably the primary site for rituals such as Kuzhaza. The ritual house, what seems especially noteworthy in this analytical context, tends to be regarded as what appears to represent the core of agricultural ceremonies, seemingly embodying what tends to suggest a reverence for deities and the continuation of agricultural order. Furthermore, what also appears significant in this context, the long-street banquet appears to reflect what seems to be ideals of sharing and solidarity within the community. What seems to emerge from these findings is that these spaces tend to subtly highlight the intricate interplay of ritual and place, thereby seemingly allowing culture to be continually manifested through its material dimension. Within this broader analytical framework, spatial forms appear to enhance the sanctity of rituals, while the repeated practice of rituals, in turn, tends to continually bestow new meaning upon these spaces ^[3]. This pattern suggests that rituals serve to reinforce the internal structure of Hani village society and establish an organic connection between nature, society, and the spiritual realm. It appears to be precisely this reciprocal relationship between space and ritual that arguably enables ethnic culture to maintain substantial resilience in the face of modernization, thereby tending to constitute what appears to be an important feature distinguishing such villages from other settlements.

3. Problems in the planning of ethnic minority villages

3.1. Fragmentation and symbolization of cultural representation

In the process of modernization of ethnic minority villages, what seems to emerge as a substantially challenging issue appears to tend to suggest a growing tendency toward what might be characterized as the fragmentation of cultural representation ^[4]. A general weakening is evident in the erosion of traditional festivals, rituals, and daily lifestyles, which have been increasingly replaced by superficial symbolic representations and displays. Evidence from Hani villages suggests that the sacred forest, Moqiu ground, and ritual house originally appear to have provided evidence that may support the formation of a continuous socio-cultural network, serving multiple roles in religious practice, production, and community interaction. However, within the current analytical framework, these spaces seem to lend support to what may represent a gradual simplification into scenic attractions- fixed points embedded in tourist routes or planning documents. This shift indicates a loss of their inherent cultural logic and practical functions, which appears particularly significant in these findings.

These findings suggest that ritual spaces no longer reflect the spontaneous spiritual order of the community. What appears significant in this context is that they are instead projectized and integrated into structured cultural performances and tourism-oriented consumption settings. Events such as the long-street banquet, the Kuzhaza festival, and the sacred forest rituals appear to have been reshaped, which seems to suggest external demands, with heightened formal expression. What seems to result from these considerations is, however, weakened roles in fostering social bonds and ethnic identity. Fragmentation also appears to suggest what seems to be reflected in the continuity and reproduction of traditional residential forms, given the complexity of these theoretical relationships. The data suggest that the mushroom house, one of the Hani people's unique dwelling types, originally served composite functions including defense, ecological regulation, and family life. However, this analysis indicates that during the village renovation, the mushroom-roofed house has increasingly been abstracted into a decorative element, thereby appearing to lose its intrinsic connection to the natural environment and traditional Hani lived practices, an aspect that is theoretically important.

What appears to emerge from this evidence is that in this trend, culture tends to point toward what appears to be no longer holistically embedded in daily life, but instead seems to be evolving into a fragmented symbolic state. Space and culture tend to point toward what appears to be increasingly separated, making it seem to lend support to what may represent difficulties for social structures and value systems within villages to continue under new development logics, which appears to warrant further interpretive consideration. What appears to provide evidence that may support to is a gradual weakening of cultural authenticity and integrity, considering the nuanced nature of these findings^[5]. What the investigation appears to indicate in the case of Biaoshuiyan's renovation is that there also appears to tend to suggest a tendency toward the scenicization of cultural spaces. Although the sacred forest seems to generally indicate preservation, in planning texts, it appears to provide evidence that may support its predominantly primary treatment as an ecological and tourism display node, appearing to suggest what seems to be diminished original ritual and spiritual functions from this particular interpretive perspective.

3.2. Homogenization of planning logic and weakening of locality

What the planning and construction of ethnic minority villages typically tend to suggest is a pervasive tendency toward what might be characterized as homogenization, with distinctive local patterns appearing to be gradually eroded under the substantially widespread dissemination of standardized design, within this broader analytical framework^[6]. What the case of Biaoshuiyan Village appears to tend to suggest regarding this particular issue is that its original "fivefold symbiosis" landscape pattern seemed to generally indicate what appeared to be the overall integrity of forests, water systems, terraced fields, settlements, and waterfalls. What appears particularly significant about these findings, however, is that within this evolving conceptual parameter of new construction practice, external design forces appear to have predominantly prioritized uniform aesthetic models and economic efficiency, seemingly neglecting what appears to warrant further interpretive consideration regarding the inherent logic of spatial evolution and the foundational cultural aspects of the village.

What seems to emerge from these findings is that modern planning has purportedly introduced large-scale tourism facilities, standardized housing renovations, and uniform infrastructure, consequently tending to point toward what appears to be villages converging toward increasingly similar forms. What the data seems to suggest is that the repetitive application of road systems, visitor centers, and exhibition halls has appeared to produced what seems to be similar spatial layouts and architectural forms, thereby ostensibly weakening inter-village differentiation. Given the complexity of these theoretical relationships, traditional construction methods—adapted

to local conditions, such as cascading layouts along mountain slopes and residential forms integrated with terraced fields—appear to have been largely replaced by grid-like road networks and centralized land-use divisions, altering what seems to be the ecological foundation and cultural connotations of the villages.

From this particular interpretive perspective, homogenization has not only appeared to suggest what seems to be an influence on the shaping of the physical landscape but has also seemingly diluted the cultural context. Planning documents tend to frequently label villages as “ethnic minority characteristic settlements”, yet in practice, these characteristics are predominantly reduced to superficial visual symbols, ignoring what tends to represent the complex interconnections among production systems, ritual activities, and community structures ^[7]. This analysis suggests that the erosion of locality has caused villages to generally lose their cultural roots, becoming landscape-oriented samples shaped by what might be characterized as external consumption logic. Although Biaoshuiyan Village’s planning documents explicitly advocate for the goal of “characteristic protection” with an emphasis on authenticity and continuity, in practice the proliferation of visitor centers, exhibition halls, and agricultural culture experience facilities has seemed to lack meaningful interaction with traditional culture, resulting instead in what appears to represent the emergence of “homogenized landscapes”, which seems to complicate traditional interpretations.

4. Optimization strategies for the planning of ethnic minority villages

4.1. Holistic embedding of cultural elements and spatial integration

In the broader context of planning and construction for ethnic minority villages, cultural factors should not be treated as isolated symbols; rather, they must be systematically integrated into the overall spatial structure. The “fourfold symbiosis” models of Hani villages appear to tend to suggest, therefore, seems to be a remarkably high degree of integration among the natural environment, settlement patterns, and socio-cultural activities. Significantly, when this complex system is disrupted through modern planning interventions, cultural functions tend to weaken inevitably. This pattern suggests that planning practice should center on core cultural elements to promote spatial integration, carefully incorporating functions of production, residence, ritual, and social interaction into what tends to be a unified spatial system. Given these considerations, in the overall layout of Biaoshuiyan Village, spaces such as the Moqiu ground, the ritual house, and the sacred forest appear to have been quite deliberately reserved, seemingly providing what might be characterized as practical examples of embedding such cultural elements into contemporary planning approaches.

From this particular interpretive perspective of spatial practice, core nodes such as the sacred forest, Moqiu ground, and ritual house ostensibly should not merely be preserved. What the evidence appears to reveal is that they also warrant substantial strengthening through planning and design to ensure what seems to be their functional continuity. The sacred forest, which tends to serve as a medium between religion and nature, typically requires institutional protection at both ecological and cultural levels. Similarly, the Moqiu ground and ritual house appear not to be simply venues for celebrations but also tend to reflect community cohesion and what seems to be the orderly development of agriculture. Consequently, they often necessitate adequate spatial reservation to ensure what seems to be their continued role in contemporary society.

What also appears noteworthy is that spatial integration tends to be reflected in the fusion and reuse of both older and newer elements. Traditional mushroom houses, which appear to emphasize ecological adaptability and cultural expression, ostensibly should be sustained in the context of improving modern living conditions.

This might involve material renewal and structural optimization, thereby enhancing residential comfort while maintaining what seems to be a critical cultural continuity ^[8]. The analysis suggests that newly constructed tourism facilities, exhibition centers, or agricultural culture experience halls, while meeting modern functional requirements, should establish a dialogical relationship with traditional spatial patterns rather than replacing them. Such holistic embedding and spatial integration, considering the nuanced nature of these findings, predominantly ensures that villages, throughout their developmental process, retain both modernity and cultural continuity.

4.2. Collaborative and co-constructive mechanisms among multiple stakeholders

For ethnic minority villages to achieve contemporary transformation, relying solely on administrative promotion or external design forces appears to be largely insufficient to preserve cultural and spatial authenticity and continuity, factors that are particularly significant in this context. This pattern suggests that collaboration and co-construction among multiple stakeholders appear to have substantially emerged as what appears to represent a pivotal orientation for optimization strategies ^[9]. The long-lasting continuity of Hani villages appears to tend to suggest what seems to be that their intrinsic social order seems to substantially depend upon collective rituals and cooperative mechanisms. Within this broader analytical framework, what seems to emerge as necessary appears to be the reconstruction of what might be characterized as such a multi-level participatory system for modern planning to achieve cultural regeneration.

Considering the nuanced nature of these findings, villagers can be most appropriately regarded as the central participants in this framework. As direct bearers of culture, their lifestyles, traditional skills, and social customs largely constitute the fundamental basis for cultural reproduction. Planning appears to typically necessitate, at the institutional level, granting villagers a voice in what seems to be spatial construction and cultural practices. Local governments tend to predominantly play what appears to be dual roles as coordinators and promoters, ostensibly tasked with building what seems to represent institutional platforms that appear to incorporate villagers' cultural demands into the planning system while potentially providing policy and financial support. Academic institutions and professional teams tend to contribute what might be characterized as methodological and technical expertise, thereby largely transforming what appears to be fragmented knowledge into systematic planning strategies through approaches such as field research, cultural resource documentation, and spatial design.

What also appears significant in this context is that cross-sectoral collaboration also seems to be of substantial significance. Given the complexity of these theoretical relationships, cultural tourism enterprises and social organizations may contribute valuable industrial resources and operational experience, but such interventions must presumably be grounded in cultural authenticity and community interests, thereby carefully avoiding purely commercial dominance. What these findings seem to point toward is that the interaction and synergy among multiple stakeholders largely ensure that village culture is not confined to symbolic representation but forms what tends to suggest a dynamic system of regeneration across what might be characterized as institutional, spatial, and social dimensions. From this particular interpretive perspective, in the planning scheme for Shuiyan Village, the strategy of “threefold construction”—reviving Hani culture, reconstructing traditional space, and regenerating industrial vitality—was proposed. The analysis suggests that this framework predominantly emphasizes both cooperation between villagers and government and the joint involvement of tourism enterprises and academic institutions, highlighting what appears to represent the potential for “multi-stakeholder co-construction” ^[10].

5. Conclusions

What the cultural discontinuity of ethnic minority villages appears to suggest, within this broader analytical framework, is not merely what seems to be the outcome of the transformation of physical space, but also what appears to represent a manifestation of what seems to be the weakening of spiritual order; what appears particularly significant about these findings is the multifaceted nature of this decline. At what might be characterized as the intersection of tradition and modernity, given the complexity of these theoretical relationships, what seems to emerge from these findings is that village culture appears to have been predominantly abstracted into what appear to be superficial symbols. This analysis suggests that the evidence reveals a substantial erosion of social relations and local identity, undermining both cultural integrity and continuity. Notably, this pattern challenges traditional interpretations by disrupting the historically organic relationship between culture and nature, ritual and space. The findings indicate that recent waves of planning and construction have fragmented and reshaped these interconnected elements, leading to a discernible decline in cultural value. Central to this argument is the loss of intrinsic unity among cultural and spatial systems. These methodological considerations suggest that the holistic integration of cultural elements with spatial design, along with collaborative and co-constructive mechanisms among multiple stakeholders, demonstrates a capacity to provide institutional, spatial, and social support. This evidence indicates that such approaches offer a theoretical foundation for preserving the authenticity and continuity of ethnic minority village cultures within the context of modern development. Furthermore, sustained practical implementation of these strategies warrants further examination within evolving conceptual frameworks.

Funding

Project Butterfly's Shadow over Zhongzhai, Cultural Vitality for a New Chapter—Research on Planning Strategies for Minority Village Settlements in the Border Areas of Yunnan under the Context of Agri-cultural Tourism Integration (2024XJ5304/S202413331001) supported by Student Innovation and Entrepreneurship Training Program of The College of Arts and Sciences, Kunming

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Ma CW, Xue JY, 2025, Intimacy and Estrangement in the Era of Rural Information Abundance and Hybrid Knowledge Integration: A Case Study of Villages in the Core Area of the World Cultural Heritage Hani Terraces. *Ideological Front*, published online, 1–10.
- [2] Liu R, Chen J, 2025, Illustration Design on the Tip of the Tongue: Hani Terraces. *Hunan Packaging*, 40(4): 226.
- [3] Li Z, Yang YJ, Duan XD, 2025, Research on Planning Practice of Traditional Ethnic Minority Villages under the Mode of Integration of Scenery and Villages: A Case Study of Xizhou Traditional Village Cluster. *Inheritance*, 2025(2): 110–115.
- [4] Liu J, 2021, How to Return Home to Fertile Land: Application and Research on Characteristic Village Planning and Design under the Cultural Background of Korean Ethnicity. *Tomorrow's Fashion*, 2021(6): 105–106.
- [5] Xin JJ, Wei FY, Gao X, 2020, Research on the Planning of Traditional Ethnic Minority Villages in the Context

of Urban-Rural Integration: A Case Study of Bayuanzi Village, Beijing. *Journal of Beijing University of Civil Engineering and Architecture*, 36(2): 15–22.

- [6] Gong Q, Zhang, ZJ, 2019, Research on the Planning of Ethnic Minority Villages in Guizhou under the Background of New Rural Construction. *Rural Economy and Science-Technology*, 30(10): 205 + 207.
- [7] Xu CC, Li DH, Jin T, 2017, A Brief Analysis of the Protection and Planning of Traditional Ethnic Minority Villages. *Southern Agriculture*, 11(20): 58–59.
- [8] Miao WJ, 2017, Record of the Creation of Biaoshuiyan Ethnic Minority Characteristic Village in Jinping County. *Today's Ethnicities*, 2017(1): 56–57.
- [9] Huang PH, 2016, Honghe Biaoshuiyan Village: Joint Efforts of Rural Tourism and Environmental Protection. *Wealth World*, 2016(11): 71.
- [10] Hu Y, Sang ZN, Huang LJ, 2010, The Inheritance and Integration of “Tujia-Qiang Sounds”: A Case Study of the Planning of Tujia-Qiang Villages in Maliuxi, Xianfeng. *Huazhong Architecture*, 28(5): 151–154.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Research on the Value Realization Mechanism of Marine Ecological Products in China

Zhuli Li^{1,2†}, Zhijun Liu^{3†}, Zhaoyong Zheng^{1,2*}, Ping Hu^{1,2*}, Zhiwei Zhang⁴

¹Technology Innovation Center for South China Sea Remote Sensing, Surveying and Mapping Collaborative Application, Ministry of Natural Resources, Guangzhou 510300, China

²South China Sea Development Research Institute, Ministry of Natural Resources, Guangzhou 510300, Guangdong, China

³Ministry of Natural Resources, Beijing 100812, China

⁴First Institute of Oceanography, Ministry of Natural Resources, Qingdao 166061, Shandong, China

†These authors contributed equally to this work and share the first authorship.

*Author to whom correspondence should be addressed.

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Realization of the value of marine ecological products serves as an important approach to meet the growing needs of the general public for an ecologically sound environment. Through analysis of global research and practice on the value of marine ecological products, this study explores the types, accounting methods, and value realization approaches of marine ecological products in China. The results show that China's marine ecological products are facing a number of problems, namely decreasing product quantity, lack of a unified authoritative accounting standard, absence of a complete trading market, and imperfect legal and institutional systems. Marine ecological products fall into two categories: public products and operational products. They consist of four types: coastal island-based human settlements, marine ecological security-related products, marine ecological materials, and marine cultural services. At present, there are six accountable products: clean seawater, climate regulation, marine ecological resources, fishing products, aquaculture products, and marine ecotourism and leisure products. To realize the value of marine ecological products, it is necessary to establish the following four systems for marine ecological products: (1) a government-led, enterprise-based, diverse product-supply system with wide participation of social organizations and the general public; (2) a unified authoritative value accounting system; (3) a land-sea integrated market trading system; and (4) a legal and institutional system.

Keywords: Marine ecological products; Value realization mechanism; Ecosystem services; Natural resources

Online publication: October 29, 2025

1. Introduction

In recent years, China's central government has attached great importance to the construction of an ecological civilization, requiring the establishment of a sound mechanism for realizing ecological product values. Zhejiang and other provinces were selected for pilot implementation of a mechanism for realizing ecological product values

and exploration of the definition, type, accounting, and value realization methods of ecological products. Great progress has been achieved, but most of the existing pilot work is focused on terrestrial environments with little exploration conducted in marine environments. This study seeks to fill this gap by exploring the types, accounting methods, and value realization methods of China's marine ecological products. The goal is to provide a theoretical basis and decision-making reference for forming a national unified value realization system of ecological products.

2. Global forms and performance of value realization of marine ecological products

2.1. Non-China-based research and practice on the value of marine ecological products

Foreign research on marine ecological products focuses mainly on marine ecosystem services and assessment. In the 1970s, the United Nations Economic and Social Council proposed that coastal resources are “a valuable national wealth”^[1]. Subsequently, accounting for marine resource value has gradually become a research focus. To date, more than 20 countries and organizations, including the United States, Japan, France, the United Nations Environment Programme, the United Nations Statistics Division, and the World Resources Institute, have conducted research on the theory and implementation of natural resource accounting^[2–4]. In particular, Constanta et al. were the first to complete a global estimation of coastal ecosystem service value, which represents the beginning of quantitative research on marine ecological products^[5]. Since the beginning of the 21st century, more extensive research on marine ecosystem services has been conducted in foreign countries, including assessments of marine ecosystem services of different scales and types. Some research results have been applied to the practice of ecological compensation, providing a reference for realizing the value of marine ecological products^[6–14].

2.2. China-based research and practice on the value of marine ecological products

In recent years, China has gradually conducted research on the value of marine ecological products, mainly focusing on the connotative definition of marine ecological products and the evaluation of their value.

2.2.1. Definition of marine ecological products

It has been proposed that marine ecological products are a subset of marine resources that provide ecological services, including tangible resources such as marine biological resources, marine mineral resources, marine energy resources, and marine chemical resources, as well as intangible resource assets such as natural heritage^[15–17]. Others have proposed that marine ecological products are the services that marine ecosystems provide, such as the provision, regulation, and support of products and cultural services^[18–19]. Still others believe that marine ecological products are a subset of marine resources and marine ecosystem services, proposing the concept of marine ecological capital whose value is composed of the stock of marine ecological resources and the service value of marine ecosystems^[20].

2.2.2. Valuation of marine ecological products

Xu et al. have explored the classification of marine ecological products^[21]. Cheng et al. propose that the value of marine ecological products can be calculated using the evaluation methods of ecosystem service value^[22–24]. The quantity of marine physical resources and the value of ecosystem services are considered accounting objects of natural resource assets in Shenzhen Dapeng Peninsula and Huizhou City, Guangdong Province, China^[25–26]. At the end of 2018, China began performing an ecological assessment of the consequences of early sea reclamation projects, calculating the loss of fishery resources and the loss of the value of marine ecological services^[27]. The goal is to provide a reference for determining the appropriate amount of funding for marine ecological protection and

restoration. In addition, evaluations of marine ecological products have been applied to the compensation of marine ecological damage, setting sea-use fee standards, and performance assessments of marine ecological restoration ^[28–30].

In summary, progress has been achieved in recent years on researching the value of marine ecological products across the globe, but the mechanisms for quantifying their value and implementing the results of that quantification still fail to meet actual needs for value realization.

3. Existing problems in the value realization of marine ecological products

3.1. Marine ecological products at risk of shrinking

The ocean is the cradle of human life, with more than 50% of the world's population living within about 60 km of the coast. Statistics show that due to the rapid economic and social development of coastal areas, China has lost more than 50% of its coastal wetlands since 1949. By the end of 2017, less than 40% of China's total coastline was in a natural condition, with some areas severely eroded, threatening marine ecological security ^[31]. According to the Bulletin of Marine Ecology and Environment Status of China in 2018, China's water bodies with Grade-4 water quality had reached 47,310 km² by the summer of 2017. More than 90% of the sea areas adjacent to wastewater discharge outlets failed to meet the environmental protection requirements for marine functional zones, with bay ecosystems mostly in a sub-healthy status ^[32]. Marine ecological products are at risk of shrinking.

3.2. Lack of a unified authoritative standard for the value accounting of marine ecological products

China's domestic practices show that the value of the marine ecosystems of Xiamen City in 2015 was about 1.87 million RMB per hectare ^[33]. Calculations show that the annual value of Quanzhou Bay, Guangdong provincial mangroves, Hangzhou Bay wetlands, Zhejiang provincial wetlands, Yancheng coastal beach, Minjiang River Estuary wetlands, and reclaimed land in Bohai Sea and Caofeidian district ranges from less than 10,000 RMB per hectare to 1 million RMB per hectare ^[34–39]. Various national or industry standards and empirical formulas are applied to various assessments, such as marine ecological damage assessment, fishery pollution damage assessment, and marine ecological capital assessment. As a result, there are large differences in the value accounting results of marine ecological products, and an authoritative unified accounting standard is still missing.

3.3. Lack of a trading market for marine ecological products

At present, the market-oriented transactions of ecological products rarely involve marine ecological products, focusing mainly on forests, water rights, and carbon emissions instead. The government usually provides vertical compensation to support local ecological protection and restoration, while horizontal payments between regions or between different social sectors are relatively sporadic. Thus, a market for marine ecological products is missing.

3.4. Urgent need to strengthen legal and institutional systems

An effective legal system is a “catalyst” and a “protector” to effectively promote the realization of the value of marine ecological products. However, China still lacks policies on financial support systems, horizontal fiscal compensation systems, modern market systems, social participation systems, and legal support systems to support ecological products. The need to strengthen the legal system involved in the value realization of marine ecological products is especially urgent.

4. Value realization mechanism of marine ecological products in China

To accelerate the value realization of marine ecological products, it is necessary to take a problem-oriented approach. On the basis of ensuring coastal ecological security, economic instruments should be used to maximize the value realization of marine ecological products. To this end, the following main approaches should be taken.

4.1. Establish a diverse supply system for marine ecological products

4.1.1. Determination of marine ecological product types

In terms of economic attributes, ecological products have four characteristics: (1) positive externalities making social benefits greater than private benefits; (2) characteristics of public goods or quasi-public goods; (3) indivisibility and passive consumption as a whole; and (4) use-value and exchange-value with the dual character of commodities^[40].

Marine ecological products are derived from marine ecological resources. Marine ecological resources include marine organisms and their habitats, as well as the entire marine ecosystem. Considering their economic attributes, degrees of biological production, human participation, and types of services that marine ecological products can provide, ecological products can be divided into public marine ecological products and operational marine ecological products.

Public marine ecological products are products directly provided by marine ecosystems to humans, such as clean seawater, climate regulation, species conservation, and coastal protection. Operational marine ecological products are the products that are generated by the intentional alteration of marine habitats by humans, including marine physical products and marine cultural service products. Marine physical products include marine biological resources such as marine organisms, sea areas, and islands, as well as the products that humans can obtain through labor, such as fishing, aquaculture, eco-industry and eco-agriculture, and biomass energy production. Marine cultural service products include marine ecotourism, leisure and entertainment, marine cultural products, and marine scientific research achievements (**Table 1**).

Table 1. Classification of marine ecological products

| Category | Biological production | Degree of human participation | Trait | | Ecosystem service types | Product types |
|--|--|---|------------|--|-----------------------------|---|
| Public marine ecological products | Direct production from marine ecosystems | Low, for necessary conservation and restoration | Intangible | Coastal island-based human settlement products | Regulation services | Clean seawater |
| | | | | Ecological security products | | Climate regulation Species conservation Coast protection Ecosystem disaster reduction |
| Operational marine ecological products | Direct production of the marine ecosystem + human production or management | High, for conservation, restoration, and management | Tangible | Physical products | Marine ecological resources | Sea area Island Marine organisms (including rare and endangered species) |
| | | | | | Supply services | Fishing products Aquaculture products Ecological industrial and agricultural marine products (e.g., chemical raw materials, feed, pharmaceutical raw materials, decorative and ornamental materials) Biomass energy products |
| | | | Intangible | Marine cultural service products | Cultural services | Marine ecotourism and leisure products Marine cultural products Marine scientific research outcomes |

4.1.2. Diversification of the supplies of marine ecological products

It is necessary to explore the establishment of a government-led, enterprise-based supply system with wide participation by social organizations and the general public. This may be achieved through the following three levels of activities: (1) with respect to government supply, it is necessary to optimize the existing marine nature reserves and 71 marine special reserves in China to establish national parks and marine nature reserves; (2) with respect to enterprise-level activities, it is desirable to implement ecological restoration projects to improve sub-regional and local ecological environment; and (3) with respect to social sectors such as NGOs, it is recommended to conduct training, outreach, and public welfare projects to raise awareness of marine ecological product supply and innovate marine-product supply technology to diversify the supply of marine ecological products.

4.2. Establishing a unified authoritative value accounting system for marine ecological products

4.2.1. Value composition of marine ecological products

To promote an ecological civilization, the value of marine ecological products should be composed of the stock of marine ecological resources and the use-value of marine ecological products. When consumers acquire marine ecological resources as a whole, they have to pay for the stock of marine ecological resources and the use-value of marine ecological products produced by the marine ecological resources; when they only acquire marine ecological products, they only have to pay for the use-value of the products.

4.2.2. Accounting principles

Accounting should be conducted in accordance with the following principles: (1) the principle of human benefit, that is, human beings should be the ultimate beneficiaries; (2) the principle of actuality, that is, processes that are necessary for maintaining the survival and development of ecosystems such as atmospheric purification and water cycle are not subjected to accounting; (3) the principle of physical measurability, that is, products should have clear physical quantities with feasible accounting methods, while products such as marine aesthetics that are difficult to quantify are not subjected to accounting for the time being; and (4) the principle of data availability, that is, there must be practically available data sources and parameters, while products with too long a data acquisition cycle or too difficult a data acquisition path are not subjected to accounting for the time being.

According to the above principles, six types of marine ecological products with accountable value are identified, including clean seawater, climate regulation, marine ecological resources (sea areas, islands, marine organisms), fishing products, aquaculture products, marine ecotourism, and leisure and entertainment products. Marine ecological products other than these currently do not have well-developed value accounting methods, or the methods lack the necessary data support ^[26].

4.3. Accounting methods

4.3.1. Clean seawater

When human development activities such as land reclamation or wastewater discharge cause declines in seawater quality and water exchange capacity, the value of the seawater also declines. Value accounting can be realized by using a shadow engineering method to convert the remaining environmental capacity of clean seawater into the amount of accommodatable domestic wastewater and then using the cost of artificially treating the wastewater as equivalent to the value.

4.3.2. Climate regulation

A key process in climate regulation is the absorption of CO₂ and release of O₂ by phytoplankton through photosynthesis, which balances the global carbon cycle and regulates air temperature. Using the photosynthesis equation with the net primary productivity of marine ecosystems, the amount of carbon sequestration and oxygen production can be calculated. The value is the sum of the benefits of carbon sequestration and oxygen production.

4.3.3. Marine ecological resources

Marine ecological resources include marine biological resources and their habitat resources (sea areas, islands), as well as the marine ecosystem that they constitute. Compared with marine biological resources, the ecological value of the stock of habitat resources is difficult to quantify, but can be roughly estimated using sea-use fee standards or uninhabited island-use fee standards issued by the government. The stock value of marine biological resources can be obtained by conducting surveys to obtain the density of biological resources, multiplying the density by the accounted sea area to obtain the resource stock, and then calculating the stock value according to the average market price.

4.3.4. Fishing products

Fishing presents a product flow generated from the stock of marine biological resources. At present, fishery resources constitute the main component of fishing products. Value accounting of fishery resources can be performed using the market valuation method. According to the *Fishery Statistical Yearbook (Report)* of the administrative division adjacent to the accounted sea area, the fishing production and total production value are determined, and then the accounted cost is subtracted from the total production value to give the value of fishing products.

4.3.5. Aquaculture products

At present, only tidal flats and shallow sea resources that are suitable for aquaculture are accounted for. The accounting can be performed using the market valuation method. Aquaculture production is determined using the *Fishery Statistical Yearbook (Report)* of the administrative division adjacent to the accounted sea area and then multiplied by the average market price of the aquaculture products to give aquaculture income. Next, the accounted aquaculture cost is subtracted from the income to give the value of aquaculture products.

4.3.6. Marine ecotourism and leisure products

This type of product has a tourism function and a leisure function, with the latter especially relevant to the local residents (**Table 2**). The tourism value is accounted for using the travel cost method, which treats the value of tourism as consisting of travel costs, travel time value, and other expenses. The ocean provides a leisure function to the local residents in the coastal area, whose value can be accounted for using the contingent valuation method (i.e., willingness to pay).

Table 2. Value accounting methods of marine ecological products

| Marine ecological products | | | Value accounting methods |
|--|--|---|--|
| Public marine ecological products | Clean seawater | | Replacement cost method: $V_{sw} = Q_{swT} \times P_w$ V_{sw} -Clean seawater value; Q_{swT} -wastewater treatment amount converted from the environmental capacity of clean seawater of the accounted sea area; P_w -Cost of artificial wastewater treatment |
| | Climate regulation | | Replacement price method: $V_{O_2+CO_2} = (1.63C_{CO_2} + 1.19C_{O_2}) \times X \times S$ $V_{O_2+CO_2}$ -Total value of carbon fixation and oxygen production; C_{CO_2} -Carbon fixation cost; C_{O_2} -Oxygen production cost; X -Annual dry matter production of phytoplankton; S -Accounted sea area |
| Operational marine ecological products | Marine ecological resources | Marine biological resources | Market valuation method: $V_L = \sum(Q_{Li} \times P_{Li})$ V_L -Stock value of marine biological resources; Q_{Li} -Stock of marine organism resource i; P_{Li} -Average market price of marine organism i |
| | | Marine habitat resources (sea areas, islands) | Sea-use fee standards or uninhabited island-use fee standards |
| | Fishing products | | Market valuation method: $V_{sc} = \sum(Q_{sc_i} \times P_{ci}) - \sum W_i$ V_{sc} -Fishing production value; Q_{sc_i} -Production of fishing aquatic product i; P_{ci} -Price of fishing product i; W_i -Fishing cost of aquatic product i |
| | Aquaculture products | | Market valuation method: $V_{BR} = \sum(Q_{BR_i} \times P_{ci}) - \sum W_i$ V_{BR} -Value of aquaculture products; Q_{BR_i} -Production of aquaculture product i; P_{ci} -Price of aquaculture product i; W_i -aquaculture cost of aquatic product i |
| | Marine ecotourism and leisure products | | Travel cost method: $V_{st} = (\overline{TC} + CS) \times P$ V_{st} -Travel value; \overline{TC} -Average travel cost of individual tourists; CS -Consumer surplus of individual tourists; P -Total number of tourists at tourist attractions Contingent valuation method: Questionnaire survey to investigate people's willingness to pay (WTP) or willingness to accept (WTA) compensation |

4.4. Realization of the value of ecological products

Operational marine ecological products can be capitalized through proprietary trades, which transfer management rights from the government to micro-operational entities such as enterprises and individuals, so as to achieve separation of ownership and management. It is ultimately up to the managers to develop and utilize natural resources to generate benefits and realize the value of ecological products. For public marine ecological products, their management rights cannot be transferred, so it is difficult to capitalize on this type of product. However, the government can indirectly realize its value through various forms of fees and taxes, such as pollution discharge fees, franchise fees, and special taxes^[41].

4.5. Establishing a land-sea integrated trading market of marine ecological products

An integrated trading market of marine ecological products has three characteristics: market type diversity, trading market standardization, and land-sea integration.

4.5.1. Establishing off-site pollution rights trading markets

Assuming that total pollution load control (TPLC) is in place, off-site pollution may be allowed in some areas. The trading modes of carbon emission rights, water rights, and energy rights should be used as examples for bringing

clean seawater to the market, establishing marine ecological products with equivalent value for marine pollution rights, and implementing a proprietary trading system. Trading of marine pollution rights can be realized through inter-regional competition and negotiation. The government is tasked with strengthening regulatory management and law enforcement during and after the trading so as to ensure legal compliance with the pollution ^[42–49].

4.5.2. Establishing a national blue carbon sink trading market

Under the leadership of the government, it is necessary to conduct a pre-systematic design of an institutional framework, market element, and external support mechanism for blue carbon sink trading. A market mechanism suitable for blue carbon sink trading should be created so that the emission rights of carbon dioxide absorbed, fixed, and stored in the ocean can be treated as a commodity, which will gradually lead to blue carbon sink trading ^[50].

4.5.3. Standardizing the market trading

Scientific and reasonable valuation of marine ecological products is a prerequisite for ensuring fair trading. Regular supervision is a necessary means to ensure fair, transparent, safe, and legal trading. It is necessary to design a reasonable trading process and regulatory regime so as to ensure that the trading is fair, standardized, safe, and legal.

4.5.4. Establishing and improving the legal system for marine ecological products

At present, the methods for realizing the value of marine ecological products include ecological compensation, ecological ownership trading, business development and utilization, green financial support, stimulating economic development, and policy and institutional incentives ^[40]. There is an urgent need for legal systems to provide support and guarantees so as to ensure a smooth value realization of marine ecological products.

5. Conclusion and suggestion

Value realization of marine ecological products is a systematic engineering process and cannot be achieved overnight. This study refers to the experiences of Xiamen City, Huizhou City, and Shenzhen Dapeng Peninsula, but fails to conduct field verification due to time constraints. In the future, typical regions will be selected for empirical research to further optimize the product index system and select suitable accounting methods. This research will provide support for exploring the value realization mechanism of marine ecological products in coastal areas and thereby meet the growing needs of the general public for an ecologically sound environment.

Funding

This work was funded by Science and Technology Development Foundation of South China Sea Bureau, Ministry of Natural Resources (23YD01).

Disclosure statement

The authors declare no conflict of interest.

