

A Study of the M.I.T.E. Model from a Digital Empowerment Perspective: A Case Study of Intangible Cultural Heritage Revitalization Pathways in Dongsha Ancient Fishing Town

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Abstract—Against the backdrop of marine culture, this study examines strategies for activating intangible cultural heritage (ICH) in island-type historic and cultural towns. It focuses on integrating marine culture, systematically constructing immersive experience scenarios, and leveraging digital technologies (e.g., AR/VR/AI) to co-create ecological value while supporting ICH safeguarding and local development. We propose the M.I.T.E. model — marine cultural resonance, immersive heritage experience, technology integration, and ecological value co-creation—to explain how digital empowerment can transition the audience from cultural resonance to value co-creation. Using Dongsha Guyu Town (Daishan County) as a case, we designed a technology-empowered experience pathway and conducted a questionnaire-based experiment ($n = 100$) comparing an experimental group with a control group. Results show that the M.I.T.E.-based experience outperformed traditional exhibitions on key indicators ($p < 0.001$), and immersion depth (I_Depth) and ecological aesthetic value ($E_Aesthetic$) were the strongest predictors of ecological value co-creation. This study offers a systematic framework for activating ICH in island-type towns and provides practical insights for digitally empowered heritage tourism.

Keywords—Dongsha Ancient Fishing Town; Coastal Intangible Cultural Heritage; M.I.T.E. Model; Technology Empowerment; Immersive Experience; Co-creation of Ecological Value

I. INTRODUCTION

With the growing integration of cultural heritage concepts into tourism practice, revitalizing intangible cultural heritage (ICH) in island-type historic towns—and achieving an organic integration of culture and tourism—has become a critical challenge. We use Dongsha Guyu Town (Daishan County, Zhejiang Province, China) as the empirical case (Figure 1). Dongsha fishermen's Xieyang Festival and Zhoushan fishermen's chant are among the most distinctive fishermen's folk activities in Zhoushan and even in China. Zhoushan fishermen's chants crystallize fishermen's collective wisdom, which embodies the harmonious coexistence between humans and the ocean and reflects regional cultural and ecological identity (Figure 2). However, at present, the activation of intangible cultural heritage mostly stays at the "ceremony level" and "cultural show", which lacks systematicness, interactivity, and durability, and

it is difficult to awaken tourists' cultural memory and ecological awareness [1].



Fig. 1. Dongsha Ancient Fishing Town, Daishan County, Zhejiang Province, China (Image from the internet)



Fig. 2. Inside the China Ocean Fisheries Museum in Dongsha Ancient Town (On-site photograph)

Amid rapid advances in digital technologies, cutting-edge media such as VR, AR, and artificial intelligence are not only instrumental but also the core driving force, which reconstructs the activation path of cultural tourism resources through multi-dimensional interaction. These technologies do not mere accumulation information but restore historical time and space through digital means, thus subtly enhancing the audience's participation in ecological sustainability and environmental governance in immersive narratives. Based on

a case study of VR traditional tourism [2], the influence of perceived usability (PEU) on tourists' behavioral tendencies is not linear but rooted in the emotional media "fear" caused by system usability. This emotional resonance is intertwined with the positive attitude of the cognitive dimension, which drives the audience to fulfill the ecological protection contract in reality.

In addition, the deepening of technical iteration has promoted a paradigm shift in the connotation of the deep integration of culture and tourism integration, that is, from one-dimensional economic income generation to the creation of cultural and ecological values for multiple subjects. In this logical turn, the core bottleneck of the "activation" of intangible cultural heritage lies in how to jump out of the shallow visual display and construct an immersive experience that integrates depth perception and ecological value. By combining the existing academic maps, it can be seen that although digital transformation has become a hot spot in heritage research, the systematic demonstration of the organic integration of "island/coastal field, marine cultural background, digital immersion media and sustainable development vision" is still relatively absent. At present, most documents [3] are rooted in the digitalization of land cities or isolated collections, but rarely go deep into the texture of fishing ports to explore the interdisciplinary demonstration of how "ocean+fishing port+intangible heritage" can achieve ecological co-creation under digital empowerment.

Based on the practical challenges of ICH activation in island settings, this study constructs and tries to put forward an integrated analysis framework of M.I.T.E, that is, a collaborative model composed of marine culture resonance (M), immersive heritage experience (I), technology integration (T) and ecological value co-creation (E), to observe the specific activation practice of Dongsha Ancient Fishing Town in Daishan County, Zhejiang Province. The logical origin of the M.I.T.E model is that it is not a mechanical superposition of various elements, but an attempt to transform the abstract ocean image into an embodied immersive perception through the intermediary of technology. Therefore, this exploration focuses on a deep theoretical topic: under the specific time and space coordinates of Dongsha ancient town, how digital empowerment can catalyze the identity transformation of tourists from "bystanders" to "value co-creators", thus giving cultural and ecological values a sustainable growth momentum in the interweaving of resonance and interaction.

