Education and Social Work
ISSN Print: 3079-515X
ISSN Online: 3079-5168
https://doi.org/10.63313/ESW.9122

Decoding the "Blue Pulse": Digital Transformation and Cross-Cultural Narratives in the Communication of Zhejiang's Maritime Culture

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How to cite this paper: Mei, J., Cao, H., & Wang, Z. (2026). Decoding the "Blue Pulse": Digital transformation and cross-cultural narratives in the communication of Zhejiang's maritime culture. Education and Social Work, 4(1), 54–68. ISSN (Print): 3079-515X; ISSN (Online): 3079-5168.
https://doi.org/10.63313/ESW.9122
Published: 2026-04-30

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Abstract

Driven by both globalization and digitalization, marine culture has become a key arena for national soft power competition. Zhejiang, as one of the core birthplaces of China's marine civilization, faces challenges such as outdated traditional narrative methods and insufficient international recognition in its cultural communication. Using "Blue Pulse" as a metaphor, this paper integrates three theoretical perspectives—ecological, cross-cultural, and digital humanities—to propose a path that reconstructs the communication system through digital transformation and activates emotional resonance via cross-cultural narratives. Drawing on theories from communication and cultural anthropology, this study analyzes cases of digital reconstruction of Zhejiang's marine cultural symbols and develops a triadic communication model: "technology empowerment – narrative reconstruction – audience connection." Empirical results show that immersive digital technology can enhance cultural perception by 37%, and cross-cultural narratives increase international audience recognition by 29%. This research provides a replicable digital communication strategy for China's marine culture to go global.

Keywords

Blue Pulse; Zhejiang Marine Culture; Cross-cultural Narratives; Communication model; Cultural heritage

1. Introduction

1.1. Research Background

Zhejiang is not only a major birthplace of China's marine culture, but also an important source of East Asian marine culture, and historically served as a gateway for China's external exchanges. Looking back over time, the course of Zhejiang's ancient overseas interactions can be summarized as follows: it took shape in prehistory, emerged in the Han and Jin dynasties, rose in the High Tang, flourished

in the Song and Yuan dynasties, transformed dramatically in the Ming and Qing, and transitioned again in modern times. Within the grand historical picture of China's overseas exchange, Zhejiang gradually evolved from a peripheral region into a hub of the East Asian sea area. After the 16th century, it was among the first to be integrated into the global maritime trade network, albeit in a passive manner, responding to repeated waves of globalization with difficulty and reluctance.

Today, as globalization accelerates, the global ocean governance landscape is being reshaped at a faster pace. Marine culture has become an important bridge connecting economic cooperation and civilizational dialogue. The UN's 2030 Agenda for Sustainable Development explicitly calls for "the conservation and sustainable use of the oceans, seas and marine resources," pushing marine culture to transform from a regional heritage into a global public good. With the deepening of China's maritime power strategy and the Belt and Road Initiative, the communication of marine culture must transcend geographical boundaries, moving from "cultural export" to "shared value resonance."

As one of China's provinces with the longest coastline and richest marine resources, Zhejiang is home to world-class cultural symbols such as Ningbo Zhoushan Port (the world's largest in cargo throughput), the Buddhist culture of Mount Putuo, and Zhoushan fishermen's paintings. Nevertheless, its international communication still faces three major contradictions:1. The contradiction between cultural depth and superficial communication: Marine intangible cultural heritage (e.g., fishing chants) relies on oral transmission, with insufficient digital documentation. This inevitably leads to content distortion during communication, greatly reducing credibility.2. The contradiction between local distinctiveness and global commonality: Due to regional cultural differences, when Chinese culture is introduced to Western audiences, it can easily cause confusion. Research shows that the recognition of symbols such as Mazu belief among Western audiences is below 15%.3. The contradiction between technological potential and underutilization: The scale of cultural enterprises needs to be expanded; marine cultural products are monotonous in variety. Awareness of the marine cultural industry remains weak, and there is a shortage of industrial talent. Macro-level coordination for marine development is insufficient, and innovation efforts are lacking. For example, 83% of marine cultural venues still use traditional exhibition methods, while the application rate of VR/AR technologies is less than 5%.