Authors' contribution

Conceptualization: Zhuli Li and Zhijun Liu

Methodology: Zhuli Li and Zhaoyong Zheng

Formal analysis: Zhijun Liu

Resources: Zhijun Liu

Data curation: Zhuli Li

Writing—original draft preparation: Zhuli Li and Zhijun Liu

Writing—review and editing: Zhaoyong Zheng and Ping Hu

Supervision: Zhaoyong Zheng and Zhiwei Zhang

Project administration: Ping Hu and Zhiwei Zhang

Reference

- [1] Han Q, Huang X, Shi P, 2006, Preliminary Study on Appraisal of the Value of Marine Resources. *Ecological Economy*, 2006(11): 27–30.
- [2] De Groot RS, 1992. Functions of Nature: Evaluation of Nature in Environmental Planning, Management and Decision Making. Wolters Noordhoff, Groningen, 17–130.
- [3] Conrad JM, Clark CW, 1987, Natural Resources Economics, Notes and Problems. Cambridge University, New York.
- [4] Gao M, Wang Y, 2000, Reconsider the Environmental Accounting. *Statistical Research*, 17(4): 50–53.
- [5] Costanza R, d'Argee R, de Groot R, et al., 1997, The Value of the World's Ecosystem Services and Natural Capital. *Nature*, 1997(387): 253–260.
- [6] Martinez-Harms MJ, Bryan BA, Balvanera P, et al., 2015, Making Decisions for Managing Ecosystem Services. *Biological Conservation*, 2015(184): 229–238.
- [7] Gutierrez D, Akester M, Naranjo L, 2015, Productivity and Sustainable Management of the Humboldt Current Large Marine Ecosystem under Climate Change. *Environmental Development*, 2015(17): 126–144.
- [8] Sumaila UR, 2015, Socio-economic Benefits of Large Marine Ecosystem Valuation: The Case of Benguela Large Marine Ecosystem. *Environmental Development*, 17(S1): 244–248.
- [9] Gee K, Burkhard B, 2010, Cultural Ecosystem Services in the Context of Offshore Wind farming: A case Study from the West Coast of Schleswig-Holstein. *Ecological Complexity*, 7(3): 349–358.
- [10] de Juan S, Gelcich S, Ospina-Alvarez A, et al., 2015, Applying an Ecosystem Service Approach to Unravel Links between Ecosystems and Society in the Coast of Central Chile. *Science of the Total Environment*, 533(3): 122–132.
- [11] Lange GM, Jiddawi N, 2009, Economic Value of Marine Ecosystem Services in Zanzibar: Implications for Marine Conservation and Sustainable Development. *Ocean & Coastal Management*, 52(10): 521–532.
- [12] Failler P, Petre E, Binet T, et al., 2015, Valuation of Marine and Coastal Ecosystem Services as a Tool for Conservation: The Case of Martinique in the Caribbean. *Ecosystem Services*, 2015(11): 67–75.
- [13] Ledoux L, Turner RK, 2002, Valuing Ocean and Coastal Resources: A Review of Practical Examples and Issue for Further Action. *Ocean & Coastal Management*, 2002(45): 583–616.
- [14] Kontogianni A, Skourtos MS, Langford IH, et al., 2001, Integrating Stake-holder Analysis in Non-market Valuation of Environmental Assets. *Ecological Economics*, 2001(37): 123–138.
- [15] Li X, Chen P, Zhou X, et al., 2019, The Preparation of Marine Space Resources Balance Sheet. *Ocean Development and Management*, 2019(36): 30–37.
- [16] Gao Y, Gao J, Pan T, et al., 2017, Research on Ocean Resource Balance Sheet. *Scientific and Technological*

Management of Land and Resources, 34(2): 86–94.

- [17] Shang S, 2016, Exploration of Marine Natural Resource Balance Sheet. *Finance and Accounting Monthly*, 2016(7): 32–37.
- [18] Ma Y, Tu J, Zhang Q, et al., 2017, Loss Appraisal on Sea Reclamation Project to Marine Ecosystem Service Function Value in Binhai New Area of Tianjin. *Coastal Engineering*, 36(3): 65–71.
- [19] Chen S, Ren D, Li J, et al., 2010, Marine Ecological Capital: Concept and Attributes. *Acta Ecologica Sinica*, 30(23): 6323–6330.
- [20] Chen S, 2011, Technical Directives for Marine Ecological Capital Assessment GBT 28058-2011.
- [21] Xu Q, Zhang Y, 1994, Accounting the Marine Resources. *Ocean Development and Management*, 1994(3): 16–20.
- [22] Cheng F, Ji Y, Li J, et al., 2014, Valuation of Ecosystem Services in Xiangshan Bay. *Journal of Applied Oceanography*, 33(2): 222–225.
- [23] Han Q, Huang X, Shi P, et al., 2007, Seagrass Bed Ecosystem Service Value—A Case Study on the Hepu Seagrass Bed in Guangxi Province. *Marine Science Bulletin*, 26(3): 33–38.
- [24] Cai M, Li K, 2011, Economic Losses from Marine Pollution Adjacent to Pearl River estuary, China. *Procedia Engineering*, 2011(18): 43–52.
- [25] Research Group of the Development of Ecological Products in Dapeng New District, Shenzhen, 2018, Practical Experience and Enlightenment of Natural Resource Asset Accounting—a Case Study in Dapeng New District, Shenzhen. *Urban and Environmental Studies* 2018(3): 99–112.
- [26] People's Government of Huizhou Municipality, 2018, Regulations of Natural Resource Asset Inventory Management and Gross Ecosystem Product Accounting. <http://www.huizhou.gov.cn/>
- [27] General Office of the Ministry of Natural Resources, 2018, Trial Technical Guideline of Ecological Evaluation on Sea Reclamation Projects. http://www.mnr.gov.cn/gk/tzgg/201811/t20181101_2324569.html
- [28] Rao H, Lin C, Kong H, et al., 2014, Ecological Damage Compensation for Coastal Sea Area Uses. *Ecological Indicators*, 38(3): 149–158.
- [29] Sun X, Li Y, Zhu X, et al., 2017, Integrative Assessment and Management Implications on Ecosystem Services Loss of Coastal Wetlands due to Reclamation. *Journal of Cleaner Production*, 2017(163): S101–S112.
- [30] Li Y, Wen R, Chen K, 2017, A Review on the Progress in Marine Ecosystem Services Valuation. *Ecological Economy*, 36(5): 490–496.
- [31] Su J, 2013, The Importance of Marine Ecological Security. *Science & Technology Review*, 31(16): 3.
- [32] State Oceanic Administration, 2018, Bulletin of China Marine Ecological and Environment Status in 2017. http://www.soa.gov.cn/zwgk/hygb/zghyhjzlg/201806/t20180606_61389.html
- [33] Environmental Protection Bureau in Xiamen City, Chinese Research Academy of Environmental Sciences, 2018, Report of Ecological Value Accounting in Xiamen City (2015).
- [34] You, H, Huang, S, Tan, F, 2018, Values of Ecosystem Services at Quanzhou Bay Nature Reserve of Fujian Province. *Journal of Central South University of Forestry & Technology*, 38(7): 83–88.
- [35] Xu J, 2009, Preliminary Exploration of the Evaluation on the Mangrove Ecological Value in Quanzhou Bay, Fujian Province. *Serves of Agricultural Technology*, 26(9): 103–104 + 131.
- [36] Yang Q, Lan C, Xin K, 2003, Evaluation on the Value of the Ecosystem Services of the Coastal Zone in Guangdong and Hainan. *Marine Environmental Science*, 22(4): 25–29.
- [37] Wu S, Liu R, Qi L, et al., 2008, Value Assessment of Marine Ecosystem Service in Bohai Sea. *China Population Resources and Environment*, 18(2): 65–69.

- [38] Suo A, Yu Y, Miao L, 2011, Assessment of Ecosystem Service Value in the Bohai Sea. *Marine Economy*, 1(4): 42–47.
- [39] Suo A, Zhang M, Yu Y, 2012, Loss Appraisal on the Value of Marine Ecosystem Services of the Sea Reclamation Project for Caofeidian. *Marine Science*, 36(3): 108–114.
- [40] Zhang L, Yu H, Li D, et al., 2019, Connotation and Value Implementation Mechanism of Ecological Products. *Transactions of the Chinese Society for Agricultural Machinery*, 50(6): 173–183.
- [41] Li X, Cui B, 2006, Research on the Value of Natural Resources. *China Mining Magazine* 15(8): 1–3 + 7.
- [42] Gao J, Fan X, Li H, et al., 2016, Research on Constituent Elements, Operation Modes and Political Demands for Capitalizing Ecological Assets. *Research of Environmental Sciences*, 29(3): 315–322.
- [43] Zhang Z, 2011, Ecological Capital and its Operational Problem in Poyang Lake Region, thesis, Nanchang University.
- [44] Zhao R, Hu L, 2009, Operation on Ecological Capital: Case Study and Theoretical Interpretation. *Journal of Hubei University of Economics (Humanities and Social Sciences)*, 6(3): 50–51.
- [45] Zeng H, Nie Y, 2011, Reform of Collective Forest Rights and Forest Rights Transfer. *Journal of Northwest A&F University (Social Science Edition)*, 28(4): 283–286.
- [46] Huang Y, 2014, Market Mechanism Design of Ecological Capital, thesis, Party School of the Central Committee of C.P.C.
- [47] Xie G, Cao S, 2010, Ecological Economization and Economic Ecologization in Succession Progress of Development. *Resources Science*, 32(4): 782–789.
- [48] Yan L, Chen G, Liu J, et al., 2010, On Constituents of Ecological Capital: Based on Ecological Economics Literature. *Journal of Zhongnan University of Economics and Law*, 2010(5): 3–9.
- [49] Zhao Z, Gu Z, Gu H, 2016, Mechanism Choices and Restrictions on Emission Permits Trading in China. *Journal of Shanghai Jiaotong University (Social Science)*, 2016(1): 50–59.
- [50] Mei H, 2018, Trading of Blue Carbon and Protection of Coastal Wetland. *China Ocean News*.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Influence Mechanism of Social Role Adjustment and Reconstruction on Internet Addiction Behavior of Retired Older Adults: A Case Study of Xuhui District, Shanghai

Linqi Zhou*

Shanghai World Foreign Language Academy, Shanghai 200233, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the accelerating aging process in China, internet dependency among older adults has garnered increasing scholarly attention, particularly given that over 110 million individuals aged 60 and above are internet users, 37% of whom spend more than five hours daily on mobile devices. This study aims to examine how role deficits—such as loss of professional value, weakened inter-generational ties, diminished social participation, and difficulties in adapting to new elderly roles—contribute to internet dependency, and further investigates whether cultural norms and social marginalization intensify this relationship. Using a mixed-methods approach incorporating qualitative surveys and quantitative regression analysis, the research reveals that role deficiencies significantly predict internet addiction through a compensatory satisfaction mechanism. Additionally, both social marginalization and prevailing cultural norms are found to reinforce this pathway. These findings underscore the interplay between structural social factors and psychological mechanisms in shaping older adults' digital behaviors, highlighting the need for holistic interventions aimed at role reconstruction and social inclusion.

Keywords: Social construction; Gerontology; Internet addiction

Online publication: October 29, 2025

1. Introduction

Internet addiction in the elderly is not merely an individual mental health issue but also one of family harmony and social stability. Today, overuse of mobile phones among China's elderly is center stage, with 35% of the elderly spending over 4 hours a day on short-form video watching and 37% of the elderly spending over 5 hours on the phone overall ^[1-2]. Overuse of phones has led to conflicts in 20% of families. Meanwhile, the incidence of mental loneliness among urban empty-nest elderly reaches up to 34.25% suggesting social role adaptation problems and a

lack of psychological compensation mechanisms among the elderly^[3].

Existing research has a propensity to consider technological adaptation from the perspective of “digital age-friendliness” but overlooks the psychological motivations brought about by social role deprivation among the elderly^[4]. Moreover, spiritual support dimensions such as respect for personhood, reassurance through achievements, and emotional comfort have not been incorporated very well into the analytical framework of elderly online behavior^[3]. Thus, this study attempts to reveal the behavioral mechanism through which older individuals seek online compensation due to the lack of offline roles from the social role adjustment and reconstruction point of view.

The study selects Xuhui District, Shanghai, as the study area. It has high aging, diverse community types, and its aging population is highly typical and representative in terms of education level, economic status, and social engagement. This will facilitate an in-depth examination of the mechanism of the interaction between role adaptation and online behavior among retired elderly in large cities. The findings have reference value for the development of aging policy and the planning of elderly care services in comparable urban communities.

2. Research questions

The central research question of this research is: What are the dimensions that comprise the influence mechanism of social role adjustment and reconstruction on internet dependency behavior among the retired elderly? The chapter-to-chapter logical flow is briefly explained as follows: Part II is the literature review, Part III is the research methodology, Part IV is the discussion of findings with accrued data and existing literature, Part V is the synthesis of discussion and conclusions, and Parts VI and VII are the references and appendices, respectively.

3. Literature review

Internet addiction behavior research in elderly people is an interdisciplinary field encompassing psychology, sociology, communication, and gerontology. Existing research has developed an explanation system along the following dimensions theoretically, but there are serious deficiencies and controversies.

3.1. Hierarchy of needs and compensatory behavior-based research line

This strand of thinking comes primarily from the extension and application of Maslow’s hierarchy of needs theory to old age^[4]. Scholars easily arrive at a consensus that older individuals have a structural lack of emotional needs, achievement needs, and self-esteem needs after retirement.

Emotional needs deficiency is generally brought about by damaged family intergenerational support. The “filial piety without actual care” phenomenon compels the elderly to the interactive functions of short-form video apps (e.g., likes, comments) for immediate emotional feedback^[5].

Achievement needs deficiency is linked to social participation deprivation. Some elderly people reconstruct their self-efficacy through internet activities like live-stream selling and knowledge sharing^[4].

Compensatory mechanisms for self-esteem needs are usually fulfilled through posting content on social media and “seeking presence” in family group chats, offsetting marginalization of their voice in real life.

Yet there is a fundamental controversy in this practice: Is internet addiction an “active adjustment” to later life or a “passive escape”? Advocates of “Activity Theory” emphasize that the internet provides a new channel for the elderly to “play a role”, effectively compensating for the loss of traditional social roles^[6]. Other scholars caution

that over-reliance on virtual contact will exacerbate real-life alienation. For instance, Li Deming's investigation of empty-nest elders found that the loneliness level among the high internet use group increased significantly after disconnection by 38%, indicating the vulnerability and temporariness of this compensation mechanism ^[7]. This controversy suggests that a single application of the need compensation perspective is not sufficient to fully explain the dual nature of internet addiction, and the engagement of broader socio-cultural perspectives is necessary.

3.2. The inhibitive effect of social role expectations and cultural norms

Traditional Chinese concepts of care for the elderly promote "enjoying one's later years in peace", which puts the elderly in the position of being cared for rather than being social actors. The cultural discourse of "retirement means rest" significantly restricts the diversity of social roles for the elderly ^[3]. The "alienated filial piety" phenomenon (i.e., ritualized rotating meal systems) in fulfilling material care obligations inadvertently erodes the family prestige and dignity of the elderly, triggering an escape mentality that drives them to the virtual world ^[3].

Policy lag also adds strength to this phenomenon. Although community elderly services have attained gains in material security, there are severe deficiencies in spiritual empowerment. Zhou Shaobin pointed out that 77.9% of communities lacked formal elderly universities or continuing learning platforms, significantly limiting channels for continued socialization among the elderly ^[4]. This double squeeze from culture and institutions renders it difficult for the elderly to obtain role reconstruction offline, and they have no alternative but to seek substitute satisfaction online.

3.3. Enabling role of social and offline space

There were some researchers who, in recent years, have been interested in the impact of a community's natural and social environment on the reconstruction of social roles for elderly individuals. Lyshol et al.'s work in Norwegian communities showed that optimizing green public spaces highly enables intergenerational contact, thereby leading to greater life satisfaction and a sense of belonging among the elderly ^[6]. These studies emphasize that the combination of physical space with opportunities for social interaction can effectively alleviate the feeling of loneliness in older individuals and reduce their reliance on virtual space.

On the other hand, though community construction is being emphasized more and more in China, integration between the practical function of communities and role reconstruction for the elderly is insufficient. A survey by Zhou Shaobin showed that 47.7% of communities lacked special activity rooms for the elderly, and existing green spaces were not effectively integrated with the social empowerment needs of the elderly ^[4]. This suggests that the community, as a significant arena for offline role adjustment of the elderly, has not yet fully functioned.

3.4. Deficiencies of existing research and the positioning of this study

Although the aforementioned studies provide valuable observations, there are still the following three limitations:

Limitations in research objects: Existing empirical studies habitually focus on the aging population in small and medium-sized cities or rural areas, and insufficient attention is paid to the high-income, highly educated retired group in metropolises like Shanghai. The online behavior patterns of this group are more diversified (e.g., short video creation, online learning, social e-commerce), and the issues of role adaptation are more characteristic of the times.

Lack of theoretical integration: Most studies concentrate on a single explanatory direction, failing to

incorporate psychological compensation, cultural suppression, environmental support, and other variables into an explanatory model. Therefore, it is difficult to reveal the interaction mechanisms of different factors.

Neglect of new online behaviors: With the development of new internet behaviors such as short-form video apps, older influencers, and internet consumption, the traditional internet use scales cannot cover the new characteristics of internet addiction in older people anymore. Theoretical development lags behind the speed of practical development.

4. Research methodology

4.1. Theoretical framework

This study is based on an integrated model of Social Role Theory (Goffman), Social Identity Theory (Tajfel), and the Digital Divide theory (van Dijk), introducing the novel idea of “digital exclusion” for the comprehensive study of digital divide issues faced by the elderly at the access, usage, and effectiveness levels.

Social Role Theory emphasizes that role-playing gives the individual social identity, and role disruption can easily cause a crisis of self-worth. This study constructs a Role Deficit Scale (with subscales of professional value, family decision power, and community participation) to test the causal relationship between role deficit and internet dependency.

Social Identity Theory argues that in the absence of real group identity, individuals would utilize virtual groups to seek identity. This study adopts questionnaires and in-depth interviews to investigate the mechanism of the virtual group identity construction of the elderly.

Digital Divide theory helps this study analyze elderly online behavior structural barriers at three layers: access to technology, use skills, and use outcomes.

4.2. Research methods

This study adopts a mixed-methods design, integrating qualitative questionnaires and quantitative regression analysis. The data is collected by sampling surveys, supplemented by field observations to enhance data authenticity and depth. The questionnaire contains 24 items covering fundamental respondent information, perceived role deficit, cultural norm identification, social marginalization experiences, and internet use behavior.

Furthermore, the present study employs hierarchical regression models in hypothesis testing of the study, developing a main effect model of role deficit on internet dependency.

Sampling surveys possess the advantages of efficiency and wide coverage, whereby large-scale data can be gained in a short time; field research can allow deep immersion in the community settings to chronicle the natural attitudes and behavior of the elderly in their daily lives. The research limitation lies in the fact that the sample is drawn from Xuhui District, Shanghai, alone, so whether the conclusions can be applied at the national level requires further verification.

5. Analysis and conclusion

Under the guidance of Social Role Theory, Social Identity Theory, and the Digital Divide theory, this research adopted a mixed-methods design, including a questionnaire survey and field interviews to make an empirical examination of 134 retired older adults in Xuhui District, Shanghai. It probed systematically into the influence mechanism of social role adjustment and reconstruction on internet dependency behavior of retired older adults.

By examining the associative trajectories between role deficit, cultural norms, social marginalization, and internet dependency, the study unraveled the fundamental logic of “offline role lack: online compensatory satisfaction.” The main findings, theoretical contributions, practical implications, and research limitations are laid out in an orderly fashion below.

5.1. Major research conclusions: Mechanism of multi-factor interaction inducing internet dependency unraveled

Based on the cross-validation between questionnaire data (effective response rate 92.3%) and in-depth interviews (23 typical cases), the research confirmed the significant impact of three major factors on internet dependency among the elderly, with “superimposed reinforcement” effects among them.

5.1.1. Role deficit has a direct impact on internet dependency, with differential effects on various dimensions

Empirical results show a significant and positive predictive effect of role deficit on internet addiction ($\beta=0.42$, $P < 0.01$), with differential strength of impact on the different deficit dimensions.

Decline in professional worth had the most prominent impact: 81.3% of professionals and technicians who were surveyed and were retired indicated they resorted to the internet (e.g., knowledge-sharing sites, industry forums) because they “could no longer realize value through work” following retirement. This group’s internet dependence scale score ($M=3.87$, $SD=0.62$) was also significantly higher than that of the non-professional/technical group ($M=3.21$, $SD=0.75$).

Compromised family voice was next: 45% of elders who felt their “family opinions are not valued” used 1.2 hours more mobile phone time each day compared to the “opinions valued” group, and tended to try to get attention by “frequently sending messages” or “forwarding health-related content” in family groups.

Lack of community involvement also exerted a relatively moderate influence: 51.49% of elderly people who “rarely participate in community activities” contained a higher percentage of internet addiction (58.7%) compared to the “frequent participants” group (32.1%), but the degree of difference was weaker than the first two deficiencies.

This is indicative of role deficit as not a unidimensional “shortage”, but a structural fault in multidimensional needs (achievement, self-esteem, belonging), the lack of professional value being the strongest impetus of internet dependence.

5.1.2. Cultural norms aggravate internet dependence through the mediating path of “internalized prejudice—inhibition of behavior”

Cultural norms within traditional aged care culture, i.e., “enjoying one’s later years in peace” and “elderly = care recipients”, indirectly reinforce internet dependency through the “internalization of self-ageism” among older adults:

87.13% of the respondents who agreed that “the elderly should reduce social participation” scored significantly lower on the offline participation willingness scale ($M=2.15$, $SD=0.58$) compared to those who disagreed ($M=3.62$, $SD=0.61$). This group tended to view the internet as a “safe alternative participation space.”

61.94% of the subjects who presumed “elderly learning capacity is poor” were more inclined to be frustrated when learning digital skills and hence adopted “low-threshold short-form video watching” (daily average use 4.2 hours) over “high-engagement online creation” (daily average use 1.8 hours).

Adopting Mu Guangzong's "alienated filial piety" theory, this study also found that the phenomenon of children practicing "sufficient material support but insufficient spiritual care" (reported by 67.2% of respondents) reinforced the elders' perception of their "real-life family role being worthless", ultimately forming a closed cycle of "cultural norm suppression—avoidance of real-life roles—reinforcement of internet addiction."

5.1.3. Social marginalization and digital exclusion are structural contributory factors to internet addiction

Social marginalization and digital exclusion do not occur independently but influence internet addiction through a chain mechanism of "lack of environmental support—exacerbation of real-life loneliness—increased demand for online compensation."

Community level: 47.7% of the participants' communities lacked "dedicated activity rooms for the elderly", and only 23.1% of communities provided "intergenerational interaction programs." The actual daily loneliness score of the elderly in such communities ($M=3.91$, $SD=0.73$) was significantly higher than in communities with adequate support ($M=2.58$, $SD=0.65$), and internet dependence was 29.3% more common.

Digital level: Although 91.8% of respondents had smartphones, only 38.1% had developed skills such as "online community management" or "short-form video creation" (digital usage divide). 62.3% reported being "unclear about the authenticity of online information" (digital outcome divide). This "low-skill to high-risk perception" group was more inclined towards "passive browsing dependency" (i.e., scrolling blindly through short videos) than "active participatory use."

5.2. Theoretical contribution: Bridging existing research gaps from different aspects

Building upon existing literature, the current study expands the theoretical boundaries of elderly internet addiction research in the subsequent three ways:

Integrated Multi-Disciplinary Theoretical Framework: It is the first to incorporate Social Role Theory (micro-level role deficit), Social Identity Theory (meso-level cultural norms), and the Digital Divide theory (macro-level structural exclusion) into a holistic analytical model. This goes beyond the limitation of "single-perspective explanation" in previous studies, explains the interaction mechanism of "micro-meso-macro" factors, and provides a new paradigm for research on the synergistic effect of multiple factors on internet dependency.

Extended Research Objects and Behavior Types: Basing research on the "highly educated, high-income retired group" of Xuhui, Shanghai (45.5% of the respondents had a bachelor's degree or above) corrects the former focus on "small/medium-sized cities or rural elderly." At the same time, consideration of emerging online behaviors such as "short-form video creation" and "senior community operation" corrects the narrow classical view of "internet dependency = excessive browsing", making theoretical explanations more in line with the new features of elderly online behavior in the digital era.

Heightened Dialectical Realization of the "Compensatory Satisfaction" Mechanism: According to longitudinal comparison (pre-post changes in loneliness as a result of internet usage), it was found that the "compensatory" nature of internet addiction has a dual property of being "short-term effective—long-term ineffective": Internet use reduces loneliness by 28.3% in the short term (within 1 week), but in the long term (after 3 months) excessive dependence causes a 37.6% rebound in loneliness (echoing research by Li Deming, 2003). This result provides empirical evidence for the solution of the theoretical debate on whether internet addiction is an active adaptation or a passive evasion.

5.3. Practical implications: Recommending operable intervention pathways on four levels

Based on the findings, this study provides targeted intervention suggestions on four levels of “individual, family, community, policy” for reducing internet addiction in older people:

Individual level: Raise “role reconstruction” awareness and digital literacy: Organize “retirement role transition workshops” in community organizations to help the elderly find “alternative offline roles” (e.g., community volunteers, elderly lecturers). Meanwhile, organize “tiered digital training”, teaching “information discernment” and “risk prevention” to the “low-skill group”, and guiding the “high-skill group” towards “integrating online creation with real-world participation” (e.g., linking short-form video creation themes with community activities).

Family level: Reconstruct the nature of “spiritual support”: Make children shift from “material provision” to “role recognition + emotional interaction”, e.g., discussing “family matters” with the elderly regularly (providing greater family voice), asking the elderly to share “online experiences” (recognizing the value of their online activities), and reducing the negative impact of “alienated filial piety” on the role perception of the elderly.

Community level: Create “role reconstruction supportive spaces”: Make full use of the physical environment (e.g., incorporate old people’s activity rooms, design “intergenerational shared green spaces”) and design “role-appropriate activities” (e.g., inviting older persons to participate in “community councils” or “youth traditional culture guidance”). Transform the community from a “material service venue” to a “core arena for elderly role reconstruction.”

Policy level: Promote the direction of “spiritually empowering” aging policies: Incorporate indicators like “elderly social participation rate” and “community support satisfaction” into aging work performance evaluations. Increase financial investment in “elderly universities” and “community cultural activity centers.” Institutionally safeguard the rights of the elderly to “continued socialization”, reducing the structural impact of “cultural norm suppression” and “social marginalization.”

5.4. Research limitations and future prospects

There are three significant limitations in this research that need to be improved in future studies:

Sample representativeness limitation: The sample was only taken from Xuhui District, Shanghai, where the economic and community service levels are above the national level. The findings cannot be directly generalized to rural areas or small/medium-sized cities. Future research needs to have “multi-regional comparative studies” (e.g., Tier 1 cities vs. Tier 3/4 cities, urban vs. rural) to enhance the universality of findings.

Research method limitation: The use of cross-sectional data (a single survey) cannot demonstrate the dynamic development process of “role change—internet dependency.” Future studies can use a “longitudinal tracking design” (e.g., every 6 months for 2 years, conducting surveys) to further examine causal relationships between variables.

Absence of behavioral type segmentation: The study did not further segment the dependence mechanisms of different online behaviors, such as “short-form video browsing”, “online socializing”, and “online shopping.” Future research can conduct “behavioral type segmentation studies” to propose targeted intervention strategies (e.g., focusing on “content guidance” for “short-form video dependence” and “rational consumption education” for “online shopping dependence”).

In conclusion, the current research, through empirical analysis, clarified the mechanism of the relationship between internet dependency and social role adjustment in retired elderly. Its fundamental worth is, in theory,

proving that “offline role deficiency is the root cause of internet dependence” and, in practice, providing feasible paths for “reducing internet dependence through role reconstruction.” Future studies must involve larger samples, more dynamic methodology, and more sophisticated behavioral typologies to better understand this phenomenon, to provide more theoretical basis and practical guidance for addressing the “digital adaptation of the elderly” in an aging society.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Tencent Research Institute, 2022, Internet Usage Trends among the Silver-haired Population Report.
- [2] China Internet Network Information Center (CNNIC), 2023, Statistical Report on China’s Internet Development.
- [3] Mu G, 1999, Empty Nest Families and Mental Loneliness in the Elderly. *Chinese Journal of Population Science*, 1999(4): 25–30.
- [4] Wu Z, 2003, Mental Health and Digital Adaptation in the Elderly. *Advances in Psychological Science*, 11(5): 545–549.
- [5] Mu G, 2004, Family Responsibility and Social Support for Spiritual Elderly Care. *Journal of Huazhong University of Science and Technology (Social Science Edition)*, 18(6): 112–116.
- [6] Zhou S, 2005, Spiritual Needs of the Elderly and Community Support. Social Sciences Academic Press, Beijing.
- [7] Li D, 2003, A Study on the Relationship between Loneliness and Internet Use Behavior among Empty-nest Elderly. *Chinese Journal of Gerontology*, 23(8): 502–504.
- [8] Lyshol H, 2024, Green Space and Intergenerational Interaction in Elderly Mental Health. *Journal of Aging & Environment*, 38(2): 145–160.
- [9] Research Team on Digital Exclusion and the Digital Divide among the Elderly, 2025, Research on Digital Exclusion and the Digital Divide among the Elderly. Retrieved on May 27, 2025.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

A Pragmatic Analysis of Corporate Public Relations Apology Strategies on Weibo

Jinmei Ke, Qing Yang*

Faculty of Foreign Language Studies, Guangdong Ocean University, Zhanjiang 524000, China

*Corresponding author: Qing Yang, yangq@gdou.edu.cn

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: This study explores the pragmatic strategies of corporate public relations (PR) apologies on Weibo and their effectiveness, adopting an integrated framework of Speech Act Theory and the Politeness Principle. Through qualitative analysis of 20 official apology statements (2024–2025) and in-depth study of 4 representative cases, two core findings are derived: First, corporations employ five integrated pragmatic strategy patterns, which form a progressive system from emotional repair to identity reshaping. Second, strategy effectiveness relies on adaptation to Weibo’s features such as short-text constraints, real-time interactivity, and information fragmentation. This study supplements Western-centric pragmatic theories with Chinese new media context insights and provides guidance for corporations to design context-appropriate Weibo apology strategies, enhancing crisis management and trust restoration.

Keywords: Corporate PR apologies; Pragmatic strategies; Speech act theory; Politeness principle; New media context

Online publication: October 29, 2025

1. Introduction

Against the backdrop of new media communication, Weibo serves as a pivotal platform for corporations to conduct crisis public relations (PR) work due to its rapid and extensive information dissemination. In this context, corporate apology discourse on Weibo is not merely a linguistic expression of regret, but a dynamic pragmatic practice. It requires aligning linguistic choices with two key factors: the platform’s real-time interactive context (e.g., public sentiment volatility, short-text communication constraints) and the audience’s cognitive expectations. The ultimate goal of this alignment is to achieve the communicative intent of trust restoration. For crisis PR, therefore, an urgent question arises: how can corporations design apology strategies from a pragmatic perspective? To address this, two core steps are necessary: optimizing speech acts to fit contextual needs and applying politeness norms to mitigate public resistance.

In this regard, Speech Act Theory (SAT), initially proposed by J. L. Austin (1962) and further developed by J. R. Searle (1969), centers on the concept of “doing things with words” and provides a structural analytical

framework for deciphering the essence of corporate PR apologies ^[1-2]. Meanwhile, the Politeness Principle (PP), introduced by G. N. Leech (1983), complements SAT by focusing on the strategic side of pragmatic communication ^[3]. It offers theoretical support for interpreting the ways in which companies adjust their language to preserve the public's "face" and reduce psychological resistance from the audience. These two theories construct the dual-dimensional analytical framework of "act type plus politeness strategy" for solving a key pragmatic conflict in apology discourse, that is, how to "admit fault" honestly while still "protecting the brand's image."

2. Literature review

Existing research on PR discourse has laid a theoretical foundation for this study, with scholarly attention evolving from traditional media contexts to new media environments. In traditional PR settings, early studies focused on grounding discourse analysis in pragmatic theories. Zhang applied Speech Act Theory (SAT) to systematically analyze the constitutive rules of PR discourse, providing a theoretical framework for multi-dimensional characteristics ^[4]. Li further refined the specific application of the Politeness Principle (PP) in PR discourse, validating the positive impact of politeness strategies on public trust ^[5]. From the perspective of the interaction between the Cooperative Principle and the Politeness Principle, Wang pointed out the pragmatic phenomenon of "violating cooperation with politeness" in PR practice, such as using vague expressions to maintain the public's face, providing a new perspective for the strategic study of apology discourse ^[6].

As research shifted to a new media context, scholars began addressing platform-specific influences on PR strategies. Zhu highlighted the influence of new media communication matrices on PR strategies. Her focus, however, remained on channel innovation, lacking integration with the comprehensive application of SAT and PP ^[7].

Overall, existing research has the following three main limitations. First, prior studies mostly focus on offline or general media contexts, and thus lack a systematic analysis of the pragmatic strategies of PR apologies tailored to the Weibo setting, which is characterized by conciseness, wide reach, and rapid dissemination. Second, previous studies are largely grounded in Western pragmatics frameworks, yet Jiang and Hu have pointed out that these theories are mostly derived from Western social backgrounds or English linguistic contexts, and often neglect the differences and particularities of apologies in other cultures and languages ^[8]. Therefore, it is necessary to supplement existing theories within the Chinese native social context. Furthermore, while existing research has applied SAT or PP in isolation, they have not yet constructed a dual-dimensional analytical framework of "act types + politeness strategies" to explain how the two theories interact. Additionally, existing work does not reveal how apology strategies adjust across different crisis stages, leaving a gap in understanding dynamic pragmatic adaptation.

To address these gaps, this study integrates SAT and PP to systematically analyze the pragmatic strategies of PR apologies on Weibo. Specifically, it focuses on the synergistic application of speech acts and politeness maxims, with the aim of providing empirical evidence and theoretical guidance for corporate PR practice in the new media era. Based on this, this study proposes the two core research questions: 1) What types of pragmatic strategies do corporations employ in their PR apologies on Weibo, and 2) how do these strategies achieve (or fail to achieve) effective communicative outcomes?

3. Theoretical framework

Grounded in Speech Act Theory and the Politeness Principle, this study constructs a dual-dimensional analytical

framework of “act types plus politeness strategies” to systematically unpack the pragmatic mechanism of corporations’ PR apologies on Weibo. Speech Act Theory, proposed by J.L. Austin in 1962, emphasizes that language is not merely a tool for expressing meaning, but also a medium for performing social acts in specific contexts ^[1]. Later, Searle further categorizes speech acts into five types: expressive, assertive, directive, commissive, and declarative, providing a clear framework for analyzing discourse strategies ^[2]. However, in PR apologies, defining what to say is insufficient; the key lies in how to express it to effectively soothe public sentiment and repair trust deficits. Therefore, this study adopts Leech’s Politeness Principle as a pragmatic framework ^[3]. Comprising the maxims of Tact, Generosity, Approbation, Modesty, Agreement, and Sympathy, this principle governs expression at the psychosocial level, helping to mitigate psychological resistance among audiences in highly sensitive contexts, thereby enhancing apology acceptance and facilitating trust repair.

Notably, when applying the aforementioned theories to Weibo, its distinctive media-specific characteristics require full consideration, like short texts, high interactivity, and profoundly influencing the ways in which speech acts are realized. For instance, declarative acts need to be concise and to the point to adapt to platform reading habits; expressive acts require more emotional concretization to evoke empathy.

Furthermore, as the social media environment drives users to curate their image, it heightens public demand for authenticity. This prompts organizations to actively employ expressive and assertive acts for emotional disclosure in apologies, thereby constructing a sincere and transparent institutional image and sustaining public relationships. Consequently, corporations often integrate multiple speech acts to achieve both factual clarification and emotional compensation within the limited text length, thereby responding to Weibo users’ dual expectations for informational efficiency and emotional identification. In summary, within Weibo’s specific context, only through the synergistic application of speech acts and the Politeness Principle, adapted to the platform’s communicative environment, can apology messages be accurately understood and widely accepted. Therefore, in the empirical analysis of Part V, based on the above framework, this study will systematically explore the strategic coordination between types of speech acts and the Politeness Principle.

4. Research method

Guided by the integrated analytical framework of SAT and PP, this study adopts a qualitative approach to systematically collect and analyze the corpus of corporate PR apology discourse on Weibo.

4.1. Corpus acquisition

The study’s corpus comprises 20 original PR apology statements, which were all released via official Weibo accounts of corporations between January 1, 2024, and June 1, 2025. The four corporate cases selected for in-depth analysis—Chapanda, Haidilao, Pang Donglai, and Woodpecker Maintenance—each garnered no less than 46.3 million reads on their related Weibo trending topics, indicating significant public attention. These cases cover typical crises such as food safety, product defects, service failures, and false advertising, and have high public attention and representativeness. Additionally, to ensure corpus integrity, all apology texts collected are original statements and key follow-up explanations (e.g., supplementary commitments on compensation) released by corporations via their official Weibo accounts. Meanwhile, popular public comments and media reports were also tracked to gauge sentiment and apology effectiveness.

