

Research on Tourism Environmental Economy of Hainan Free Trade Port: Evolution Context, Hotspot Review and Frontier Prospect

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Abstract: As the highest form of opening-up in the global contemporary economy, the free trade port undertakes the strategic function of promoting institutional reform and high-quality regional development through opening-up. As the core experimental field of China's open economic system with Chinese characteristics, Hainan Free Trade Port (Hainan FTP) deeply integrates tourism, ecological environment and economic development in its construction process, forming a unique research field of tourism environmental economy. Taking the tourism environmental economy of Hainan FTP as the research object, this paper systematically sorts out the historical evolution of relevant research from the exploration stage of special economic zone and the construction stage of international tourism island to the implementation stage of free trade port strategy. It reviews four core hot topics, including duty-free consumption and international tourism consumption center construction, rural tourism and rural revitalization, tourism land use and ecological environment governance, and digital economy and high-quality tourism development. On this basis, this study prospects the frontier research directions of in-depth institutional opening, digital intelligent transformation, regional coordinated development and international comparative research. The results show that existing literature presents phased characteristics dominated by policy interpretation, prioritized by institutional innovation and legal guarantee, and gradually popularized by quantitative evaluation. However, research on the dynamic evolution of the coupled tourism-environment-economy system, factor allocation efficiency and multi-agent collaborative governance is still insufficient. This paper provides a systematic literature review and research gap enlightenment for theoretical deepening and policy optimization of tourism environmental economy research on Hainan FTP.

Keywords: Free Trade Port; Tourism industry; Environmental economy; Evolution context; Research hotspot; Frontier prospect

Introduction

The construction of free trade ports is a major strategic measure for China to promote high-level opening-up and build a new open economic system in the new era [1,2]. As China's largest free trade port, Hainan FTP has been at the forefront of policy and academic discussion since its official launch in 2018. Under the orientation of building a free trade port with Chinese characteristics, tourism has been es-

tablished as a leading industry. Meanwhile, Hainan's unique ecological endowment creates a natural tension between tourism development and environmental constraints, which derives the collaborative governance problem of the coupled tourism-environment-economy system [4]. Relevant research is not only crucial for the sustainable release of opening-up dividends of FTP, but also vital for the localized implementation of the concept of "lucid waters and lush mountains are invaluable assets" in tropical island scenarios.

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In recent years, academic research on Hainan's tourism economy has maintained a continuous growth trend, covering institutional policies, industrial development, consumption behavior, spatial pattern and ecological environment. Nevertheless, most existing studies focus on single topics or policy interpretation, lacking systematic combing and theoretical summary of the compound tourism-environment-economy system [5]. Based on the above research deficiencies, this paper sorts out relevant literature systematically and critically along the logical mainline of evolutionary context, hotspot review and frontier prospect. It aims to clarify research consensus and differences, identify research gaps, and provide directional reference for subsequent theoretical and empirical research.

The remainder of this paper is structured as follows. The second part sorts out the evolutionary context of tourism environmental economy research on Hainan FTP. The third part reviews four core research hotspots. The fourth part identifies research gaps and prospects future frontier directions. The fifth part presents the research conclusions.

Evolution Context: Three-stage Transition from Special Economic Zone to Free Trade Port

The evolution of tourism environmental economy research on Hainan FTP is highly synchronized with the national and local policy process. The research focus has gradually shifted with the deepening of opening-up level and institutional arrangement, which can be divided into three interconnected stages.

Stage of special economic zone and ecological tourism positioning (1988–2009)

In the early stage of reform and opening up, Hainan, as China's largest special economic zone, incorporated tourism development into the regional development framework at an early time. During this period, most literature started from the perspective of regional development and spatial organization, holding that tourism, relying on superior natural ecological resources, served as a core engine to drive regional economic take-off [6]. From the perspective of political geography, the establishment of free trade zones involves in-depth reconstruction of spatial ownership, resource allocation and regional governance, which provides a theoretical basis for understanding the spatial layout of Hainan's tourism industry [6]. In addition, research on high-quality development of coastal areas concerned the balance among tourism development, opening-up and ecology in Hainan, laying a foundation for subsequent research on environment-economy coupling [5]. In general, studies in this stage were dominated by qualitative description and policy interpretation, without forming a standardized and systematic research framework.

Stage of international tourism island construction (2010–2017)

Around 2010, the approval of Hainan International Tourism Island strategy elevated local tourism development to the national strategic level. The research hotspot shifted to tourism marketization, emerging business forms such as cruise tourism, and the development trend of tourism market economy [7]. As a landmark business form of international tourism island construction, cruise tourism attracted extensive academic attention. Relevant studies explored the development paths and restrictive factors of Hainan cruise tourism under the background of free trade zone (port) construction [8]. Meanwhile, research on tourism economic development began to focus on consumption upgrading and source market expansion, providing preliminary support for the subsequent positioning of international tourism consumption center [7]. Research in this stage initially adopted industrial economic analysis and regional comparative perspectives, but still focused on industrial phenomenon description, lacking systematic introduction of institutional variables.