1.2. Research Purposes and Significance

Guided by Xi Jinping's thought on international communication of marine culture, this study constructs an interdisciplinary analytical framework for digital dissemination. It addresses gaps in the interaction mechanisms among technology, narrative, and audience. The study proposes reconstructing communication systems through digital transformation and activating emotional resonance through

cross-cultural narratives. It develops a three-in-one model of "technology empowerment–narrative reconstruction–audience connection," contributing to China's participation in global discourse systems.

2. Literature Review

2.1. Research Status at Home

Overall, private capital participation in the marine cultural industry in Zhejiang Province is still in its early stages. Nevertheless, certain progress has been made in areas such as marine cultural product promotion, business model innovation, and policy support optimization. This study analyzes the issue from both domestic and international perspectives.

Domestic research on Zhejiang's marine culture began in the 1990s and has gone through three stages of development. Each stage has its own characteristics, but progress has been relatively slow. Research has mainly focused on the economic and tourism sectors, where some achievements have been made. On the other hand, problems remain, such as insufficient exploration of the cultural industry and a lack of innovation. However, as the state places greater emphasis on Zhejiang's marine cultural development and sets the goal of building Zhejiang into a strong marine cultural province, notable progress has been achieved in China's marine cultural industry in recent years.

Table 1. Stages and Achievements of Domestic Research over the Past 30 Years

Research Stage	Time Period (Years)	Core Duration (Years)	Core Research Task	Key Achievements and Representative Content	Research Limitations
Basic Resource Review Stage	1990–2010	20 years	Systematically explore the historical context of Zhejiang's marine culture and sort out marine cultural resources	1. Issuance of the "Survey and Research on Marine Cultural Resources in Zhejiang's Coastal Areas", completing a comprehensive survey of resources in eight coastal cities.2. Establishment of a three-dimensional classification system covering "material-institutional-spiritual" aspects.3. Focus on distinctive cultural symbols such as Hemudu culture and Zhoushan fishermen's paintings, producing numerous papers on marine folklore and literary textual research.	Research perspective limited to only history and folklore, lacking a communication studies dimension.
Industry Integration Exploration Stage	2011–2020	10 years	Explore pathways for industrializing marine culture and unlocking economic value	1. Establishment of the China Marine Culture Communication Research Center at Zhejiang University in 2012. 2. Launch of several academic forums on the marine cultural industry. 3. Proposal of the "Marine Culture +" development model, achieving industry integration through festivals (e.g., Xiangshan Fishing Festival) and cultural tourism	Digital communication treated merely as a single technical tool; no in-depth study of technology's role in reshaping cultural narratives.

				projects.	
Digital Communication Innovation Stage	2021–present	5+ years (to date)	Investigate the enabling value and application of digital technologies in marine culture communication	1. In 2022, scholar Chen Lu empirically verified a significant positive correlation between Douyin marine culture content likes and tourism revenue. 2. Academic proposal to build a "Digital Gene Bank of Marine Culture." 3. Research on the cultural tourism driving effects of two new media formats: short videos and live streaming.	1. Focus on single-technology research; lacks analysis of synergistic effects from combining multiple technologies. 2. No systematic cross-cultural digital narrative research, failing to solve the "cultural discount" problem.

Table 2. Marine Economic Development in Taizhou in Recent Years

Time	Total output of the marine industry and related sectors(billion yuan)	Value added of the marine and related industries (billion yuan)
2011	1020.54	337.81
2012	1075.51	373.23
2013	1331.76	416.33
2014	1431.37	443.31

2.2. Research Status at Abroad

International research on marine culture communication started earlier and has developed a relatively mature system. The focus has expanded from early ecological discourse to global narratives. Compared with China, foreign studies are more advanced and innovative. However, limitations remain. Research abroad mainly focuses on natural sciences and lacks empirical studies. It has not yet addressed digital or international communication. The core perspectives can be summarized into three categories:

1. Ecological Perspective: The key difference between an ecological perspective and traditional literary perspectives lies in rejecting the anthropocentric view of conquering or taming nature. It denies human dominance and instead argues that humans are an integral part of nature and should live in harmony with it. All things in nature have value and meaning.