II. RELATED WORK

Looking back on the evolution of the heritage field in recent decades, the survival and activation of ICH have become the core proposition of the deep integration of culture and tourism integration. For fragile islands and coastal communities, their "marine culture" is not a simple symbol stack but a regional identity deeply rooted in fishing skills, marine time and space concepts, and folk festivals, symbolizing a unique symbiotic memory of man and sea. However, this study found that the systematic demonstration of the coupling between "ocean field" and ICH activation in the previous academic maps was obviously lagging behind, and most of the investigations were still confined to the handicraft or festival research from the perspective of land, which led to the empirical analysis of the life form of fishing port community still in the marginal area [4]. Simultaneously,

the paradigm shift in the technical dimension provides a deconstruction path for this dilemma. The iteration of immersive technology (VR/AR/MR) promotes the transformation of heritage protection from "static preservation" to "interactive regeneration," and the bibliometric data also confirm the subversive potential of this digital narrative in the deep participation of the public and the ubiquity of education [5] [6]. Although AR/VR technology has matured in the non-invasive activation of built heritage, such as historical blocks, and large-scale language models (LLM) have begun to intervene in the precise restoration and digital transcoding of traditional heritage [7], how to adapt such digital media to the marine cultural space with high salinity, high humidity, and strong liquidity is still a logical gap that needs to be filled urgently in the current digital heritage research.

In the context of the transformation of intangible cultural heritage (ICH), technology integration (T) is not a simple hardware embedding but a core intermediary that catalyzes immersive heritage experiences. The existing research consensus points out that when digital representations such as AR/VR/MR are deeply stitched with narrative design, they can effectively break down the barriers of time and space, thus inducing stronger cultural identity and knowledge internalization at the audience end [8] [9]. This innovation at the level of means essentially points to a paradigm shift in ICH activation. Simultaneously, the focus of academic circles is gradually expanding from a single cultural heritage to "ecological value co-creation (E)" – that is, seeking the integration and coordination of cultural, social, and environmental values. Based on the enlightenment of "Living-Lab" and other governance models, this co-creation logic emphasizes the deep embedding of multiple stakeholders in the value chain [10] [11].

This study holds that emotional experiences such as nostalgia and flow of mind are the endogenous mechanisms that drive this recognition of responsibility to protect [12], which urges communities, experts, and tourists to jointly construct heritage significance in digital scenes [13], thus verifying the possibility of the parallel development of emotional identity and sustainable tourism [14]. However, looking at the current theoretical map, a significant logical fault still exists: although digitalization and co-creation logic have made progress, systematic integration for this specific field of island-type communities is rare [15]. Currently, no research has penetrated the representation of marine cultural resonance (M) and made a closed-loop theoretical coupling with immersive experience, technological integration, and deep ecological value creation [16]. Therefore, this study attempts to construct a comprehensive theoretical framework, the M.I.T.E. model (Marine Cultural Resonance, Immersive Heritage Experience, Technology Integration, and Ecological Value Co-creation), to fill these research gaps. The M.I.T.E model is not only to fill the academic puzzle, but also to provide a paradigm reference for the activation of coastal ICH with both operability and evaluation dimensions.

III. METHODOLOGY

A. Research Strategy

This study integrates "model construction, path design and empirical evaluation" into a trinity inquiry strategy, aiming to deeply deconstruct the specific effectiveness of the M.I.T.E framework in the practice of intangible cultural

heritage regeneration in Dongsha ancient fishing town. This methodology system follows the progressive logic from theoretical deduction to field practice: first, based on the four core dimensions of marine cultural resonance (M), immersive experience (I), technical integration (T), and ecological value co-creation (E), the mechanism expression of the M.I.T.E model is completed from the top design level; second, taking this as the blueprint to drive the concretization of the technical path, digital media such as AR/VR and AI are embedded in the specific intangible carrier of Dongsha ancient town, thus catalyzing the immersive narrative beyond the traditional dimension; finally, empirical data are collected through quantitative questionnaires, aiming at dialectically comparing the validity differences between the technical empowerment scene and the conventional display mode in terms of the depth of tourists' empathy and ecological value identification.

B. Transformation and Application of the M.I.T.E. Model in Dongsha Ancient Fishing Town

As the mechanism revealed in Figure 3, the M.I.T.E framework abandons the simple superposition of isolated elements and instead constructs a set of dynamic matrices that cooperatively drive the rebirth of Dongsha ancient fishing town, and its essential appeal is to make digital empowerment converge to the macro picture of value creation accurately. From the perspective of this model, marine cultural resonance (M), immersive heritage experience (I), technology integration (T), and ecological value co-creation (E) are endowed with strong coupling, which together reconstruct the activation paradigm for cultural capital in the Dongsha field. The ceremony of offering sacrifices to the sea, such as the "Xie Yang Festival", which is deeply rooted in Dongsha's blood, has already crossed the scope of pure fishery production and evolved into a cultural crystal of symbiotic wisdom between people and sea and regional blood identity. This study attempts to go beyond the repetition of physical representation and focuses on the digital deconstruction and reorganization of the historical texture behind cultural fragments. Thanks to this logical reconstruction of situational narration and deep interaction, tourists have completed a cross-time tracing of the core of marine value in the media space where reality and reality coexist, and finally catalyzed the cognitive upgrading from simple sensory consumption to deep cultural identity.