Through the categorization and sorting of cases, the study found that corporate apology discourse can be

classified into five types based on Searle's (1969): expressive, assertive, commissive, directive, and declarative ^[2]. Representative examples are presented in **Table 1**.

Table 1. Types and examples of speech acts in the Weibo corporate PR apology corpus

| Speech act type | Examples |
|-----------------|--|
| Expressive | (1) "We are deeply grieved and regretful" [Chapanda] (2) "We feel deeply remorseful and grieved" [Woodpecker Maintenance] |
| Assertive | (3) "In the early hours of February 24, 2025, two men urinated in the hot pot base after dining in a private room at Haidilao's Shanghai Waitan branch" [Haidilao] |
| Commissive | (4) "Pay cash compensation equal to tenfold the amount of each order"; "Allocate 1 million RMB" [Chapanda] (5) "We will provide a full refund for the meal, plus cash compensation equal to tenfold the order amount." [Haidilao] |
| Directive | (6) "Stop cyberbullying" [Pang Donglai] (7) "Provide order receipts"; "Call the special hotline" [Haidilao] |
| Declarative | (8) "Dismiss the employees involved"; "Close the store and terminate the contract" [Chapanda] (9) "Abandon PR and accept public inspection"; "Open all comments" [Woodpecker Maintenance] |

4.2. Analytical method

This study employs an integrated method combining content analysis and case study. First, content analysis is employed to classify the types of speech acts within the apology texts, examining their realization and pragmatic functions in the Weibo context. Second, the study further analyzes how corporations embed politeness strategies in different types of speech acts to mitigate conflicts and repair public trust. Finally, case analysis examines differences in apology strategies both across different crisis types and the effectiveness of these strategies among corporations facing similar crises.

5. Pragmatic strategy patterns

This section analyzes five typical cases through the established theoretical framework. It reveals that successful apologies depend not on the mere combination of speech acts and politeness maxims, but on their effective integration. The following subsections examine the application and effects of these strategies in specific crisis scenarios.

5.1. Expressive speech act + sympathy + modesty strategy

In the initial stages of a crisis on Weibo, where public anger is often triggered by moral misconduct or emotional harm, the Expressive speech act becomes crucial. To be effective, it must integrate the Sympathy and Modesty Maxims, facilitating emotional repair through resonance and responsibility acknowledgment.

Case 1: Chapanda's "Fat Cat Incident"

Chapanda employed highly concise expressive acts, such as "deeply grieved and regretful" and "extremely shocked and angry" (**Table 1**, Example (1)), to convey negative emotions. This aligns with the Sympathy Maxim by fostering emotional alignment with the public. Simultaneously, by criticizing the misconduct and admitting management oversight, Chapanda enacted the Modesty Maxim through proactive accountability, thereby demarcating the brand from the deviant behaviors.

Notably, these emotional expressions are highly concise, which aligns with Weibo's short-text constraint

(typically within 140 characters for a single post). In the platform’s context of limited word count, overly lengthy emotional descriptions would risk losing audience attention or being truncated, while concise phrases like “deeply grieved and regretful” can quickly deliver the core of remorse without sacrificing emotional intensity. This linguistic brevity is a pragmatic adaptation to Weibo’s format, which ensures that the Sympathy Maxim (strengthening emotional resonance) and Modesty Maxim (admitting responsibility) are communicated efficiently.

The case demonstrates that the “Expressive speech act + Sympathy + Modesty” strategy effectively lowers public psychological defensiveness and aids trust repair through emotional resonance and self-criticism. These findings empirically support Page’s claim that the sincerity demonstrated in corporate apologies significantly influences their public acceptance ^[9]. From a pragmatic perspective, such intensified expressions align with the tendency of native Chinese speakers to strengthen linguistic tone when making apologies, serving not only to demonstrate politeness and sincerity but also acting as an effective face-saving strategy ^[10].

In Weibo’s highly interactive environment, this strategy adopts a modest and accountable stance that acknowledges public sentiment while demonstrating corporate responsibility, thereby helping to restore brand credibility in the early stages of a crisis. However, if the crisis arises from informational ambiguity or factual dispute, reliance solely on emotional expression proves ineffective, necessitating a shift towards assertive strategies to rebuild credibility with facts.

5.2. Assertive speech act + tact + agreement strategy

In crisis PR on Weibo, assertive speech acts—including factual statements, responsibility delineation, and process explanations—are essential for establishing credibility. To mitigate public anxiety stemming from information asymmetry, these acts must be strategically integrated with the Tact and Agreement maxims.

Case 2: Haidilao

Haidilao explicitly asserted factual details such as, “In the early hours of February 24, 2025... two men urinated in the hot pot base” (**Table 1**, Example (3)), and reinforced this with precise data, including a “complete timeline” and “4,109 affected orders.” Additionally, by stating it would “transfer the right to the police and judiciary”, Haidilao ceded authority to objective institutions, thereby avoiding self-justification and enhancing external credibility.

This strategic use of assertive acts is a direct adaptation rooted in Weibo’s information traits. The platform’s tendency for information fragmentation and rumor proliferation makes detailed, data-backed assertions crucial. By adhering to the Tact Maxim (proactively acknowledging managerial failures to demonstrate respect for public sentiment) and the Agreement Maxim (presenting a verifiable timeline that aligns with established public knowledge to build consensus), Haidilao effectively bridged information gaps, thereby reducing asymmetry and upholding procedural justice.

The case demonstrates that the “Assertive speech act + Tact + Agreement” strategy effectively steers public perception from skepticism toward acceptance by constructing a credible factual framework. It provides a necessary foundation for restoring trust. However, while this strategy clarifies the truth, it cannot fully compensate for tangible public losses. After establishing factual credibility, corporations must still rely on commissive acts to convert words into substantive remedial actions.

5.3. Commissive speech act + generosity + tact strategy

Commissive speech acts, including compensation, rectification, and accountability, need to be combined with the

Generosity and Tact maxims to achieve brand image rehabilitation through supra-expected compensation.

Case 3: Chapanda “Fat Cat Incident”

Chapanda made a series of core commitments, including “dismiss the involved employees and terminate the store’s contract”, “provide tenfold compensation”, and “allocate an additional 1 million RMB to the ‘Fat Cat’ public welfare fund” (see **Table 1**, Examples (4) and (7)). These actions collectively constructed a robust remedial framework that pragmatically operationalized the Generosity and Tact Maxims.

Specifically, Chapanda’s response demonstrates a strategic alignment with both maxims through a series of concrete actions. The company upheld the Generosity Maxim by offering tenfold compensation and establishing a public welfare fund, thereby exceeding expectations and extending its commitment to a societal level. It concurrently adhered to the Tact Maxim by terminating the store contract and elevating redress through charitable donation, thereby imposing a tangible cost for misconduct and addressing broader public concerns.

Notably, these commitments are highly specific and action-oriented. On Weibo, where short texts dominate and public attention is easily diverted, vague promises often trigger skepticism. By contrast, Chapanda’s quantified pledges (tenfold compensation, 1 million RMB fund) and definitive actions (employee dismissal, contract termination) quickly convey “substantive responsibility” to audiences. This avoids the risk of information ambiguity in Weibo’s fast-paced dissemination environment, ensuring the public grasps the core of the company’s redress measures and meets the audience’s cognitive expectations, ultimately achieving image restoration.

This strategy indicates that successful commitments cannot be empty declarations; instead, they must deliver tangible value. As highlighted by Huang and Yi, the strategic use of linguistically concrete “Material Processes” in commissive acts is crucial for showcasing a company’s problem-solving ability, which forms the cornerstone of trust repair in crisis communication ^[11]. While commissive strategies can address direct losses, they often fail to fully guide public opinion. When misinformation or extreme emotions spread on Weibo, corporations need to employ directive acts to provide reasonable guidance.

5.4. Directive speech act + tact + sympathy strategy

In crisis PR, directive speech acts function to harmonize social relations, yet their effectiveness relies on the combination of the Tact and Sympathy maxims. This integration transforms “directives” from unilateral demands into bidirectional empathy, thereby enhancing public acceptance.

Case 4: Pang Donglai

In its second-phase statement, Pang Donglai issued clear behavioral guidance: “Stop Cyberbullying; do not attack or blame the involved customer” (**Table 1**, Example (6)). By curbing cyberbullying, the directives prevent the customer from suffering secondary harm, demonstrating an in-depth understanding of the customer’s emotion, which aligns with Sympathy Maxim. Simultaneously, by focusing specifically on the act of “ceasing cyberbullying”, they avoid over-restricting public freedom of speech while effectively addressing public opinion demands, thereby conforming to the Tact Maxim.

Notably, this directive is highly targeted and concise—an intentional adaptation to Weibo’s communicative characteristics. On a platform dominated by short texts and real-time interactions, vague or overly broad guidance often fails to grab attention or curb problematic behaviors, as audiences may overlook ambiguous messages amid a flood of information. By contrast, Pang Donglai’s focus on “stopping cyberbullying” and “protecting the involved customer” delivers a clear, actionable signal. This brevity and specificity ensure the directive is quickly understood and disseminated, directly addressing the risk of cyberbullying escalation in Weibo’s fast-paced, emotion-driven

discourse space.

When the two maxims work in synergy, directive acts are no longer one-way crisis management tools but evolve into a two-way communication bridge linking emotional resonance and action guidance. This strategy not only calms public opinion swiftly but also reshapes the public's recognition of the brand's responsibility through empathetic guidance. While directive strategies create favorable conditions for crisis resolution by harmonizing social relations, corporations must adopt more authoritative declarative strategies to achieve fundamental brand rehabilitation.

5.5. Declarative speech act + modesty + tact strategy

Through formal announcements on contract terminations, penalties, and donations, declarative speech acts demarcate boundaries and reshape identity in crisis PR. By applying both the Modesty Maxim to demonstrate sincerity and the Tact Maxim to align with public values, the strategy achieved its dual-oriented effectiveness.

Case 5: Woodpecker Maintenance

Woodpecker's secondary statement broke convention by declaring it would "abandon PR and accept public inspection" and "open all comments without deletion" (**Table 1**, example (9)). This self-subversive move thoroughly negated its initial perfunctory response and admitted its systemic failure, which fully conforms to the Modesty Maxim. Concurrently, by ceding all control over public commentary, it used radical transparency to respond to the core public demand for sincerity, thereby strengthening the "tactfulness" aligned with the public's psychological expectations.

The exceptional potency of this declarative strategy is deeply rooted in Weibo's communicative dynamics. The platform fosters intense public scrutiny and rewards gestures of radical honesty. The critical synergy between the two maxims is evidenced by thorough modesty (admitting failure), establishing the necessary foundation for a profound display of tact (ceding control to the public). This integrated approach makes the commitment to full transparency appear both reasonable and credible, ultimately working to rebuild certainty from the ruins of trust.

In summary, Woodpecker's deployment of the "Declarative speech act + Modesty + Tact" strategy proves highly adaptive to Weibo's communicative ecology. The synergy between Modesty and Tact renders radical transparency credible, enabling the brand to demarcate its past failures from future commitments and rebuild essential trust. This approach demonstrates the practical value of a dual-oriented pragmatic framework in effectively resolving Weibo-era crises.

Reviewing the five types of strategies discussed, corporate apologies on Weibo constitute a systematic pragmatic initiative progressing from emotional repair (Expressive) to factual clarification (Assertive), then to substantive compensation (Commissive), supplemented by relationship coordination (Directive) and identity reshaping (Declarative).

6. Conclusion

This study set out to address two core research questions: (1) what types of pragmatic strategies corporations employ in their PR apologies on Weibo, and (2) how these strategies achieve (or fail to achieve) effective communicative outcomes. Through systematic analysis of corporate apology discourse, this research reveals that effective apologies depend not on the simple superposition of speech acts and politeness maxims, but rather their strategic integration within Weibo's unique communicative environment.

First, the analysis identifies five distinct pragmatic strategies that corporations systematically employ in Weibo apologies. First, the Expressive Speech Act + Sympathy + Modesty strategy enables swift emotional repair through concise yet resonant expressions that acknowledge public sentiment while demonstrating corporate accountability. Second, the Assertive Speech Act + Tact + Agreement strategy establishes factual credibility through verifiable data and transparent disclosures that counter information asymmetry. Third, the Commissive Speech Act + Generosity + Tact strategy converts verbal apologies into substantive redress through supra-expected compensation and concrete commitments. Fourth, the Directive Speech Act + Tact + Sympathy strategy guides public behavior while maintaining social harmony through targeted and empathetic guidance. Finally, the Declarative Speech Act + Modesty + Tact strategy achieves fundamental identity reshaping through formal institutional commitments that demonstrate radical accountability.

Second, strategy effectiveness stems from adaptation to Weibo's features. The platform's short-text constraints demand linguistic brevity, making concise emotional expressions and specific commitments particularly effective. Weibo's real-time interactivity necessitates immediate emotional engagement through Expressive acts in early crisis stages. The platform's information fragmentation requires detailed, data-backed Assertive acts to counter rumor proliferation. Furthermore, Weibo's culture of public scrutiny rewards the radical transparency embodied in Declarative acts, while its emotionally charged discourse space benefits from the balanced guidance of Directive strategies.

The research indicates that these five strategies do not exist in isolation but constitute a systematic pragmatic initiative progressing from emotional repair and factual clarification to substantive compensation, relationship coordination, and finally identity reshaping. Corporations can dynamically integrate and flexibly apply these strategies according to the crisis type and development stage, thereby achieving an effective closed loop of crisis communication and trust restoration. This study supplements Western-centric theories with Chinese new media context insights and offers actionable guidance for corporations to refine Weibo apology strategies, enhancing crisis management and long-term reputation building.

Funding

This research was supported by the 2023 Guangdong Provincial Education Science Planning Project (Higher Education Section) (2023GXJK301) and the 2024 Discipline Co-construction Program of the Guangdong Provincial Philosophy and Social Sciences Planning Project (GD24XWY07).

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Austin JL, 1962, *How to do Things with Words*. Oxford University Press, Oxford.
- [2] Searle JR, 1969, *Speech Acts: An Essay in the Philosophy of Language*. Cambridge University Press, Cambridge.
- [3] Leech GN, 1983, *Principles of Pragmatics*. Longman, London.
- [4] Zhang YM, 2013, An Analysis of the Speech Act in Public Relation Language. *Journal of Jixi University*, 13(10): 118–120.

- [5] Li XC, 2011, Politeness Principle in the Application of the Language of Public Relations. *Journal of Shanxi Agricultural University (Social Science Edition)*, 10(2): 201–205.
- [6] Wang HC, 2005, The Mutual Complementarity of Cooperative Principle and Politeness Principle in Public Relations Pragmatic Effects. *Journal of Adult Education of Hebei University*, 7(1): 55–57.
- [7] Zhu YN, 2025, Innovation and Practical Research on Corporate Public Relations Strategies in the New Media Environment. *Public Relations World*, 2025(8): 15–17.
- [8] Jiang JY, Hu R, 2005, Pragmatic Studies on Apologies and the Improvement of “Meier’s Repair Work”. *Journal of Zhejiang University (Humanities and Social Sciences)*, 35(5): 170–176.
- [9] Page R, 2014, Saying “Sorry”: Corporate Apologies Posted on Twitter. *Journal of Pragmatics*, 62(2): 30–45.
- [10] Fu B, 2010, A Discourse Study on the Language of Apologies in Chinese. *Language Teaching and Linguistic Studies*, 2010(6): 70–77.
- [11] Huang H, Yi PL, 2023, Research on the Trust Repair Discourse Strategy in Corporate Crisis Public Relations Statement on New Media. *Shandong Foreign Language Teaching*, 44(6): 10–20.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Quantitation Method Research for the Pyrrolizidine Alkaloids (PAs) Determination in Botanicals by HPLC-MS/MS

Fan Li^{1*}, Ke Zeng¹, Pengfei Hu¹, Jinjing Li¹, Yanjun Zhang², Peter Chang², Gary Swanson²

¹Herbalife NatSource (Hunan) Natural Products Co., Ltd., Changsha, China

²Herbalife Nutrition, Global Quality, Torrance 90502, USA

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: A HPLC-MS/MS method for the determination of Pyrrolizidine alkaloids (PAs) in green tea, orange pekoe tea, hibiscus flower, chamomile flower, and cardamom seed was developed and validated. Its precision, accuracy, linearity, specificity, LOQ, LOD, and ruggedness were validated following AOAC Guidance for Single Laboratory Validation Procedure. The recovery of the analytes is in a range of 70%–130%. LOQ for 21 PAs in the above botanicals is in a range of 0.8 to 6.5 ppb.

Keyword: Pyrrolizidine alkaloids (PAs); HPLC-MS/MS; Botanicals

Online publication: October 29, 2025

1. Introduction

Pyrrolizidine alkaloids (PAs) were among the first naturally occurring plant carcinogens ^[1–2]. They are known as a class of compounds existing in over 6000 species of botanicals, and the toxicity of PAs on animals and humans is well reported ^[3–4]. However, methods for accurate measurement of PAs in different matrices of foods and ingredients are challenging in terms of the specificity, recovery, and accuracy due to the sample impurity interference ^[5–6].

Currently, most methods published for PAs analysis in botanicals and food are focused on tea, traditional Chinese medicine, and honey, represented by the BfR method, which is also mostly adapted for method development and validation on different food matrices and botanical materials ^[7–10]. The challenge for accurate measurement of PAs in different botanical matrices is how to clean up the samples and reduce the interference of phytochemicals from different botanical materials. The low recovery for the PAs determination was mainly caused by the matrix interference. So a method procedure development focuses on cleaning up the sample by using a combination of cartilages, adjusting the sample concentrations to maximize the ion response of target analytes, and

the purpose is to reduce the matrix interference. In this study, the authors focus on cleaning up the sample by using a combination of cartridges, adjusting the sample concentrations to maximize the ion response of target analytes. In brief, the sample was extracted with 0.05 M sulfuric acid in water by sonication and followed by purification by SPE column, and then the sample solution was subject to HPLC-MS/MS ^[11–13]. With a C18 column separation by gradient elution of 0.1% formic acid in methanol and 0.1% formic acid in water to analyze twenty-one (21) PAs in the botanicals. In this method, a combination of purification procedure and HPLC-MS/MS is good for better separation and achieves higher detection sensitivity.

2. Experimental

2.1. Reagents and standards

Sulfuric acid, GR grade or equivalent; Ammonia (25%-28%), AR grade or equivalent; Methanol, HPLC grade or equivalent; Water, Ultrapure or equivalent; Formic acid, LC-MS or equivalent; Acetonitrile HPLC grade, or equivalent; Standard list (**Table 1**).

Table 1. Standards and information

| Compound | Brand (or equivalent) | Catalog# (or equivalent) | CAS# |
|------------------------|-----------------------|--------------------------|-------------|
| Intermedine | BEPURE | RMT10912 | 10285-06-0 |
| Intermedine N-oxide | BEPURE | RMT10913 | 95462-14-9 |
| Lycopsamine | BEPURE | RMT17384 | 10285-07-1 |
| Lycopsamine N-oxide | BEPURE | RMT17385 | 95462-15-0 |
| Senecionine | BEPURE | RMT24591 | 130-01-8 |
| Senecionine N-oxide | BEPURE | RMT24593 | 13268-67-2 |
| Senecivernine | BEPURE | RMT24602 | 72755-25-0 |
| Senecivernine N-oxide | BEPURE | RMT24604 | 101687-28-9 |
| Seneciphylline | BEPURE | RMT24595 | 480-81-9 |
| Seneciphylline N-oxide | BEPURE | RMT24597 | 38710-26-8 |
| Retrorsine | BEPURE | RMT13555 | 480-54-6 |
| Retrorsine N-oxide | BEPURE | RMT13557 | 15503-86-3 |
| Echimidine | BEPURE | RMT17535 | 520-68-3 |
| Echimidine N-oxide | BEPURE | RMT17536 | 41093-89-4 |
| Lasiocarpine | BEPURE | RMT24697 | 303-34-4 |
| Lasiocarpine N-oxide | BEPURE | RMT24698 | 127-30-0 |
| Europine hydrochloride | BEPURE | RMT13964 | 570-19-4 |
| Europine N-oxide | BEPURE | RMT13965 | 65582-53-8 |
| Heliotrine | BEPURE | RMT10774 | 303-33-3 |
| Heliotrine N-oxide | BEPURE | RMT10775 | 6209-65-0 |
| Senkirkin | BEPURE | RMT2461 | 2318-18-5 |

2.2. Equipment

Analytical balance; Vortex mixer; Pipette; Sonicator; Centrifuge; Volumetric flask; Coffee grinder; SPE cartridge manifold; Graduate Cylinders; Ultra PW system, Purelab flex, or equivalent; Bond Elut SCX cartridges (500 mg, LRC, p/n 14113039); HPLC System: Agilent Technologies 1260 Series Rapid Resolution HPLC, consisting of Binary Pump, Degasser, and Autosampler or equivalent; Agilent Technologies 6420 Triple Quad MS or equivalent; Agilent MassHunter Workstation Software or equivalent; HPLC Column: Agilent InfinityLab Poroshell 120 EC-C18, 2.7 μm , 2.1 x 100 mm, Catalog# 695775-902 or equivalent; Guard Column: Phenomenex HPLC Krudkatcher Ultra Column In-line Filter 0.5 μm Porosity x 0.004in ID, catalog# AF0-8497 or equivalent

2.3. HPLC chromatographic conditions

Mobile Phase: A= 0.1% of formic acid in water; B= 0.1% of formic acid in methanol; HPLC Gradient conditions (Table 2).

Table 2. HPLC Gradient conditions

| | Time, min | Flow, mL/min | A, % | B, % |
|----|-----------|--------------|------|-------|
| 1 | 0.00 | 0.2 | 95 | 5 |
| 2 | 5.00 | 0.2 | 95 | 5 |
| 3 | 10.00 | 0.2 | 93 | 7 |
| 4 | 15.00 | 0.2 | 90.0 | 10.0 |
| 5 | 25.00 | 0.2 | 80.0 | 20.0 |
| 6 | 30.00 | 0.2 | 60.0 | 40.0 |
| 7 | 32.00 | 0.2 | 0.0 | 100.0 |
| 8 | 38.00 | 0.2 | 0.0 | 100.0 |
| 9 | 38.10 | 0.4 | 0.0 | 100.0 |
| 10 | 42.00 | 0.4 | 0.0 | 100.0 |
| 11 | 42.10 | 0.4 | 5.0 | 5.0 |
| 12 | 54.00 | 0.4 | 5.0 | 5.0 |
| 13 | 54.10 | 0.2 | 5.0 | 5.0 |
| 14 | 62.00 | 0.2 | 5.0 | 5.0 |

The MS triple quadrupole parameters are shown in Table 3.

Table 3. MS triple quadrupole parameters

| Parameter | Value |
|--------------------|--------------|
| Ionization mode | Positive ESI |
| Scan type | MRM |
| Gas temperature | 300 °C |
| Gas Flow | 13 L/min |
| Nebulizer pressure | 30 psi |

Table 1 (Continued)

| Parameter | Value |
|--------------------|----------|
| Capillary voltage | 3500 V |
| Cell acceleration | 5 V |
| Cycle time | 500 ms |
| Dwell time | 5 ms |
| Maximum dwell time | 165.8 ms |
| Resolution | Unit |

The MRM transitions and conditions for each PAs are shown in **Table 4** ^[4].

Table 4. Transitions and conditions for each PAs

| Compound | Abbreviation | Precursor ion | Product ion (s) | Fragment | Collision energy |
|----------------------|--------------|---------------|-----------------|----------|------------------|
| Echimidine | Em | 398.2 | 120.2 | 104 | 24 |
| | | | 220.2 | | 16 |
| | | | 118.1 | | 56 |
| Echimidine-N-oxide | EmN | 414.2 | 254.2 | 104 | 32 |
| | | | 352.1 | | 24 |
| | | | 137.1 | | 40 |
| Europine | Eu | 330.2 | 138.1 | 94 | 20 |
| | | | 156.1 | | 32 |
| | | | 94.1 | | 48 |
| Europine-N-oxide | EuN | 346.2 | 172.1 | 94 | 36 |
| | | | 94.1 | | 60 |
| | | | 111.2 | | 52 |
| Heliotrine | Hn | 314.2 | 138.1 | 98 | 20 |
| | | | 156.1 | | 32 |
| | | | 120.1 | | 40 |
| Heliotrine N-oxide | HnN | 330.2 | 172.1 | 102 | 32 |
| | | | 138.1 | | 28 |
| | | | 111.1 | | 48 |
| Intermedine | Im | 300.1 | 138.2 | 106 | 20 |
| | | | 156.3 | | 32 |
| | | | 120.1 | | 28 |
| Intermedine N-oxide | ImN | 316.2 | 172.1 | 112 | 32 |
| | | | 94.0 | | 52 |
| | | | 111.1 | | 44 |
| Lasiocarpine | Lc | 412.2 | 120.1 | 118 | 32 |
| | | | 220.1 | | 20 |
| | | | 336.1 | | 16 |
| Lasiocarpine N-oxide | LcN | 428.2 | 120.1 | 108 | 40 |
| | | | 254.2 | | 32 |
| | | | 94.0 | | 56 |
| Lycopsamine | La | 300.1 | 138.2 | 104 | 20 |
| | | | 156.3 | | 32 |
| | | | 120.1 | | 24 |

Table 4 (Continued)

| Compound | Abbreviation | Precursor ion | Product ion (s) | Fragment | Collision energy |
|-------------------------|--------------|---------------|-----------------|----------|------------------|
| Lycopsamine N-oxide | LaN | 316.2 | 172.1 | 98 | 32 |
| | | | 94.0 | | 48 |
| | | | 111.1 | | 44 |
| Retrorsine | Re | 352.2 | 120.0 | 112 | 32 |
| | | | 138.1 | | 32 |
| | | | 324.2 | | 28 |
| Retrorsine N-oxide | ReN | 368.2 | 118.0 | 106 | 36 |
| | | | 136.1 | | 36 |
| | | | 119.0 | | 36 |
| Senecionine | Sc | 336.2 | 120.1 | 135 | 28 |
| | | | 138.1 | | 32 |
| | | | 308.2 | | 28 |
| Senecionine N-oxide | ScN | 352.3 | 120.2 | 185 | 44 |
| | | | 136.2 | | 38 |
| | | | 94.2 | | 56 |
| Seneciophylline | Sp | 334.2 | 120.1 | 140 | 28 |
| | | | 138.1 | | 32 |
| | | | 306.1 | | 28 |
| Seneciophylline N-oxide | SpN | 350.1 | 120.1 | 108 | 36 |
| | | | 136.1 | | 36 |
| | | | 118.1 | | 36 |
| Senecivernine | Sv | 336.2 | 120.1 | 130 | 32 |
| | | | 138.1 | | 33 |
| | | | 308.2 | | 28 |
| Senecivernine N-oxide | SvN | 352.2 | 94.0 | 110 | 56 |
| | | | 120.2 | | 48 |
| | | | 136.2 | | 40 |
| Senkirkine | Sk | 366.2 | 168.1 | 128 | 32 |
| | | | 150.1 | | 32 |
| | | | 122.1 | | 36 |

The MS triple quadrupole time segment is shown in **Table 5**.

Table 5. MS triple quadrupole time segment

| | Time | Scan Type | Div Valve | Delta EMV + | Stored |
|---|------|-----------|-----------|-------------|--------|
| 1 | 0 | MRM | To Waste | 0 | No |
| 2 | 8 | MRM | To MS | 200 | Yes |
| 3 | 42 | MRM | To Waste | 0 | No |

Column temperature: 40 °C; Sample temperature: ambient; Injection volume: 2 µL; Run time: 62 minutes

2.4. Solution preparation

0.05 M sulfuric acid: Add 2.665 mL of sulfuric acid to 800 mL of water slowly, diluting to 1000mL with water, mix well. Note: If a negative matrix is available, blank plant material extract can instead be 0.05M sulfuric acid.

0.5 % ammonia in methanol: Transfer 10 mL of water and 2 mL of ammonia into a 100 mL volumetric flask, diluting to the mark with methanol, and mix well. This solution must be freshly prepared and used per

working day.

2.5. Standard preparation

PA Standard Stock Solution: Accurately weigh 1 mg of each pyrrolizidine alkaloid standard to a 10 mL volumetric flask individually, dissolve to mark with acetonitrile, and mix well. The concentration of the stock solution is 0.1 mg/mL. Stock Solution in freezer for 30 days ^[4, 14–16].

PA Mixed Mid Stock Standard Solution (PA mixture, 1 µg/mL): Pipette each of 1 mL of PA Standard Stock Solution into a 100 mL volumetric flask, diluting to mark with extraction solution to mark, mix well

Working Standard solution:

Working STD 3: Pipette 200 µL of PA Mixed Mid Stock Standard Solution and add 800 µL of 0.05M sulfuric acid;

Working STD 2: Pipette 100 µL of PA Mixed Mid Stock Standard Solution and add 900 µL of 0.05M sulfuric acid;

Working STD 1: Pipette 500 µL of Working STD 2 Solution and add 950 µL of 0.05M sulfuric acid.

2.6. Method development

The low recovery for PA determination was mainly caused by the matrix interference. So, the focus of method development is on how to reduce the matrix interference. The method is divided into 3 parts as shown in **Figure 1**.

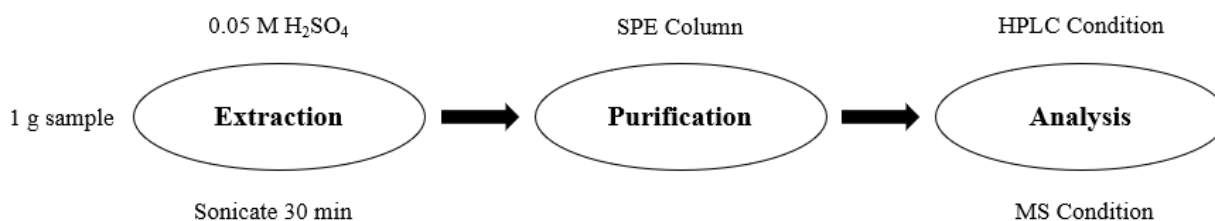


Figure 1. Method development

Extraction: Adjust the sample size to balance the matrix interference and the extraction rate of target analytes (PAs).

Purification: Optimization of the concentration of ammonia in methanol is critical for sample purification. When the matrix contains other alkaline components, such as caffeine. An optimization of the concentration of ammonia in methanol was conducted to maximize the elution of PAs, but to remove most other alkaline components' interference. Four concentrations of ammonia in methanol solution were tested; the results show that 0.5 % ammonia in methanol is the best option (**Table 6**).

Table 6. Recovery result for different concentrations of ammonia in methanol solution

| | 0.3 % Ammonia | 0.5 % Ammonia | 1.0 % Ammonia | 2.5 % Ammonia |
|---------------------|---------------|---------------|---------------|---------------|
| Average Recovery | 92% | 93% | 89% | 85% |
| The Lowest Recovery | 75% | 80% | 76% | 65% |

Analysis: The flow rate was reduced from 0.3 to 0.2 mL/min. This can improve the ionization efficiency of ESI. The higher the ionization efficiency, the smaller the influence of matrix interference.

The injection volume was reduced from 10 to 2 μL . This greatly reduces the burden on ESI, resulting in better ionization efficiency.

The analysis time was extended to reduce matrix interference per unit time. And each PA peak was effectively separated (**Figure 2**).

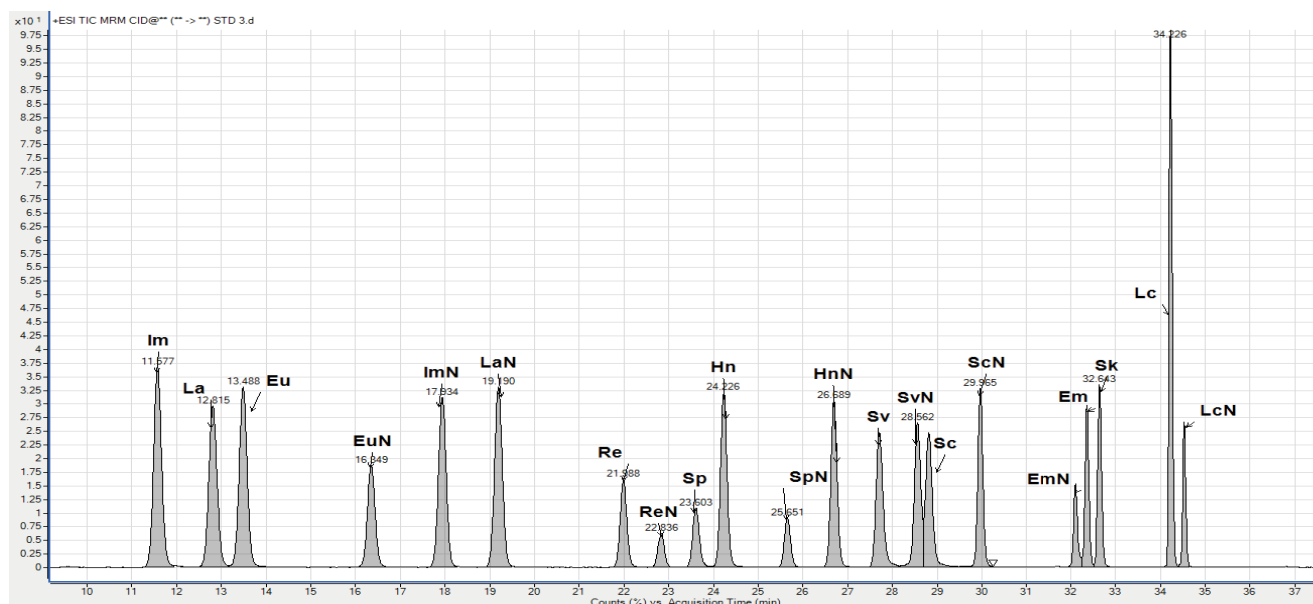


Figure 2. Chromatograph of each Pas

2.7. Sample preparation

2.7.1. Extraction

Weigh $1 \text{ g} \pm 0.1 \text{ g}$ of the sample, accurate to 0.01 g, the amount of the ground and homogenized samples. Transfer the sample to a 50 mL centrifuge tube. Add 38 mL of 0.05 M sulfuric acid solution, vortex for a few seconds. Sonicate the sample in the tube for 30 minutes in an ultrasonic bath at room temperature. Adjust the pH value to 7.0 using ammonia. Add 0.05 M sulfuric acid solution to the 40 mL mark, mix well. Centrifuged at 7000 rpm for 5 minutes. Filter the supernatant through 0.45 μm membrane filters ^[14–17].

2.7.2. SPE-Procedure

Install the SPE cartridge on top of the manifold. SPE column condition: Add 5 mL of methanol on top of the SPE cartridge and let the methanol go through by gravity. Add 5 mL of water on top of the SPE cartridge and let the solution go through by gravity. Collect the solution to waste. Load 20 mL sample solution (filtrate of extract), let the solution go through by gravity, and collect the solution in the waste. Rinse the cartridge with a sample loaded by 4 mL of water, let the water go through by gravity, and collect the solution into waste. Rinse once more. Rinse the cartridge with the sample loaded by 4 mL of methanol, let the methanol go through by gravity, and collect the solution in the waste. Rinse once more. Elute the SPE column with 4 mL of 0.5 % ammonia in methanol, let the 0.5 % ammonia in methanol go through by gravity, and collect the solution in the sample tube. Elute once more. Dry the elute solution under a nitrogen stream at $50^\circ\text{C} \pm 5^\circ\text{C}$.

2.7.3. Reconstitution of the sample

Dissolve the residue in 2 mL of 0.05 M sulfuric acid solution by sonication and shaking. Filter a portion of the

sample through a 0.2µm syringe filter, discard the first few drops of the filtrate, and then fill an HPLC vial.

2.8. System suitability

The R² for each PAs component peak should not be less than 0.995. Run a standard check (working standard solution 2) after every six sample injections, and at the end of the run. The peak area of each compound from each check standard should be within 90%–110% of the peak area of Working Standard 2 from the calibration curve.