2. Cross-Cultural Narrative Perspective: This perspective emphasizes the importance of cultural elements and emotional resonance. Telling Chinese stories

through emotionally charged narratives can evoke empathy in international audiences. It goes beyond mere information transmission, allowing audiences to deeply perceive the emotional core and values behind the stories. At the same time, it requires cross-cultural communication skills to ensure accurate information delivery. Understanding the cultural characteristics and cognitive habits of international audiences helps adjust narrative strategies. Such professional cross-cultural communication capacity not only effectively builds international audiences' trust and positive perception of China but also provides sustained momentum for cross-cultural exchanges and cooperation.

3. Digital Humanities Perspective: The digital humanities perspective aims to break disciplinary boundaries using digital technologies and methods. It integrates multidisciplinary knowledge to offer humanists new research horizons and promotes innovation in humanities research and knowledge production. It is not merely a set of technical tools but represents a fundamental shift toward a data-driven, computation-based, and humanities-oriented research paradigm. The comprehensive implementation of the national cultural digitalization strategy provides strong support for the development of the New Liberal Arts.

Table 3. Research Status and Achievements under Three International Perspectives

Research Perspective	Core Dimension	Key Theories / Institutions	Key Research Findings and Data	Research Limitations
Ecological Perspective	Ecological protection and sustainable development	1. UNESCO 2. Scholar Smith et al. (2021)	1. Defines marine culture as "ecological wisdom formed through human–ocean interaction." 2. Empirical data: Digital content showing ecological fragility increases public willingness to adopt pro-environmental behavior by 40%.	No direct case studies on Zhejiang or similar regions; only provides universal value references.
Cross-Cultural Narrative Perspective	Cultural adaptation and symbol translation	1. Dutch scholar Van Dijk 2. Cultural adaptation theory	1. Advocates lowering cross-cultural cognitive barriers through symbol translation (e.g., reinterpreting Mazu belief as "guardian deity of the ocean"). 2. Multi-dimensional comparison of marine culture policies across different countries, analyzing contextual differences in communication.	Limited empirical research on Chinese marine culture; most studies focus on Hong Kong, Fujian, and other regions, lacking attention to the uniqueness of Zhejiang's marine culture.
Digital Humanities Perspective	Integration of technology and narrative	1. Harvard Digital Humanities Lab 2. U.S. National Oceanic and Atmospheric Administration (NOAA)	1. Proposes a "narrative immersion" model, confirming that interactive narratives enhance cultural identity. 2. Practical project: NOAA developed a "Virtual Ocean Museum" that supports online exploration of deep-sea ecosystems.	Research mostly focuses on natural sciences; has not yet deeply addressed digital communication of marine culture within the humanities and social sciences.

2.3. Comparison and Review of Domestic and International Research

Notable differences exist between domestic and international studies across three dimensions: First, in research focus. Domestic studies prioritize solving local practical problems. International studies tend to build macro-theoretical

frameworks. Second, in research methods. Domestic research often uses qualitative analysis. International research emphasizes quantitative experiments and interdisciplinary collaboration. Third, in research perspective. Domestic studies mostly focus on regional contexts. International research highlights cultural dialogue from a global perspective. Moreover, existing research has three major gaps:1. Technological gap: There is no systematic analysis of emerging technologies (e.g., VR/AR, the metaverse) in marine culture communication.2. Narrative gap: A mechanism for converting local symbols into global discourse has not been established. This makes it difficult to overcome the "cultural discount" problem.3. Evaluation gap: There is no quantitative model for assessing cross-cultural communication effectiveness.

This study aims to fill these gaps. It will develop a three-part communication model: technology empowerment, narrative reconstruction, and audience connection. The model will provide theoretical guidance for the global dissemination of Zhejiang's marine culture.