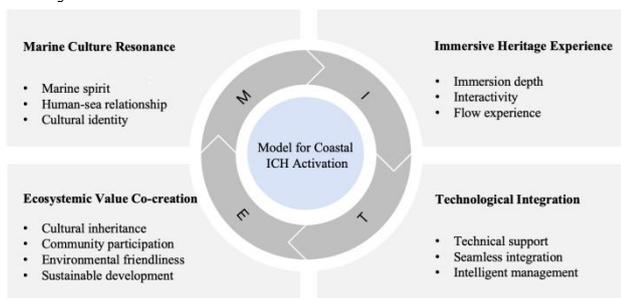


Fig. 3. Model for Coastal ICH Activation

Table 1 shows the application of the M.I.T.E model in the intangible cultural heritage activation of Dongsha ancient fishing town and its corresponding technical empowerment design path. The table lists the four core dimensions of the model in detail: marine cultural resonance (M), immersive heritage experience (I), technical integration

(T), and ecological value co-creation (E), and combines the intangible elements of Dongsha ancient fishing town corresponding to each dimension and its corresponding technological empowerment scene. First, marine cultural resonance (M) is generated by using AI technology to generate a personalized marine cultural narrative, as shown in Figure 4. With the phonetic synthesis of Zhoushan dialect/chant rhythm, tourists can scan the QR code of the scenic spot to listen to it, strengthen their cultural identity with the fishermen's Xie Yang Festival, Zhoushan fishermen's chant and fishing port history, and stimulate the deep resonance of the marine spirit and the relationship between people and sea. Second, the immersive heritage experience (I) reconstructs the traditional scene of fishermen going out to sea and offering sacrifices to the sea through VR technology, so that tourists can experience fishermen's daily life and activities in an immersive way. According to the practical teaching needs of fishing knot skills, the knitting step is transformed into lightweight 3D virtual content, and users can watch the real-time demonstration knitting process of virtual hand model (including details such as knot insertion and tightening) by calling AR function in the real-life space of ancient fishing town, and complete the "real-life bearing+tightening" (Figure 5). In terms of technology integration (T), it combines AR/VR/AI, big data and smart facilities to provide tourists with real-time tour, display intangible skills demonstrations and marine ecological information, and ensure the seamless connection between technology and cultural content. Finally, ecological value co-creation (E) guides tourists to participate in marine protection actions through a digital interactive platform to enhance their awareness of ecological protection. Tourists submit creative elements of fishermen's paintings through the platform, which are screened by ICH inheritors and made into limited cultural creations, with the names of co-creators marked to promote the two-way co-creation of cultural heritage and ecological protection, as shown in Figure 6. Through these modern technical means, the intangible cultural heritage projects in Dongsha ancient fishing town have not only been effectively activated but also achieved the integration of sustainable development between cultural inheritance and ecological protection.

TABLE I. APPLICATION AND TECHNOLOGY-EMPOWERED SCENARIO DESIGN IN INTANGIBLE CULTURAL HERITAGE REVITALIZATION

Dimension	Corresponding Intangible Cultural Heritage Elements of Dongsha Ancient Fishing Town	Technology-Empowered Scenario Design
M (Marine Culture Resonance)	Fishermen's Festival, Zhoushan Fishermen's Chants, History of Fishing Ports	Fishermen's Festival, Zhoushan Fishermen's Chants, History of Fishing Ports
I (Immersive Heritage Experience)	Fishing customs experience, fishing knot craftsmanship, ancient architectural spaces	VR Immersive Experience + AR Blending Reality and Virtuality in Education : Reconstruct scenes of fishermen setting sail and performing sea rituals, enabling embodied

Dimension	Corresponding Intangible Cultural Heritage Elements of Dongsha Ancient Fishing Town	Technology-Empowered Scenario Design
T (Technological Integration)	AR/VR/AI, Big Data, Smart Infrastructure	<p>interaction; provide virtual instruction on fishing knot techniques with real-time demonstrations of braiding steps.</p> <p>AR Guided Tours + Big Data Dynamic Adaptation: Real-time overlay of intangible cultural heritage demonstrations and marine ecological information; Dynamically adjust AR content delivery by analyzing visitor movement patterns and interest preferences.</p>
E (Ecological Value Co-creation)	Fishermen's Art Cultural Products, Ecotourism, Marine Conservation Awareness	<p>Digital Interactive Platform + Co-creation Communication: Engage visitors in marine conservation initiatives and share co-created value. Visitors submit creative elements inspired by fishermen's paintings via the platform. Intangible cultural heritage inheritors curate these submissions to produce limited-edition cultural and creative products.</p>