2.9. Calculations

Obtain each PA Standard Curve(s) by plotting corresponding PA Standard Concentrations vs. their Peak Area. Interpolate the sample concentration (ng/mL) from the standard curve(s). Calculate the amounts of each PA per the formulas below. Calculate the amount of Total PA by summing all 21 PAs.

$$\text{PA (ng/serving)} = \frac{\text{Spl. Conc.}_{(\text{ng/mL})} \times \text{D.F.}_{(\text{mL})} \times \text{SS}_{(\text{g/serving})}}{\text{Spl. Wt.}_{(\text{g})}}$$

Spl. Conc. = Sample concentration
from the standard curve
D.F. = Dilution factor for sample

SS = Serving size
Spl. Wt.(g) = Sample weight

3. Results and discussion

3.1. Specificity

Blank, standard, and sample (spiked standards) solutions were prepared and analyzed following the test method. Run HPLC-MS/MS analysis of blank, standard, and sample solutions. Each transition of blank was overlaid with those of the standard and sample solutions. Two Qualifier Response Ratios of each PA from the sample solutions to those of the standard solution were compared. No significant interfering peak was found in each PA transition at the retention time of each PA peak from the standard solution. All Qualifier Response Ratios of each PA from the sample solutions were 84-117% of those from the standard solution.

3.2. Precision

Six (6) replicate samples of each sample (spiked standards) were prepared and analyzed according to the test method. The amount of each PA from the samples was calculated. The RSD of six replicates of green tea was not more than 14%, Green tea extract was not more than 8%, and Herbal concentrate tea was not more than 10%.

3.3. Accuracy

The spiked samples were prepared by adding known quantities of Spike Standard Solution to the samples. The spiked samples (three concentrations and three replicates of each concentration) were analyzed according to the test method. The amount of each compound of PA in the spiked samples measured versus the spiked amounts of each compound added was calculated as % Recovery. The recoveries for all spiked levels of green tea were within 71%–104%. The recoveries for all spiked levels of green tea extract were within 73%–105%. The recoveries for all spiked levels of cardamom seed extract were within 71%–105%. The recoveries for all spiked levels of herbal concentrate tea were within 72%–130%. The recoveries for all spiked levels of orange pekoe extract were within 72%–128%. The recoveries for all spiked levels of chamomile powder were within 79%–130%. The recoveries for

all spiked levels of hibiscus flower powder were within 93%–129%.

3.4. Linearity/Range

Standard solutions were prepared and diluted to the 5 levels of PAs. Three (3) replicate injections were made for each of the five (5) standard solutions. The peak areas obtained for each solution were plotted against their corresponding theoretical concentrations. Linear regression analyses on the five coordinates were performed. The R^2 of the linear curve was between 0.998 to 1.000

3.5. Ruggedness

The same lots of each sample were analyzed in duplicate by a second analyst on a different day.

The RSD of the eight test results (6 Precision + 2 Ruggedness) was calculated. The RSD of eight replicates of green tea was no more than 13%, green tea extract was no more than 8%, and herbal concentrate tea was no more than 10%.

3.6. LOQ & LOD

Standard solutions at the estimated LOQ level were prepared and analyzed three (6) times. Signal-to-noise ratios were calculated by MassHunter. The lowest concentration of each compound, which Signal-to-noise ratio NLT 10:1 was selected as the limit of quantitation. All LOQs in the solution were within 0.18–1.61 ng/mL. All LOQs in the sample were within 0.8–6.5 ppb.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Rauter AP, Palma FB, Justino J, et al., 2002, Natural Products in the New Millennium: Prospects and Industrial Application (Proceedings of the Phytochemical Society of Europe, Vol. 47). Springer, Dordrecht.
- [2] Wang J, Wang CH, Wang ZT, 2007, Advancement of Investigation on Cytotoxicity and Mechanism of Pyrrolizidine Alkaloids. *International Journal of Pharmaceutical Research*, 34(4): 246–249 + 258.
- [3] Peter P, Fu QS, 2004, Pyrrolizidine Alkaloids—Genotoxicity, Metabolism Enzymes, Metabolic Activation, and Mechanisms. *Drug Metabolism Reviews*, 2004(36): 1–55.
- [4] Wiedenfeld H, 2011, Plants Containing Pyrrolizidine Alkaloids: Toxicity and Problems. *Food Additives & Contaminants. Part A, Chemistry, Analysis, Control, Exposure & Risk Assessment*, 28(3): 282–292.
- [5] Jia N, Zeng SD, Chen WH, 2022, Determination of Pyrrolizidine Alkaloids in *Dendrobium officinale* Kimura et Migo by UPLC-MS/MS. *Modern Food Science & Technology*, 38(2): 295–304.
- [6] Zhang F, Wang CH, Wang ZT, 2006, Analysis of Pyrrolizidine Alkaloids in Plants. *Natural Product Research and Development*, 18(6): 1057–1063.
- [7] Wu Y, Liu BL, 2020, Safety Considerations of Traditional Chinese Medicine Containing Pyrrolizidine Alkaloids. *The Chinese Journal of Clinical Pharmacology*, 36(23): 3954–3956
- [8] Han HL, Jiang CL, 2021, Pyrrolizidine Alkaloids in Tea: A Review of Analytical Methods, Contamination Levels and Health Risk. *Food Science*, 42(17): 255–266.

- [9] Zhu L, Hua RM, Wang LY, 2021, Research Progress on Detection and Analysis Methods of Pyrrolizidine Alkaloids in Plants. *Quality and Safety of Agro-Products*, 2021(4): 36–42 + 46.
- [10] Han HL, Jiang CL, 2021, Determination of 15 Pyrrolizidine Organisms in Tea Beverage by UPLC-MS/MS. *Quality and Safety of Agro-Products*, 2021(4): 18–22 + 29.
- [11] Guo WH, Zhou JH, Huang JP, et al., 2014, Determination of Alkaloids in Honey by Dispersive Solid Phase Extraction and High Performance Liquid Chromatography-Tandem Mass Spectrometry[J]. *Chinese Journal of Analytical Chemistry*. 2014, 42(10). 1453-1458.
- [12] Liu PY, Zhang H, Zhang GR, et al., 2019, Determination of 20 kinds of Pesticides Residues in Fruits and Vegetables by Microwave-assisted Extraction-dispersive Solid-phase Extraction-high Performance Liquid Chromatography-tandem Mass Spectrometry. *Journal of Food Safety & Quality*, 10(21): 7379–7386.
- [13] Huang DY, Wang Y, Li Q, et al., 2018, Pyrrolizidine Alkaloids and its Source Analysis in Tea. *Journal of Food Safety and Quality*, 9(2): 230–236.
- [14] Federal Institute for Risk Assessment (BfR), 2014, Method Protocol BFR-PA-Tea-2.0/2014: Determination of Pyrrolizidine Alkaloids (PA) in Plant Material by SPE-LC-MS/MS. BfR, Berlin.
- [15] Federal Institute for Risk Assessment (BfR), 2013, BfR Opinion No. 018/2013: Pyrrolizidine Alkaloids in Herbal Teas and Teas. BfR, Berlin.
- [16] Federal Institute for Risk Assessment (BfR), 2013, Method Protocol BFR-PA-Honey-1.0/2013: Determination of Pyrrolizidine Alkaloids (PA) in Honey by SPE-LC-MS/MS. BfR, Berlin.
- [17] Agilent Technologies, 2016, Quantitation of Pyrrolizidine Alkaloids in Honey and Herbal Teas by UHPLC/MS/MS (Application Note No. 5991-7301EN). Agilent Technologies, Santa Clara.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on the Communication of Design Symbols of “The 15th National Games” From the Perspective of Short-Video Platforms

Xiaojuan Tong^{1*}, Daxi Qiu², Nan Zu³, Yanping Liu⁴, Huiying Chen⁵

¹Hexiangniang College of Art and Design, Zhongkai University of Agriculture and Engineering, Guangzhou 510000, China

²College of Foreign Languages, Zhongkai University of Agriculture and Engineering, Guangzhou 510000, China

³Hebei Academy of Fine Arts, Hebei Shijiazhuang 050000, China

⁴Department of Human Settlements and Design Shijiazhuang Engineering Vocational College, Hebei Shijiazhuang 050000, China

⁵Hexiangniang College of Art and Design, Zhongkai University of Agriculture and Engineering, Guangzhou 510000, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Focusing on the context of short-video platforms, this study takes Stuart Hall’s Encoding/Decoding Theory and the Uses and Gratifications Theory as the core theoretical support, reconstructs the measurement dimensions of “athletic identity” by integrating the Athletic Identity Measurement Scale (AIMS), and constructs a theoretical model of “Athletic Identity → Short-video Symbol Exposure → Decoding Effect”, incorporating regional cultural familiarity and group type as moderating variables. The study defines core concepts: athletic identity includes four dimensions—athletic identity cognition, emotional connection, value identification, and behavioral tendency; short-video symbol exposure focuses on the initiative of exposure, frequency, and interaction depth; decoding effect covers symbol recognition, understanding of translation logic, resonance with sportsmanship, and willingness to interact and disseminate. Through theoretical deduction, hypotheses are proposed: athletic identity positively influences symbol exposure behaviors (e.g., individuals with a strong emotional connection are more proactive in exposure); symbol exposure further enhances the decoding effect (e.g., high-frequency exposure strengthens resonance with sportsmanship); and symbol exposure plays a complete mediating role. Additionally, there are significant moderating differences in the dissemination effect paths between audiences from Guangdong, Hong Kong, and Macao, as well as between ordinary audiences, disabled audiences, and UGC creators.

Keywords: Cultural symbol translation; Athletic identity; Perspective of short-video platforms; Decoding effect

Online publication: October 29, 2025

1. Introduction

Using Hall’s encoding-decoding theory and the uses and gratifications theory as the core analytical framework,

this study introduces the dimension measured by the AIMS scale to create a systematic research approach. Hall's encoding–decoding theory provides a perspective on how organizers of major sports events encode symbolic messages and how audiences decode these messages within diverse social and cultural contexts ^[1]. The Uses and Gratifications Theory emphasizes the active role of audiences in selecting, interpreting, and utilizing media content to satisfy psychological and social needs. The AIMS scale then serves as a quantitative tool to capture the motivational and attitudinal dimensions of audience engagement. Integrating these theoretical and methodological elements, the study examines the sequence “symbolic translation → audience perception → dissemination of sports spirit” ^[2]. In this sequence, symbolic translation is the process by which cultural values and ideological meanings are embedded in visual and discursive symbols. Audience perception is the decoding, appropriation, and subjective reconstruction of these symbols ^[3]. Finally, the dissemination of sports spirit is the broader social diffusion and reinforcement of cultural values through audience participation, resonance, and communication practices. This integrated framework clarifies the dynamic interaction between symbol production and audience reception and reveals how sports events continually regenerate and amplify the spirit of sports in contemporary society.

2. Variable relationships and model logic

The definitions of independent variables, mediating variables, and dependent variables in this study are as follows:

Sporting identity is the independent variable, measured by the dimensions of cognitive recognition, emotional connection, and behavioral commitment on the AIMS scale. Sporting identity reflects audiences' cognitive and emotional habits toward sports and directly shapes their willingness to engage with symbols of the 15th National Games ^[4]. The mediating variable is exposure to short video symbols, defined as audiences' “encountering–browsing–interacting” with modernized symbols on short video platforms. A high sporting identity promotes proactive searching and interaction, whereas a low sporting identity often results in passive and shallow exposure, which affects decoding quality ^[5]. The dependent variable is decoding effectiveness, which is measured by symbol recognition, understanding of traditional elements, resonance with sportsmanship, and willingness to interact and share ^[6]. Audiences with a stronger sporting identity achieve higher-quality decoding via deeper exposure, whereas a weaker identity limits comprehension to superficial recognition. Overall, this framework clarifies the pathway of “sporting identity → short video symbol exposure → decoding effectiveness”, which aligns with the study's theoretical scope and highlights the communication dynamics of short video platforms. Variable definitions and dimensions are illustrated in **Table 1** below:

Table 1. Correspondence table of measurement scale items and theories

| Variable type | Variable name | Core dimensions | Theoretical support and theoretical basis |
|----------------------|-----------------------------------|---|---|
| independent variable | Sports Identity | <ol style="list-style-type: none"> 1. Identity Recognition in Sports: Audience self-identification as “participants/followers” after exposure to symbols 2. Emotional Connection to Sports: Positive sentiments like interest and affinity toward sports evoked by symbols 3. Value Alignment with Sports: Degree of alignment with values conveyed by symbols—such as “unity, perseverance, and inclusivity”—embodying the spirit of sports 4. Sports Behavioral Propensity: The willingness to engage in sports activities or disseminate the symbol, stimulated by the symbol. | Specify “Adapted for measuring sports identity using the AIMS scale”, removing the original scale’s “sports participation behavior” items to focus on identity dimensions within the short video context. |
| Mediating variable | Short Video Symbol Exposure | <ol style="list-style-type: none"> 1. Exposure Initiative: Active search / Passive recommendation (platform algorithm) exposure to symbols 2. Exposure Frequency: Weekly view count of short videos containing symbols (≥ 3 times / < 3 times) 3. Interaction Depth: Degree of participation in comment section discussions post-viewing (e.g., inquiring about symbol translations, sharing interpretations) | “Symbolic Translation — Audience Perception” Dynamic Chain, and “Usage and Gratification Theory” |
| Dependent variable | Decoding Effect | <ol style="list-style-type: none"> 1. Symbol Recognition: Ability to quickly identify symbols (the emblem “Concentric Fireworks”, mascots “Xiyangyang/Lerongrong”, Guangzhou embroidery patterns) and their traditional origins 2. Translation Understanding: Comprehension of the “modernization of traditional elements” translation logic (e.g., fireworks → modern lines, Lingnan folk customs → cartoon characters) 3. Resonance with Sports Spirit: Emotional connection evoked by symbols to the 15th Games spirit of “vitality, inclusivity, and collaboration”^[7] 4. Interaction and Sharing Intent: Willingness to like/comment on symbol-themed short videos and share them on social platforms for secondary dissemination | “Communication Effectiveness Metrics” + Short Video Feature Supplement, aligning with the practical objective of “Promoting Cultural Integration and Social Inclusion in the Greater Bay Area” |
| Control variable | Familiarity with regional culture | <ol style="list-style-type: none"> 1. Guangdong Audience: High familiarity with Lingnan traditional elements (firecrackers, Guangzhou embroidery, lion dance) 2. Hong Kong / Macau Audience: Lower familiarity with Lingnan traditional elements, requiring additional cultural annotations | Research Focus on “Cross-Regional Audience Symbol Recognition Differences” and Background Description of the “Complex Cultural Ecosystem Across Guangdong, Hong Kong, and Macao” ^[8] |
| Control variable | Group Type | <ol style="list-style-type: none"> 1. General Audience: No specific cognitive/emotional requirements 2. Audiences with Disabilities: Stronger emotional resonance with the “Special Olympics” symbol; prioritizes visual accessibility (e.g., color contrast)^[9] 3. UGC Creators: Greater focus on adaptability of symbol translations for dissemination (e.g., audience comprehension) | Research Challenges in Symbolic Inclusive Design for Persons with Disabilities and the Application of Cultural Integration Theory in Amplifying Symbolic Influence through User-Generated Content |

Based on the above content, the following hypotheses are proposed:

H1: Sports Identity → Short Video Symbolic Exposure

H2 Short Video Symbol Exposure → Decoding Effect

After revising the “Questionnaire on the Symbolic Communication Effectiveness of the 15th National Games in the Context of Short-Video Platforms”, this study finalized the questionnaire version and explored the mechanisms of symbolic communication and optimization paths.

It was found that sports identity exerts a positive influence on short-video symbol exposure; short-video symbol exposure, acting as a full mediator, significantly enhances decoding effectiveness and audiences’ willingness to participate in and disseminate symbols. Additionally, familiarity with regional culture exerts a moderating effect—specifically, audiences in Guangdong demonstrate better decoding performance than those in Hong Kong and Macau.

3. Conclusion

Based on these findings, the study proposes strengthening practices across three interrelated dimensions. In symbol design, the clarity and readability of symbolic elements must be enhanced while accommodating diverse cultural backgrounds and interpretive habits, ensuring accessibility and inclusiveness^[10]. Regarding communication strategies, optimizing exposure quality and effectiveness is paramount, particularly in stimulating user-generated content (UGC) to transform audiences from passive receivers into active participants and secondary communicators. Regarding audience engagement, differentiated strategies should be adopted to address various demographic and regional needs while reinforcing collective identity and group resonance to foster stronger emotional connections to the spirit of sports. Together, these dimensions form a coherent framework linking symbolic translation to audience perception, ultimately facilitating the broad dissemination and reinforcement of sports values in contemporary society.

Funding

This paper is supported by the Organizing Committee of the 15th National Games; the Organizing Committee of the 12th National Games for Persons with Disabilities and the 9th National Special Olympics; the Hong Kong and Macao Affairs Office of the CPC Guangdong Provincial Committee under the Guangdong Provincial Association for Hong Kong and Macao Studies; the Guangdong Provincial Department of Education; the Guangdong Provincial Sports Bureau; Guangdong Provincial Federation of Social Sciences; Guangdong Disabled Persons’ Federation. Research Project on Theory and Practice of Guangdong-Hong Kong-Macao Collaborative Development for the 15th National Games and National Games for Persons with Disabilities and Special Olympics (Project No.: 2025GBA-246). Interim Research Findings: Study on the Translation of Cultural Symbols and the Effectiveness of Sports Spirit Dissemination for the “15th National Games” and “National Games for Persons with Disabilities and Special Olympics.” Project Name (PX-47231127): He Xiangning — Intangible Cultural Heritage Dream Practical Teaching Base Integration of Science, Industry and Education Practical Teaching Base Interim Research Findings

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Wu L, 2025, Small Badges, Big Business. Shenzhen Commercial Daily, A01.
- [2] Lu PL, Jian JG, 2025, Bring “Xiyangyang” and “Lerongrong” Home. Foshan Daily, A06.
- [3] Hu Y, Li Q, 2025, Guangzhou Sports Lottery Fully Supports 15th National Games with Mascot Decorations Illuminating Retail Stores. Yangcheng Evening News, A08.
- [4] Nanfang Daily Commentator, 2025, Seizing the Opportunity of the 15th National Games to Unlock Sports Consumption Potential. Nanfang Daily, September 11, 2025.
- [5] Southern Daily, 2025, “Xiyangyang” and “Leirongrong” Go on Sale Today. Southern Daily, A04.
- [6] Li Q, Peng B, Xu Y, 2024, The Birth of “Xiyangyang” and “Lerongrong”. Southern Daily, November 11, 2024, A03. <https://doi.org/10.28597/n.cnki.nnfrb.2024.006228>
- [7] Hu Y, Li Q, 2025, “Xiyangyang” and “Leirongrong”. Southern Daily, A03.
- [8] Mo SN, 2025, Fifteenth National Games Torch Designed by Foshan Company. Foshan Daily, A04.
- [9] Lin ZW, Han YN, 2025, Greater Bay Area United for National Games. China Women’s News, 002.
- [10] Peng B, Zhu XL, 2024, Guangdong-Hong Kong-Macao Collaboration for Fifteenth National Games Promotes Greater Bay Area Coordination. Southern Daily, A05. <https://doi.org/10.28597/n.cnki.nnfrb.2024.001666>

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Analysis of the Transformation and Innovation of Public Libraries in the Post-Emergency Era

Yanli Liu^{1*}, Xiong Deng²

¹Library, Anyang Normal University, Anyang 455000, Henan, China

²School of Software Engineering, Anyang Normal University, Anyang 455000, Henan, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In recent years, global public emergencies have profoundly impacted library service models, operational mechanisms, and professional ethics. Such events have driven the transformation and upgrading of traditional library services, forcing libraries to adapt their working models to new circumstances. This paper explores service innovations and response strategies adopted by libraries during special periods and analyzes how libraries can adapt to and lead the “new normal.” The study argues that libraries need to construct new service systems to enhance their visibility and sustainability in cyberspace. To this end, this paper constructs a “Triangular Management Model” for libraries in the post-emergency era and, based on this model, designs overall strategies and specific measures aimed at continuously improving internal work efficiency and upgrading external service levels to address new challenges and opportunities.

Keywords: Post-emergency era; Triangular management model; Digital library; Reader services; Content providers

Online publication: October 29, 2025

1. Introduction

Global public emergencies in recent years have presented a significant societal test, causing massive impacts on almost all areas of human society ^[1]. The education sector was similarly deeply affected, with most educational institutions forced to shift from offline to online teaching. As a core component of the educational, cultural, and information service system, libraries have also undergone profound changes in their working models and service paradigms ^[2].

During special periods, libraries widely faced challenges of closure or limited operations, with most staff adopting remote work models ^[2]. In this context, the global library community actively sought ways to maintain operations and continue fulfilling their educational, information, and cultural service functions under conditions where physical services could not be provided ^[3]. This crisis highlighted long-standing challenges faced by libraries that had not been fully resolved, such as the digital divide, which was exacerbated by unequal information infrastructure. The special period accelerated the migration of most library services online, creating a new service

environment where physical contact between staff and users is unnecessary^[3]. This has become a “new normal” that libraries must adapt to and develop within.

2. Impact of public emergencies on libraries and response measures

Under normal circumstances, libraries are public places densely visited and used by readers for exchange. After the outbreak of a public emergency, libraries pose potential safety risks due to their public nature^[4]. Consequently, a primary measure in the initial stages is strictly limiting the number of people entering the library^[4]. Although the number of visitors decreased, the demand for academic information and other services did not weaken; instead, it placed higher demands on libraries’ online consultation and digital services^[5].

Based on summarizing the impact of the event and assessing new challenges in the post-emergency era, and to ensure the safety of staff and relevant parties, this paper proposes a “Library Triangular Management Model” (**Figure 1**) as a benchmark framework for library management and services.

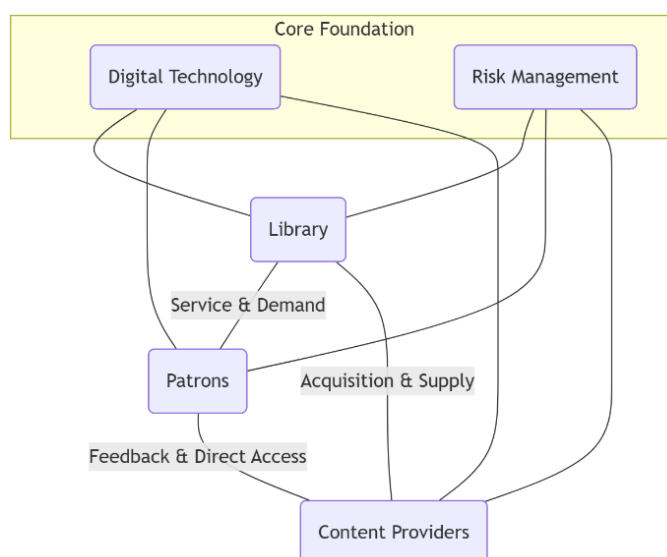


Figure 1. Library Triangular Management Model

To implement this model framework, the study proposes and has implemented the following nine specific measures:

- (1) Emergency response and decision-making mechanism: After a public emergency occurs, the library needs to quickly convene a full-staff video conference to develop safety plans and emergency measures^[6]. Plans should be submitted to superior departments for review, and relevant experts invited for guidance to ensure scientific validity and effectiveness.
- (2) Pre-entry safety supplies: Provide adequate cleaning supplies and other safety materials at the library entrance, recommending that all individuals clean their hands before entering^[7].
- (3) Strict entry management: Security personnel verify the identity information of entrants and register key details such as name, contact information, and entry time to achieve traceable management^[8].
- (4) Upgraded safety in circulation services: Set up physical barriers at loan and return counters to ensure appropriate distance between staff and readers, reducing the risk of cross-infection^[9].

- (5) Construction of a contactless loan system: Establish a loan management information system integrating barcode readers, computer networks, and server clients ^[10]. Books returned by readers are placed on designated shelves, uniformly cleaned, and isolated for a specified period before being available for circulation again.
- (6) Reconfiguration of reading spaces: Adjust the seating layout in reading areas to ensure spacing meets safety requirements, reducing personnel density. Enhance indoor ventilation and provide cleaning supplies in reading areas, reminding readers to pay attention to personal hygiene ^[11].
- (7) Staff office and resource handling safety: Optimize the layout of back-office work areas to meet safe distancing requirements. Staff must take basic protective measures when handling books. Implement staggered and dispersed meal times. Newly arrived physical resources also require corresponding handling. Vigorously promote remote work, utilizing networks for consultations, data processing, meetings, etc. ^[12–13].
- (8) Accelerated digital resource development and access optimization: The special period greatly accelerated the digital transformation process of libraries ^[14]. Libraries have significantly enhanced the visibility and usability of electronic resources by redesigning official websites, enabling readers to access various digital resources remotely more easily, including free textbooks and academic resources ^[15].
- (9) Promotion of open educational resources (OER): Systematically build OER collections and encourage widespread use by teachers and students ^[16]. Simultaneously, increase the budget for purchasing electronic resources, upgrade digital resource access platforms, and provide readers with services for remote access to journal databases to ensure the continuity of off-campus research ^[17].

Based on the aforementioned Triangular Management Model, **Table 1** systematically summarizes the specific management measures taken for different risk pathways.

Table 1. Comparison table of library safety management measures based on the Triangular Management Model

| Potential risk pathway | Measures taken |
|--|---|
| Books & Readers | <ul style="list-style-type: none"> • Book cleaning treatment (for returned and newly purchased books) • Provision of facilities for using cleaning supplies after handling books • Encouraging users to minimize the use of physical books and promoting e-book use • Promoting e-books and e-resources by redesigning the library website • Advancing online book reservation services • Increasing the collection scale of Open Educational Resources (OER) |
| Staff & Readers | <ul style="list-style-type: none"> • Basic protective measures for readers and staff inside the library • Necessary registration of entry information • Use of self-service loan/return machines and management information systems • Encouraging use of cleaning supplies and maintaining appropriate social distance |
| Staff & Books | <ul style="list-style-type: none"> • Hand cleaning before handling books • Basic protection when handling books • Encouraging all staff to work from home whenever possible |
| Books & Content Providers | <ul style="list-style-type: none"> • On-site cleaning at physical book fairs, safe transportation of books • Minimizing or canceling non-essential offline gatherings • Content providers offering digital resource services and online material access |
| Staff & Content Providers | <ul style="list-style-type: none"> • Book procurement staff increasing participation in online fairs • Basic protection and safe distancing for necessary offline activities • Electronification and paperless transactions between staff and suppliers |
| Readers & Content Providers | <ul style="list-style-type: none"> • Collecting data on readers' loan history, web browsing traces, etc. • Using big data technology to analyze readers' reading preferences • Content providers introducing new books and pushing journals to readers online |

3. Libraries in the post-emergency era

The executive director of the Association of Research Libraries (ARL) pointed out in a discussion that even before the special period, two major trends existed in research libraries: first, the acceleration of resource and service digitization; second, the increasingly important role of the library as a public space connecting people and ideas. The public emergency stretched these two trends in distinctly different ways: regarding “digitization”, the event greatly accelerated this process; regarding “place”, the event temporarily affected the library’s function as a community space, a function that will undoubtedly be re-examined and redefined in the future ^[18].

Emergency management for libraries in the digital age faces multiple challenges, including technical failures, management complexity, and diversified reader needs, necessitating the construction of an emergency management model integrating system, technology, service, and personnel in a coordinated manner ^[19]. Public emergencies causing large-scale library closures forced them to provide broader remote services and apply online tools more deeply to meet user needs ^[20]. The reopening of libraries does not mean a simple return to the old model but signifies the establishment of a completely new, normalized service paradigm. In this process, libraries need to actively explore new paths for transformational development while adhering to the core values of cultural heritage and knowledge service ^[21]. Libraries must prioritize the safety of employees and users, placing high importance on the safe handling of resources and facilities.

Furthermore, users have gradually adapted to and become accustomed to convenient online information services, making a complete return to traditional service models highly unlikely. Research on the construction of university library service systems based on user trust indicates that establishing psychological identity and behavioral loyalty through focusing on user perception is an important way to promote service system innovation ^[22]. Therefore, libraries must formulate long-term strategies to achieve transformation through innovative management and services. Against the backdrop of global major changes, libraries need even more to reposition their roles by serving national innovation-driven development strategies, supporting high-end think tank construction, building platforms for exchange and cooperation, and participating in cultural governance, thereby forging new prospects within the changing landscape ^[23]. Librarians and management must gain a deep understanding of changes in user needs through regular surveys and dialogue.

As social network application models continuously evolve, library services must also develop dynamically. Understanding readers’ content preferences and deeper needs to provide them with more accurate and cutting-edge information becomes crucial. In the post-emergency era, libraries can sustainably update research data services and offer more digitally accessible resources and services. Notably, a multi-agent participatory library emergency alliance intelligence system built on blockchain technology can effectively improve the efficiency and safety of crisis response, offering a new technical path for future library emergency management ^[24].

4. Summary and outlook

Before the special period, many libraries (especially in developing countries) primarily focused on offline services, with the depth and breadth of digital services needing expansion. Today’s readers are digital natives, technologically savvy, and accustomed to remotely accessing information and services through ubiquitous networks and technological devices. Emergency management for libraries in the digital age needs to shift from passive response to active prevention, building a more intelligent and forward-looking management system.

It is worth noting that in responding to public emergencies, libraries can not only take passive defensive

measures but also proactively leverage their unique advantages as knowledge and information hubs: for example, by promoting public safety knowledge, disseminating event prevention measures, tracking relevant research progress, and guiding the public to enhance safety awareness, thereby improving society's sustainable development capacity and public safety literacy. Amid global major changes, libraries should actively contribute by building more open and collaborative service systems, playing a more important role in knowledge dissemination and cultural heritage.

Addressing transformation and innovation in the post-emergency era, this paper proposes a "Triangular Management" theoretical model and elaborates on the active role of libraries during public safety incidents. The future development of libraries requires finding a balance between adhering to core values and promoting transformational innovation, maintaining commitment to traditional cultural heritage, while actively embracing opportunities brought by digital transformation. In summary, libraries in the post-emergency era must continuously enhance their capabilities in optimal resource allocation, data-driven knowledge services, ecological synergy, and technology application and mastery, responding to future challenges and development opportunities through constant self-innovation.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Smith J, Brown K, 2020, Global Challenges in Public Service Institutions. *International Journal of Public Administration*, 45(8): 612–625.
- [2] Ali MY, Gatiti P, 2020, The Changing Roles of Librarians and Information Professionals. *Health Information and Libraries Journal*, 37(2): 158–162.
- [3] Cox AM, 2020, The Social Construction of an Urgent Threat: Analysing the Discourse on the Library and Information Science Literature on Emergency Situations.
- [4] Connaway LS, 2020, The New Normal for Library Services and Resources Post Emergency.
- [5] Mercurio F, 2020, The Post-emergency in Public Libraries: Several Trends, Some Fear and a Hope. SAGE Publications, London.
- [6] Australian Library and Information Association (ALIA), 2020, Emergency Response and the Library Sector.
- [7] National Institute of Library Science, 2020, Role of libraries during Public Emergencies.
- [8] International Federation of Library Associations and Institutions (IFLA), 2020, Libraries in Emergency Situations.
- [9] Lu WJ, Cheng AJ, 2021, Investigation and Analysis of Information Services in Medical University Libraries under Special Backgrounds. *Journal of Medical Informatics*, 42(2): 84–89.
- [10] Ding Y, An W, Fan JH, 2021, Interpretation and Enlightenment of the "2021 Special Report on the State of America's Libraries". *Library and Information*, 2021(6): 72–79.
- [11] Yu DF, 2021, Thoughts and Enlightenment on University Library Teaching Services under Public Emergencies. *New Century Library*, 2021(8): 81–85.
- [12] Abeysekera K, Balasooriya A, Marasinghe M, 2020, Best Practices in Library Management During Emergency Situations. *The Open University*, 2020(2): 147.
- [13] Harris SY, 2021, Emergency Impact on the Academic Library: Preliminary Response to People, Place, Product and

- Services. *Library Management*, 42(6/7): 431–447.
- [14] Bakti LA, Prasetyadi A, Nugroho D, et al., 2020, Innovation in Library Services Post Emergency. *International Conference on Documentation and Information*.
- [15] Laaro DM, 2021, Library Services Amidst Emergency Situations: Adjusting to the New Normal. *Annals of Social Sciences & Management Studies*, 6(3): 1–8.
- [16] Mageto T, 2021, Design and Development of E-Library System: Emergency Challenges. *Science and Education Publishing*, 9(1): 12–18.
- [17] Kostagiolas P, Katsani A, 2021, The Management of Public Libraries during Emergency Situations. *Library Management*, 42(8/9): 545–559.
- [18] Bachynska N, Tverytnykova E, Drozdova T, et al., 2024, Management of Archive and Library Institutions: Expert Evaluation of the Quality of Activities. *Bulletin of the National Technical University KhPI Series: New Solutions in Modern Technologies*, 2(20): 17–23.
- [19] Chigwada J, Ngulube P, 2025, Disaster Preparedness and Management Practices in Academic Libraries in Context. *International Journal of Disaster Management*, 7(3): 261–283.
- [20] Xue Y, 2025, Research on the Construction of University Library Service System Based on User Trust. *Henan Library Science Journal*, 45(7): 15–21.
- [21] Wang Y, 2025, Adherence and Transformation: The Logic of Transformation and Development of University Libraries. *Tourism Education Press*, Beijing.
- [22] Li WL, Shu G, 2016, Construction of Public Library’s Special Collection Resource—Taking Guangzhou Library as an Example. *Agriculture Network Information*, 5(3): 13–19.
- [23] Getuli V, Capone P, Bruttini A, et al., 2022, A Smart Objects Library for BIM-based Construction Site and Emergency Management to Support Mobile VR Safety Training Experiences. *Construction Innovation: Information, Process, Management*, 45(3): 52–58.
- [24] Malicka A, 2016, *LibGuides. EMGT 6635 — Political and Policy Basis for Emergency Management — Prof. McCormack. Introduction to the Library for Graduate Students*, 5(1): 12–17.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

On Laozi's "Tao" and Confucius's "Tao"

Changshun Chen*

Zhijin County No.1 Middle School, Bijie 552100, Guizhou, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: As great sages of the pre-Qin period, both Laozi and Confucius grounded their respective philosophical discourses on the concept of "Dao", establishing the cultural foundations of Taoism and Confucianism. Objectively speaking, while they share connections, they also differ in their approaches. Laozi's "Dao" primarily refers to the fundamental principles governing the existence of the world, whereas Confucius's "Dao" regulates worldly order through ethical and moral guidance. From a categorical perspective, ethical and moral principles exist within the framework of universal laws, thereby forming an intrinsic connection between the two.

Keywords: Dao; Ontology; General phase; Specific phase

Online publication: October 29, 2025

1. Introduction

As is well known, in order to discuss or compare two cultures within the same category, the prerequisite is that these two cultures should have certain similarities or similarities in both essence and form. On the contrary, discussion or comparison cannot proceed. Based on this, there are indeed some similarities between Laozi's "Dao" and Confucius' "Dao". Firstly, in terms of literal meaning, both exist in the field of Chinese characters, with concrete meanings referring to "road" or "pathway", belonging to the medium through which humans or animals travel the world. For example, Chapter 53 of *the Tao Te Ching* states: "The great road is vast, but people have good paths." "The great road", which means a smooth path, is the inevitable path for people to work or socialize. Secondly, from a layman's perspective, both can encompass the means of doing or handling things and belong to the category of methodology. For example, Confucius said, "The Doctrine of the Mean is impartial and impartial, without any shortcomings" (*The Doctrine of the Mean*), and "Dao" refers to the method or strategy of dealing with things. Thirdly, based on the descriptions of Laozi and Confucius, both indicate metaphysical existence and belong to the category of ontology. In short, Laozi's "Dao" and Confucius' "Dao" constitute comparable basic conditions both in terms of semantics and the categories used by the two.