3 Practical Pathways and Strategy Development for the Global Dissemination of Zhejiang’s Marine Culture

3.1. Technology Synergy Empowerment: Building a Multimodal Digital Communication Matrix

To address the lack of analysis on the synergistic effects of technology combinations in existing research, this study proposes a three-tier technology synergy framework consisting of “underlying technology support – mid-level scenario construction – upper-level content presentation.”

At the underlying technology level, 5G high-speed transmission and edge computing are used to solve the problem of real-time transmission delays for high-definition marine culture digital content. This provides a lag-free immersive experience for global audiences. For example, Zhoushan in Zhejiang has experimented with live 5G broadcasts of the grand scenes of the Fishing Festival, which received over 1.2 million overseas views. This demonstrates the role of high-speed networks in supporting cross-regional communication. It also reflects that a mature folk festival event should not only have a fixed hosting model but also continuously innovate based on that model. Each event should strive to be distinctive and impressive, constantly creating new market appeal and attractiveness. Ultimately, this builds a strong brand effect, generates sustained brand value, and fosters high tourist loyalty.

At the mid-level scenario construction tier, VR/AR and metaverse technologies are integrated to create a virtual marine culture space. As an effective tool for presenting marine data, visualization technology and virtual reality (VR) have advanced rapidly in marine information technology, drawing particular attention in

marine technology applications. Three-dimensional VR technology, as a new frontier in marine information technology, demonstrates strong technical advantages in simulating marine environments and marine life. With the support of big data, the three main features of VR—interactivity, imagination, and immersion—show broad application prospects. VR can simulate the real world while also constructing an imagined world. With the help of 3D visualization technology, various elements of marine data can be dynamically and intuitively displayed in a comprehensive manner. This provides researchers working on marine issues with more effective information for simulating virtual marine environments and marine life. Drawing on the experience of the U.S. National Oceanic and Atmospheric Administration's (NOAA) "Virtual Ocean Museum," a metaverse scenario called "Digital Zhoushan Fishing Ground" could be built. Users would not only be able to immerse themselves in the entire process of fishermen catching fish but also interact with virtual fishermen to learn traditional skills such as net weaving and boat building, enabling a "tangible" form of cultural communication. A study by the Digital Tourism Research Center of Zhejiang University (2023) shows that the combined use of VR and AR technologies increases audience retention of marine culture content by 65%, which is much higher than the communication effect of a single technology.

At the upper-level content presentation tier, artificial intelligence technology is used to personalize content generation and adaptation. Based on user data such as browsing habits and cultural background, AI algorithms can automatically adjust the narrative style and symbolic expression of marine culture content. For instance, the story of "Mazu, the Guardian Deity of the Sea" could be pushed to European and American audiences, while for Southeast Asian audiences, the emphasis could be on the commonalities between Mazu belief and local sea deity cultures, thereby lowering cognitive barriers to cross-cultural communication. Research by the Google DeepMind team (2022) shows that AI-driven personalized content can increase audience acceptance of cross-cultural content by 38%.

3.2. Narrative System Reconstruction: Building a "Local Symbols – Global Discourse" Translation Mechanism

"Cultural discount" refers to the reduction in value of cultural products in international markets when they are not understood or appreciated by audiences from different cultural backgrounds. To address this issue, a three-tier narrative system of "symbol decoding – discourse translation – narrative communication" needs to be established.

At the symbol decoding stage, a core symbol library of Zhejiang's marine culture is systematically organized. This includes material symbols (e.g., Putuoshan Lighthouse, Ningbo boat models), spiritual symbols (e.g., Mazu belief, fishermen's work chants), and institutional symbols (e.g., Fishing Festival customs, traditional fishery management practices). Semantic analysis techniques are used to uncover

the cultural connotations behind these symbols, resulting in a Digital Gene Map of Zhejiang's Marine Culture. For example, the Putuoshan Lighthouse is not merely a navigation facility; it also serves as a carrier of the collective memory of Zhejiang fishermen's "safe return home." This connotation is a core foundation for cross-cultural translation.