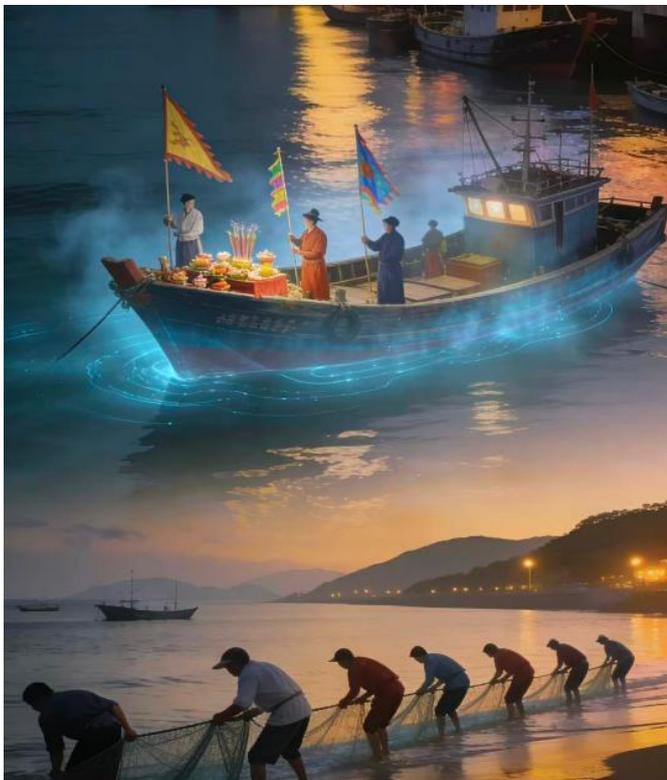


Fig. 4. AI Story Generation Based on Marine Scenarios



Fig. 5. AR Hands-On Instruction for Fishing Rope Knot Techniques



Fig. 6. Visitors submit conceptual diagrams featuring creative elements from fishermen's paintings via the platform (combining real-world scenes with AI-generated elements).

Note: The electronic screen and shop in the picture are hypothetical scenes generated by AI and are not real research sites. This schematic diagram was used to simulate the future application of technology and analyze its influence on tourists' behavior.

C. Effect Evaluation Method (Quantitative Questionnaire Design)

1) Core Dimensions and Variable Redefinition

In the empirical study of the M.I.T.E model, the selection of observed variables is not based on simple average distribution logic but is deeply rooted in the dynamic game between theoretical connotation adaptability and measurement accuracy requirements. Based on this differential weight consideration, the study did not blindly pursue the "surface equilibrium" of variable distribution, but deconstructed the connotation breadth, conceptual complexity, and actual measurement scene requirements of each core concept, scientifically determined the configuration of observation variables, and thus constructed a set of robust measurement closed loop under the precise combination of eight key observation variables. This configuration strategy aims to ensure that the interference of redundant information can be eliminated in complex empirical fields, such as the Dongsha ancient fishing town,

and the core structure of the model can be accurately captured (Table 2).

TABLE II. M.I.T.E. MODEL AND CORE DIMENSIONS

M.I.T.E. Variable	Corresponding to the M.I.T.E. Dimensions	Measuring the Inner Meaning
M_Resonance	M (Marine Cultural Resonance)	Visitors' identification with the spirit and values of marine culture.
M_Emotional	M (Oceanic Emotional Resonance)	Visitors' emotional connection and empathy toward marine culture.
I_Depth	I (Immersion Experience Depth)	The degree of emotional and cognitive engagement experienced by visitors, such as through states of flow, concentration, and the loss of perception of time and space.
I_Immersion	I (Immersive Experience)	Visitors' assessment of overall immersion throughout the experience, including sense of participation, level of technological integration, and depth of multisensory engagement.
T_Integration	T (Technology Integration)	Visitors' perception of how technology (immersive technologies like VR/AR/MR) integrates with intangible cultural heritage content, its application effectiveness, and how it enhances cultural experiences.
E_Aesthetic	E (Ecological Aesthetic Value)	Visitors' appreciation of coastal landscapes and intangible cultural heritage artistry, along with their recognition of ecosystem functions.
E_Cognition	E (Ecological Value Awareness)	Visitors' understanding and awareness of ecological conservation and sustainable development.
E_Value	E (Ecological Value Co-creation Score)	Visitors' overall evaluation of the co-creation of ecological, cultural, and economic value, along with their willingness to participate in such co-creation.

2) Data Collection Method

In this study, the validity verification is focused on the empirical field, and the application efficiency of the M.I.T.E model in the activation practice of Dongsha ancient fishing town is accurately captured through the face-to-face questionnaire survey, aiming at eliminating the common environmental noise and media barriers in online research. During the sample screening and experimental intervention, We randomly recruited 100 participants from visitors in Dongsha. Based on a rigorous controlled experimental design, the samples were equally divided into the experimental group (n = 50) and the control group (n = 50): the former was placed in the intangible perception scene reconstructed by digital logic and deeply involved in AR virtual and real teaching (such as digital deconstruction of fishing knots) and fishermen's paintings to create interaction through terminal equipment; the latter, as a contrast, is maintained in the traditional narrative framework of static display and conventional explanation. To ensure the internal validity of the experiment, based on randomized grouping,

this study deliberately balanced the distribution of demographic characteristics such as intergenerational differences, gender ratio, and cultural literacy between the two groups to eliminate the influence of exogenous interference variables to the greatest extent at the methodological level.

