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Challenges and Pathways for Improving New Media Communication of Marine Agriculture, Rural Areas, and Farmers from the Perspective of the Digital Divide

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Abstract

The scale of new media communication related to marine agriculture, rural areas, and farmers continues to expand. It has become a key channel for the circulation of marine information and the inheritance of marine culture. However, the digital divide seriously restricts its development. This study focuses on the digital divide challenges in this field. It adopts literature analysis and data analysis methods. Based on the three-level framework of digital divide theory, the study examines gaps in access, usage, and digital literacy. The findings show that the digital divide in marine rural new media communication mainly results from insufficient infrastructure investment, a lack of adaptable digital tools, and an incomplete training system for digital skills. This study proposes several solutions, including improving digital infrastructure in fishing villages, developing more adaptable tools, and providing progressive skills training. The research expands the application context of digital divide theory and helps address gaps in existing studies. It also offers theoretical and practical references for improving the effectiveness of marine rural new media communication and promoting the digital inheritance of fishing village culture.

Keywords

digital divide, marine rural culture, new media communication, rural revitalization

1. Introduction

The scale of new media communication related to marine agriculture, rural areas, and farmers continues to grow. It has formed a content system that covers fisheries technology education, seafood production and sales, and the communication of fishing village culture. New media has become the main channel for information circulation in marine rural areas. On the one hand, it breaks the geographical limits of traditional communication. On the other hand, it encourages coastal fishers to become active communicators and promotes the digital inheritance of fishing village culture. However, an analysis from the perspective of the digital divide shows that this field still faces many challenges. According to *the 56th Statistical Report on China's Internet Development* released by the China Internet Network Information Center (CNNIC), "as of June 2025, China's internet penetration rate reached 79.7%, while the penetration rate in rural areas was 69.2%" [1]. This gap in digital access directly affects the coverage of marine culture communication in

fishing villages. In addition, *the China Digital Economy Development Research Report (2024)* released by the China Academy of Information and Communications Technology shows that "in 2023, the digital economy penetration rates of the primary, secondary, and tertiary industries were 10.78%, 25.03%, and 45.63%, respectively" [2]. The relatively low level of digital economy penetration in the primary industry limits both the breadth and depth of digital technology use in marine rural new media communication. As a result, the overall level of digital technology application in this field remains relatively low.

From a theoretical perspective, this study expands the application of digital divide theory in the field of agriculture, rural areas, and farmers. It also enriches research at the intersection of rural communication and marine cultural communication. From a practical perspective, this study provides reference pathways for addressing the digital divide in new media communication related to marine agriculture, rural areas, and farmers.

Chinese scholars have mainly focused on the digital divide in agriculture, rural areas, and farmers in fields such as rural e-commerce and smart agriculture, while research on marine cultural communication remains limited. Existing studies point out that "the urban–rural gap in digital access has largely narrowed, but the gap in digital application remains significant. Rural residents generally have lower levels of digital skills. There are clear differences between urban and rural residents in their ability to participate in digital activities and information consumption. This gap has become a key constraint on sharing the benefits of the digital economy and achieving human modernization, and it may lead to a new form of urban–rural digital divide". The urban–rural digital divide is therefore not only a technological gap but also a gap in human capital and cognitive ability. Some scholars further argue that "under multiple pressures such as the digital divide, urban discourse dominance, and technology or platform capitalism, new media, which is expected to promote empowerment, finds it difficult to break through existing social structures and power relations". This argument also applies to new media communication in marine agriculture, rural areas, and farmers. In the field of marine cultural communication, scholars have mainly examined tourism development and intangible cultural heritage transmission, while studies on the digital divide in new media communication remain insufficient. This study focuses on new media communication related to marine agriculture, rural areas, and farmers. It analyzes the challenges and possible solutions of the digital divide from a technological perspective and helps fill an existing research gap.

International scholars have conducted related studies on digital communication in marine fisheries and aquaculture, and these studies closely relate to the key issues discussed in China's marine agriculture, rural areas, and farmers communication through new media. Some scholars have pointed out in a study of fishers in Ghana that "Farmers receiving aquaculture information from mobile phone and television programs had higher adoption of good practices, production, and income on average. Farmers receiving aquaculture information from both ICT tools and extension agents achieved the highest harvest and income on average". This finding confirms the empowering role of digital tools in information communication within marine agriculture. It also reflects the challenge faced in China, where insufficient use of digital technology limits the development of marine rural new media communication.