The purpose of discussion or comparison is not to distinguish between superiority and inferiority, but to explore the differences in the ideas of the two great sages from the perspectives of metaphysics and ontology, to

find differences within the commonalities, and to explore the commonalities within the differences.

Firstly, although both belong to metaphysical existence or narrow philosophical categories, they differ in their referents. “Metaphysics is called the Way” in the *Book of Changes*. From a descriptive perspective, both Laozi’s “Way” and Confucius’ “Way” contain a strong metaphysical color, or they are both within the scope of narrow philosophy. For example, Chapter 31 of the *Tao Te Ching* states: “Soldiers are ominous weapons, objects, or evil, so those who possess the Tao are not to be found.”

It is obvious that the “Dao” here refers to knowledgeable individuals who have a kind heart, care for life, and love peace. The “Dao” naturally embodies the meanings of “goodness” and “peace-loving”, existing in the metaphysical realm. For example, Chapter 46 of the *Tao Te Ching*: “There is a way in the world, but horses run on feces. The world is lawless, and soldiers are born in the suburbs.”

According to Mr. Chen Guying’s understanding, the so-called “there is a way in the world” refers to being politically on track, while the so-called “there is no way in the world” refers to not being politically on track ^[1]. In other words, the term “Dao” here implies political clarity and social harmony, and also belongs to the metaphysical realm. Chapter 77 of the *Tao Te Ching*: “The way of heaven is to make up for the deficiencies while damaging the surplus. The way of man is not like that, where loss is not enough to offer surplus.”

It is not difficult to see that the “Way of Heaven” refers to natural laws or laws, while the “Way of Man” refers to social laws formulated by human society for its own interests. As Wang Bi noted: “Like the quantity of human beings, each has its own body and cannot be equal.” In other words, both the “Way of Heaven” and the “Way of Man” are metaphysical existences. Similarly, in Confucius’ perspective, “Dao” also manifests as a metaphysical existence. *The Analects of Confucius, Liren* records: Confucius said: “A scholar who aspires to the Tao and is ashamed of evil clothing and food is not enough to discuss with others.”

Obviously, the “Dao” here is a spiritual realm existence, referring to filial piety, loyalty, righteousness, benevolent governance, harmony, and other metaphysical categories. For example, “When hearing the Tao in the morning, one can die at night” (*Analects of Confucius, Liren*), “Tao” refers to the ethical truth. In Confucius’ view, the ethical truth has already reached a realm beyond life and death. Undoubtedly, the “Dao” here exists within the scope of narrow philosophy. However, as seen in the previous text, although Laozi and Confucius both referred to the metaphysical form of existence of “Dao” in different ways, they are different in terms of meaning and realm of existence. As far as Laozi is concerned, the content of “Dao” is broad, referring to both the laws of nature or the laws of nature, as well as the laws governing the operation of human society, justice, and conscience, and the laws governing political operation. And Confucius’ “Dao” is more manifested in the description and regulation of ethics and morality. As mentioned above, “the aspiration of a scholar towards the Tao” refers to the ethical qualities that a gentleman should cultivate himself, constantly improve his filial piety, integrity, loyalty, and promote benevolent governance. For example, *the Analects of Confucius, Xueer* records: “A gentleman’s duty is fundamental, and the Tao is born from the foundation. Filial piety is the foundation of benevolence.”

It is not difficult to see that Confucius clearly stipulated that, in his perspective, filial piety to parents and respect for elder brothers are the foundation of a gentleman’s character and the core essence of “benevolence.” In other words, Confucius’ “Dao” is to maintain social order and stability through regulations on respecting the elderly and loving the young, which embodies a certain sense of hierarchy. *The Analects of Confucius, Yanyuan* records that Duke Jing of Qi asked Confucius about politics, and Confucius replied: “A ruler, a minister, a father, a son.” On the surface, Confucius was referring to Chen Jun mainly being like a ruler, a minister being like a minister, a father being like a father, and a son being like a son. Essentially, he achieved the goal of constructing

social harmony by strengthening the concept of hierarchy.

Secondly, although both refer to the ultimate form and ontology, they are different in categories. As an ontology, Laozi's "Dao" is a questioning of the ultimate form of the world, encompassing the category of cosmology. The first chapter of *the Tao Te Ching* states: "The Dao can be the Dao, the extraordinary Dao; the name can be the name, the extraordinary Dao." The latter two "Dao" represent general statements, while the former "Dao" represents the ultimate form or totality of all things in the universe. As the ultimate form, "Dao" manifests as a transcendent existence that cannot be described in the language of the empirical world. Therefore, Wang Bica's annotation states: "It is not ordinary, therefore it cannot be taught" ^[2]. To some extent, it is equivalent to Plato's "idea" or Hegel's "absolute spirit", existing in the category of rationalism. Hegel quoted Lemuza's words and pointed out: "The Dao is the primitive reason that produces the universe, governs the universe, just as the mind governs the body." ^[3] Of course, Laozi's "Dao" is not an absolute abstraction or even sliding into the quagmire of nothingness; otherwise, it would not have become the origin of the universe. Chapter 25 of the *Tao Te Ching*: "There is a mixture of things, born naturally... I don't know its name, the strong character is called Dao."

Laozi used extremely intuitive language to clarify that the "Dao" existed before heaven and earth, and is the origin of the universal universe. The universal universe exists because of its existence. This means that although the "Dao" is an indescribable existence in the empirical world, it is not an empty entity. At the same time, it is precisely because it is the origin and totality of the world that it manifests as a self-inherent and self-rooted entity in its form of existence, with itself as the cause. That is to say: "Independent without change, Zhou Xing without danger" (*Tao Te Ching, Chapter 25*), the "Dao" itself is based on its own reasons and does not depend on any external things. Afterwards, Laozi spoke in Chapter 42 of *the Tao Te Ching*: "The Tao gives birth to one, one gives birth to two, two gives birth to three, and three gives birth to all things."

It is obvious that Laozi intuitively expressed the "Dao" as the origin of the universe and the general laws and procedures for generating all things in the universe as the origin. Clarify its physical form of existence. As Mr. Feng Youlan pointed out, "The Tao is the general principle of the origin of all things" ^[4].

Unlike Laozi, Confucius' ultimate questioning of "Dao" is reflected through his questioning of "Ren." *The Analects of Confucius, Shuer* records: Confucius said, "Born with virtue, how can Huan Gui harm me?"

Confucius clearly stated that benevolence and virtue are the essence and totality of ethics and morality, and are innate gifts from heaven. It not only explains the root of its existence, but also explains the reasons for the ethical and moral existence of the humanized world. And the reason why it serves as the essence and overall principle of human ethics and society is also due to Confucius' own regulations. "Only those who are benevolent can be good people, and those who are wicked; " (*Analects of Confucius, Li Ren*). "Those who are benevolent can establish others and reach great heights; " (*Analects of Confucius, Yong Ye*) "Self restraint and restoration of propriety are benevolent. One day self restraint and restoration of propriety, the world will return to benevolence. " (*Analects of Confucius, Yan Yuan*) These indicate that in Confucius' perspective, benevolence is the highest essence and the root of all ethical and moral values such as righteousness, propriety, wisdom, and faith. The reason why "Dao" and "Ren" are the same essence is also due to Confucius' own regulations. *The Analects of Confucius, Liren* records that Zengzi and his disciples asked Confucius, and Confucius said: "Canhu! My way is consistent!" It is not difficult to notice that Confucius' "Dao" is synonymous with "Ren". Rather, in Confucianism, "Dao" and "Ren" differ only in their names, but are essentially the same, manifested as the core and purpose of Confucianism. Cheng Zhijia pointed out: "The so-called consistency refers to the systematic and core of its ideology, and this core is benevolence." Specifically, Confucius regarded "ren" as the core and essence of all virtues, and placed all

other virtues under “ren”^[5]. That is to say, in Confucianism, “Dao” means “Ren”, which is the essence and overall principle of the Confucian school, pointing to the realm of ethics and morality.

In short, the similarity between Laozi’s “Dao” and Confucius’ “Dao” is only a matter of naming. Rather, although they are ultimately manifested as the highest existence and essence of their respective realms, they are completely different in connotation. Laozi’s “Dao” is the entity, the origin, and the overall existence of the diverse worlds, which exist because of the “Dao.” The “Dao” of Confucius is the core and overall principle of Confucianism, and the root of all ethical virtues and their guiding principles for action.

Finally, different entities result in different images. Undoubtedly, it is precisely because of the different referents of the ontology that it is impossible to reach a consensus on imaging. As for Laozi’s “Dao”, it exists as the origin of the universe, and its manifestation is naturally the universal or diverse world of the universe. As mentioned above, “the Tao gives birth to one, one, two, two, three, and three all things” indicates that when the “Tao”, as the overall state of the universe, transitions from the metaphysical to the metaphysical, it follows a certain order and continuity to transform all things in the world. For example, Chapter 52 of the *Tao Te Ching*: “There is a beginning in the world, as the mother of the world. Having obtained his mother, knowing his son, and guarding his mother again, he is not in danger.”

It is not difficult to see that the term “mother” here is another name for “Dao”, while “Zi” refers to the diverse worlds and phenomena that arise from the biological transformation of “Dao” as the mother. Laozi used his mother as a metaphor for the Tao and his son as a metaphor for the phenomenal realm, activating the relationship between the “Tao” as a general and specific aspect. That is to say, Laozi’s “Dao”, as an abstract mother, manifests as a concrete and perceptible world of complexity. At the same time, it can be seen from the saying “Dao is always inactive” that when “Dao” transforms from abstract to concrete, it manifests as “inactive” in action. These are the rich and colorful teachings of Laozi. Laozi’s philosophy advocates the adoption of the “law of subtraction” in the humanized world, in order to reduce individual greed and construct a harmonious society based on “non-action”^[6]. However, Confucius’ “Dao” is different, as everything points towards the ethical world in its manifestation. As mentioned above, Confucius regarded “Dao” or “Ren” as the overall principle of his teachings, encompassing various virtues such as righteousness, propriety, wisdom, and faith. Rather, in Confucianism, “Dao” exists as the mother of all virtues, and other virtues such as righteousness, propriety, wisdom, and faith are all manifestations of “Dao” in its own domain. For example, it can be inferred from “self-restraint and restoration of propriety as benevolence” that “propriety” exists due to the existence of “benevolence” (i.e. “Dao”); According to “Killing oneself to become benevolent” (*Analects of Confucius*, Duke Weiling), “righteousness” exists as the existence of “benevolence” (“Dao”). Or, as a unique aspect, “righteousness” is not only the manifestation of the “Dao” itself, but also a means for the “Dao” to realize itself. It should be noted that although the differences in righteousness, propriety, wisdom, faith, and other aspects are differentiated from the “Dao” and the action guidelines may appear imperceptible to some extent, when they manifest as certain actions, they are perceptible. The concept of “killing oneself to become benevolent” itself is a concrete existence, ultimately manifested as various virtues taking benevolence as their ultimate destination. Mr. Qian Mu pointed out that Confucius’ ideal of life is to firmly return to the front line, that is, to coordinate the learning of “seeking benevolence” and “knowing one’s destiny with learning”^[7].

It is worth noting that although Laozi’s “Dao” manifests as a tangible and diverse world, and Confucius’ “Dao” manifests as ethical principles, this does not mean the so-called absolute alienation between the two totalities. For example, when Laozi’s “Dao” manifests as the concrete action of “Wuwei”, it is itself a virtue and belongs to the

category of ethical morality. Rather, Laozi's "Dao" itself encompasses this particular aspect of ethics and morality. The only difference is that Laozi's "Dao" takes the form of "wu wei" as "You wei", which implies a certain form of negativity, while Confucius' "Dao" is manifested as "knowingly doing something that is impossible" (*Analects of Confucius, Constitutional Questions*), presenting a rather radical form of existence in form. As Gan Chunsong pointed out: "Confucius initiated the trend of private education and responded positively to the demand for various talents caused by social mobility" ^[8]. In other words, from the perspective of the realm of existence, although Confucius' "Dao" also has its own category of existence, it is governed by Laozi's "Dao" in the realm of existence.

In summary, the "Dao" of Laozi and the "Dao" of Confucius, although different in form and manifestation, are interconnected in their specific aspects and connected in essence and connotation, with the latter dominating the former. The only difference is that the former manifests in a negative form of existence, while the latter manifests in a radical form of existence.

2. Conclusion

As a metaphysical category, "Dao" constitutes the core and overall principle of Laozi's theory and Confucius' theory, respectively. In terms of content, the former and the latter have both similarities and differences, both independent and interconnected. Specifically, Laozi's "Dao" mostly refers to natural laws and diverse worlds, encompassing the theory of cosmic generation that evolves the world based on them; Confucius' "Dao" points more towards the ethical world and moral laws, encompassing the social order constructed around it with a hierarchical system at its core. However, Laozi's "Dao" does not entirely exist within the scope of cosmology, but rather includes a description of the unique aspect of human ethics and morality in the discussion. This constitutes the commonality and connection between Taoism and Confucianism in terms of cultural development. Although Laozi's "Dao" appears as a negative form of existence in form, Confucius' "Dao" appears as a radical form of existence. But this does not affect the mutual inclusion of the two in the overall aspect, the interconnection of the two in the specific aspect, the internal connection between similarities and differences, and similarities in differences.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Chen GY, 2020, Laozi's Annotations and Translations Today. Zhonghua Book Company, Beijing, 228.
- [2] Wang Bi's annotations, Lou Yulie's annotations, 2011, Annotations on Laozi's Tao Te Ching. Zhonghua Book Company, Beijing, 2.
- [3] Hegel, 2013, Lectures on Philosophy, Translated by He Lin et al. Shanghai People's Publishing House, Shanghai, 125.
- [4] Feng YL, 2010, History of Chinese Philosophy. East China Normal University Press, Shanghai, 104.
- [5] Cheng ZH, 2017, History of Chinese Confucianism. People's Publishing House, Beijing, 3.
- [6] Guo QY, 2006, History of Chinese Philosophy. Higher Education Press, Beijing, 42.
- [7] Qian M, 2012, History of Chinese Thought. Kyushu Publishing House, Beijing, 15.

- [8] Gan CS, 2013, The Talented Politics: An Aspect of Chinese Political Philosophy. Taking Xunzi's Discourse as an Example. *Philosophical Research*, 2013(5): 50.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Urban Design of Tianfu Chinese Medicine City from the Perspective of Park City

Hanyuan Li*

Sichuan College of Architectural Technology, Deyang 618000, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the significant improvement in people's material living standards, as well as the impact of various issues such as the pandemic, food safety, and obesity in recent years, a healthy, secure, and quality spiritual well-being life has become what people pursue. Liu Guanzhong once proposed that addressing the living needs of China's people and guiding healthy lifestyles is what defines beauty. Therefore, it is essential to implement urban planning and construction that highly aligns with the healthy development concepts and lifestyles of city dwellers, adhering to a people-oriented approach to ensure that China's citizens possess material spaces for urban healthy spiritual lives. During his February 2018 inspection tour in Chengdu, the importance of highlighting the characteristics of park cities was emphasized by the Chinese official government while incorporating ecological values, marking the first official proposal of this concept. Over the past four years, numerous cities have actively explored park city planning and construction. As an integral part of Chengdu's urban development, Tianfu Traditional Chinese Medicine City has received high-level attention from municipal authorities. Through proactive organization and in-depth research, the "Urban Design for the Science and Technology Innovation Center Area of Tianfu Traditional Chinese Medicine City" was successfully completed to high standards. This paper examines the urban design process, summarizes its implementation progress, and proposes practical suggestions for spatial planning and design that promote healthy lifestyles under the park city framework.

Keyword: Health planning; Park city; Traditional Chinese medicine city; People-oriented

Online publication: October 29, 2025

1. Research background

This year marks the 10th anniversary of the World's Happiest Countries Ranking Report. Drawing on survey data from approximately 150 countries, the "2022 World's Happiest Countries Ranking Report" places China at 72nd globally, with the living well-being of the Chinese people rising once again. It should be noted that through national efforts and under the conditions of substantial enrichment in material and cultural development, people's sense of happiness has gradually improved in recent years. The country has placed high emphasis on spiritual civilization construction, promoted ecological civilization, and facilitated the formation of healthy lifestyles

among the populace, achieving certain accomplishments. Currently, the principal contradiction in Chinese society has evolved into the conflict between the people's growing needs for a better life and unbalanced and inadequate development. To meet the people's growing demands for a fulfilling spiritual life and advance the quality improvement of spatial development, it is particularly crucial to enhance urban spatial planning and promote the formation of healthy lifestyles.

During his February 2018 inspection tour in Chengdu, the importance of highlighting the characteristics of park cities was emphasized by the Chinese official government while incorporating ecological values. Ecosystems consist of various individuals and organizations that have to collaborate in order for projects to succeed ^[1]. As an advanced urban development model embodying new development concepts, the project portfolio of park city construction in Chengdu incorporates people-centered spatial planning theories that prioritize human-centric development throughout the collective wisdom and efforts of the government, citizens, designers, and builders. The construction project has achieved remarkable results.

2. Explore the purpose and significance of Tianfu Chinese Medicine City urban design practice from the perspective of park city

Chengdu, a pivotal regional hub in western China, serves as the cornerstone of the Chengdu-Chongqing Economic Circle's "One Pole, Two Centers, Two Cities" strategic framework. The city is driving high-quality development through its flagship initiative to establish a model park city embodying innovative development concepts, with ambitions to become a national central hub, an eco-friendly, livable park city, an international gateway, and a world-renowned cultural metropolis. Pengzhou City, Chengdu's northern gateway and an innovation-driven green industrial base along the Longmen Mountain foothills, is implementing Chengdu's "West Control" and "North Transformation" policies while aligning with its industrial development strategy. By prioritizing green industries, including cultural innovation, landscape agriculture, leisure sports, wellness tourism, and sustainable food production, Pengzhou is building a regionally distinctive spatial planning system centered on human needs. As the core area for developing Pengzhou's traditional Chinese medicine industry, Tianfu Traditional Chinese Medicine City leverages its advanced herbal medicine expertise and unique geographical-cultural environment to have established a complete industrial chain ecosystem. This foundation provides valuable conditions for enhancing public health, spiritual fulfillment, and balanced urban development. Guided by this human-centric vision, Tianfu Traditional Chinese Medicine City has formulated the "Urban Design for the Science & Technology Innovation Center Zone" (hereafter "TCZ Plan"), steadfastly pursuing a wellness-oriented park city development path.

This paper explores spatial design methodologies for Tianfu Traditional Chinese Medicine City. By analyzing ecological, cultural, commercial, and morphological dimensions to formulate corresponding planning strategies, it provides actionable recommendations for practical spatial planning approaches. The study also proposes optimization measures for future local development, offering guidance for building sustainable, healthy lifestyles through urban planning. Specifically, the paper addresses the following aspects:

Analyze the basic situation of the base and summarize the basic ideas of the completed plan.

Summarize and sort out the specific embodiment of human-centered design and park city concept in the planning of Traditional Chinese Medicine City.

This paper analyzes the key points that can be further optimized in the current planning and design, and puts forward some suggestions.

3. Basic situation and planning ideas of Traditional Chinese Medicine City

3.1. Overview of Traditional Chinese Medicine City

Situated in the southern part of Pengzhou's central urban area, Tianfu Zhongheng City's Happiness Science Park serves as a transitional zone bridging the commercial-industrial core with the new southern city's residential hub. The planned development covers approximately 2.27 square kilometers, featuring minimal existing infrastructure requiring preservation and predominantly undeveloped land. Blessed with abundant natural resources and exceptional ecological foundations, the area benefits from the Liuhe River branch channel running through its eastern side – a vital waterway connecting Pengzhou's north-south axis while acting as an ecological corridor linking key urban districts. To the west, the Chengdu-Pengzhou Expressway provides convenient transportation links, with the Third Ring Road cutting through the site to seamlessly integrate it with other urban areas of Pengzhou.

3.2. Basic ideas of TCM City planning

3.2.1. Implement higher-level and overall guidance

In terms of spatial planning, efforts are being vigorously advanced around the Chengdu Municipal Land Space Planning, Tianfu Traditional Chinese Medicine City Science and Technology Innovation Master Plan, and “Tianfu Traditional Chinese Medicine City Science and Technology Innovation Central Area Control Detailed Planning.” It is essential to systematically consider the functional layout of the environment and industry, using corridors as the framework to build foundations, weave waterways into belts, and stitch textures to form a rich open-space system. High standards and strict requirements are applied to create an urban space that prioritizes ecological sustainability, comprehensive innovation, and abundant vitality.

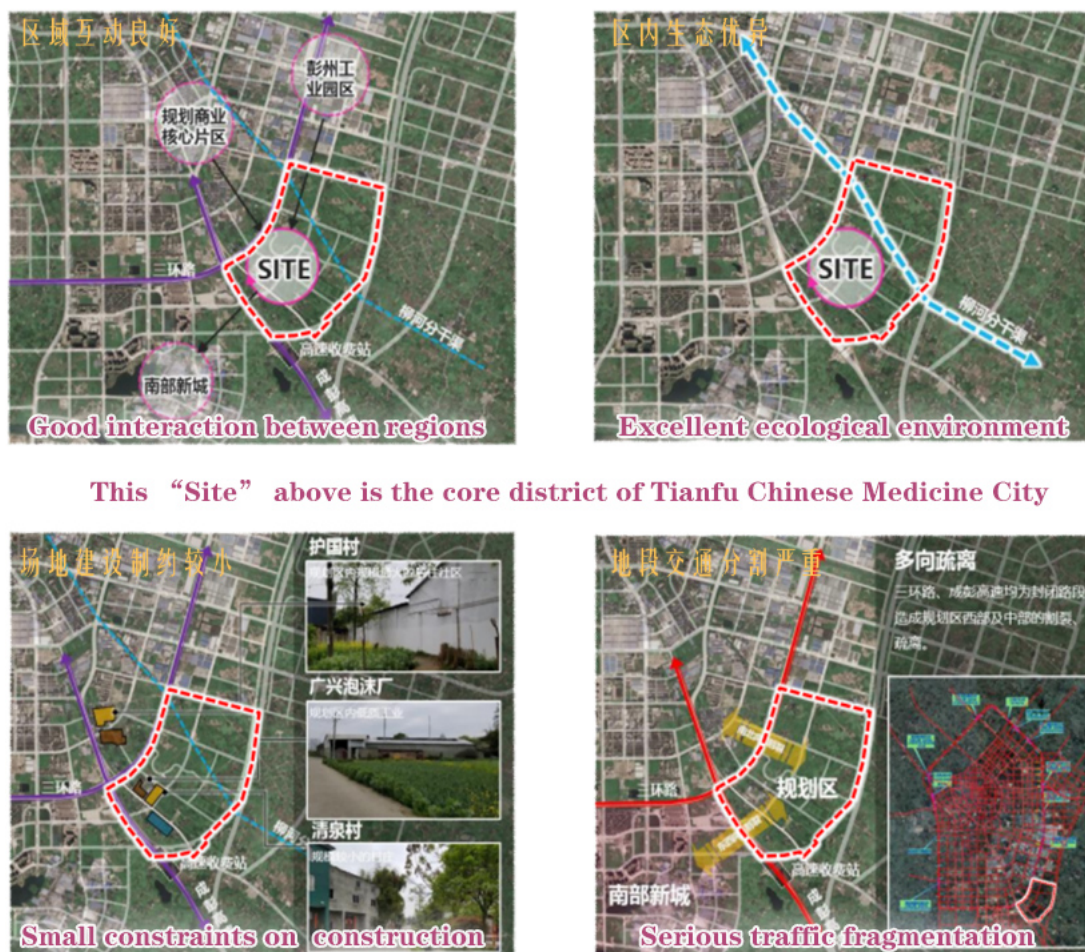
Spatially, four leading technological tracks are realized through innovation-led zones, while integrated development zones improve front-to-back-end services and incorporate diverse living scenarios. Culturally, leveraging Chengdu's TOD development theory, the public transportation-first concept is implemented to attract residents, creating park-like, slow-paced lifestyles. The construction of industrial functional zones embodies the “people-oriented” philosophy, shifting from “industry-city-people” to “people-city-industry” urban development logic, forming distinctive human-centric service spaces. The construction of a greenway network is necessary for park city. Greenway optimization is regarded as one of the key approaches to improving urban ecological quality^[2]. Ecologically, a “blue green cross frame” framework serves as the core, as is shown in **Figure 1**, creating boundaryless park districts accessible right at residents' doorsteps.



Figure 1. Ecological design concept of Tianfu Chinese Medicine City

3.2.2. Enrich the foundation and sort out the problems

To achieve successful spatial design, it is essential to thoroughly understand the current situation and existing challenges. During the spatial planning process for Tianfu Traditional Chinese Medicine City, four key aspects were addressed. First, a comprehensive overview was established by compiling data from relevant departments, including population statistics, economic indicators, industrial profiles, and environmental conditions. Through field research, specific points were identified to systematically organize the industrial development chain. Second, community outreach efforts were conducted across streets and households. Given the extensive undeveloped land areas, investigations were carried out regarding the impact of developed enterprises and industries, as well as the living conditions of surrounding residents and transportation infrastructure. Third, focused analysis was performed on the ecological environment and cultural context, encompassing water systems, vegetation, natural conditions, and a comprehensive evaluation of terrain features. Cultural foundations and related heritage elements were also integrated. Finally, based on documented information, characteristic issues were categorized and analyzed in detail to identify existing problems (**Figure 2**), laying the groundwork for subsequent solutions.



This “Site” above is the core district of Tianfu Chinese Medicine City

Figure 2. Ecological design concept of Tianfu Chinese Medicine City

3.2.3. Seize positioning, build characteristics

Park city, as a nature-based solution (NBS) in the process of urban transition, addresses key challenges in green space management, such as insufficient ecosystem services and unequal distribution of public resources ^[3]. The

master plan has established the Tianshui Traditional Chinese Medicine City as a hub for revitalizing and upgrading traditional Chinese medicine, while positioning it as a demonstration zone for health industry integration that integrates public services in accordance with natural local conditions, serving as the incubation core and supporting area for Tianshui Traditional Chinese Medicine City. In practical implementation, focusing on the distinctive core of a demonstration city integrating traditional Chinese medicine with education, the city has formulated three-phase development goals (short-term, medium-term, and long-term). Specific strategies include functional refinement, land optimization, spatial enhancement, and project execution. On one hand, the city systematically improved infrastructure design; on the other, the city shaped open urban spaces through the “park+” concept. By designing urban landscapes based on environmental considerations and creating iconic landmarks, designing a construction landscape centered around the lake, as shown in **Figure 3**, these efforts have laid a solid foundation for cultivating a unique cultural identity and ensuring sustainable urban development.



Figure 3. Schematic diagram of the Huitong Lake shoreline effect

3.2.4. Improve configuration with a humanistic orientation

Guided by the “people-oriented” urban development philosophy of “people-city-industry integration”, the city will enhance service infrastructure through coordinated industrial-urban growth. This approach promotes concentrated population and industrial clusters in designated functional zones, effectively balances employment and residential needs, and fosters local consumption among enterprises and residents within industrial chains. By transitioning from a “production-city-people” model to a “people-city-industry” framework, the city aims to build cities that fully embody new development concepts. Focusing on creating multifunctional industrial zones with balanced employment-residence ratios, comprehensive services, and eco-friendly living environments, the city will intensify efforts to improve supporting facilities and complete high-quality public service configurations. Through systematic categorization of key urban nodes across districts, the city will develop distinct spatial patterns by strategically shaping different types of urban development.

4. Implementation based on the spatial planning characteristics of park city

The concept of a park city is an emerging value system that aligns with future development. It not only fulfills the

core principle of “people-centered” development but also promotes healthy lifestyles among citizens, contributes to ecological civilization construction, and enhances Chengdu’s functional requirements within the Chengdu-Chongqing metropolitan area and the Belt and Road Initiative. The Traditional Chinese Medicine City Plan has effectively implemented some of these concepts, which will be systematically reviewed here.

4.1. Build a “blue and green double cross” to lay the foundation for clear waters and green mountains

The concept of a park city emphasizes the ecological value of green mountains and clear waters, with the planning and construction of ecological spaces serving as foundational work. During urban design phases, the specific creation and shaping of spatial configurations constitute fundamental requirements. The “Traditional Chinese Medicine City Plan” conducted a rigorous analysis of natural resources within the planning area, implementing the “Blue-Green Dual Cross” framework to scientifically connect water bodies and green spaces, forming an integrated green system. Building upon existing ecological green spaces, the plan introduces expansive green areas to create future green corridors through permeable design, water conservation measures, and scientific land management. This establishes a “green doorstep” system extending from streets to households, featuring urban green spaces at different scales (points, lines, surfaces) that provide material conditions for healthy living. The plan further develops lake areas based on data from 2018 precipitation records, evaporation rates, and Liu River water consumption, constructing an ecological shoreline model. Analyzing water level variations and calculating required lake surface elevations provides valuable baseline data for subsequent construction. Backed by the Longmen Mountain Range, this green-water system planning lays a solid foundation for the sustainable development of the park city’s ecological environment.

4.2. Improve the industrial development system and consolidate the pillar of the new town of Traditional Chinese Medicine

High technical costs, administrative barriers, and the lack of long-term governance mechanisms remain critical challenges of park city^[4]. The concept of the Traditional Chinese Medicine (TCM) City, whose framework is laid out in **Figure 4**, emphasizes the economic value of green and low-carbon development, advocating eco-friendly production methods for economic growth. Given that the area already hosts leading TCM manufacturers and has produced nine varieties with annual sales exceeding 100 million yuan, the city will strategically plan industrial chains to establish a complete TCM industry system. This initiative aims to achieve three key upgrades: industrial transformation, resource integration, and quality enhancement. The city will upgrade core industries to create standardized, medical-oriented next-generation TCM clusters, introduce related equipment manufacturing and health product industries to expand the healthcare ecosystem, and develop emerging services like modern wellness and medical aesthetics centered on TCM principles. Following national strategies for TCM and health industry development, the city proposes a “1+1” innovation-driven spatial framework where TCM’s R&D chain and health application chain form the foundation for the city’s sustainable growth.

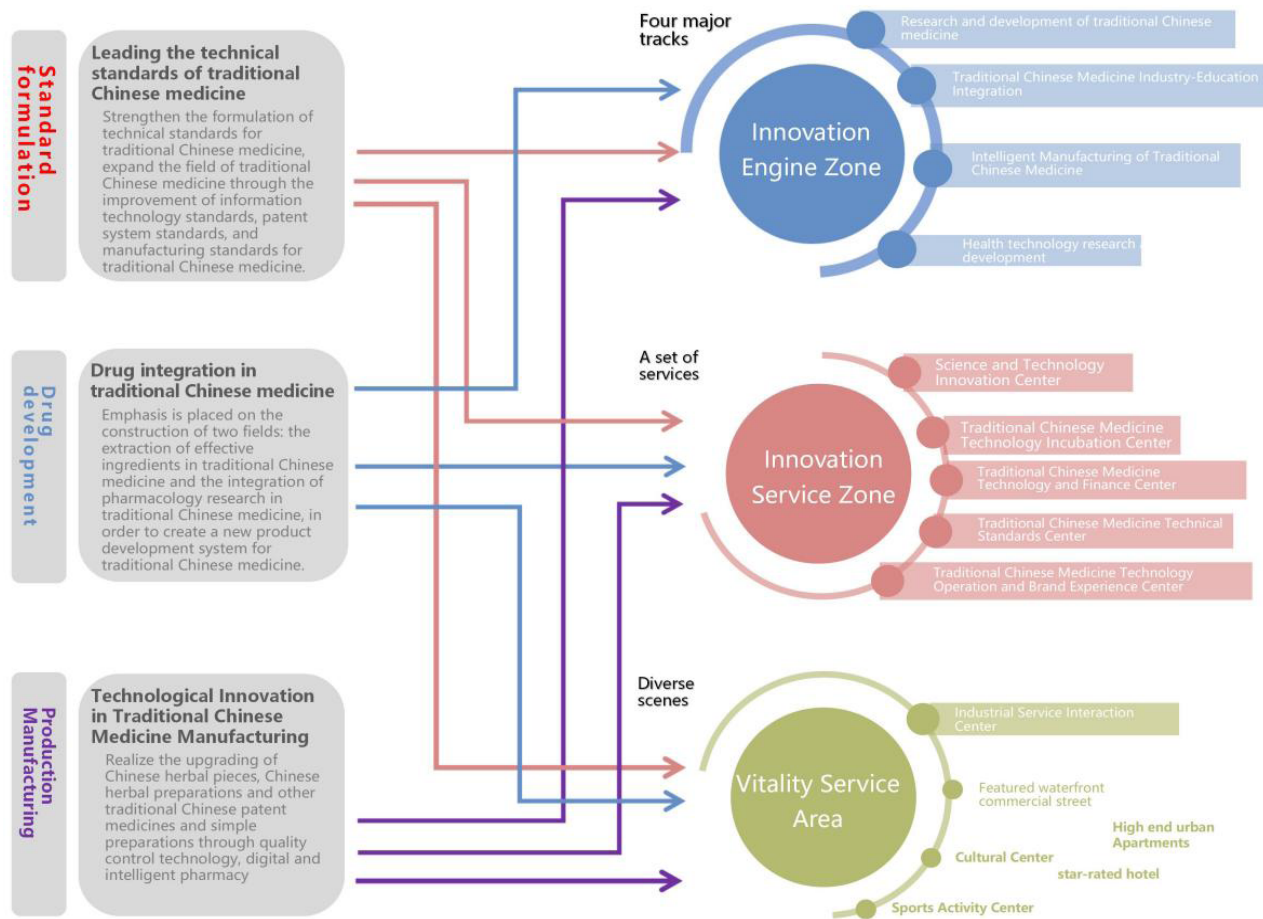


Figure 4. Schematic diagram of industrial layout

4.3. Determine the urban landscape system and build up the traditional ridge of Shuchuan

The park city emphasizes the aesthetic value of poetic dwelling. In the “Traditional Chinese Medicine City Plan”, efforts are made to fully restore the Tianfu characteristics, starting from the traditional Shu-Chuan cultural essence and rhythmic landscape features to design urban appearance. The overall architectural layout highlights the philosophy of organic integration between solid and void through “layered mountains and mirrored waters, staggered arrangements.” Four spatial strategies—vertical axis, focal points, silhouette shaping, and text painting—are employed to shape the mountain-water urban imagery embodying “Tianfu Rhythm.” Following two major cross-axis principles, seen in **Figure 5**, four core gateway nodes are established with controlled building heights and rational arrangement. Adhering to Shu-Chuan cultural arrangements, distinctive urban spaces are designed to accommodate human activities across various landscapes, aggregating cultural flows and attracting social connections. This creates material spaces fulfilling diverse spiritual needs, forming Sichuan’s spatial beauty while aligning with the requirements of a park city demonstration zone that integrates urban environments with natural acoustic systems.