To meet the needs of the empirical evaluation of the M.I.T.E model, a questionnaire survey scale was developed in this study, which closely followed the four core concepts of technology integration, marine culture resonance, immersion experience, and ecological value creation. In the weight allocation of observation variables, the study abandoned the traditional "arithmetic average" logic and instead anchored eight core observation points differently according to the connotation extension and empirical accuracy requirements of each dimension. The scale adopts a five-point Likert scoring system to accurately capture the audience's subtle attitudes. To improve the reliability and validity of the data to the greatest extent, the research team went deep into the core scenic spot of Dongsha Guyu Town and adopted a face-to-face investigation scheme. In terms of execution procedures, researchers guided the audience to answer independently in a controlled on-site environment after expressing their academic intentions and reaching informed consent, thus effectively avoiding the common self-selection bias in online research. Through real-time monitoring and an immediate recovery mechanism of the response time (with an average of approximately 5-10 minutes), researchers can complete the first round of cleaning of missing and invalid items at the collection terminal. This high-intensity manual intervention process guarantees the originality and integrity of the sample data.

3) Data Analysis

Data were collected from 100 participants (N = 100). Data were analyzed using the M.I.T.E. model. Statistical analyses were conducted in SPSS and included descriptive statistics, independent-samples t tests, and multiple linear regression. Descriptive statistics calculated mean scores and standard deviations for each dimension. Independent samples t-tests compared score differences between the experimental and control groups across dimensions. Regression analysis examined the predictive role of factors like immersion depth and ecological aesthetic value on the total ecological value co-creation score. Through these statistical analyses, this study evaluated the M.I.T.E. model's effectiveness in enhancing visitors' intangible cultural heritage experiences and promoting ecological value co-creation.

IV. RESULTS

This empirical study focuses on the differential promotion of coastal intangible value perception from the observation perspective and compares the validity of the M.I.T.E. model-driven empowerment scene with the conventional display mode through a quantitative questionnaire.

A. Descriptive Statistics and Reliability Analysis

In this study, N = 100 high-quality and valid sample questionnaires were obtained through on-site interception, and the experimental and control groups (n = 50 each) were placed in different narrative situations according to the randomization principle. The age distribution of the sample

is shown in Figure 7, and the interviewed groups show an obvious trend of youthfulness, among which the youth group aged 20-35 accounts for 75% of the absolute weight. This age structure is not an accidental fluctuation but a highly fitting portrait of tourists who pay equal attention to "digital nomadism" and "cultural exploration" in contemporary historical and cultural towns, thus providing a representative field sample for the application validity of the M.I.T.E model in a specific audience.

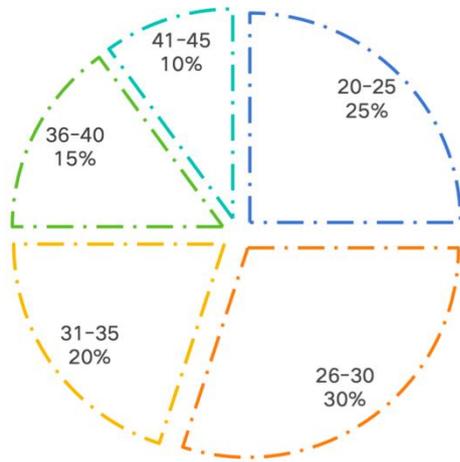


Fig. 7. Age Distribution of Participants

Table 3 presents descriptive statistics (mean M and standard deviation SD) for the experimental and control groups across all dimensions of the M.I.T.E. framework and core experience indicators.

TABLE III. DESCRIPTIVE STATISTICS OF M.I.T.E. DIMENSIONS AND CORE EXPERIENCE INDICATORS

Indicator(M.I.T.E. Variable)	Control Group Mean (M_C)	Experimental Group Mean (M_E)	Control Group Standard Deviation (SD)	Experimental Group Standard Deviation (SD)
T_Integration	3.48	3.70	0.61	0.65
M_Resonance	3.36	3.60	0.75	0.61
I_Depth	2.68	4.30	0.87	0.65
E_Aesthetic	3.06	4.18	0.89	0.69
I_Immersion	2.72	4.14	0.90	0.61
M_Emoational	2.36	4.26	0.75	0.60
E_Cognition	2.92	3.90	0.83	0.68
E_Value	3.08	4.16	0.85	0.65

The descriptive statistics summarized in Table 3 show that the experimental and control groups show distinct mean difference (M) and standard deviation (SD) in all dimensions and core indicators of the M.I.T.E framework. The results of the statistical comparison show that the experimental group has a significant advantage in all-dimensional evaluation. In particular, in terms of depth of immersion experience (I_Depth), ecological aesthetic value (E_Aesthetic), immersion experience (I_Immersion), and marine emotional resonance (M_Emoational), the average performance of the experimental group showed a leap-forward growth (Figure 8). The depth of this data confirms that the technological path based on the M.I.T.E model is not a simple sensory blessing, but activates the cultural identity and ecological empathy of tourists through digital logic depth. The effectiveness of technical empowerment in the activation of the intangible cultural heritage of Dongsha Ancient Fishing Town essentially depends on its ability to reshape the emotional

media and immersion depth of the audience, which provides solid empirical support for the contemporary transformation of the intangible cultural heritage of the ocean.