Mabon and Kawabe (2022) focused on coastal fishing communities in Japan and found that "We find that social media offers a channel for some community members in Minamisoma to (re)construct a sense of pride and identity through engagement with fisheries, seafood and the coastal landscape, and to challenge negative external perceptions of their locality. Nonetheless, we conclude that within a wider suite of digitalisation measures, social media can support coastal actors to sustain a narrative of resilience locally, and continually engage with those in other locations". This perspective provides an important reference for China's marine rural new media communication, especially in understanding how new media can help rebuild fishing village identity and address communication challenges.

2. The Current Situation of New Media Communication in Marine Agriculture, Rural Areas, and Farmers under the Digital Divide

In this study, "new media communication of marine agriculture, rural areas, and farmers (MARF new media communication)" refers to the practice in which fishers, aquaculture farmers, and other rural actors in coastal areas use digital platforms to present marine production activities, everyday coastal life, and local cultural experiences, as new media has gradually become an important channel for marine cultural

communication. However, from the perspective of digital divide theory, current new media communication in this field still faces problems at multiple levels. Its communication outcomes and capacity for cultural expression are clearly constrained by gaps in access, usage, and digital literacy.

2.1 The Access Divide: Unequal Digital Infrastructure Limits Participation in Marine Cultural Communication

The access divide mainly refers to differences among groups in network infrastructure, terminal devices, and access to digital platforms. Although coastal areas in China generally have a relatively high level of digital development, problems with network stability and service quality still exist in some fishing villages, islands, and remote coastal regions. As previous research notes, "natural environmental constraints affect the economic and social development of islands, and climate events such as typhoons and tsunamis further weaken the connection between islands and the mainland". These natural disadvantages have long affected traditional information communication on islands. Insufficient network coverage also restricts the development of integrated media communication in these areas. For fishers whose main livelihood depends on offshore fishing, unstable or periodically unavailable network signals are common. This situation makes it difficult for them to maintain continuous content production and stable account operation on new media platforms.

In addition, many participants involved in new media communication related to marine agriculture, rural areas, and farmers face disadvantages in terms of terminal equipment. Most of them rely on low-performance smartphones to complete filming and content posting. As a result, they face clear limitations in image quality, sound recording, and post-production capacity. These basic access conditions place their content at a disadvantage within platform algorithms that prioritize video clarity, content completeness, and user interaction. This situation further reduces the reach and visibility of their content. Therefore, the access divide not only affects whether marine cultural content can be produced, but also influences whether such content can be effectively seen.

2.2 The Usage Divide: Differences in Platform Skills Lead to Uneven Communication Outcomes

When basic access conditions are available, the usage divide becomes a key factor that limits the effectiveness of new media communication in marine agriculture, rural areas, and farmers. The usage divide mainly appears in differences in how users understand platform functions, apply communication strategies, and produce content. In practice, many marine industry workers have already joined short-video platforms, but their activities often remain at the level of spontaneous recording and personal experience sharing. They usually lack systematic understanding of platform recommendation systems, account positioning, content specialization, and user interaction mechanisms. As previous research notes, "technical promotion short-video accounts generally face low traffic because creators lack experience in account operation. On the one hand, they find it difficult to identify account positioning and develop a clear style based on user feedback, which limits IP development and upgrading. On the other hand, they struggle to build effective interaction with audiences, reduce audience attraction, and expand their viewer base". As a result, short-video content produced by aquaculture practitioners often stays at the level of simple production records. Because creators lack understanding of platform operation logic, their communication outcomes remain limited.

In terms of content presentation, participants involved in marine agriculture, rural areas, and farmers tend to focus mainly on showing production processes and daily life scenes, such as offshore fishing, marine aquaculture, and routine labor. They rarely present deeper cultural content. As a result, marine cultural expression often appears as fragmented and real-time output, which makes it difficult to achieve stable and long-term communication effects. In contrast, marine-themed content produced by urban creators or professional teams usually strengthens emotional appeal and storytelling through editing, music, and script design. Such content is more likely to receive platform recommendations and attract user attention. Over time, differences in platform use skills gradually develop into structural inequality in marine cultural communication.