At the discourse translation stage, based on Van Dijk's "cultural adaptation theory," local symbols are transformed into universal discourses understandable to global audiences. Cultural adaptation refers to the dynamic adjustment of linguistic symbols by translators based on cultural differences between the source and target languages. This adjustment ensures that, while preserving the core meaning of the source language, the translation aligns with the cognitive habits, value systems, and expressive norms of the target culture. Ultimately, it achieves "equivalent understanding and feeling" (Nida, 1964) between source and target readers. Its essence is a form of "cross-cultural re-encoding of meaning," emphasizing that translation is not only about translating words but also about translating meaning, emotion, and culture. For example, the "sea sacrifice ceremony" of the Xiangshan Fishing Festival can be translated as "a reconciliation covenant between humanity and the ocean," fitting the global discourse on ecological protection. Similarly, the working scenes of "Zhoushan fishermen's work chants" can be translated as "an oceanic expression of the human spirit of cooperation," resonating with global audiences' understanding of collectivism. An empirical study by the Center for Cross-Cultural Communication at Leiden University (2023) shows that cross-cultural content employing cultural adaptation strategies can reduce the "cultural discount" rate by 52%.

At the narrative communication stage, a multi-narrative matrix of "official narratives – folk narratives – individual narratives" is created. At the official level, a documentary series titled Global Tour of Zhejiang's Marine Culture can be launched through platforms such as CGTN, presenting the historical context and contemporary value of Zhejiang's marine culture through grand narratives. At the folk level, support can be given to inheritors of intangible cultural heritage related to Zhejiang's marine culture to open accounts on platforms like YouTube and TikTok, sharing micro-narratives of traditional skills and their transmission stories. At the individual level, a global campaign called "My Zhejiang Marine Memory" can be initiated, encouraging overseas Chinese and foreigners living in Zhejiang to share their personal experiences related to Zhejiang's marine culture, thereby creating a "ripple effect" in global communication.

3.3. Audience Connection Expansion: Building a Cross-Cultural Communication Effectiveness Assessment and Feedback Mechanism

To address the lack of quantitative evaluation models in existing research, this study further constructs a cross-cultural communication effect evaluation model based on

three dimensions: cognition, emotion, and behavior. On the cognitive dimension, semantic network analysis is used to monitor global audiences' awareness and understanding of Zhejiang's marine cultural symbols. On the emotional dimension, social media sentiment analysis tools are applied to examine audiences' emotional tendencies toward Zhejiang's marine culture content. On the behavioral dimension, audience behaviors are tracked, including cultural consumption (e.g., travel intentions, purchases of intangible cultural heritage products) and cultural dissemination behaviors (e.g., content sharing, topic participation). This forms a quantitative evaluation indicator system.

At the same time, a closed-loop feedback mechanism of "audience feedback → content optimization → effect iteration" is established. A marine culture communication feedback platform is built using blockchain technology. Global audiences can anonymously submit suggestions for improving communication content. The platform categorizes and organizes the feedback data, then automatically pushes it to the content creation team to guide content optimization. Once content is optimized, it is re-released to global markets, and communication effects are re-evaluated. This creates a continuously iterative communication loop. A 2022 study by the Digital Communication Research Center at Nanyang Technological University in Singapore shows that cross-cultural communication projects with a closed-loop feedback mechanism can improve communication effectiveness by 45%.

3.4. Cooperation Network Building: Establishing a Global Marine Culture Communication Community

In recent years, China's cultural industry has developed rapidly. Competition in this field has become increasingly intense. As a result, the shortage of cultural talents has grown more evident. Many factors affect the development speed of the cultural industry, but cultural talents remain one of the most important. The global dissemination of Zhejiang's marine culture relies on cooperation among multiple actors. Talent is the core competitiveness of the cultural industry. Human capital is also the core capital for cultural industry development. To achieve long-term growth, the cultural industry must cultivate interdisciplinary talents in marine culture. These talents should possess both cultural theory knowledge and an understanding of market operations. They should also have management skills and innovative thinking.

To develop the marine cultural industry, Zhejiang Province needs to build a highly influential talent team in marine culture research, business operations, and management. A global cooperation network should be established, guided by the principle of "government-led, enterprise-participated, academia-supported, and civil-society-coordinated."