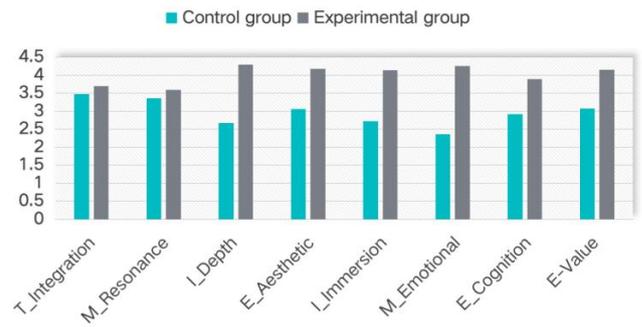


Fig. 8. Comparison of Perceived Value Across M.I.T.E. Dimensions

B. Comparative Analysis of M.I.T.E. Dimension Perception

Figure 9 further illustrates the comparison of perceived scores across each M.I.T.E. dimension between the experimental and control groups. Results indicate that the experimental group scored higher than the control group across all dimensions, with particularly significant improvements in I_Depth (Immersive Experience Depth) (Control group M = 2.68, Experimental group M = 4.30) and E_Aesthetic (Ecological Aesthetic Value) (Control group M = 3.06, Experimental group M = 4.18). This indicates that the technology-enabled pathway based on the M.I.T.E. model demonstrates outstanding effects, particularly in enhancing immersive experiences and ecological aesthetics. In contrast, the improvements in T_Integration (perceived technological integration) and M_Resonance (perceived resonance with marine culture) were relatively smaller, though still showing certain advantages. Figure 9 presents a line chart illustrating these significant perceptual differences.

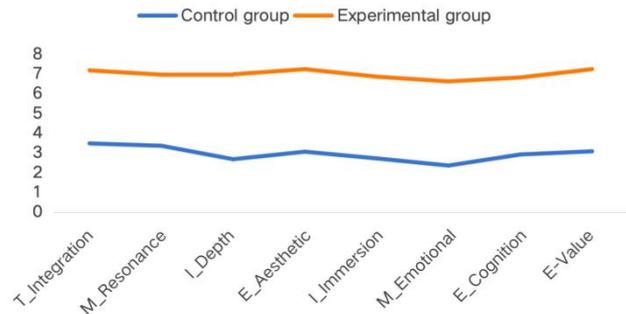


Fig. 9. Perceptual Difference Comparison Chart

C. Core Experience Metrics Comparison Analysis

Table 4 Presents the results of an independent samples t-test comparing the experimental and control groups on core experience indicators.

TABLE IV. INDEPENDENT SAMPLES T-TEST RESULTS FOR CORE INDICATORS

Indicator(M.I.T.E. Variable)	Control Group Mean (M_C)	Experimental Group Mean (M_E)	t	p
T_Integration	3.48	3.70	-1.744	p > 0.05
M_Resonance	3.36	3.60	-1.761	p > 0.05
I_Depth	2.68	4.30	-10.586	p < 0.001

E_Aesthetic	3.06	4.18	-7.029	p < 0.001
I_Immersion	2.72	4.14	-9.221	p < 0.001
M_Emotional	2.36	4.26	-13.998	p < 0.001
E_Cognition	2.92	3.90	-6.462	p < 0.001
E_Value	3.08	4.16	-7.118	p < 0.001

The results of the independent samples t-test show that the experimental and control groups show strong mean deviations in several key dimensions covered by the M.I.T.E model. The data feedback showed that the evaluation level of the experimental group was significantly better than that of the control group in core indicators such as immersion experience depth (I_Depth), ecological aesthetic value (E_Aesthetic), immersion experience (I_Immersion), marine emotional resonance (M_Emotional), ecological value cognition (E_Cognition), and ecological value co-creation (E_Value). In particular, for I_Depth and M_Emotional, the scores of the experimental group were significantly higher than those of the control group ($t = -10.586, p < 0.001$ and $t = -13.998, p < 0.001$), which revealed that technological empowerment enhanced the immersion and emotional resonance of tourists. Dialectically, the difference between the sense of technological integration (T_Integration) and the sense of cultural resonance (M_Resonance) were not statistically significant ($p > 0.05$), which implies that the fitness of the underlying technology and the original attraction of the cultural background still maintain a certain balance between the two groups in the concrete practice of the Dongsha ancient fishing town. Overall, the digital reconstruction strategy based on the M.I.T.E framework not only effectively catalyzes the cultural identity of tourists, but also successfully realizes the paradigm transition from passive viewing to active ecological value co-creation through the strong intervention of immersion perception and emotional media.