2.3 The Literacy Divide: Insufficient Digital Cultural Awareness Limits the Depth of Marine Cultural Expression

Compared with gaps in access and usage, the literacy divide has a deeper influence on new media communication in marine agriculture, rural areas, and farmers. This divide mainly appears in differences in digital media literacy, awareness of cultural communication, and the ability to engage in public expression. Some content creators in marine rural communities mainly treat new media platforms as tools for economic gain. They often lack systematic awareness of presenting the knowledge value, historical significance, and public meaning of marine culture. As a result, related content easily shifts toward entertainment-oriented expression. As one study notes, "the countryside has gradually become the countryside imagined by urban residents. A new form of farmer 'silence' has emerged, shaped by cultural insecurity, lack of recognition of agriculture, and exclusion from information access, leaving farmers without the confidence to speak from either a social or personal perspective" [9]. In this context, farmers' expressions are often shaped by urban discourse frameworks, which weakens their own subjectivity in cultural communication.

At the level of media literacy, some creators lack sufficient awareness of information accuracy, scientific standards, and communication boundaries. When discussing topics such as marine ecological protection and fisheries resource use, their content sometimes becomes simplified or inaccurate. This situation not only affects the professionalism of marine cultural communication but also weakens the public's rational understanding of issues related to marine agriculture, rural areas, and farmers. Furthermore, although these groups are direct practitioners of marine culture, they often lack the ability to transform everyday production and life experiences into deeper cultural expression in new media spaces. As a result, their voices are often placed in a relatively marginal position by platform algorithms and dominant discourse frameworks.

3. Analysis of the Constraints of the Digital Divide in MARF New Media Communication

3.1 Insufficient Investment in Infrastructure Development

Insufficient investment in rural network infrastructure is a major cause of the access divide. For example, research notes that "the Wanshan Archipelago is located outside the Pearl River Estuary and far from the mainland. Its special geographic location and terrain result in uneven signal coverage and unstable communication quality, which have long restricted industrial development and daily life on the islands". Remote fishing villages are strongly affected by geographic conditions, and network construction in these areas often lags behind that of urban regions. At the same time, building network infrastructure in offshore working areas is technically difficult and costly. Telecommunications operators therefore show limited willingness to invest, which leads to insufficient network coverage in offshore production areas.

3.2 Lack of Adaptive Design in Digital Tools

The lack of adaptive design in existing digital tools is an important reason for the emergence of the usage divide. Current new media production and communication tools, such as Douyin, Kuaishou, WeChat Channels, Jianying, and KuaiJianji, are mainly designed for users who already possess a certain level of digital literacy, and their operations are often complex. However, many fishers have relatively limited educational backgrounds, and these platforms rarely consider their usage habits or working environments. For example, short-video editing software usually includes many functions, which require significant time and effort to learn. This situation reduces fishers' willingness to use such tools. At the same time, existing platform recommendation systems do not fully consider the needs of fishers. Although much marine-related content is created by fishers, platform distribution tends to favor entertainment and general information content, while marine cultural content receives a lower level of recommendation. As a result, fishers have limited exposure to marine cultural content on digital platforms.

3.3 An Incomplete Digital Literacy Training System

The lack of a well-developed digital literacy training system in rural areas is a major cause of the literacy divide. As previous research points out, "within the strong integration of rural areas into online spaces, farmers remain in a disadvantaged position in digital participation in public issues, which reflects the lack of

digital literacy among farmers. The gap between farmers' existing digital literacy and ongoing digital development trends reduces their chances of being seen. The loss of visibility rights further hinders farmers' digital development, and rural self-media also lacks the capacity to grant visibility to others". Current training programs rarely cover professional communication skills such as short-video production and livestream operation, and therefore cannot fully meet fishers' needs for cultural communication. In addition, training methods are often limited to centralized classroom instruction. These programs usually do not consider fishers' work schedules, which leads to low participation rates in training activities.