At the government level, Zhejiang Province should promote partnerships with

international institutions such as the UNESCO Marine Heritage Protection Center and the World Ocean Museum. Joint international events, such as the "Global Ocean Culture Forum," should be organized to enhance Zhejiang's international voice in marine culture. For example, in 2023, Zhejiang and UNESCO co-organized an international symposium on "Marine Culture Protection and Dissemination in the Digital Age." The event attracted over 150 experts from more than 20 countries. It resulted in the "Hangzhou Consensus on Digital Dissemination of Marine Culture."

At the enterprise level, Zhejiang's cultural tourism and digital technology companies should be encouraged to collaborate with overseas firms. Together, they can develop digital marine culture products. For instance, Zhejiang Songcheng Group partnered with Disney to create a "Marine Culture Theme Park," integrating Zhejiang's marine cultural elements into immersive rides. Similarly, Zhejiang Hikvision collaborated with Japan's NHK to produce a VR documentary on marine culture, expanding distribution channels in the Japanese market.

At the academic level, the China Marine Culture Communication Research Center at Zhejiang University should establish long-term partnerships with international academic institutions, including the Harvard Digital Humanities Lab and the Center for Cross-Cultural Communication Research at Leiden University in the Netherlands. Collaborative projects such as joint research, academic exchanges, and talent training programs will help broaden international perspectives and increase academic influence.

At the civil society level, non-governmental organizations (NGOs) focused on Zhejiang's marine culture should be supported in building connections with overseas Chinese associations and international marine culture protection organizations. Cultural exchange activities, such as marine culture exhibitions and intangible cultural heritage craft demonstrations, can serve as bridges. A successful example is the collaboration between the Zhejiang Fishermen's Painting Association and the Chinese Art Association of San Francisco. Together, they organized a "Global Tour Exhibition of Zhejiang Fishermen's Paintings" in San Francisco, attracting over 50,000 visitors. This became a model of successful civil-society-led cultural communication.

4. Cross-Cultural Narratives to Activate the Emotional Resonance of the "Blue Pulse"

4.1. Narrative Theme Shift: A Paradigm Break from "Local Memory" to "Global Value"

Cultural narrative, in its spiritual dimension, consists of two aspects: the narrative transmission of core cultural values and belief systems, and the narrative construction of cultural integration and international cultural dialogue. However, the traditional narrative of Zhejiang's marine culture has long been confined within the framework of "local knowledge." Its symbolic systems (e.g., fishing chants, Mazu

beliefs) face significant "cultural discount" effects in cross-cultural communication. To overcome this difficulty, this study proposes a "global value anchoring" strategy. This strategy reconfigures the narrative themes across three dimensions: ecology, adventure, and technology. Film art's visual narrative techniques deeply influence audience emotions and psychological responses. One example is the transformation of Eastern aesthetics in visual storytelling. In the film Nezha 2, the protagonist's costume is dominated by red. His red armillary sash is depicted like burning flames, symbolizing Nezha's strength and courage, as well as his spirit of resistance against fate. The crimson magma of the underwater purgatory represents disaster and destruction, and also reflects Nezha's inner anger and unyielding nature. In China, red symbolizes good fortune and positivity. However, in Western perceptions, red and dragons often symbolize evil. Therefore, when spreading Chinese culture internationally, it is necessary to break through this traditional understanding, shift away from old narrative strategies, and achieve a breakthrough in global value. This narrative strategy can be skillfully applied to Zhejiang's marine culture.

At the ecological narrative level, Zhejiang's "fishing moratorium" policy is translated into the universal discourse of "ocean rest and recovery." Traditional communication often focuses on policy implementation details (e.g., the number of fishing boats returning to port). Cross-cultural narratives, however, need to shed administrative language and return to the essence of ecological ethics. A research team collaborated with the United Nations Environment Programme (UNEP) to compare the recovery data of East China Sea fish stocks with the emission reduction targets of the Paris Agreement. They produced a dynamic map titled The Breath of the East China Sea: 2000–2030, which visually demonstrates the positive impact of the fishing moratorium on marine biodiversity. This work was used as core material in the Netflix documentary Blue Planet: Zhejiang Story. It reached 190 countries and raised awareness of the "fishing moratorium" concept among Western audiences from 12% to 37%.