D. Regression Analysis: Predictive Role of M.I.T.E.

Dimensions on Total Ecological Value Co-creation Score

To investigate the relative contributions of each M.I.T.E. dimension to the total ecological value co-creation score (E_Value), this study conducted a multiple linear regression analysis. The specific regression results are presented in Table 5. This regression model considers four core dimensions as independent variables: Technology Integration (T_Integration), Marine Cultural Resonance (M_Resonance), Immersive Experience Depth (I_Depth), and Ecological Aesthetic Value (E_Aesthetic), with the Ecological Value Co-creation Total Score (E_Value) as the dependent variable.

TABLE V. MULTIPLE LINEAR REGRESSION ANALYSIS OF M.I.T.E. DIMENSIONS PREDICTING ECOLOGICAL VALUE CO-CREATION

Variable	B	(SE)	β	t-Value	p-value
Constant term	-1.271	0.236	0.00	-5.384	p < 0.001
T_Integration	0.033	0.049	0.041	0.664	p > 0.05
M_Resonance	0.021	0.046	0.029	0.458	p > 0.05
I_Depth	0.269	0.030	0.597	9.087	p < 0.001
E_Aesthetic	0.177	0.035	0.343	5.023	p < 0.001

Note: B represents the unstandardized regression coefficient, SE is the standard error, and β is the standardized regression coefficient. * p < 0.05, ** p < 0.01, *** p < 0.001.

The regression model demonstrated good fit ($R^2 = 0.647$, $F(4, 95) = 43.466, p < 0.001$), indicating its ability to effectively explain variance in the total ecological value co-creation score (E_Value). By examining the regression coefficients, this study found that the driving force of audience's behavior decision-making showed obvious path preference: the depth of immersion experience (I_Depth, $B = 0.269$) and ecological aesthetic value (E_Aesthetic, $B = 0.177$) as core variables, all of which anchored the growth trend of co-creation willingness at a very significant level. This shows that the immersion experience and ecological aesthetic value play an important role in enhancing tourists' recognition and participation in the creation of ecological, cultural, and economic values. It is worth pondering that the sense of technological integration (T_Integration) and cultural resonance (M_Resonance) did not pass the significance test in this model ($p > 0.05$). This exploration holds that this non-significant result does not necessarily indicate the absence of media utility, but may imply that in the concrete practice of Dongsha ancient town, the underlying technology has been internalized by the audience as "background facilities," and it is difficult to directly transform the simple resonance into the entity's co-creation behavior without the support of immersion depth. Fig. 10 shows the regression coefficient and 95% confidence interval (CI) of the ecological value co-creation (E_Value) for each dimension in the M.I.T.E model.

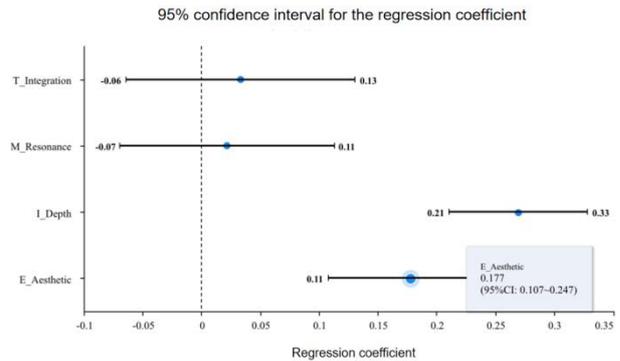


Fig. 10. Regression coefficient and its 95% confidence interval (CI)

V. DISCUSSION

A. Interpretation of Results and Validity of the M.I.T.E. Model

Through the empirical feedback of a quantitative questionnaire, this study confirmed the remarkable effectiveness of the M.I.T.E model as a driving path for the activation of the intangible cultural heritage in Dongsha ancient fishing town. The mean deviation of the experimental group in the full-dimension index not only quantifies the advantages of technical intervention but also outlines the growth pole of immersion experience depth (I_Depth) as the core variable. This empirical result accurately anchors the endogenous logic of the M.I.T.E framework: technological integration (T) is not an isolated tool but acts as a catalytic medium to solidify the abstract marine cultural resonance (M) into an immersive experience (I), ultimately leading to the value endpoint of ecological value creation (E). In contrast, the traditional display mode (control group) is weak in the dimensions of technology integration (T_Integration) and marine culture resonance

(M_Resonance), which essentially exposes the natural shortcomings of static narrative in crossing the "emotional resonance threshold" level. On the other hand, experience design under digital empowerment, the intervention of VR/AR, and other media successfully reconstructed the sensory boundary of tourists, especially the breakthrough in the I_Depth dimension, which induced the audience's awareness of ecological E_Aesthetic and value E_Cognition, thus completing a cognitive transition from passive reception to active watch.