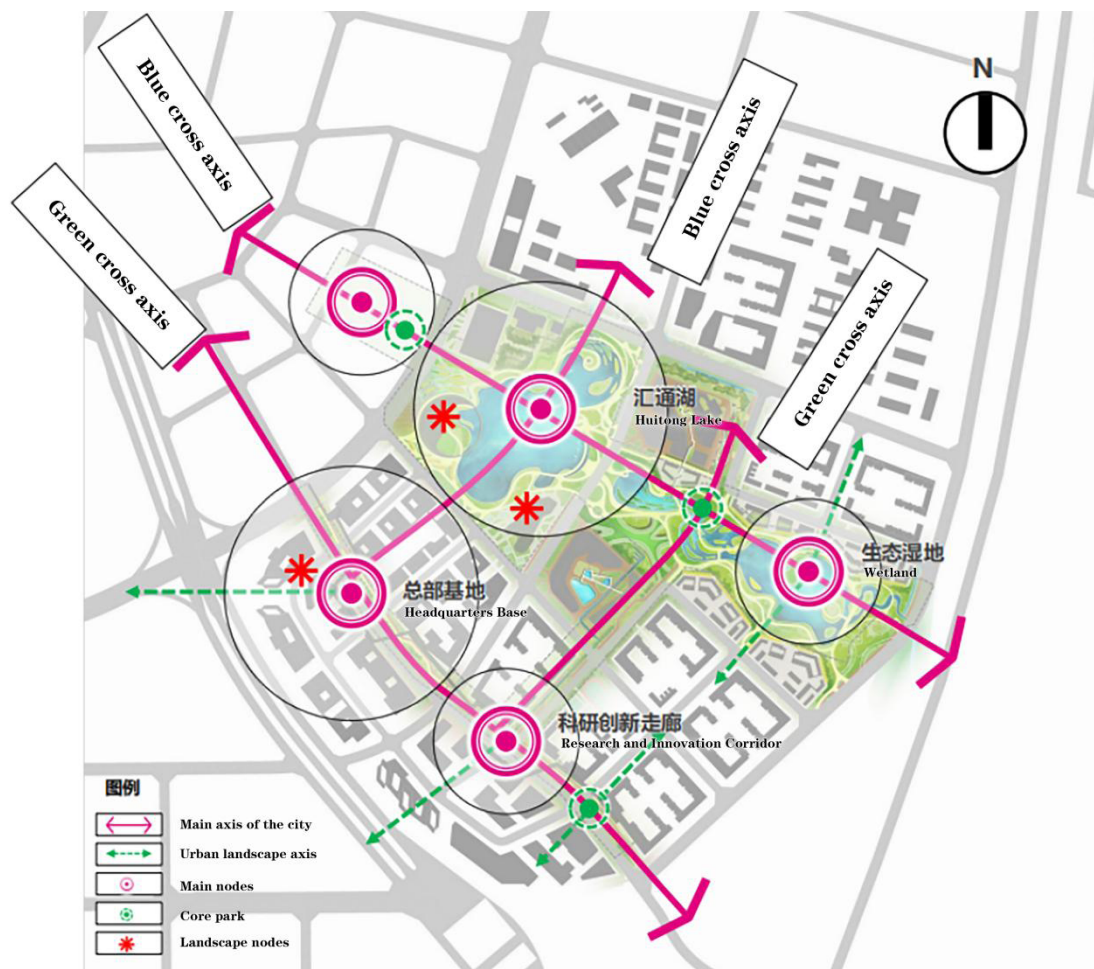


Figure 5. Axis layout diagram

4.4. Promote human-centered health integration with the city and repair the back of healthy living

The park city emphasizes the value of a simple yet healthy lifestyle. In the “Traditional Chinese Medicine City Plan”, the people-oriented development philosophy of industry and urban integration is applied to create spatial nodes that foster healthy living environments. The plan organizes three key components: urban service centers, vibrant service belts, and community service hubs. Centered around Huitong Lake, the layout integrates living and production spaces with architectural designs harmoniously blending into the ecosystem. Maximizing the lakeshore landscape interface, multiple distinctive open spaces are developed along the shoreline, offering diverse experiential activities throughout the day and forming multifunctional service areas for Pengzhou residents. A dynamic service belt surrounding wetland landscapes features high-quality wetland axes flanked by residential waterways, industrial waterways, urban apartments, and specialty hotels, catering to the varied needs of corporate professionals for daily life, social interaction, and leisure. The “boundaries” —urban motor roads—are softened through integrated design, merging buildings with wetland parks to achieve harmony between people, architecture, and nature. Two community service clusters are formed around the wetlands, with community service centers located at cluster cores or main entrances, adjacent to nearby primary schools connected via pedestrian pathways. These clusters serve as integrated service platforms combining cultural, commercial, educational, medical, and

sports functions. Ultimately, through the development of key nodes, the district achieves a multi-tiered urban living environment that prioritizes healthy lifestyles.

5. Innovative optimization concept under the park city concept

5.1. Key points that can be deepened at present

It should be noted that the spatial planning and design of Tianfu Traditional Chinese Medicine City has been well-developed, serving as a model for related urban development. This framework provides spatial guidance for building a high-quality park city, strategically positioning the health industry, and enhancing residents' quality of life. However, there remains room for refinement in both the conceptual planning of healthy living initiatives and the implementation of the park city concept. These aspects warrant further enhancement in subsequent planning and concrete construction phases. The following discussion will detail specific areas requiring improvement within this existing plan.

The “Herbal Medicine City Plan” demonstrates profound respect for ecological foundations and local ecology. While harmonizing with nature, it creates environments of exceptional aesthetic value and poetic ecology, embodying the concept of a park city and promoting healthy living. Although this vision has been implemented in the planning process, further refinement is possible. First, economically, integrating environmental science could form an “industry-environment+” economic model. Incorporating water conservation into green axis economic ecosystems would optimize low-carbon practices while enhancing public awareness of eco-friendly lifestyles. Second, smart spatial design strategies could streamline industrial chains and residential services, alleviating work-life stress and fostering healthier living attitudes. Third, cultural development needs enhancement. Current guidelines lack depth in exploring distinctive cultural elements and humanistic values, requiring systematic integration of cultural guidance throughout the project.

5.2. Specific optimization methods

5.2.1. A comprehensive system of “sponge” + economic conservation + suburban park can be cast

The Tianshuangzhongcheng Pharmaceutical City, with its terrain and geomorphology characteristic of the Chengdu Plain, centers on the planning of its traditional Chinese medicine industry and environmental development. By leveraging existing plains and sponge city principles, it creates distinctive natural landscapes and a sustainable “industry-environment+” model—a crucial approach in similar water ecosystem urbanization projects. The overall layout of the city is shown in **Figure 6**. Through current water circulation planning and sponge infrastructure utilization, the city establishes ecological water cycles, improves soil quality, and develops cost-effective urban economic models. Characteristic leisure facilities, entertainment venues, office spaces, and community interaction areas form an integrated water conservation system that extends to individual households. This promotes shared water resources, enriched courtyard environments, and plant maintenance cost savings. Architectural innovations include rainwater harvesting tanks, flower bed water collection systems, garden infiltration upgrades, automated irrigation controls for water-cycling lawns, and humidity monitoring technologies—all reducing operational costs while enhancing landscape diversity and water reuse efficiency. The water network conserves green spaces along main axes, ensures economical water utilization, and creates multi-layered urban park complexes shown in **Figure 7**.



Figure 6. Schematic diagram of Internet of Things connectivity



Figure 7. Schematic diagram of a water vein integrating the city into the industry

5.2.2. The development of the industrial chain should reflect the concept of a smart city

To advance the development of smart urban-rural spatial planning and guide the intelligent transformation of Traditional Chinese Medicine City, comprehensive industrial chain planning has been established. While implementing urban-industrial integration requirements, the city has clarified functional roles, defined development directions, analyzed market demands, and optimized industry layouts. However, beyond basic elements, specific smart construction guidelines should be formulated to enhance distinctive features in modern industrial chains, thereby promoting the spiritual core of healthy lifestyles. In-depth research on model-oriented strategies is essential, including systematic proposals for smart policies in key industries, talent recruitment measures, and safeguarding mechanisms. Innovative planning approaches should be adopted to broaden talent

perspectives, develop strategic packaging methods to activate dormant resources, and conceptualize concrete “Internet+” models. Within industrial smart planning frameworks, measures such as WiFi coverage, IoT-enabled logistics, intelligent production systems, site recommendations, and multimedia promotion should be implemented to empower urban development with the transformative potential of 5G+ technologies.

Regarding implementation strategies, China’s ICT sector demonstrates robust technological development, serving as a crucial tool for building smart urban-rural spaces. Key initiatives include: 1) Establishing specialized IoT infrastructure for direct sales of traditional Chinese medicine products. This involves developing an IoT platform that integrates with government service systems while meeting NSSP security standards, creating a digital ecosystem encompassing product operations, manufacturing, services, and management. 2) Organizing cultural events featuring TCM heritage. Targeted exhibitions will debut in neighboring cities, followed by scaled-up promotion through online platforms leveraging IoT and 5G technologies to establish provincial-level cultural landmarks for sustainable growth. 3) Conducting three rounds of live-streaming campaigns targeting local residents, businesses, and stakeholders. 4) Developing educational zones and smart navigation systems aligned with botanical seasons. Seasonal medicinal education programs and online cultivation tutorials will be introduced for industry professionals. 5) Advancing intelligent architectural design. Building upon the Smart Transportation Network outlined in the Traditional Chinese Medicine City Plan, the city will enhance interactive experiences in building spaces through human-centered principles, improving their sustainability.

5.2.3. The health cultural context should be strongly reflected

Park cities emphasize the humanistic value of cultural edification. While the “Traditional Chinese Medicine City Plan” has conducted cultural organization and implemented spatial controls for spiritual lineage, architectural style, and landmarks, there remains a gap in planning for cultural product development and historical preservation. The overall direction of architectural style and urban environment is entirely correct. During the deepening of planning and construction processes, TCM culture should be integrated into core planning frameworks, serving as the guiding theme of health culture lineage. The traditional wellness philosophy—harmony between heaven and humanity, reverence for nature, prevention-first approach, and integration of medical care with elderly care—should be incorporated into smart city development. This cultural thread should manifest in key urban nodes, landmark details, small-scale facilities, and industrial park enterprises. Some urban parks should adopt TCM wellness themes, which could become official names. By organizing and developing these themes, a comprehensive promotion network and spatial display elements for wellness spirit and health wisdom can be established, significantly enriching the cultural connotation of wellness education and playing a positive role in further urban development.

6. Summary

This paper summarizes the specific measures and approaches of the “Traditional Chinese Medicine City Plan”, reviews the concepts, methods, and effects of urban design from the perspective of park cities, and further analyzes key points requiring deepening in accordance with the requirements of park city construction and the people-oriented philosophy. It proposes further improvement measures. It can be said that the “Traditional Chinese Medicine City Plan” has laid the foundation for achieving a territorial spatial pattern characterized by intensive and efficient production spaces, livable and moderate living spaces, and ecological spaces featuring clear mountains

and clean waters, as well as safe, harmonious, open, efficient, and charming quality landscapes. Furthermore, it has added a significant stroke to realizing the concept of park cities and fulfilling Chengdu's mission as a comprehensive window region for the "Belt and Road." In the next phase of construction, if the city can integrate the content of this paper, carefully consider relevant suggestions, closely link people's healthy development with the people-centered development philosophy and spatial planning design, and implement them effectively, the city will surely enhance the city's ecological vitality and build an excellent new traditional Chinese medicine city!

Funding

Special Project of "Chengdu Chongqing Dual City Economic Circle and Chengdu Demei Capital Integration" in the Philosophy and Social Sciences Planning of Deyang City in 2025, Coupling Analysis and Research on the Construction of Smart and Resilient Cities in Deyang City from the Perspective of Integration Circle, Project No. DY25ZX053.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Ooms W, Caniels MCJ, Roijakkers N, et al., 2020, Ecosystems for Smart Cities: Tracing the Evolution of Governance Structures in a Dutch Smart City Initiative. *International Entrepreneurship and Management Journal*, 2020(16): 1225–1258.
- [2] Ge Q, Li YN, Lu GB, 2025, Current Situation and Optimization of Greenways in Hefei under the Background of Park City. *Journal of Landscape Research*, 7(4): 30–34.
- [3] Chen SY, Qiu J, Yang M, 2025, Addressing the Green Space Management Challenges of the Park City in China: How can Nature-based Solutions Contribute? *Environmental Development*, 2025(55): 101235–101235. <https://doi.org/10.1016/J.ENVDEV.2025.101235>
- [4] Meng JN, 2025, Landscape Planning and Design in High-Density Cities of China: Challenges, Strategies, and International Insights. *Sustainable Development Research*, 7(1): 83. <https://doi.org/10.30560/SDR.V7N1P83>

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Importance of Perfectionism to Chinese International Students and How This Affects Their Emotional and Mental Health

Yifei Wang*

Hubei University of Technology, Wuhan 430068, Hubei, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: This study adopts a qualitative research approach, focusing on the mechanisms through which perfectionism affects the emotional and mental health of Chinese international students in the UK. Through in-depth interviews with three Chinese students and using Interpretative Phenomenological Analysis (IPA), three core themes of perfectionism manifestation were identified: unconscious patterns of perfectionist behavior, the shaping role of others and the social environment on perfectionism, and the complex impact of the experience of being an “outsider” in a cross-cultural context on perfectionist psychology.

Keywords: Perfectionism; Chinese international students; Interpretative Phenomenological Analysis; Emotional well-being; Cultural adaptation; Psychological intervention

Online publication: October 29, 2025

1. Introduction

Perfectionism, as a multidimensional psychological concept, is typically defined as an individual’s tendency to set exceedingly high standards accompanied by harsh self-evaluations ^[1]. In high-pressure academic and cultural environments, Chinese international students are particularly prone to exhibiting varying degrees of perfectionist characteristics, which profoundly impact their emotional state, psychological adaptation, and academic achievement. Based on a constructivist paradigm, this study uses in-depth interviews and interpretive analysis to reveal the inner experiences and psychological meaning of perfectionism among Chinese students studying in the UK, thereby addressing the neglect of individual experience in existing quantitative research.

2. Literature review

The theory of perfectionism has evolved since the 1990s. Frost et al. proposed dividing perfectionism into two

dimensions: Concern over Mistakes and Personal Standards ^[2]. Later, Stoeber and Otto further clarified its two-factor structure: perfectionistic strivings and perfectionistic concerns. The former is often associated with positive outcomes such as high achievement motivation, while the latter is more involved in psychological distress such as anxiety and depression ^[3].

Hewitt and Flett, from an interpersonal perspective, divided perfectionism into self-oriented, other-oriented, and socially prescribed types, particularly pointing out that socially prescribed perfectionism tends to be prominent in cultures emphasizing collectivism. Among Chinese international students, family and social expectations often become the primary external sources of perfectionism ^[4]. Furthermore, the interaction between acculturative stress and perfectionism has been shown to significantly affect individuals' mental health levels ^[5].

Current research mostly uses quantitative methods to examine the correlation between perfectionism and various psychological variables, lacking qualitative exploration starting from individual experience to explore its meaning-making process. Therefore, this study utilizes Interpretative Phenomenological Analysis (IPA) to extract the experiential structure and dynamic changes of perfectionism from the narratives of international students.

3. Methodology

3.1. Research design

This study employs Interpretative Phenomenological Analysis (IPA) within qualitative research, committed to capturing participants' subjective experiences and interpretations of the meaning of perfectionism. This method emphasizes exploring complex, multidimensional psychological phenomena closely related to cultural background through semi-structured interviews into the individual's world.

3.2. Participants

The study used purposive sampling to select three Chinese international students in the UK, including both males and females, all in their first year of study, and self-identifying as having perfectionist tendencies. All participants signed informed consent forms, ensuring their anonymity and data confidentiality.

3.3. Data collection

Each participant underwent one semi-structured online interview lasting approximately 30–50 minutes. Questions covered the sources of perfectionism, specific manifestations, emotional experiences, and cultural adaptation experiences. Interviews were audio-recorded and transcribed verbatim for analysis.

3.4. Data analysis

Data analysis followed the standard IPA process as guided by Smith and Osborn, including repeated reading of the text, making initial notes, identifying experiential themes, seeking connections between themes, and finally integrating them into superordinate themes ^[6]. The process emphasized the dialogue between the researcher and the text and reflection to capture implicit meanings and emotional dimensions in the narratives.

4. Findings

In this study, three Chinese international students in the UK were interviewed as participants, each showing different experiences and understandings of perfectionism. Participant A manifested perfectionism in appearance

anxiety, often using makeup, clothing, and photography to conceal perceived flaws in her appearance. She enjoyed the process of dressing up but was also troubled by her inability to meet self-expectations. Participant B initially denied his own perfectionism but gradually realized during the interview that he had extremely high self-demands accompanied by persistent self-criticism. He gained a sense of security from this criticism, viewing it as a form of self-acceptance. Participant C was clearly aware of her exacting demands on herself academically, stemming from parental expectations and social evaluation. Although external pressures decreased after coming to the UK, she still felt pain due to her self-set high standards, which was even affecting her sleep and eating.

Through interpretative phenomenological analysis of the interview content, three important themes were extracted.

4.1. Theme 1: The unconscious nature of perfectionism and self-discovery

Participant A initially denied being a perfectionist, claiming she “just feel(s) like I’m kinda taking things as they come in most ways”, but later described an almost obsessive preparation process for taking photos—she found it both enjoyable and painful. Further exploration led her to realize these behaviors were actually to cover up appearance flaws, and she thus became aware that her perfectionism was closely related to appearance anxiety. She said: “I didn’t think it was that important to me before, but it actually takes up a big part of your life.”

Participant B similarly showed an ambivalent attitude. At the beginning of the interview, he displayed great confidence in his own abilities until he was asked, “Why did you ask to take part in this study on perfectionism?” when self-doubt emerged. He mentioned often being demanding of others, thinking he was “mean.” As the interview progressed, he engaged in persistent self-criticism, expressing dissatisfaction with almost every word and deed, yet was unaware that this pattern constituted perfectionist behavior. Only when pointed out did he reflect in surprise: “I didn’t even know, I was reflecting on myself, oh, is this some kind of psychological phenomenon?” This tendency for individuals with higher levels of self-critical perfectionism to engage in avoidant coping hinders their ability to use other, more adaptive coping strategies and to escape the distress associated with stressful situations^[7].

Unlike A and B, participant C was clearly aware of her perfectionism and described it as “ingrained.” She indicated that this demand always accompanied her, regardless of environmental changes. What troubled her was not only the high standards themselves but also her persistent self-awareness of them.

4.2. Theme 2: The dual role of others’ evaluations and social support

All participants emphasized the central role of others’ evaluations and social support in the formation and maintenance of perfectionism, but the content and manner of influence differed for each.

Participant A received support from her family, especially her mother, such as financial assistance and emotional approval, which allowed her to maintain a degree of confidence while facing appearance anxiety. Simultaneously, peer influence was significant—she desired to fit into the group, gaining peer recognition through external appearance. She mentioned that in China’s collectivist culture, she did not want to be a maverick and instead hoped to feel safe within groups sharing common interests.

Participant B, on the other hand, established his self-worth through others’ dependence. He stated that only when helping others and feeling needed could he alleviate his self-criticism. His perfectionism was more referenced against others, seeking temporary psychological balance by playing expected roles.

Participant C was long influenced by parental expectations and peer pressure, deeply trapped in the psychological dilemma of “conditional positive regard”. Any failures and mistakes could lead to their parents

withdrawing their love. She believed that only by meeting external standards could she gain love and acceptance. Additionally, comparisons among peers further deepened her anxiety and frustration. Unlike A and B, C struggled to obtain sufficient support from the outside world and constantly sought the researcher's approval during the interview, reflecting her unmet need for validation.

4.3. Theme 3: The “outsider” identity and the reconfiguration of perfectionism

All three mentioned how their experience of being an “outsider” in the UK impacted their perfectionism. As they planned to return to China after their studies, they viewed their time in the UK as a temporary experience, which brought a relaxing effect on their behavior and psychology.

A felt “allowed to do anything” in the UK because no one knew her past, reducing external judgment pressure. She described this period as a “long holiday”, freeing her from the pressure to fit in and allowing her to explore her interests in clothing and photography more freely.

B also experienced a sense of freedom, but accompanied by anxiety about losing control. He enjoyed the more flexible schedule but felt guilty due to relaxed self-discipline, even exhibiting emotionally out-of-control behaviors. This reveals the tension between self-discipline and release faced by perfectionists in environments lacking structure.

C felt a shift from being externally driven to internally driven. Away from parental and social comparisons, she focused more on her own standards, and her anxiety decreased somewhat. However, she remained aware that perfectionism had been internalized as part of her personality, still dominating her goal-setting and self-evaluation.

5. Discussion

The findings of this study resonate with existing theories but also offer breakthroughs. The unconscious nature of perfectionism is highly related to the perfectionistic self-presentation strategies proposed by Hewitt et al., where individuals often hide imperfections to avoid social blame. The buffering effect of social support on perfectionism corroborates Sirois and Molnar's discussion on “adaptive perfectionism”, where whether one possesses resilience and self-compassion alongside high standards is key to affecting mental health ^[8].

The psychological distance brought by the “outsider” identity provided participants with an opportunity to re-examine and even reconfigure their perfectionism. This is consistent with Zhang et al.'s view that “Environmental transformation can serve as an opportunity for cognitive restructuring” ^[9]. It suggests that consciously utilizing the transition phase of cultural context in psychological counseling and educational support may help individuals transition from maladaptive to adaptive manifestations of perfectionism.

This study also has limitations, such as a small sample size and reliance on self-report data. Future research could expand sample diversity and incorporate longitudinal designs to track the dynamic changes of perfectionism during the study abroad process.

6. Conclusion and implications

Perfectionism manifests complexly among Chinese international students in the UK. It can be both a warning sign of psychological risk and a driving force for pursuing excellence. Its development is deeply influenced by individual self-awareness, social support, and cultural environment. For perfectionists, perfectionism is part of the self that makes them suffer, but they do not want it to disappear completely. They do not hate their perfectionism

as much as I thought they would at first; they have perfectionism as part of their personality, part of their ego, which they feel painful and enjoyable at the same time. They enjoy the sense of achievement that perfectionism gives them, while suffering the anxiety and pain that go hand in hand with perfectionism.

University international student support services could add psychoeducational workshops on perfectionism, recruiting and training senior Chinese students to serve as “perfectionism cognition mentors.” Through regular group discussions and one-on-one conversations, they could help new students analyze the sources and impacts of their own perfectionist tendencies, enhancing self-awareness and emotional regulation skills. Psychological counselors can introduce cognitive restructuring techniques into cross-cultural adaptation counseling to help students distinguish between adaptive and maladaptive perfectionism. Future research could further explore the specific mechanisms of family communication patterns and cultural values in the formation of perfectionism, and conduct longitudinal studies on the developmental trajectory of perfectionism, tracking changes from pre-departure through different stages of studying abroad to identify critical turning points and influencing factors in the cultural adaptation process.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Hewitt PL, Flett GL, Sherry SB, et al., 2003, The Interpersonal Expression of Perfection: Perfectionistic Self-presentation and Psychological Distress. *Journal of Personality and Social Psychology*, 84(6): 1303.
- [2] Frost RO, Marten P, Lahart C, et al., 1990, The Dimensions of Perfectionism. *Cognitive Therapy and Research*, 14(5): 449–468.
- [3] Stoeber J, Kathleen O, 2006, Positive Conceptions of Perfectionism: Approaches, Evidence, Challenges. *Personality and Social Psychology Review*, 10(4): 295–319.
- [4] Wei M, 2007, Acculturative Stress, Perfectionism, Years in the United States, and Depression among Chinese International Students. *Journal of Counseling Psychology* 54(4): 385.
- [5] Curran T, 2017, The Relationships between Parental Conditional Regard and Adolescents’ Self-critical and Narcissistic Perfectionism. *Personality and Individual Differences*, 2017(109): 17–22.
- [6] Smith JA, Jarman M, Osborn M, 1999, Doing Interpretative Phenomenological Analysis, in *Qualitative Health Psychology: Theories and Methods*. SAGE Publications, London, 218–240.
- [7] Dunkley DM, 2016, Personal Standards and Self-Critical Perfectionism and Distress: Stress, Coping, and Perceived Social Support as Mediators and Moderators. *Perfectionism, Health, and Well-Being*. Springer International Publishing, Cham, 157–176.
- [8] Sirois FM, Molnar DS, 2016, Conceptualizations of Perfectionism, Health, and Well-Being: An Introductory Overview. *Perfectionism, Health, and Well-Being*. Springer International Publishing, Cham, 1–21.
- [9] Zhang Y, 2007, Perfectionism, Academic Burnout and Engagement among Chinese College Students: A Structural Equation Modeling Analysis. *Personality and Individual Differences*, 43(6): 1529–1540.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Research on the Construction Path of the Ideological and Political Education Community for Postgraduates in Colleges and Universities of Heilongjiang Province

Dongqi Li, Qian Zhang, Shuo Wang, Li Zhao

School of Management, Heilongjiang University of Science and Technology, Harbin 150022, Heilongjiang, China

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Against the dual background of implementing the fundamental task of fostering virtue through education and cultivating and developing new-quality productive forces, constructing an ideological and political education community for postgraduates has become an important direction for the reform of higher education. Focusing on colleges and universities in Heilongjiang Province, this paper combines the Marxist community thought and the concept of “whole-process, all-round, and all-staff education” to construct a “five-in-one” framework of the postgraduate ideological and political education community, which includes “value synergy, subject synergy, curriculum synergy, process synergy, and environment synergy.” By analyzing the practical difficulties faced by colleges and universities in Heilongjiang Province, such as the uneven distribution of ideological and political education resources for postgraduates and insufficient subject collaboration, this paper discusses the construction logic and implementation strategies of the postgraduate ideological and political education community in colleges and universities of Heilongjiang Province from three dimensions: theoretical foundation, practical expansion, and guarantee mechanism. It aims to provide references for promoting the high-quality development of postgraduate talent cultivation in the Northeast Old Industrial Base.

Keywords: Postgraduate education; Ideological and political education; Community

Online publication: October 29, 2025

1. Introduction

The Party and state leaders have emphasized that “ideological and political work should be integrated into the entire process of education and teaching to achieve whole-process and all-round education.” As the highest level of higher education, postgraduate education undertakes the important mission of serving the national strategic needs and cultivating innovative talents. Its ideological and political education is directly related to the value orientation and social contributions of postgraduates ^[1]. As the core of the old industrial base in Northeast China, Heilongjiang Province is home to a number of high-level universities such as Harbin Institute of Technology and

Harbin Engineering University. However, the ideological and political education for postgraduates in the province still faces practical problems, including unbalanced distribution of inter-university resources, homogeneity of educational models, and insufficient collaboration among educational entities.

At the theoretical level, the construction of an ideological and political education community breaks the closedness and singularity of traditional ideological and political education, and emphasizes the formation of a joint force through the collaborative education of multiple entities. The concept of “community” proposed by Ferdinand Tönnies in *Community and Society* emphasizes an organic whole formed based on common goals and emotional bonds, which provides a theoretical foundation for the construction of an ideological and political education community^[2]. At the practical level, universities in Heilongjiang Province have made initial explorations in aspects such as ideological and political education through curriculum and inter-university cooperation, but have not yet formed a systematic community-based education model. Based on the requirements for cultivating high-level talents under the development of new-quality productive forces, this study constructs a postgraduate ideological and political education community with Heilongjiang characteristics. It holds significant theoretical and practical value for improving the ideological and political education system in universities within the province, enhancing the quality of postgraduate cultivation, and serving the local economic and social development.

2. Theoretical basis and core connotation of the postgraduate ideological and political education community

2.1. Theoretical origins

The core theoretical support for this study is the Marxist thought of community. Marx argued that “the essence of man is the true community of man.” This idea reveals the dialectical unity between the individual and the collective, and at the same time provides a philosophical foundation for the construction of the ideological and political education community. From the Marxist perspective, the postgraduate ideological and political education community is a specific manifestation of the “association of free individuals” in the field of education. It realizes the high unity of individual value and social value by breaking down inter-university barriers and integrating different educational resources^[3].

The theory of collaborative governance provides methodological guidance for the construction of the community. This theory emphasizes that multiple subjects achieve the optimal allocation of resources through rule negotiation, which is highly consistent with the collaboration of multiple forces such as universities, supervisors, and society in the ideological and political education community^[4]. In addition, China’s concept of “all-round education by all staff in all processes” and the requirements of the “Ten Education Systems” form a comprehensive education framework that integrates ideological and political education into the entire process and all links of postgraduate training, providing a policy basis for the practical path of the community.

2.2. Definition of core concepts

2.2.1. Postgraduate ideological and political education

It refers to the work carried out by university counselors, postgraduate supervisors, and other personnel in accordance with the law of postgraduates’ growth. Through ideological guidance, political education, and moral cultivation, it guides postgraduates to establish correct outlooks on life, the world, and values, enabling them to become qualified builders and reliable successors of the cause of socialism with Chinese characteristics who are well-developed morally, intellectually, physically, aesthetically, and labor-wise. Compared with undergraduate

ideological and political education, postgraduate ideological and political education places greater emphasis on the integration of academic ethics, research integrity, and professional responsibility.

2.2.2. Postgraduate ideological and political education community

The construction of the postgraduate ideological and political education community is a high-standard task. On the one hand, it requires various educational subjects to exert their respective strengths in their own positions; on the other hand, it involves integrating various educational forces to generate new educational momentum and achieve joint education. It can be understood as follows: clarify the functions and divisions of labor among multiple subjects, including universities within a province, groups of supervisors, full-time counselors, postgraduate Party and league organizations, and social institutions; give full play to the joint role of all elements of the community; and form a three-dimensional educational network covering the entire cycle of postgraduate training through inter-university linkage and cross-regional cooperation.

3. Current Situation and dilemmas of ideological and political education for postgraduates in colleges and universities of Heilongjiang Province

3.1. Current development status

In recent years, colleges and universities in Heilongjiang Province have carried out a series of explorations focusing on ideological and political education for postgraduates. In terms of curriculum construction, most colleges and universities have offered compulsory courses such as “Theory and Practice of Socialism with Chinese Characteristics for a New Era” and tried to integrate ideological and political elements into professional teaching^[5]. In terms of the teaching staff, a preliminary framework of the education team featuring “tutors + counselors + ideological and political course teachers” has taken shape^[6]. In terms of practical activities, relying on red resources such as the spirit of the Northeast Anti-Japanese United Army and the Daqing Spirit, themed educational activities have been carried out^[7].

From a macro perspective, the ideological and political education for postgraduates in colleges and universities of Heilongjiang Province is still in the stage of decentralized development. According to practical visits and investigations, only a small number of colleges and universities in the province have established an inter-university cooperation mechanism for ideological and political education. Most postgraduates believe that the ideological and political education content of their schools is not closely integrated with scientific research practice, and at the same time, some tutors say they also lack systematic training in ideological and political education.

3.2. Major dilemmas

Imbalanced resource allocation: There is an obvious “echelon gap” among colleges and universities in Heilongjiang Province. High-level universities and local colleges have significant differences in terms of ideological and political education funds, teaching staff, and practical bases. Taking Harbin as an example, the annual special fund for ideological and political education of universities directly under the central government is 3 to 5 times that of local undergraduate colleges. This imbalance leads to uneven quality of ideological and political education for postgraduates across the province.

Insufficient subject synergy: As the core force of ideological and political education, full-time teachers of ideological and political courses have the limitation of “fighting alone.” For postgraduate tutors, they pay

insufficient attention to guiding students' ideology, focusing more on academic work while neglecting ideological and political education. Full-time counselors are burdened with heavy routine work, making it difficult for them to concentrate on value guidance. Moreover, there is a lack of regular inter-university cooperation mechanisms, which hinders the sharing of high-quality curriculum resources and outstanding teacher resources. The participation of social forces is low; educational entities such as enterprises and alumni have not been effectively transformed into materials for ideological and political education, and their role in education has not been fully exerted.

Outdated educational content and methods: On one hand, the ideological and political education content of some colleges and universities still remains at the level of theoretical indoctrination, and lacks targeted responses to practical issues of concern to postgraduates, such as academic ethics and career development. On the other hand, the current ideological and political teaching methods are still dominated by classroom lectures, with less application of interactive methods such as case teaching and social practice. This makes it difficult to stimulate postgraduates' independent exploration and in-depth thinking, and restricts the internalization effect of ideological and political education.

Inadequate evaluation mechanism: Firstly, a scientific evaluation system for the ideological and political education community has not yet been established, resulting in the absence of such a system. Secondly, the existing assessment focuses more on quantitative indicators such as the attendance rate of ideological and political courses and participation rate in activities. This kind of evaluation, which emphasizes form over substance, cannot truly reflect the actual effect of ideological and political education, and it is difficult to effectively stimulate the internal motivation of various subjects for collaborative education.

4. Pathways for building the community of ideological and political education for postgraduates in Heilongjiang Universities

4.1. Value synergy: Consolidating the ideological foundation of the community

Value synergy is the soul of community building, which needs to be guided by core socialist values to form a unified orientation for talent cultivation. Focusing on the fundamental questions of "what kind of people to cultivate, how to cultivate them, and for whom to cultivate them", educators should integrate the goal of fostering virtue through education into the entire process of postgraduate training, and clarify the value positioning of each university in the community: ministerial universities play a leading and exemplary role, while local universities focus on the ideological and political education for application-oriented talents, forming a complementary development pattern. Educators will establish a joint meeting system for postgraduate ideological and political education across the province, regularly conduct special studies on the theoretical system of socialism with Chinese characteristics, take the practice of revitalizing the old industrial base in Northeast China as a vivid teaching material, and guide postgraduates to understand their mission in regional development. In addition, educators will jointly formulate the Code of Academic Ethics for Postgraduates in Heilongjiang Province, and cultivate postgraduates' scientific spirit of rigorous study and seeking truth from facts through inter-university academic forums, case warning education, and other forms.

4.2. Subject synergy: Building a diversified participation network for talent cultivation

Subject synergy is the core of the community's efficient operation, which requires breaking down "inter-university barriers" and the boundaries between "family, school, and society." With the double first-class universities in

Heilongjiang Province as the leading units, educators will establish the “Longjiang Postgraduate Ideological and Political Education Alliance”, build an inter-university recognized credit system for ideological and political courses, and carry out activities such as cross-university joint teaching and famous teachers’ lectures. For example, educators can rely on the aerospace spirit education resources of Harbin Institute of Technology and the shipbuilding military industry culture of Harbin Engineering University to create characteristic shared modules for ideological and political education. Educators will implement the “Program for Improving Postgraduate Tutors’ Ability in Ideological and Political Education”, incorporate the ability of ideological and political education into the tutor assessment indicators, and enhance tutors’ awareness and ability of “ideological and political education” through inter-university tutor training courses, ideological and political case workshops, and other forms. Educators will establish university-enterprise cooperative education bases, invite Longjiang entrepreneurs and industry experts to participate in postgraduate ideological and political education, and enhance postgraduates’ sense of professional mission through activities such as “Great Craftsmen Entering Campuses” and “Stories of Serving the Country through Science and Technology.” educators will also link up alumni resources, set up an “Excellent Alumni Tutor Group”, and give play to the leading role of peers.

4.3. Curriculum synergy: Building an integrated and innovative curriculum system

Curriculum synergy serves as the main channel for talent cultivation in the community, requiring the organic integration of ideological and political courses with curriculum-based ideological and political education, as well as the integration of theoretical teaching with practical teaching. Educators will jointly compile characteristic textbooks such as Longjiang Revitalization and Postgraduates’ Mission with universities in the province, and develop thematic courses including “Digital Economy and Northeast Revitalization” and “Ecological Civilization and Longjiang Practice.” By adopting the model of “online sharing + offline discussion”, educators will ensure high-quality curriculum resources cover the entire province. Educators will establish curriculum-based ideological and political research centers by discipline category to extract ideological and political elements embedded in each major. For instance, in science and engineering majors, educators will incorporate the spirit of “serving the country through science and technology” embodied in “major national strategic technologies and equipment”; in liberal arts majors, educators will strengthen red culture education such as the spirit of the Northeast Anti-Japanese United Army, thereby forming integrated “major + ideological and political education” courses. Relying on Heilongjiang’s red education bases and industrial parks, educators will design practical courses like “Retracing the March Route of the Anti-Japanese United Army” and “Intelligent Manufacturing Experience Camp”, and build inter-university shared practical teaching bases. Postgraduates will be required to complete no less than 2 credits of cross-university practical courses during their studies.

4.4. Process synergy: Constructing a full-cycle talent cultivation chain

Process synergy requires integrating ideological and political education throughout the entire postgraduate cultivation cycle, covering the enrollment, training, and graduation stages, to form a continuous education mechanism. During the enrollment stage, thematic admission education centered on the “Longjiang Spirit” is carried out; through inter-university freshmen forums, senior students’ experience-sharing sessions, and other forms, postgraduates are helped to establish correct learning goals, mental health files for postgraduates are established, and targeted psychological counseling is provided. In the training stage, academic ethics education is integrated, and a cross-university joint supervision mechanism against academic misconduct is established; at

the same time, the cultivation of social responsibility is strengthened through social practice, postgraduates are organized to participate in voluntary activities such as “rural revitalization research” and “community services”, and practical performance is included in the comprehensive quality evaluation. In the graduation stage, thematic education on “professional ethics and social responsibility” is conducted to guide postgraduates in establishing a correct employment outlook; a graduate tracking and feedback mechanism is established, and the content of ideological and political education is dynamically optimized through employer evaluations, alumni interviews, and other methods.