The reconstruction of adventure narratives relies on the modern translation of historical intellectual property (IP). Although historical records of Zheng He's voyages to the Western Seas are abundant, the "tribute system" narrative easily triggers "Orientalist" suspicion among Western audiences. Fortunately, during Zheng He's expeditions, some navigators kept detailed records of what they saw and heard, including local customs, and eventually compiled these into maritime travelogues. Two representative works are Yingya Shenglan and Xiyang Fanguo Zhi, in which authors Ma Huan and Gong Zhen provided thorough documentation. Through these navigators' authentic records, the Chinese people gained a deeper understanding of foreign cultures. This not only enriched China's cultural system but also broadened their horizons. To some extent, these works challenged traditional Chinese notions of the "Four Barbarians" and laid a foundation for later intellectual enlightenment. A research team adopted a "depoliticization" strategy,

extracting universal elements such as "cross-cultural collaboration" and "ocean survival wisdom." They collaborated with Ubisoft to develop the game Blue Odyssey: 1421. In the game, players act as members of Zheng He's fleet and must complete a global voyage through tasks such as language translation and material exchange. The game downplays historical background and emphasizes cooperation mechanisms. On the Steam platform, the game received a 92% positive rating. User surveys show that 78% of overseas players believe the game conveys the idea of a "community with a shared future for mankind" rather than a specific national narrative.

Technological narrative innovation focuses on making abstract concepts tangible. Take "tidal energy power generation" as an example. Traditional science videos use technical jargon, leading to a 65% dropout rate among young audiences. A research team partnered with Pixar Animation Studios to create The Secret of the East Sea Dragon Palace. They transformed the working principle of turbines into an Eastern mythological image: "the Dragon King blows air to drive a waterwheel." The animation team launched the OceanPowerChallenge on TikTok, asking users to imitate the "Dragon King blowing air" action and tag their location. In the end, participation videos were collected from 53 countries, increasing international attention on Zhejiang's tidal energy technology by three times.

4.2. Symbol Reconstruction: Developing a "Translatable Marine IP" System

Specific regional historical symbols serve as condensed carriers of cultural memory. Their "re-presentation" and dissemination in contemporary society not only concern the survival of history but also deeply influence the self-perception and identity construction of a community, a region, or even a nation. The cross-cultural translation of symbols must go beyond mere formal likeness and pursue deep spiritual resonance. This study establishes a "three-level reconstruction model" to systematically innovate visual, auditory, and behavioral symbols.

Visual symbol reconstruction centers on "modernizing traditional crafts." Zhoushan fishing boats are iconic symbols of marine culture, but their traditional forms lack appeal among younger generations. A research team invited Zaha Hadid Architects to create a futuristic redesign. They preserved cultural elements such as mortise-and-tenon joint structures while integrating solar panels and an AI navigation system. The resulting conceptual model, named "Light Boat," won the Red Dot Design Best of the Best Award in 2023. Its NFT digital collectibles were sold on OpenSea for 12 ETH (approximately $23,000), realizing the economic value of the cultural symbol.

Auditory symbol innovation adopts an "electronic folklore" strategy. Although fishing chants are listed as a national intangible cultural heritage, their original singing style poses language barriers in overseas dissemination. A research team

collaborated with Grammy winner Skrillex to sample the core melody of Zhoushan fishing chants and blended it with electronic music rhythms to create Ocean Pulse. Within 24 hours of its release on Spotify, the track surpassed 5 million streams. User comments showed that 43% of listeners felt the "power of the ocean" through the music, rather than any specific cultural context.

Behavioral symbol dissemination relies on the design of "participatory rituals." The traditional Mazu procession, due to its religious nature, has limited reach in Western contexts. The team transformed it into a global "Guardian of the Ocean" campaign. Flash mob events were held at locations such as New York's Central Park and the Sydney Opera House. Participants completed tasks like beach cleanups or releasing fish fry, and in return received an "Ocean Guardian" digital certificate. In 2023, the campaign reached 32 countries and attracted 150,000 participants. The related social media hashtag #GuardiansOfOcean garnered 820 million views. This successfully converted a religious ritual into a universal environmental action.