B. Attribution of Differences: The Key Driving Role of Immersive Experience and Ecological Aesthetics

Regression analysis revealed that the depth of immersion experience (I_Depth) was the key factor in predicting the total score of ecological value creation (E_Value). The depth of immersion experience (I_Depth) and ecological aesthetic value (E_Aesthetic) are the most significant predictors of E_Value, indicating that the depth of experience is the core mechanism that drives tourists from cultural perception to value co-creation in coastal ICH activation. Through VR technology, the fishermen's hardships are reproduced, and tourists are no longer bystanders but physical participants. This deep immersion experience is directly transformed into strong marine emotional resonance (M_Emotional), which in turn inspires tourists' sense of responsibility for culture and ecology. Although technology integration (T_Integration) and marine culture resonance (M_Resonance) have weak marginal effects in the direct prediction model, this does not imply the absence of their effectiveness. This study holds that the two essentially constitute the "hidden base" that drives the co-creation of ecological values: technical empowerment and cultural resonance provide the necessary physical media and psychological presupposition for the immersive experience with high perception. Under this causal nesting logic, only when the above-mentioned antecedents are successfully transformed into the core intermediary of the depth of immersion experience (I_Depth), its hidden energy will be released, and it will evolve into a decisive force to promote the co-creation of ecological value (E_Value). This logical translation of "from precondition to core-driven" accurately reveals the non-linear interaction nature among the elements in the process of intangible cultural heritage activation.

C. Theoretical and Practical Value

From the perspective of theoretical reconstruction, this study has essentially completed a systematic revision of the activation mechanism of coastal ICH by analyzing the endogenous logic of the M.I.T.E framework. This construction fills the academic gap between the core of marine culture and the logic of ecological value in prior studies. This empirical exploration reveals a deeper intermediary-driven chain: the depth of immersion experience (I_Depth) and ecological aesthetics (E_Aesthetic) are not independent evaluation dimensions but the core center that helps the audience to leap from initial intention to value co-creation. This discovery has anchored a precise strategic origin for the design of heritage experience, that is, locking the emotional resonance threshold of tourists by means of digital intervention, and then inducing them to have a higher level of ecological responsibility. On a practice-oriented level, this study deeply observes the construction vision of the "digital block" in Dongsha Guyu Town, which provides a key decision criterion for the differentiated

screening of its technical path. Based on this, the study points out that the activation strategy must go beyond the superficial "digital reproduction" and turn to deeply cultivating the projects with strong interaction and embodiment, such as AR/VR/AI, to vertically enhance the depth of perception and realize the dynamic regeneration of cultural heritage. In addition, the universal value of the M.I.T.E model means that it can transcend geographical limitations, provide a set of replicable "culture-ecology-technology" integration paradigms for more islands and coastal ancient towns facing transformation difficulties, and realize the leap from simple scene restoration to a deep value symbiosis system under the framework of multidimensional sustainable development.

VI. CONCLUSION

Based on the actual conditions of Dongsha Ancient Fishing Town in Daishan County, Zhejiang Province, China, this study proposes the original M.I.T.E. model (Marine Cultural Resonance, Immersive Heritage Experience, Technology Integration, Ecological Value Co-creation) and constructs a technological pathway for revitalizing coastal intangible cultural heritage value. Quantitative questionnaire analysis reveals that technology-enabled experiences grounded in the M.I.T.E. Based on the regression effect, it can be seen that the depth of immersion experience (I_Depth) and ecological aesthetic value (E_Aesthetic) essentially construct a dual-power engine to drive the co-creation of ecological value (E_Value). The marginal contribution of this exploration lies in that it not only outlines the theoretical base of the system for the ICH regeneration of island-type historical towns through the M.I.T.E framework, but also precipitates a set of operational paradigms for benchmarking in the field of deep integration of cultural tourism.

Although this empirical study analyzes the internal logic and phased effect of the M.I.T.E model-driven intangible cultural heritage activation, due to objective empirical conditions, its research boundary still needs to be revised. Based on this, this study concludes that existing achievements should be promoted as global coastal heritage sites with a cautious perspective, and the main constraints are reflected in the following dimensions:

First, as far as the representativeness of the sample size is concerned, although the data with $N = 100$ have reached a strict balance in gender and intergenerational distribution, the smaller absolute scale inevitably weakens the universality of the conclusion. This exploration holds that Future research should focus on building a large-scale cross-regional database to stabilize the inference bias caused by sample fluctuations. Second, the technical generation difference of media carriers limits the drilling of the audience immersion threshold. At this stage, audiences mainly rely on mobile terminals to participate in AR/VR scenes. Owing to the screen scale and usage limitations, the "ceiling effect" of immersion depth still exists. Therefore, it is suggested that follow-up practice should iterate on higher-order hardware such as holographic projection or wearable interactive equipment to break through the existing physical perception barrier at the level of "physical participation." In addition, the simplification of the perception dimension is still a territory to be completed. In the future, we should try to introduce multisensory mechanisms, such as smell and touch, to reconstruct a more complete sense of the presence of marine culture. Finally, the indicators of the evaluation

system must be refined and transformed. Future research should focus on developing a quantifiable ecological value evaluation matrix to sublimate the M.I.T.E. model from a single-field analysis tool to a set of universal evaluation benchmarks for global coastal heritage management.

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