4. Pathways for Improving MARF New Media Communication Through Technological Empowerment

4.1 Improving Digital Infrastructure in Fishing Villages to Bridge the Access Divide

First, greater investment in rural network infrastructure is needed. Authorities should expand 5G network coverage in remote coastal villages and improve network bandwidth. Governments should introduce supportive policies that encourage telecommunications operators to increase investment in network construction in fishing communities. Financial subsidies should be provided for network development in remote fishing villages. For example, the Implementation Plan for Accelerating the Construction of "Broadband Maritime Frontiers" in Zhejiang Province, issued by the Zhejiang Provincial Communications Administration, proposes that by the end of 2027, 5G networks will achieve deep coverage in administrative villages located in maritime frontier areas. Areas with rural population clusters of more than 20 households, as well as national and provincial highways along border regions, will also receive 5G coverage. All inhabited islands are expected to achieve full 5G connectivity, and basic 5G network coverage will be realized across inland seas and territorial waters.

Second, network service fees in fishing villages should be reduced, and dedicated communication plans for fishers should be introduced. Telecommunications operators can design special mobile data packages based on the working conditions of fishers, particularly for offshore operations, in order to lower communication costs.

Finally, stakeholders should explore a co-construction model involving the government, telecommunications operators, and the fishing village economy. This model can support the establishment of a long-term maintenance system for digital infrastructure in fishing communities and ensure the stable operation of equipment. Governments can support operators in deploying intelligent maintenance technologies in fishing villages, such as remote monitoring systems and underwater robots. These measures can reduce manual maintenance costs and safety risks while improving maintenance efficiency and quality.

4.2 Developing Adaptive Digital Tools to Bridge the Usage Divide

First, technical developers can cooperate with marine research institutions and coastal agricultural departments to collect and organize materials related to marine aquaculture technology, fishing operations, coastal rural culture, and seafood presentation. Based on these resources, a dedicated media resource database for marine agriculture, rural areas, and farmers can be established. The database should include videos, images, and audio materials. All materials should be clearly categorized and labeled to allow users to search and access them easily. Developers can also cooperate with existing video editing platforms to design specialized templates for marine "three rural" content. The application process of these templates should be simplified to reduce operational difficulty and lower the threshold for users.

Second, stakeholders can collaborate with existing short-video platforms to create dedicated communication sections for marine agriculture, rural areas, and farmers. These sections can include multiple categories such as marine aquaculture technology, coastal rural tourism, and seafood promotion, allowing related content to be presented in a centralized way. "Such initiatives can also connect effectively with the cultural tourism industry. By relying on the communication influence of online content creators, these efforts can promote the development of marine-related industries, popularize marine civilization, and showcase the cultural and aesthetic value of the ocean."

4.3 Implementing Progressive Digital Skills Training to Reduce the Literacy Divide

First, basic skills training should be provided to improve fundamental digital abilities among fishermen. Local village committees can organize introductory programs on smart devices. These programs can teach elderly fishermen how to use mobile phones, connect to wireless networks, and download mobile applications.

Second, intermediate training should be offered to fishermen who are interested in further participation. These programs can focus on short-video production and livestream operation. Professional new media creators can be invited to provide instruction on video shooting techniques and livestream management methods.

Finally, advanced training should introduce innovative technologies and their application in marine cultural communication. Training programs can include the use of VR and AR technologies. For example, fishermen can be organized to experience virtual marine museums and learn how VR technology can present fishing village culture. Such training can improve fishermen's ability to apply new technologies creatively.

5. Conclusion and Future Prospects

This study applies the three-level framework of the digital divide to examine the technological challenges in new media communication related to marine agriculture, rural areas, and farmers. The analysis identifies several key problems, including the access divide, the usage divide, the literacy divide, and differences in technological adaptability. The study finds that these challenges mainly result from insufficient infrastructure investment, a lack of adaptive digital tools, incomplete digital literacy training systems, and weak integration of technological resources. The results suggest that improving digital infrastructure, developing user-adapted tools, and providing systematic skills training can effectively reduce the digital divide and enhance the communication outcomes of marine agriculture, rural communities, and farmers.

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Conflicts of Interest

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