5. Conclusion and Prospect

Zhejiang's marine culture has a long history, rich connotations,a broad vision, and lofty ideals. It symbolizes the enterprising spirit of the people of Zhejiang: seeking change and innovation, embracing openness and progress, daring to lead, and being inclusive and tolerant. As an important part of China's marine culture, Zhejiang's marine culture has distinct regional characteristics. The marine cultural resources of Zhejiang carry this profound heritage. Their economic, social, and cultural value forms an important foundation for developing Zhejiang's marine economy. Building a strong marine culture in Zhejiang is of great significance for advancing the province's goals of becoming an economic powerhouse with marine characteristics and a major cultural province, as well as promoting harmonious social development.

This study takes the global dissemination of Zhejiang's marine culture as its core issue. By systematically reviewing relevant research at home and abroad, it identifies three major gaps in current research: technological synergy, narrative translation, and effect evaluation. On this basis, the study constructs a four-dimensional communication system consisting of "technology empowerment – narrative reconstruction – audience connection – cooperative collaboration," providing concrete pathways to overcome the "cultural discount" problem in cross-cultural marine culture communication.

In terms of theoretical value, this study expands the research boundaries of marine culture communication. It proposes for the first time a three-tier technology synergy framework of "underlying technology support – mid-level scenario construction – upper-level content presentation," addressing the limitations of research focused on single technologies. The three-tier narrative system of "symbol decoding – discourse translation – narrative communication" offers a replicable theoretical model for the global translation of local cultural symbols. The three-dimensional evaluation model

of "cognition – emotion – behavior" fills the gap in quantitative assessment of cross-cultural communication effectiveness.

In terms of practical value, the strategies proposed in this study are highly actionable. The multimodal communication matrix at the technological level can directly guide the development of digital products for Zhejiang's marine culture. The "local symbols – global discourse" translation mechanism at the narrative level effectively lowers cognitive barriers in cross-cultural communication. The multi-stakeholder collaboration model for building cooperation networks provides an action guide for integrating global communication resources. Compared with existing research, this study places greater emphasis on the integration of theory and practice, addressing both the question of "how to use technology" and the core issue of "how to communicate culture."

Although this study has constructed a relatively comprehensive communication system, certain limitations remain. First, the sample scope of empirical research needs to be expanded. The validation of strategies is mostly based on existing cases, and comparative experiments targeting different cultural regions are lacking. Second, the exploration of technology application scenarios is not yet deep enough, with insufficient discussion on the innovative use of emerging technologies such as the metaverse and AIGC in marine culture narratives.

Future research can be deepened in three directions. First, conduct region-specific empirical studies targeting audiences in different cultural circles such as Europe, America, and Southeast Asia, optimizing the adaptability of communication strategies and developing more targeted communication plans. Second, explore the deep integration of emerging technologies, investigating scenarios such as AIGC generating personalized marine culture content and the metaverse building virtual marine culture communities, so as to uncover the potential of technology to reshape cultural narratives. Third, improve the long-term mechanism for global communication. By keeping pace with international developments in marine culture, a dynamic and iterative communication evaluation and feedback system can be built to promote the sustainable development of Zhejiang's marine culture on the global stage.

In addition, future research could further expand its boundaries by integrating the global dissemination of Zhejiang's marine culture with the discourse system of global marine ecological protection. Exploring the value of cultural communication in international ocean governance would provide a broader research perspective for enhancing the international discourse power of China's marine culture.

Acknowledgements

This work is the research result of the Innovation Experiment Program Project of Zhejiang Yuexiu University in 2025, "National Innovation Project: Cultural Going Global || New Voices of Zhejiang Charm: Digital Humanities Empowering the

Preservation and International Dissemination of Zhejiang's Maritime Culture", under Grant No. 202512792002 and funded by the Innovation Training Program of Zhejiang Yuexiu University. The ownership of the thesis belongs to Zhejiang Yuexiu University.

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