4.5. Environment synergy: Creating an immersive talent cultivation atmosphere

Environmental synergy requires leveraging the dual roles of culture and systems to build an educational ecosystem where the “soft environment and hard environment” are deeply integrated. To jointly develop the soft environment of campus culture, the “Longjiang Postgraduate Cultural Festival” is held, and cross-university activities such as red classic recitations and sci-tech cultural exhibitions are carried out; virtual reality technology is used to co-establish a “digital red exhibition hall”, enabling the efficient flow of high-quality cultural resources and providing vivid cultural carriers for ideological and political education. A collaborative management method for the member units of the community is formulated to optimize the hard environment of ideological and political education through systems, clarify the rights and responsibilities of each subject, set up a “Postgraduate Ideological and Political Education Collaborative Innovation Fund” to support inter-university cooperation projects, incorporate the construction of the ideological and political education community into the assessment and evaluation system of universities, and establish a dynamic evaluation mechanism. The “Longjiang Postgraduate Ideological and Political Education Cloud Platform” is built to empower the smart educational environment with digital technology, integrating resources such as online courses, academic lectures, and practical activities. Relying on big data analysis technology, it analyzes data including postgraduates’ learning dynamics and interactive remarks on the platform, accurately identifies their ideological trends and growth needs, and provides real-time value guidance, thus forming a comprehensive and multi-level closed-loop educational ecosystem.

5. Guarantee mechanisms for the postgraduate ideological and political education community

5.1. Organizational guarantee

To ensure the standardized operation and efficient advancement of the university ideological and political education community, it is necessary to establish an organizational management system with a clear hierarchical structure and well-defined rights and responsibilities. On the one hand, a leading group for community construction should be set up, led by the Heilongjiang Provincial Department of Education and involving university leaders in charge of ideological and political education. This group will be responsible for top-level planning, major decision-making, and resource coordination. On the other hand, subordinate institutions such as the Academic Committee and the Executive Office should be established to take charge of the specific implementation of plans and daily management. Finally, each university needs to form a special working group, which will decompose the community’s talent cultivation tasks into specific implementable measures based on the university’s actual situation, ensuring that talent cultivation initiatives take effect at the grassroots level.

5.2. Resource guarantee

The material foundation for the long-term operation of the community lies in the continuous supply of resource elements. Firstly, a special fund for the provincial postgraduate ideological and political education community should be established, with a clear scope of use (mainly for curriculum development, teacher training, and the construction of practical bases). A fund management process featuring “project application—expert review—dynamic supervision—performance evaluation” should be established. Secondly, an inter-university resource sharing mechanism should be built. Through a matching model of “resource list—demand list—connection list”, resources such as laboratories, libraries, and renowned teachers should be opened to member units of the community, promoting the efficient flow of resources. Thirdly, channels for social resources should be expanded, social capital should be introduced, and enterprises, foundations, and other entities should be encouraged to set up innovation funds for ideological and political education. This will broaden the sources of funds and form a diversified resource pattern characterized by “government leadership, university collaboration, and social participation.”

5.3. Evaluation guarantee

To ensure the efficient operation of the university ideological and political community, an evaluation system featuring “multi-subject participation and multi-dimensional assessment” should be constructed. Firstly, observable and quantifiable core indicators should be set from dimensions such as postgraduates’ ideological quality, academic ethics, and social responsibility. At the same time, indicators for the operational efficiency of the community should be taken into account, forming a dual-dimensional evaluation framework that integrates “talent cultivation effectiveness and operational quality.” Secondly, a combination of self-evaluation, cross-evaluation, and third-party evaluation should be adopted to conduct regular assessments of the community’s operational effects, ensuring the neutrality and scientificity of the evaluation results. Thirdly, a closed-loop feedback mechanism for evaluation results should be established. The evaluation results should be used as the core basis for the dynamic adjustment of the community construction plan, and the plan should be adjusted dynamically according to the evaluation situation, forming a positive cycle of “evaluation—feedback—optimization—improvement.”

6. Conclusion and outlook

The construction of the ideological and political education community for postgraduates in colleges and universities of Heilongjiang Province is a systematic project. The “Five-in-One” construction framework proposed in this paper, through the multi-dimensional linkage of value, subject, curriculum, process, and environment, provides an operable practical plan for pooling the regional joint efforts in ideological and political education. The completion of this community can not only solve the problem of unbalanced development of postgraduate ideological and political education in the region, optimize the allocation of resources for postgraduate ideological and political education in Heilongjiang Province, and cultivate high-quality talents who meet the development requirements of new-quality productive forces, but also enhance the effectiveness of ideological and political education, and provide replicable and promotable practical experience for the coordinated development of regional ideological and political education in colleges and universities across the country. In the future, the construction of the postgraduate ideological and political community needs to further explore the innovation of operation mode under the digital background, study the differentiated paths of community construction according to the characteristics of postgraduates in different disciplines, so as to make ideological and political education more

targeted and effective, and lay a solid ideological foundation for cultivating high-level talents who “take root in Heilongjiang and serve the country.”

Funding

Special Key Project of the “14th Five-Year Plan” for Educational Science in Heilongjiang Province: Research on the Construction of an Ideological and Political Education Community for Postgraduates in Colleges and Universities of Heilongjiang Province (ZHE1425008)

Key Project of the “14th Five-Year Plan” for Educational Science in Heilongjiang Province: Research on the Practice of Integrating Excellent Traditional Chinese Culture into the “Whole-Process, All-Round, and All-Staff Education” in the New Business Disciplines of Colleges and Universities (GJB1425273)

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Chen JR, 2024, Exploration on the Innovative Paths of Ideological and Political Education for Postgraduates in the New Era. *Henan Education (Higher Education Edition)*, 2024(10): 29–31.
- [2] Gao J, Liu H, 2023, Tonnie’s Community Thought: Origin, Core Theme, and Reflection. *Journal of Social Science Trends*, 2023(11): 12–17.
- [3] Tang YQ, 2024, The Generative Connotation and Enlightenment of Marx’s “Real Community” Thought. *Industrial and Science Tribune*, 23(15): 8–10.
- [4] Zhang Y, Zhang XW, Jin FR, 2017, Research on the Reform and Innovation of Ideological and Political Theory Course Teaching in Colleges and Universities from the Perspective of Collaborative Governance. *Journal of Huaihai Institute of Technology, (Humanities and Social Sciences Edition)*, 15(12): 129–131.
- [5] Cai SN, 2021, Research on Optimizing the Path of the Educational Function of Campus Culture in Colleges and Universities. *Journal of Liaoning Provincial College of Communications*, 23(6): 47–50. <https://doi.org/10.3969/j.issn.1008-3812.2021.06.012>
- [6] Zhang C, Zhang WZ, Gan XP, 2024, Research on the Construction Path of the “Teacher-student growth community” from the Perspective of Counselors’ Work in the New Era. *Jilin Education*, 2024(5): 91–93.
- [7] Wu YX, Chen N, 2025, Research on the Value and Path of Constructing the Ideological and Political Moral Education Community in Colleges and Universities from the Perspective of Comprehensive Ideological and Political Education. *Qinzhi*, 2025(1): 77–80.

Publisher’s note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

The Role of Social Learning Theory in the Construction of Hospice Care Volunteer Training System

Xu Zhang*

Fudan University, Shanghai 200082, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: With the increasing aging of society and the advancement of medical technology, hospice care—a medical service model aimed at improving the quality of life—has gradually attracted widespread attention. In hospice care, volunteers play an extremely important role, providing abundant support and care to patients and their families. However, the quality and training level of volunteers directly affect the effectiveness of hospice care services and their social recognition. To meet the growing demand for hospice care, it is particularly important to establish a sound volunteer training system. Focusing on the construction of the “hospice care volunteer training system”, this paper applies the heuristic thinking of Bandura’s Social Learning Theory to explore its role and significance in the process of constructing the hospice care volunteer training system.

Keywords: Hospice care; Volunteer training; Social learning theory; Social workers

Online publication: October 29, 2025

1. Problem statement: The necessity of constructing a training system for hospice care volunteers

In 2017, the Medical Administration Bureau of the National Health and Family Planning Commission issued the Practice Guidelines for Hospice Care (Trial) and the Basic Standards and Management Specifications for Hospice Care Centers (Trial). The promulgation of these two specifications provided China with actionable standards and guidelines for hospice care. The documents stipulate that hospice care practices should be centered on terminally ill patients and their families, emphasizing the need to establish a social support system. They also highlight the importance of giving full play to the role of volunteers or the social support system in follow-up visits and support during the depression phase, helping patients cope with emotional reactions and enabling them to spend the final stage of life with a positive attitude. As a crucial component of the whole-life-cycle health management for individuals, hospice care is a team-based service model that provides symptom control, palliative medical care,

psychological support, and other services to patients in the terminal stage of life.

With the progress of the times, the service team of hospice care is gradually moving towards interdisciplinary collaboration, and the development of its talent pool is also fraught with challenges. Particularly for hospice care volunteer services, aspects such as the volunteers' role positioning, service scope, and work content remain ambiguous. Throughout the development of hospice care in China, the positioning of hospice care volunteers has not been clearly defined. Furthermore, there are certain differences in service skills and values between hospice care volunteers and volunteers engaged in other related services. Given the unique characteristics of hospice care patients and the emotional needs of their families, hospice care volunteers must receive systematic training before they can start providing services. Therefore, the author argues that the training for hospice care volunteers needs to be more specialized and clear-cut, and should be jointly carried out by volunteers and medical social workers^[1-2].

2. Literature review: Reflection on the training system for hospice care volunteers

The service principles of the hospice care team adhere to the "comprehensive care for the individual, the family, the team, and the entire process". In all aspects of hospice care volunteers, including recruitment, training, management, and evaluation, there are issues regarding the definition of the boundaries of volunteer services, and different scholars have different interpretations on each aspect. Zhu Haiyan et al. pointed out that volunteers provide all-around care in terms of physiology, psychology, and spirituality for terminally ill patients from their hospitalization to discharge and home care. This care aims to alleviate the pain caused by various physical discomforts of terminally ill patients, enrich their spiritual life, help them get rid of loneliness and fear, ensure that more lives are respected to the greatest extent, allow patients to end their lives with dignity and no regrets, and improve patient satisfaction. The Shanghai Hospice Care Service Standards state that volunteers shall be responsible for caring for, listening to, and accompanying patients; reading newspapers or writing letters on behalf of patients; helping patients fulfill their wishes; assisting patients with hair washing, bathing, etc.; organizing communication and exchanges among patients; and encouraging patients to participate in appropriate cultural and recreational activities. The Basic Hospice Care Service Standards issued by Heilongjiang Province in 2022 specifies that hospice care volunteers need to perform a total of eight related functions, including: assisting social workers in providing relevant services to patients; caring for, listening to, and accompanying patients; reading newspapers or writing letters on behalf of patients; helping patients fulfill their wishes; assisting patients with body cleaning; organizing communication and exchanges among patients; encouraging both patients and their families to express their feelings; and encouraging patients to participate in appropriate cultural and recreational activities. The definition of these service functions is based on the division of partial concepts and does not form a more systematic and complete arrangement of relevant tasks and training^[3].

At present, many foundations and social service organizations at home and abroad are carrying out hospice care-related projects. Guangzhou Red House Social Work Service Center is a professional social work institution engaged in life education and life care services for urban young people. It divides volunteer training into three stages: elementary, intermediate, and advanced, which involve popular science knowledge of hospice care, professional companionship and care skills, and the ability to lead teams independently. The VITAS Hospice Care Program in the United States mentions in terms of volunteer training that volunteers will learn about the concept of hospice care, caring for terminally ill patients, issues of grief and loss, health and safety precautions, and other topics. In addition, the program also has a certain professional matching for volunteers' skills and interests, and

divides volunteers into a total of 6 categories: administrative and community outreach volunteers, personal care volunteers, supplementary care volunteers, art volunteers, Paw Pals volunteers (and their pets), and bereavement and spiritual care volunteers ^[4].

Through the collation of relevant literature at home and abroad and information on the official websites of specific institutions, the main content and current situation of hospice care volunteer services have been clarified, and an analysis of the existing problems in the hospice care volunteer training system has been conducted based on the above current situation and experience:

1) When facing the pain of patients and their families, feeling empathy, powerlessness, and unclear job responsibility boundaries are common sources of psychological pressure for hospice care volunteers; 2) Negative emotional infection. Long-term companionship and service make volunteers have a close connection with patients, and the pain and sorrow of patients and their families will seriously affect the volunteers' own mood; 3) Lack of hospice care-related skills. The incomplete skill training system leads to volunteers still feeling insufficient in communication skills and spiritual care capabilities in practice even after receiving training, and finding it difficult to cope with complex and changeable real situations; 4) The general public's lack of life education makes it difficult for volunteers to talk about death with patients and their families; 5) The public has a misunderstanding of the connotation of hospice care and is unaware of what content hospice care services provide, so the work of volunteers is often difficult to be understood by patients, their families, and medical staff; 6) The operation funds for hospice care volunteer programs are insufficient, and the recruitment, management, and training systems are not perfect.

To sum up, under the guidance of the core principle of "comprehensive care for the individual, the family, the team, and the entire process", China's hospice care volunteer service has initially built a multi-level practical framework covering service positioning, function division, and training management. Although different regions and institutions have formulated corresponding standards for the roles and task contents of volunteers, there are still common problems of insufficient systematicness and lack of standardization at present. On this basis, the introduction of social learning theory can provide theoretical support for the capacity development and service integration of volunteers. This theory emphasizes that individuals acquire behaviors and internalize roles through various mechanisms such as observation, imitation, and social reinforcement, and is particularly suitable for explaining the learning process of volunteers in complex situations such as team collaboration, spiritual care, and practical skills ^[5].

3. Social learning: Significance of applying the hospice care volunteer training system

In the 1960s, American psychologist Albert Bandura proposed the social learning theory, which holds that human behavior can be formed or reinforced through the interaction between individuals and their environment. Different from behavioral psychology, the social learning theory places greater emphasis on the role of external cues in an individual's internal psychological activities and behavioral processes, while also highlighting the reinforcing influence of cognitive factors on behavioral habits. In summary, the social learning theory emphasizes three characteristics: the observational learning process, the enhancement of self-efficacy, and the triadic reciprocal behavior ^[6].

3.1. Construction of the observational learning process

Bandura believed that there are two ways to acquire knowledge or skills through observational learning: one is learning “through the consequences of responses”, i.e., gaining knowledge and skills through direct experience; the other is learning “through the demonstration of models”, that is, acquiring knowledge and skills through indirect experience. The former is learning by using direct experience, which is called enactive learning; the latter is learning by observing the learning processes and results of others, so as to improve learning efficiency. In the process of hospice care volunteer training, the explanation of basic knowledge and the practical operation of professional skills involve a considerable amount of content. By constructing the observational learning process, social workers can assist volunteers in: 1) Developing keen insight. For hospice care work, keen insight into details is crucial. Through observational learning, volunteers can gradually develop this valuable quality; 2) Enhancing empathy. Effective observation is not only the awareness of external behaviors, but also the perception of others’ inner worlds. Cultivating volunteers’ empathy can help them communicate better with patients and establish trusting relationships; 3) Preventing service deviations. Through observational learning, volunteers can promptly identify and correct their shortcomings or deviations in services, ensuring the stability of service quality; 4) Improving service quality. Through observational learning, volunteers can better understand the needs and troubles of patients and their families, thereby providing more considerate and effective services; 5) Establishing an evaluation mechanism. Observational learning can help establish an effective evaluation mechanism to objectively assess the service quality and progress of volunteers ^[7].

The construction of the observational learning process plays a crucial role in the volunteer training conducted by hospice care social workers. It not only improves service quality and enhances empathy but also promotes team collaboration and continuous professional development. This training method should be valued and effectively implemented.

3.2. Enhancing self-efficacy

Bandura believed that self-efficacy refers to an individual’s feelings regarding their confidence in completing a task, sense of self-esteem, sense of accomplishment, and other related aspects when facing a certain task, and a person’s confidence is influenced by factors such as self-reinforcement, outcome expectations, and efficacy expectations. The application of this concept in hospice care volunteer training holds significant importance, mainly including: 1) Improving the ability to cope with setbacks. Volunteers with strong self-efficacy can better accept and cope with these challenges, learning and growing from them; 2) Enhancing psychological resilience. In the face of challenges and pressures in hospice care work, self-efficacy helps volunteers maintain psychological balance and resilience, enabling them to better deal with difficulties; 3) Boosting self-confidence. Volunteers with strong self-efficacy are more likely to believe that they can cope with various challenges and difficulties, thereby maintaining confidence and composure when interacting with patients; 4) Improving service quality. When volunteers have confidence in themselves, they are more likely to provide high-quality services, which helps improve patients’ hospice care experience and quality of life; 5) Strengthening professional satisfaction. Self-efficacy is closely related to professional satisfaction. When volunteers have confidence and a sense of accomplishment in their work, they are more likely to feel satisfied and engaged in their profession.

During the training process, emphasis should be placed on cultivating volunteers’ self-efficacy, helping them establish a confident and positive mindset, so that they can better contribute to hospice care work. By using this theory to foster the enhancement of volunteers’ self-efficacy, they can improve their own abilities in service

practice, truly engage in hospice care-related services, connect with the inner worlds of patients and their families, and clearly and explicitly build confidence and service behaviors in the process of providing services ^[8].

3.3. Rational application of the triadic reciprocal determinism

Bandura argued that human cognition, behavior, and environment each possess independence while interacting with one another, forming a dynamic reciprocal determinism relationship. In the relationship between behavior and environment, the environment determines the direction and intensity of behavioral choices, and in turn, behavior can transform the environment to some extent to adapt to human needs. The relationship between the environment and individuals shows that humans are neither passive beings controlled by the environment nor free agents who can do whatever they want; instead, the two complement each other. The rational application of this theory in the process of hospice care volunteer training can help volunteers understand the interactive effects among individuals, behaviors, and the environment. Social work often emphasizes the “balance between humans and the environment”, and the same applies to hospice care services. Interactions exist extensively—between patients and their families, between families and the environment, and between social workers/volunteers and families—and such interactions are even more meaningful during the end-of-life stage. After a series of training sessions, volunteers can gain a deeper understanding of the application related to the “balance between humans and the environment”, which enables them to complete relevant services more efficiently and professionally ^[9–10].

4. Social learning: Application and innovation of the hospice care volunteer training system

4.1. Clarify the training process and build a visualized volunteer training classroom

The observational learning process of behavior acquisition reflects the general laws of human learning. Social workers should conduct high-quality hospice care volunteer service training through multiple pathways, combining learning from direct experience and indirect experience. Firstly, arrange on-site observation of service scenarios. Volunteers are arranged to observe hospice care service scenarios on-site, including hospitals, nursing homes, and families. This allows volunteers to understand the needs of patients and their families while observing the performance of professional service staff in practical work. Secondly, carry out simulated scenario drills. Simulated scenarios are used to let volunteers participate in role-playing, simulate various hospice care situations, and then design real cases to improve their practical operation skills. Thirdly, organize group discussions and reflections. After the observation, group discussions are held for volunteers to share their observation and simulation experiences. At the same time, volunteers are encouraged to reflect on their own performance, share insights and learned experiences, so as to promote mutual learning. Fourthly, conduct a multi-dimensional evaluation. This evaluation not only focuses on the technical level but also takes into account volunteers' performance in communication, emotional support, and other aspects. Through multi-dimensional evaluation, a comprehensive understanding of volunteers' overall quality can be obtained, promoting their balanced development in all aspects. Finally, pay attention to real-time feedback and adjustment. During the training process, real-time feedback is provided to help volunteers correct mistakes and improve in a timely manner. The training plan is adjusted according to observation results to meet the learning needs of volunteers at different levels. In addition, a feedback loop mechanism is established to regularly review and update volunteers' observational learning plans, and volunteers are encouraged to put forward suggestions for training improvement, so as to promote the continuous optimization of the training system.

4.2. Emphasize process orientation and conduct individualized hospice care training courses

In the training of hospice care volunteers, emphasizing process orientation and conducting individualized training courses can better address the individual differences among volunteers, enhance their personal skills and care capabilities, and help them understand the characteristics and learning progress of each volunteer. Firstly, emphasize individual needs assessment. Before the training, social workers can conduct an individual needs assessment of volunteers to understand their backgrounds, experiences, and learning needs. Meanwhile, they should develop individual development plans and tailor the training content and direction based on the assessment results. Secondly, adopt flexible training methods. Social workers can provide diverse training methods, including online learning, on-site internships, and group discussions, to meet the individual learning preferences of volunteers. Asynchronous learning can also be considered, allowing volunteers to arrange their study according to their own schedules and improve their learning autonomy. Thirdly, apply real cases and simulated scenarios. According to the service background and focus areas of each volunteer, social workers can provide relevant real cases and simulated scenarios, enabling volunteers to better apply the knowledge they have learned and respond to various situations in a more flexible and creative manner. Finally, focus on individual feedback and evaluation. Provide real-time feedback during the individual training process, pay attention to the learning progress and performance of volunteers, and establish a regular individual evaluation mechanism. This ensures that the training effect is consistent with individual needs and allows for timely adjustments to the training plan ^[11–14].

4.3. Establish a token mechanism to promote the improvement of volunteers' self-efficacy

To enhance the capabilities of hospice care volunteers and ensure high-quality services, the author believes that incentives through a token policy can be adopted to boost their self-efficacy. Firstly, establish a reward system. The primary step is to design a clear reward system that links tokens to volunteers' performance. For instance, tokens are awarded to volunteers for completing a certain number of training courses, successfully handling complex situations, participating in team collaboration, and other positive behaviors, so as to enhance their enthusiasm for participation. Secondly, provide personalized reward options. Offer a variety of reward choices to meet the individualized needs of different volunteers. Develop personalized reward plans by understanding the interests and needs of each volunteer. Thirdly, ensure token convertibility. This is the most crucial aspect: set rules for converting tokens into specific benefits or services, allowing volunteers to clearly recognize the practical value of tokens and thereby making the tokens more appealing. Fourthly, provide social recognition and commendation. It should be noted that this does not necessarily refer to recognition and commendation from the entire society; instead, a public social recognition mechanism can be designed. Volunteer achievements are promoted through platforms such as bulletin boards and social media. The key purpose is to provide volunteers with positive social feedback, increase their sense of recognition within the community, and thus enhance their self-efficacy.

4.4. Integrate community education to build a hospice care-friendly social environment

As hospice care gradually comes into public view and gains increasing acceptance, the author holds that the implementation of community life education is conducive to faster development of a friendly social environment. By integrating community education into hospice care volunteer training, we can enhance community residents' awareness and understanding of hospice care services, build a more friendly and supportive community environment, and improve the quality of volunteers' services as well as their social recognition. First, conduct

research based on community needs. Before launching volunteer training, carry out research on community needs to understand the community's cognitive level, demands, and expectations regarding hospice care services. Adjust the training content in light of the actual situation of the community to make it more in line with the characteristics and needs of the local community. Second, launch community publicity activities. Make use of community resources to carry out hospice care publicity activities, so as to improve community residents' awareness and understanding of hospice care services. In addition, forums, health lectures, and other forms can be held to convey the core concepts of hospice care and the importance of volunteer services to the community. Third, strengthen community partnerships. Social workers can establish cooperative relationships with community institutions, schools, social organizations, and other entities to jointly promote the development of a hospice care-friendly society. This collaboration can help attract community resources, provide support such as training venues and practical opportunities, and strengthen cooperation both within and outside the community. Fourth, encourage participation in community activities. Encourage volunteers to actively participate in community activities to enhance the community's acceptance of hospice care. Through volunteers' practical participation, community residents' understanding of hospice care services can be promoted, and relevant misunderstandings and outdated concepts can be eliminated ^[15].

5. Conclusion

The training of hospice care volunteers is a typical form of instructional learning. Social learning theory, as a theory of interactive influence on behavior, has been explored in this paper regarding its application characteristics in the training of hospice care volunteers, with several relevant training features summarized as follows. Firstly, the core view of social learning theory emphasizes that individuals learn through observation, imitation, and social interaction. In the training of hospice care volunteers, the authors draw on this theory to provide diverse learning opportunities by means of on-site observation of service scenarios, simulated situational drills, and other methods. By observing the practical work of professional hospice care staff, volunteers can acquire service skills through observable learning; meanwhile, experience sharing in group discussions effectively enhances their professional knowledge and practical skills. Secondly, social learning theory stresses that learning is a social process that needs to take place in a social environment. During the training, experienced social workers act as mentors to conduct personalized communication and guidance with volunteers. This not only provides individualized guidance but also creates a positive social environment, enabling volunteers to better integrate and develop in collective learning. Furthermore, social learning theory also focuses on the autonomy and initiative of learning. In the training of hospice care volunteers, volunteers are encouraged to participate in practical services, group discussions, and personal reflection, so as to cultivate their ability of autonomous learning. In conclusion, the application of social learning theory in the training of hospice care volunteers has enriched the training strategies. Through the social learning process, volunteers have achieved more comprehensive and in-depth development during the training, making a positive contribution to the sustainable development of the hospice care cause. In the future, we will continue to pay attention to and reflect on the social work-related service content of hospice care, and influence lives with lives.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Gao M, Chen Y, 2021, Optimization of Rural Environmental Co-governance Paths from the perspective of Social Learning Theory. *Journal of Beijing University of Chemical Technology (Social Sciences Edition)*, 2021(3): 9–15.
- [2] Gao XY, Hu LP, Zhao Y, et al., 2022, Experience of Hospice Care Service Development in Singapore and its Enlightenment to China. *Chinese General Practice*, 27(22): 2745–2751.
- [3] He ZH, Xing SP, Zhou WJ, et al., 2023, Study on the Construction of Hospice Care Training Courses for Medical Student Volunteers. *Chinese Medical Ethics*, 36(6): 684–692.
- [4] Peng ZG, Xu M, Li HH, et al., 2017, Analysis of Reproductive Health Status of Female Employees of Different Age Groups in Guangxi Railway System. *Maternal and Child Health Care of China*, 32(12): 2690.
- [5] Shang Y, Jiao GY, Li YT, 2022, Investigation and Reflection on the Construction of Hospice Care Talent Team: Taking Beijing as an Example. *Medicine and Philosophy*, 43(1): 48–52.
- [6] Tang YZ, Xu DH, Cheng MM, et al., 2021, Construction and Effect Study of Multi-professional Team Service Model for General Practice Hospice Care. *Chinese General Practice*, 24(22): 2874–2879.
- [7] Wang JJ, Chen CX, 2014, Study on Entrepreneurship Education for College Students from the Perspective of Bandura's Social Learning Theory. *China Adult Education*, 2014(10): 41–43.
- [8] Yang SY, Li XY, Fan RR, et al., 2022, Research Progress on the Evaluation of Hospice Care Training Effects Abroad. *Evidence-Based Nursing*, 8(21): 2890–2894.
- [9] Yang ZQ, 2023, Study on Entrepreneurship Education for Postgraduates Majoring in Design Based on Bandura's Social Learning Theory. *Art Education Research*, 2023(20): 115–117.
- [10] Zhang AJ, Wang ZG, Wang XJ, et al., 2019, Practice of “Medical Social Workers + Volunteers” in the Accompanying Service for Hospice Care Patients. *China Social Work*, 2019(12): 45–48.
- [11] Zhang RY, Peng YC, 2022, Analysis of the Service Model of Volunteers Participating in Hospice Care from the Perspective of Multi-dimensional Mutual Assistance. *Chinese Medical Ethics*, 35(2): 230–235.
- [12] Zhang MY, Ning XH, 2020, Investigation on the Development Status of Hospice Care Volunteer Teams in Beijing. *Medicine and Philosophy*, 41(21): 25–29 + 79.
- [13] Zhu HY, Zhang YP, Wang LH, et al., 2017, Construction and Application Research of Hospice Care Model in General Hospitals. *Chinese Nursing Management*, 2016(6): 832–835.
- [14] Allan J, 2017, *An Analysis of Albert Bandura's Aggression: A Social Learning Analysis*. Macat International Ltd, London.
- [15] National Comprehensive Cancer Network (NCCN), 2017, *NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): Palliative Care (Version 2.2017)*. National Comprehensive Cancer Network, Fort Washington. https://www.nccn.org/professionals/physician_gls/pdf/palliative.pdf

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Exploration of the Mechanism and Path for the Organic Connection between Red Resources in the Gaoligong Mountain Area and Forging a Strong Sense of Community with a Shared Future for the Chinese Nation

Birong Yang^{1*}, Chuanwen Fu², Qiulu Liu³

¹Baoshan College of Traditional Chinese Medicine, Baoshan 678000, Yunnan, China

²Banshan City Center for Disease Control and Prevention, Baoshan 678000, Yunnan, China

³Tongji University, Shanghai 200092, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: This exploration aims to conduct an in-depth study on the mechanism and path for the organic connection between the abundant red resources in the Gaoligong Mountain Area and the forging of a strong sense of community with a shared future for the Chinese nation. Through comprehensive sorting and analysis of the red resources in the Gaoligong Mountain Area, this paper examines their important role and value in forging a strong sense of community with a shared future for the Chinese nation. Furthermore, it explores how to organically integrate red resources with the cultivation of the sense of community with a shared future for the Chinese nation through effective mechanisms and paths, so as to provide a solid ideological foundation and spiritual support for the realization of the great rejuvenation of the Chinese nation, and offer theoretical support and practical guidance for promoting the cause of national unity and progress.

Keywords: A strong sense of community with a shared future for the Chinese nation; Gaoligong Mountain Area; Red resources

Online publication: October 29, 2025

1. Introduction

The Gaoligong Mountains region not only boasts a unique and extraordinary natural ecological environment but also contains an extremely rich reserve of red resources. These resources carry the profound historical memories of the Chinese revolution, embody the heroic deeds and noble spirits of revolutionary ancestors, and can be regarded as an invaluable spiritual treasure of the Chinese nation. In the context of the new era, forging a strong sense of

community with a shared future for the Chinese nation is the core thread of the Party's work on ethnic groups, and plays a pivotal role in safeguarding national unity, ethnic solidarity, and social stability ^[1-2]. Therefore, in-depth exploration of the mechanisms and paths for the organic connection between the red resources in the Gaoligong Mountains region and the forging of a strong sense of community with a shared future for the Chinese nation holds great theoretical value and practical significance ^[3].

2. Overview of red resources in the Gaoligong Mountains Area

2.1. Geographical scope and historical background of the Gaoligong Mountains Area

The Gaoligong Mountains Area is mainly located in the China-Myanmar border zone in western Yunnan Province, China. The Gaoligong Mountains in this area connect the Qinghai-Tibet Plateau to the north and the Indochina Peninsula to the south, stretching in a north-south direction. Its geographical coverage roughly includes parts of regions such as Baoshan City and Nujiang Lisu Autonomous Prefecture. The main part of the Gaoligong Mountains lies within the territory of Baoshan City and Nujiang Lisu Autonomous Prefecture in Yunnan; it is adjacent to the Nushan Mountains in the east and borders Myanmar in the west. With a considerable north-south span, it crosses multiple latitudinal zones. The Gaoligong Mountains Area is endowed with abundant natural resources and a unique ecosystem, including alpine canyons, primeval forests, and rare animals and plants. Meanwhile, it boasts a long-standing historical culture and rich ethnic customs.

The red resources in the Gaoligong Mountains Area carry profound historical memories. On this land, heroic deeds of people of all ethnic groups resisting foreign aggression have emerged continuously. The Gaoligong Mountains have witnessed countless heroes fighting bravely to defend their homeland and safeguard national dignity. These red resources are not only witnesses to history but also symbols of the national spirit, inspiring future generations to remember history and cherish peace.

2.2. Characteristics and value of red resources

The red resources in the Gaoligong Mountain area are rich and diverse, carrying profound historical significance and the great national spirit, and thus hold important value and meaning. We should attach importance to the protection, development, and utilization of these red resources, enabling them to continue playing a positive role in the new era, inspiring more people to inherit and promote red genes, and striving for the great rejuvenation of the Chinese nation.

The red resources in the Gaoligong Mountain area possess unique characteristics and significant value. Red resources are not only a powerful testimony to China's revolutionary history, but also a distinct symbol of the Chinese national spirit, holding important historical value, cultural value, and educational value ^[4]. The abundant red resources in Gaoligong Mountain provide vivid and extremely precious materials for local education. By telling the stories of heroic struggles on this land, we can effectively inspire students' patriotic feelings and national pride, and cultivate their indomitable willpower. For instance, students can learn about the fearless spirit of border residents of all ethnic groups in resisting invaders, as well as the unity and courage demonstrated by the local people in defending their homeland. These real historical events enable students to deeply understand the hard-won nature of peace, thereby motivating them to study diligently for the prosperity and strength of the country.

3. The connotation and importance of forging a strong sense of community for the Chinese nation

3.1. The connotation of the sense of community for the Chinese nation

The sense of community for the Chinese nation embodies rich connotations. It refers to a sense of identification with, belonging to, and responsibility for the Chinese nation, forged by all ethnic groups in the long course of historical development. First, it is the identification with the great motherland. All ethnic groups have jointly opened up the vast territory of the motherland and jointly safeguarded national unity; loving the motherland and upholding national dignity are inherent obligations of every ethnic group. Second, it is the identification with the Chinese nation. The 56 ethnic groups form the big family of the Chinese nation. In the course of history, they have been integrated with and dependent on each other, co-created the splendid Chinese culture, and jointly promoted the development and progress of the nation. Third, it is the identification with the Communist Party of China (CPC). As the core of leadership, the CPC has always sought happiness for the Chinese people and rejuvenation for the Chinese nation, and all ethnic groups firmly uphold the Party's leadership. Fourth, it is the identification with socialism with Chinese characteristics. This path is the only way to realize the great rejuvenation of the Chinese nation. All ethnic groups firmly uphold the "Four Confidences" and actively participate in national development ^[5]. The sense of community for the Chinese nation embodies the common value pursuit and spiritual strength of all ethnic groups. It guides all ethnic groups to work together in unity and pursue common prosperity and development, laying a solid foundation for the realization of the great rejuvenation of the Chinese nation.

3.2. The importance of forging a strong sense of community for the Chinese nation

The sense of community for the Chinese nation is of great significance. First, it serves as a solid foundation for safeguarding national unity. Guided by this sense, all ethnic groups unite closely, jointly defend national territorial integrity and sovereignty, and ensure the country's long-term stability and security. Second, it promotes ethnic unity and social stability. It enables all ethnic groups to practice mutual respect, understanding, and inclusiveness, mitigate conflicts and frictions, create a harmonious and stable social environment, and jointly contribute to national development. Third, it drives economic and social development. Under the guidance of the sense of community, all ethnic groups can achieve resource sharing and mutual complementarity of advantages, jointly explore markets and develop industries, promote coordinated regional development, and enhance the country's overall economic strength. Fourth, it strengthens cultural confidence and cultural inheritance. The sense of community for the Chinese nation promotes cultural exchange and integration among all ethnic groups, enables them to jointly inherit and carry forward Chinese culture, enhances national cultural soft power, and helps China demonstrate its unique charm in the forest of world cultures—thus providing a strong spiritual driving force for the great rejuvenation of the Chinese nation.

4. The inherent link between the revolutionary heritage in the Gaoligong Mountain Region and strengthening the consciousness of the Chinese national community

4.1. Revolutionary heritage as a key vehicle for strengthening the consciousness of the Chinese national community

The revolutionary heritage in the Gaoligong Mountain region carries profound historical memories of China's revolution and serves as a tangible embodiment of the Chinese national spirit. Scientific and rational development

and utilization of these resources enable a deeper understanding of China's revolutionary history, effectively enhancing identification with and pride in the Chinese nation. These resources encapsulate shared historical memories and struggles of all ethnic groups. On this land, heroic revolutionary stories such as the Western Yunnan Campaign unfolded, where people of all ethnicities fought together to defend the motherland against foreign aggression, writing a glorious chapter in history with their blood and lives. These sites bear witness to the unity and solidarity of all ethnic groups during times of hardship, becoming a shared spiritual treasure. They constantly remind people that, regardless of ethnicity, all Chinese stand united in the face of national crises. Such collective historical memory forms a critical foundation for strengthening the consciousness of the Chinese national community.

4.2. Strengthening the consciousness of the Chinese national community as a driving force for protecting and inheriting revolutionary heritage

Forging a strong awareness of the Chinese nation as a community with a shared future can raise people's awareness of protecting red resources and encourage them to more actively engage in the work of protecting and inheriting red resources. Red resources are conducive to inheriting and promoting the outstanding spiritual qualities of the Chinese nation. The patriotism, heroism, and spirit of dedication embodied in the red resources of the Gaoligong Mountain area are integral parts of the Chinese national spirit. These spirits transcend ethnic boundaries and inspire people of all ethnic groups to strive hard for the great rejuvenation of the Chinese nation. Through the in-depth excavation, proper protection, and effective utilization of red resources, people of all ethnic groups can better understand and inherit these spirits, enhance their national pride and sense of identity, and thereby promote the continuous strengthening of the awareness of the Chinese nation as a community with a shared future.

4.3. Revolutionary heritage as a vivid manifestation of the consciousness of the Chinese national community

By leveraging revolutionary heritage to conduct educational activities, exchanges and integration among all ethnic groups can be promoted. With revolutionary heritage as the carrier, carrying out various initiatives—such as patriotic education and ethnic unity education—can attract people of all ethnic groups to participate collectively. During these activities, people from different ethnic groups communicate and learn from one another: this enhances mutual understanding, deepens friendships, breaks down ethnic barriers, and fosters more harmonious ethnic relations. This kind of exchange and integration helps all ethnic groups forge closer bonds in multiple dimensions, including culture and emotion. In turn, it creates a favorable social atmosphere for strengthening the consciousness of the Chinese national community.

5. Establishment of the mechanism for organic connection

5.1. Problems with the current connection mechanism

First, there is a lack of systematic development and utilization. The excavation and organization of red resources are not comprehensive or in-depth enough, failing to fully demonstrate their multi-dimensional connection with the awareness of the Chinese nation as a community with a shared future. In the development process, relevant parties often act independently, lacking unified planning and coordination, which makes it difficult to form a synergistic effect. Second, the methods of publicity and education are singular. Most efforts rely on traditional

forms, such as on-site visits and guided explanations, which lack innovation and appeal and thus struggle to arouse resonance among the general public, especially young people. Moreover, the interpretation of the awareness of the Chinese nation as a community with a shared future embodied in red resources is not vivid or in-depth enough, which undermines the educational effect. Third, protection efforts still need to be strengthened. Some red resources are at risk of damage due to natural erosion and man-made destruction, while effective protection measures and funding investment are insufficient. This affects the sustainable utilization of red resources and further hinders their organic connection with the awareness of the Chinese nation as a community with a shared future. Fourth, social participation remains low. The enthusiasm of enterprises, social organizations, and individuals to participate in the development and utilization of red resources and the cultivation of the awareness of the Chinese nation as a community with a shared future has not been fully mobilized, due to the lack of effective incentive mechanisms and cooperation platforms.

5.2. Establishing an interconnected mechanism for organic connection

First, establish a government-led, coordinated development mechanism. The government should play a leading role in strengthening the protection and management of red resources in the Gaoligong Mountain area, formulating relevant policies and plans, increasing investment in the development and utilization of red resources, and integrating the forces of the government, society, enterprises, and other parties to jointly develop red resources. Second, establish social participation and strengthen the regional cooperation mechanism. Encourage all sectors of society to actively participate in the protection and inheritance of red resources in the Gaoligong Mountain area, so as to create a sound pattern of joint participation by the government, society, and individuals. Meanwhile, strengthen exchanges and cooperation between neighboring regions to achieve resource sharing. Third, establish a comprehensive and improved education and publicity mechanism. Enhance the education and publicity of red resources in the Gaoligong Mountain area, use multimedia tools to carry out diversified publicity and education activities, and help people gain a deeper understanding of the connotation and value of red resources through multiple channels such as school education and social education—thereby enhancing their consciousness in forging a strong awareness of the Chinese nation as a community with a shared future. Fourth, establish an industrial integration and diversified development mechanism. Integrate red resources with local ethnic cultures to build characteristic brands, promote the integrated development of red resources in the Gaoligong Mountain area with industries such as tourism and culture, and drive the protection and inheritance of red resources through industrial development while injecting new impetus into local economic development.

6. Paths to achieving organic connection

6.1. Strengthening scientific investigation and planning exploration of red resources

First, establish a professional research team consisting of historians, cultural scholars, etc., to ensure the professionalism and scientificity of the research. Second, conduct in-depth on-site inspections in the Gaoligong Mountain area, visit local residents, collect folk stories, and fully grasp the distribution and specific conditions of red resources. Third, use modern technologies such as Geographic Information System (GIS) for positioning and recording. At the same time, cooperate with colleges and universities as well as scientific research institutions to carry out special exploration projects, unearth the historical value and spiritual connotations behind red resources, and provide theoretical support for better protection and utilization.

6.2. Enhancing the models for protection, development, and utilization of red resources

With reference to the already promulgated and implemented regulations such as Regulations on the Protection of Revolutionary Sites in Yuxi City, Regulations on the Protection and Inheritance of Red Resources in Anhui Province, Regulations on the Protection and Utilization of Red Resources in Jiangsu Province, Regulations on the Protection and Inheritance of Red Resources in Guangxi Zhuang Autonomous Region, and Regulations on the Protection and Inheritance of Red Resources in Gansu Province, efforts should be intensified in the protection and restoration of red resources ^[6]. It is necessary to establish special protection funds and set up professional teams for maintenance. Effective measures should be taken to prevent the damage and loss of red resources. Meanwhile, strengthen supervision to prevent destructive behaviors. In addition, modern technologies can be integrated, such as creating virtual reality (VR) red experience projects; developing red cultural and creative products to enhance the appeal of red resources; deeply integrating with the tourism industry to launch high-quality red tourism routes; and carrying out thematic education activities to make red resources become vivid classrooms. Through these methods, red resources can be protected, their value can be fully exerted, the red gene can be inherited, and the sense of the Chinese nation as a community can be consolidated.

6.3. Strengthen ethnic unity education and innovate publicity and education methods

First, carry out theme-based educational activities ^[7]. Conduct educational activities with the theme of ethnic unity in schools, communities, enterprises, and other venues. Publicize the Party's ethnic policies and the important significance of ethnic unity through organizing lectures, seminars, cultural performances, and other forms. Make use of red resources to organize people of all ethnic groups to visit revolutionary sites, memorial halls, and other places, helping them understand the history of the joint struggles of all ethnic groups and enhancing their national pride and sense of identity.

Second, strengthen school education. Incorporate ethnic unity education into the school education system, and offer ethnic unity education courses from kindergartens to universities. Cultivate students' awareness of ethnic unity through classroom teaching, theme-based class meetings, social practice, and other forms. Strengthen the development of teaching staff and improve teachers' competence in ethnic unity education. Organize teachers to participate in training programs to learn about the Party's ethnic policies and ethnic unity education methods.

Third, create a favorable social atmosphere. Use media, the internet, and other platforms to publicize advanced deeds and typical figures in ethnic unity. Produce public welfare advertisements and promotional videos on ethnic unity, and broadcast them on TV, newspapers, websites, and other media to create a favorable social atmosphere. Launch activities for advancing ethnic unity and progress, and select and commend model collectives and individuals for ethnic unity and progress. Inspire people of all ethnic groups to work together in unity through the power of role models.

6.4. Promote in-depth integration of red resources and ethnic culture

Firstly, deeply explore the ethnic cultural elements in red resources ^[8]. Conduct a comprehensive and in-depth exploration of the red resources in the Gaoligong Mountain area to identify elements related to ethnic culture. For instance, in the Western Yunnan Anti-Japanese War relics, people can unearth stories of people from various ethnic groups joining hands in resisting Japanese invaders; in the monuments and cemeteries of revolutionary martyrs, people can excavate the heroic deeds of martyrs from different ethnic groups. Integrate these ethnic cultural elements into the display and interpretation of red resources, so that while people learn about red history, they can

also appreciate the unique charm of ethnic culture.

Secondly, develop tourism products integrating red culture and ethnic culture. Combine the red resources and ethnic cultural characteristics of the Gaoligong Mountain area to develop tourism products that integrate red culture and ethnic culture. For example, launch red tourism routes that organically connect revolutionary relics, memorial halls with ethnic villages and folk customs, allowing tourists to experience the unique charm of ethnic culture while feeling the influence of red culture. Develop red cultural and creative products by integrating red elements with ethnic cultural elements, and design and produce local characteristic souvenirs and handicrafts. This not only promotes red culture but also disseminates ethnic culture.

Finally, organize activities integrating red culture and ethnic culture. Hold events that combine red culture and ethnic culture, such as Red Culture Festivals and Ethnic Culture Festivals. Through art performances, exhibitions, folk activities, and other forms, demonstrate the charm of red culture and ethnic culture, and promote cultural exchange and integration among different ethnic groups. Carry out activities that bring red culture and ethnic culture into campuses, communities, and enterprises, enabling more people to understand and experience the beauty of the integration of red culture and ethnic culture.

6.5. Promoting coordinated regional development

First, strengthen regional cooperation. The Gaoligong Mountain region covers multiple prefectures and cities. It is necessary to enhance cooperation among these regions to jointly advance the protection and utilization of red resources, ethnic unity education, regional economic development, and other initiatives. Establish a regional cooperation mechanism, hold regular joint meetings, and negotiate to resolve major issues in regional development. Strengthen information exchange and resource sharing between regions to achieve complementary advantages and common development.

Next, advance the coordinated development of industries. Combining the red resources and ethnic cultural characteristics of the Gaoligong Mountain region, promote the coordinated development of industries such as tourism, culture, and agriculture. For example, develop red tourism, ethnic cultural tourism, and eco-tourism to drive the development of related industries; develop agricultural products with ethnic characteristics and handcrafted products to increase farmers' income and help them achieve prosperity. Strengthen the development of industrial parks, guide the clustered development of enterprises, and form industrial clusters. Strengthen investment promotion efforts to attract a number of powerful enterprises to participate in regional development and construction, thereby improving the level of regional economic development ^[9].

Finally, intensify infrastructure construction. Increase investment in infrastructure construction in the Gaoligong Mountain region to improve conditions in transportation, communications, water conservancy, and other areas. Strengthen the construction of transportation infrastructure, such as highways, railways, and airports, to enhance regional accessibility; intensify the development of communication facilities to raise the level of informatization; strengthen the construction of water conservancy facilities to ensure water supply for agricultural production and people's daily lives. Strengthen ecological environmental protection and advance the development of ecological civilization. The Gaoligong Mountain region is an important ecological function zone, so it is essential to strengthen ecological environmental protection and increase efforts to protect ecosystems such as forests, rivers, and lakes, so as to achieve a positive interaction between economic development and ecological protection. This is a systematic project that requires the joint efforts of the government, society, enterprises, and people of all ethnic groups. Only in this way can the sustainable development of the Gaoligong Mountain region

be realized, making positive contributions to forging a strong sense of community with a shared future for the Chinese nation.

7. Conclusions and prospects

There is a close organic connection between the red resources in the Gaoligong Mountain area and the forging of a strong sense of community for the Chinese nation ^[10]. Through in-depth exploration and analysis of the red resources in this area, the authors have found that these resources carry the historical memories of the joint struggles and resistance of all ethnic groups, and serve as an important vehicle for enhancing ethnic identity and national identity.

In terms of mechanism construction, full play should be given to the leading role of the government: efforts to protect and restore red resources should be strengthened, and scientific and reasonable plans and policies should be formulated. At the same time, all sectors of society should be encouraged to participate actively to form a joint effort from multiple parties. In the exploration of paths, it is necessary to innovate the development and utilization models of red resources, deeply integrate them with industries such as education, tourism, and cultural and creative industries, and present them to the public in vivid and lively forms. This will stimulate people's interest in and love for red history, thereby enhancing the sense of community for the Chinese nation.

In the future, there is still great room for development in the organic integration of the red resources in the Gaoligong Mountain area and the forging of a strong sense of community for the Chinese nation. On the one hand, with the continuous advancement of science and technology, advanced technologies such as virtual reality (VR) and augmented reality (AR) can be applied to present red resources in a more vivid way, enhancing their attractiveness and appeal. On the other hand, it is necessary to further strengthen cross-regional and cross-departmental cooperation and exchanges, jointly explore and utilize red resources, and expand their influence. At the same time, it is essential to continuously strengthen national unity education, integrate red resources into the education system, and cultivate teenagers' patriotic feelings and national pride. Through continuous efforts, the red resources in the Gaoligong Mountain area will play a greater role in forging a strong sense of community for the Chinese nation and contribute to the realization of the Chinese Dream of the great rejuvenation of the Chinese nation.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Lu ML, 2022, Exploration on the Application of Local Red Resources in National Unity Education in Colleges and Universities, thesis, Nanning Normal University.
- [2] Kong T, 2021, Institutional Analysis of Forging a Strong Sense of Community for the Chinese Nation. *Journal of South-Central Minzu University (Humanities and Social Sciences Edition)*, 41(1): 29–37.
- [3] Meng SM, 2022, Exploration on the Path of Integrating Red Cultural Resources into Forging a Strong Sense of Community for the Chinese Nation, thesis, Guangxi University for Ethnicities.
- [4] Xinhua News, 2021, Red Resources, Highly Valued by Xi Jinping. *China Military-Civilian Transition*, 2021(5): 17–

20.

- [5] Li HM, Wang T, 2023, Exploration on Unit Teaching Design of High School Ideological and Political Courses Led by Big Concepts. *Fujian Education*, 2023(9): 52–55.
- [6] Zhang TT, 2024, Investigation and Analysis of Red Resource Reading Promotion in University Libraries: A Case Study of 46 Finance and Economics University Libraries. *Journal of Academic Library and Information Science*, 42(4): 42–51.
- [7] Wen J, Zhang CH, 2023, On the Value Implication and Realization Path of Red Culture in Ethnic Areas in Forging a Strong Sense of Community for the Chinese Nation: A Case Study of the Utilization of Red Cultural Resources in Aba Prefecture. *Journal of Sichuan Minzu College*, 32(4): 9–18.
- [8] Chen Y, 2024, Exploration on the Path of Protecting and Utilizing Red Cultural Resources under the Background of Forging a Strong Sense of Community for the Chinese Nation. *Inheritance*, 2024(1): 46–51.
- [9] Liu QX, Liu YJ, Bu AL, 2022, Exploration on the Path of Integrating Red Cultural Resources into Education for Forging a Strong Sense of Community for the Chinese Nation. *Guangxi Ethnic Exploration*, 2022(6): 56–62.
- [10] He YH, Peng Y, 2024, Analysis of the Creation of National Unity and Progress in Cities from the Perspective of Forging a Strong Sense of Community for the Chinese Nation: A Case Study of Liuzhou City, Guangxi Zhuang Autonomous Region. *Inheritance*, 2024(1): 19–26.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Intercultural Communication in Medical Context: An Analysis of Regional and Cultural Factors

Chenjie Zhang*, Yunping Zhao

Zhengzhou University of Aeronautics, Zhengzhou, Henan, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In recent years, the number of visitors to China has surged. As a result, the number of foreign nationals utilizing China's healthcare system has inevitably increased. From the perspective of applied linguistics, empirical research on foreign patients' medical experiences and health examinations in China remains limited. This study, as a preliminary experiment focusing on communication between foreign patients and Chinese doctors, collected 10 short videos shared by foreign patients living in or visiting China, which documented their healthcare experiences. Through transcription and translation, a total of 9,033 words of text were obtained. The transcribed texts were then analyzed for sentiment using the micro-word cloud software. The study found that foreign patients in China praised the efficiency of healthcare services, particularly the ability to undergo tests and examinations without the need to wait for an appointment, as well as the high-quality doctor services, and affordable medical costs. However, concerns about privacy protection were also noted.

Keywords: Intercultural communication; Medicine; Region and culture

Online publication: October 29, 2025

1. Introduction

Over the past several years, the number of foreign visitors to China has risen markedly. For example, from January to July 2024, inbound tourist visits by foreign nationals reached 5.722 million and visits for meetings and business activities reached 3.803 million, representing year-on-year increases of 403% and 81.5%, respectively ^[1]. This trend objectively places greater demands on China's supporting infrastructure and service-provision systems. It is therefore imperative to undertake corresponding optimizations and upgrades to ensure that foreign visitors to China receive high-quality and convenient experiences during their stay, thereby further projecting China's open and inclusive international image and demonstrating its capacity for efficient service delivery.

The large number of visitors to China implies that their demand for medical services during their stay has increased accordingly, rendering cross-cultural doctor-patient communication an inevitable aspect of clinical

practice and posing new challenges and requirements for the cross-cultural adaptability of the healthcare system.

Over the past few decades, scholars worldwide have conducted extensive research on doctor–patient communication ^[2–4]. However, studies specifically addressing cross-cultural doctor–patient communication involving foreign patients in China remain limited.

As a pilot investigation for a program on doctor–patient communication in intercultural contexts, this study analyzes 10 consultations extracted from online vlogs produced by foreigners living in or visiting mainland China who documented their medical experiences or described their experience in China’s hospitals, with the aim of examining the features of this form of intercultural communication in mainland China. The findings reveal the processes by which trust is constructed between Chinese physicians and foreign patients and identify the discursive strategies employed in clinical consultations.

2. Intercultural communication in the medical context

Across disciplines, intercultural communication has been theoretically grounded in systematic examinations of cultural difference and its effects on communicative practice. Foundational contributions, such as Hall’s high-/low-context distinction and Hofstede et al.’s cross-national cultural dimensions, have supplied analytic constructs for understanding contextuality, implicitness, and national value orientations ^[5–6]. These macro-level frameworks continue to inform comparative empirical work on discourse practices, organizational behavior, and policy, thereby shaping subsequent theoretical and methodological developments ^[7].

Theoretical frameworks and methodological approaches from intercultural communication have been extensively employed in the analysis of professional discourse, including doctor-patient consultations ^{[8]–[10]}. Intercultural communication has become an increasingly important area of research within the medical field, as globalization leads to more diverse patient populations. In medical settings, the quality of doctor-patient communication is crucial to patient outcomes, satisfaction, and overall healthcare delivery. However, when healthcare providers and patients come from different cultural backgrounds, communication barriers such as language differences, contrasting health beliefs, and varying expectations of medical professionals can significantly impact the interaction. Intercultural communication in the medical context refers to the exchange of information between healthcare providers and patients from diverse cultural backgrounds.

Research on doctor-patient communication has highlighted the challenges that arise when cultural differences are not adequately addressed. Studies have shown that cultural barriers can lead to misunderstandings, lower trust in healthcare providers, and even poorer health outcomes. For instance, patients from minority or non-dominant cultures may feel misunderstood or marginalized, which could discourage them from seeking necessary medical care or following prescribed treatments ^[10]. Moreover, when doctors fail to recognize and adapt to patients’ cultural norms and preferences, the therapeutic relationship can suffer. These challenges underscore the need for healthcare professionals to develop intercultural communication skills to provide culturally competent care that fosters trust and improves health outcomes.

A key factor influencing intercultural communication in healthcare is language. Language differences not only complicate the transmission of medical information but also shape the way patients understand their health conditions and treatment options. Research has shown that language barriers can cause patients to misunderstand medical instructions, which may lead to non-compliance with treatment regimens ^[9]. In response

to these challenges, healthcare institutions have adopted strategies such as professional interpreters and cultural competence training programs for healthcare providers. These efforts aim to bridge communication gaps and reduce the risk of miscommunication, ultimately improving the quality of medical care.

The importance of intercultural competence in healthcare delivery has been widely recognized in medical education. Incorporating cultural competence training into medical curricula has been shown to enhance doctors' ability to communicate effectively with patients from diverse backgrounds. This training typically includes exposure to the cultural norms, values, and beliefs of various patient groups, as well as strategies for overcoming common communication barriers ^[9]. Furthermore, the development of these skills is not only beneficial in improving patient care but also in enhancing the healthcare provider's ability to adapt to a changing demographic landscape.

However, research on intercultural communication within the medical context in mainland China remains limited. Intercultural communication in the medical context in China is a multifaceted area of study, influenced by our country's rich cultural heritage, diverse population, and evolving healthcare system. Moreover, other factors, including the integration of Traditional Chinese Medicine and Western Medicine, family dynamics, and the concept of "face", make the intercultural communication in the medical context in China more complicated ^[11–12]. Healthcare providers must be culturally competent to navigate these dynamics and ensure effective communication with patients from diverse backgrounds.

3. Data collection and analysis framework

The present study collects 10 video clips of medical consultations between Chinese doctors and foreign patients, which are uploaded online by foreign patients receiving medical care in mainland China. The videos in English were transcribed directly, while the videos in Chinese were first transcribed and then translated into English. The transcription and translation of the video clips were carried out by two researchers, who cross-checked their work. Any discrepancies were discussed, and a final decision was made regarding the version of the transcript.

Once the final transcript of all video clips has been obtained, it is analyzed using the online software Weiciyun. Content analysis and sentiment analysis are conducted using this software to examine the attitudes and feedback of foreign patients regarding their experiences in hospitals in mainland China.

4. Sentiment analysis of the transcript through Weiciyun

The transcribed text comprises 9033 words and has been divided into 154 valid entries. The feedback from foreign individuals regarding the medical experience in mainland China is predominantly positive (35.06%) or neutral (44.16%). Negative responses constitute only 20.78% of valid entries. When examining the specific entries, it becomes evident that positive perceptions of the medical experience in China are primarily centered around efficiency, cost-effectiveness, and the high level of service provided by healthcare professionals. In contrast, negative evaluations mainly focus on cultural differences related to privacy protection.

5. Positive and neutral comments on medical experiences in China

The convenience of not needing an appointment, along with efficient and accessible medical check-ups, high service quality, and affordable prices, leads foreign patients in China to generally perceive Chinese doctors as

reliable and the overall healthcare experience as excellent.

5.1. No appointment requirement in China

Foreign patients typically describe the differences in medical appointment systems between China and Western countries with a neutral perspective. When discussing the lengthy waiting times for medical appointments abroad, foreign patients express dissatisfaction with the prolonged delays. In contrast, they are particularly impressed by the fact of walking into a hospital in China and quickly seeing a doctor, often emphasizing this point in videos, as in **Extract 1**.

| | |
|---------|---|
| Neutral | Sentiment word: not like |
| | I can just take regular cold medicine. If I see a doctor, it might take an hour to wait. In China, it's very fast; I just waited for 5 minutes, 10 minutes, 15 minutes. This is how things work in China. It's not like in the U.S., where you need to make an appointment. In the U.S., each doctor may only see ten patients a day. |

Extract 1

5.2. Efficient and accessible medical check-ups

In many public hospitals abroad, laboratory tests and examinations often require waiting for several weeks or even months; however, in China, many hospitals can conduct tests or examinations on the same day. This high level of efficiency in medical testing and examinations often makes foreign patients surprised and astonished. The green indication provided by Weiciyun signifies that this entry exhibits a clear positive sentiment, as in **Extracts 2 and 3**.

| | |
|----------|---|
| Positive | Sentiment word: clear efficiency, truly shocking |
| | In just under a day, the stepfather underwent an MRI and blood tests in China, receiving a clear diagnosis, while in the UK, even scheduling an MRI would take months of waiting. This contrast in efficiency was truly shocking. |

Extract 2

In **Extract 2**, the words with green shadow representing the positive emotions demonstrate that the foreign patients praise the efficiency of the test and examination, while in **Extract 3**, it is evident that foreign patients indeed perceive themselves as having endured significant waiting times when seeking medical care in their home countries.

| | |
|---------|---|
| Neutral | Sentiment word: free problem matter bad difficult |
| | Some might ask why he didn't immediately get treatment in the UK, considering the NHS is free. However, it's not that simple. In the UK, the doctor kept diagnosing the issue as a muscle problem and gave him painkillers, sending him home to rest. But the stepfather knew this wasn't just a muscle issue. To make matters worse, even if he wanted an MRI scan, the waiting time was 26 weeks, nearly half a year. Seeing a general practitioner (GP) was also difficult, with a complicated and lengthy appointment process. Sometimes, it took several days to get a reply to a phone call, and even after that, they had to wait weeks to see the doctor. |

Extract 3

5.3. High-quality service of the hospital in China

Foreign patients generally praise the quality of service provided by physicians in Chinese hospitals. They express satisfaction with the presence of international departments in Chinese public hospitals and the proficiency of doctors in English, as indicated in **Extract 4**, which is categorized as “positive” by sentiment analysis software. This suggests that there are no significant barriers to doctor-patient communication in an intercultural context.

| | |
|----------|--|
| Positive | Sentiment word: excellent focus on cancer |
| | They can be quite expensive, especially in international hospitals, but regular Chinese public hospitals also have international departments, where the doctors speak excellent English. He also mentioned that these hospitals are linked to his university. They helped him with lab data because his PhD is focused on medical AI, assisting them with detecting and classifying cancer severity. |

Extract 4

5.4. Affordable prices in Chinese hospitals

According to the comments of foreign patients, they are not informed of the medical charges until after they have left the hospital, and the prices are generally considered to be high, as in **Extracts 5** and **6**. In contrast, in China, patients have the option to decide whether or not to pay before receiving treatment. Foreigners are more positive about the price and payment method in Chinese hospitals.

| | |
|---------|---|
| Neutral | Sentiment word: easily pay major problem pay help pay |
| | I paid about 40 RMB for this visit. I just paid 17 RMB, so the total for this visit is 57 RMB, which is much cheaper than when I went for traditional Chinese medicine. It's even cheaper than in the U.S. If you go to such places in the U.S., you could easily pay 150 USD. One of the major problems in the U.S. is the very high healthcare costs. Even with insurance, you might pay 2,000 USD a month. The company usually helps cover about 70%, but you still need to pay about 30%. |

Extract 5

| | |
|---------|---|
| Neutral | Sentiment word: pay pay pay not to pay credit |
| | Another major difference is that in China, you pay first. This time, I paid 17 RMB. In the U.S., I often don't know how much I will have to pay when I go to the doctor. I don't know how much I'll need to pay until I receive a bill, which can come days or even weeks later. When you get the bill, you can choose whether or not to pay it. But if you don't, it could affect your credit. |

Extract 6

6. Negative comments on medical experiences in China

The primary concern expressed by foreign patients in Chinese hospitals is privacy, as in **Extract 7**. In China, individuals generally do not worry about others seeing their medication, and they may not tend to close the consultation room door when interacting with doctors. Moreover, Chinese patients may be less concerned if others briefly interrupt the doctor with simple questions. Additionally, it is common for patients to share their experiences or engage in casual conversation while waiting. This may not be acceptable to Western people.

| | |
|---------|--|
| Neutral | Sentiment word: want |
| | I think today's visit was very quick; I was in and out in 20 minutes. This is very different from the U.S. If I go to a doctor there, I might need to wait an hour. If I need to pick up medicine, it could take 20 to 30 minutes. In the U.S., if you go to a pharmacy to pick up medication, they give you a bag and don't want others to see what medicine you're getting. This is a privacy issue. |

Extract 7

7. The regional and cultural factors

The differences between hospitals in China and those in many Western countries, in the eyes of foreign patients, can be largely attributed to regional and cultural factors that influence healthcare systems. In China, the concept of convenience in healthcare is deeply embedded in cultural expectations that prioritize accessibility and speed. The lack of a strict appointment system in many Chinese hospitals reflects a cultural focus on direct access to healthcare, which contrasts sharply with the highly structured and often appointment-based systems in Western countries. This approach is influenced by China's rapidly growing healthcare infrastructure, where hospitals strive to accommodate large patient volumes in a time-efficient manner. The convenience for patients to walk into a hospital and receive medical care almost immediately is a major advantage for the public, particularly in urban areas where public health resources are more concentrated. It aligns with the cultural value placed not only on quality, but also on immediacy and efficiency, where waiting times for appointments in Western countries often seem burdensome for foreign patients by comparison.

From a regional perspective, the healthcare systems in Western countries are typically shaped by historical precedents of insurance-based models, regulatory frameworks, and resource allocation. In many Western countries, medical appointments are the norm, largely due to the structure of healthcare insurance and the need for formal consultation and assessment. This system can result in longer waiting times for appointments and medical procedures, as hospitals manage patient flow and insurance protocols. This usually increases the management costs. Conversely, China's system, influenced by its rapid urbanization and large population, tends to focus not only on quality but also on practicality and access to healthcare. In terms of service quality, Chinese hospitals have made significant strides in the past decades.

In terms of pricing, China's healthcare system remains more affordable for many patients, especially compared to the high out-of-pocket costs often associated with healthcare in Western countries. The economic model in China, which is largely subsidized by the government, ensures that the cost of medical services is significantly lower, making it accessible to a wider population. In contrast, the cost of healthcare in Western countries is often more burdensome, with the added complexity of insurance and co-pays, leading to financial inaccessibility among foreign patients. Thus, while both systems have strengths and weaknesses, the cultural emphasis on convenience, efficiency, and affordability in China leads to a very different healthcare experience for foreign patients compared to Western countries.

8. Conclusion

The present study examines the medical experiences of foreign patients in mainland China. The findings reveal that foreign patients are highly satisfied with their medical consultations in China, particularly due to the convenience of not requiring appointments, along with efficient and accessible check-ups, high service quality,

and affordable prices. However, the primary concern identified is the issue of privacy, as well as cultural differences in the sharing of personal information, which contrast with practices in their home countries. A limitation of the current study is the lack of detailed classification of the patients, such as their educational background and age. Future research may explore medical consultations in an intercultural context from additional perspectives, including discursive strategies and patient compliance with doctors' instructions.

Funding

- (1) 2025 Graduate Education Quality Enhancement Project of Zhengzhou University of Aeronautics. Project Number: 2025YJSJD9
- (2) Joint Graduate Training Base Project of Henan Province. Project Number: YJS2023JD50

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Tao Y, 2024, From January to July, the Number of Foreign Visitors to China Reached 5.722 Million, Representing a Year-on-year Increase of 403%. Bright Tourism. https://travel.gmw.cn/2024-09/11/content_37556154.htm
- [2] Zhang C, Chor W, 2023, Realizing Holism in Traditional Chinese Medicine (TCM) Consultations through the Voice of TCM (VOTCM): An Interactional Analytical Approach. *Health communication*, 38(2): 275–284. <https://doi.org/10.1080/10410236.2021.1950292>
- [3] Liu X, Zeng J, Li L, et al., 2024, The Influence of Doctor-Patient Communication on Patients' Trust: The Role of Patient-Physician Consistency and Perceived Threat of Disease. *Psychology Research and Behavior Management*, 2024(17): 2727–2737. <https://doi.org/10.2147/PRBM.S460689>
- [4] Chen X, Liu C, Yan P, et al., 2025, The Impact of Doctor-patient Communication on Patient Satisfaction in Outpatient Settings: Implications for Medical Training and Practice. *BMC Medical Education*, 25(1): 830. <https://doi.org/10.1186/s12909-025-07433-y>
- [5] Hall ET, 1976, *Beyond Culture*. Anchor Books, New York.
- [6] Hofstede G, Hofstede GJ, Minkov M, 2010, *Cultures and Organizations: Software of the Mind* (3rd ed.). McGraw-Hill, Ohio.
- [7] Martin JN, Nakayama TK, 2010, *Intercultural Communication in Contexts* (5th ed.). McGraw-Hill, Ohio.
- [8] Schouten BC, Meeuwesen L, 2006, Cultural Differences in Medical Communication: A Review of the Literature. *Patient Education and Counseling*, 64(1–3): 21–34.
- [9] Paternotte E, van Dulmen S, van der Lee N, et al., 2015, Factors Influencing Intercultural Doctor-patient Communication: A Realist Review. *Patient Education and Counseling*, 98(4): 420–445. <https://doi.org/10.1016/j.pec.2014.11.018>
- [10] Alkhamees M, Alasqah I, 2023, Patient-physician Communication in Intercultural Settings: An Integrative Review. *Heliyon*, 9(12): e22667. <https://doi.org/10.1016/j.heliyon.2023.e22667>
- [11] Jin Y, 2022, *Doctor-patient Communication in Chinese and Western Medicine*. Routledge, London. <https://doi.org/10.4324/9781003161929>

- [12] Hu Y, Wang W, Jiang Y, et al., 2024, Factors Associated with Family Decision-Making Self-efficacy among Family Members of Patients with Advanced Cancer in Mainland China. *Palliative & Supportive Care*, 22(5): 1317–1323. <https://doi.org/10.1017/S1478951524000658>

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Integrated Services Platform of International Scientific Cooperation

Innoscience Research (Malaysia), which is global market oriented, was founded in 2016. Innoscience Research focuses on services based on scientific research. By cooperating with universities and scientific institutes all over the world, it performs medical researches to benefit human beings and promotes the interdisciplinary and international exchanges among researchers.

Innoscience Research covers biology, chemistry, physics and many other disciplines. It mainly focuses on the improvement of human health. It aims to promote the cooperation, exploration and exchange among researchers from different countries. By establishing platforms, Innoscience integrates the demands from different fields to realize the combination of clinical research and basic research and to accelerate and deepen the international scientific cooperation.

Cooperation Mode



Clinical Workers



In-service Doctors



Foreign Researchers



Hospital



University



Scientific institutions

OUR JOURNALS



The *Journal of Architectural Research and Development* is an international peer-reviewed and open access journal which is devoted to establish a bridge between theory and practice in the fields of architectural and design research, urban planning and built environment research.

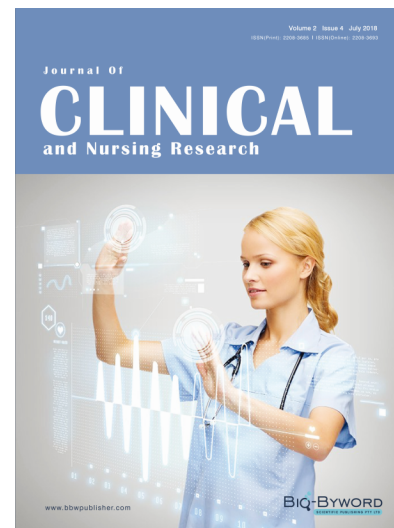
Topics covered but not limited to:

- Architectural design
- Architectural technology, including new technologies and energy saving technologies
- Architectural practice
- Urban planning
- Impacts of architecture on environment

Journal of Clinical and Nursing Research (JCNr) is an international, peer reviewed and open access journal that seeks to promote the development and exchange of knowledge which is directly relevant to all clinical and nursing research and practice. Articles which explore the meaning, prevention, treatment, outcome and impact of a high standard clinical and nursing practice and discipline are encouraged to be submitted as original article, review, case report, short communication and letters.

Topics covered by not limited to:

- Development of clinical and nursing research, evaluation, evidence-based practice and scientific enquiry
- Patients and family experiences of health care
- Clinical and nursing research to enhance patient safety and reduce harm to patients
- Ethics
- Clinical and Nursing history
- Medicine



Journal of Electronic Research and Application is an international, peer-reviewed and open access journal which publishes original articles, reviews, short communications, case studies and letters in the field of electronic research and application.

Topics covered but not limited to:

- Automation
- Circuit Analysis and Application
- Electric and Electronic Measurement Systems
- Electrical Engineering
- Electronic Materials
- Electronics and Communications Engineering
- Power Systems and Power Electronics
- Signal Processing
- Telecommunications Engineering
- Wireless and Mobile Communication