Stage of free trade port strategy implementation (2018–Present)

The official launch of Hainan FTP strategy in 2018 and the release of the Overall Plan for the Construction of Hainan Free Trade Port in 2020 marked a new stage of high-level institutional opening-up, with 2025 becoming a critical period for island-wide customs clearance operation. Policy leapfrogging greatly stimulated academic research enthusiasm, resulting in a substantial increase in literature volume. The research perspective expanded from single industrial development to multi-dimensional integration of institution, law, ecology and digital economy [1,9]. Systematic evolutionary research pointed out that the construction of Hainan FTP has practical necessity and historical inevitability, and its institutional design should serve the new high-level open economic system [1]. Institutional innovation research focused on the core institutional arrangements such as "opening the first line and controlling the second line", providing a framework for analyzing the institutional environment of tourism economy [9]. Furthermore, international comparative and legal guarantee studies have gradually emerged, including empirical reference from Florida's regional optimization experience [20], the impact of RCEP economic and trade rules on FTP legal innovation [3], and discussions on international trade legal norms [22], which jointly promoted the standardization and theorization of relevant research.

In summary, the three stages present a bottom-up progressive transition. The research focus has shifted from resource exploitation to institutional innovation, from industrial growth to high-quality development, and from single economic perspective to coordinated environment-economy development, laying a solid contextual foundation for subsequent hotspot research (**Figure 1**).

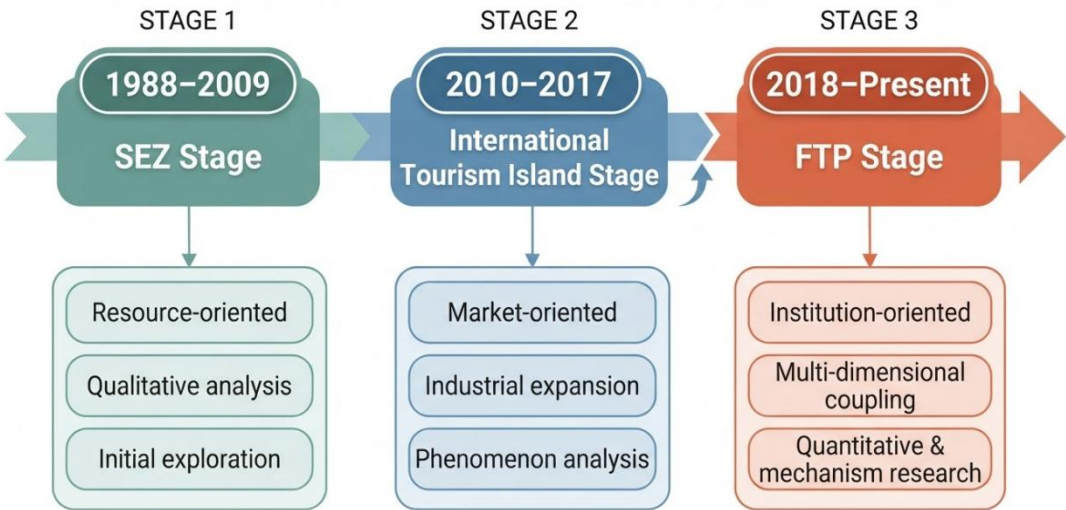


Figure 1 | Three-stage Evolution Framework of Hainan Tourism Environmental Economy Research



Figure 2 | Systematic framework of core research hotspots concerning Hainan FTP tourism environmental economy

Review of Core Research Hotspots (Figure 2)

Duty-free consumption and international tourism consumption center

Duty-free shopping is one of the most distinctive policy dividends of Hainan FTP and a core research cluster in academic circles. Existing studies generally believe that the off-shore duty-free policy has effectively expanded local consumption scale and become a key starting point for cultivating an international tourism consumption center [12]. International comparative research on duty-free industry man-

agement shows that mature global duty-free markets have accumulated rich experience in regulatory framework, pricing mechanism and consumption promotion, which can provide institutional reference for Hainan [13]. Nevertheless, academic divergences remain. Some studies confirm that the duty-free policy has an obvious short-term passenger flow effect but limited driving effect on the in-depth extension of local tourism industrial chain. Other scholars argue that duty-free consumption should transform from a “price depression” to a “consumption ecosystem”, and integrate with cultural tourism and leisure vacation to form sustainable competitive advantages [12,14]. The controversy essentially

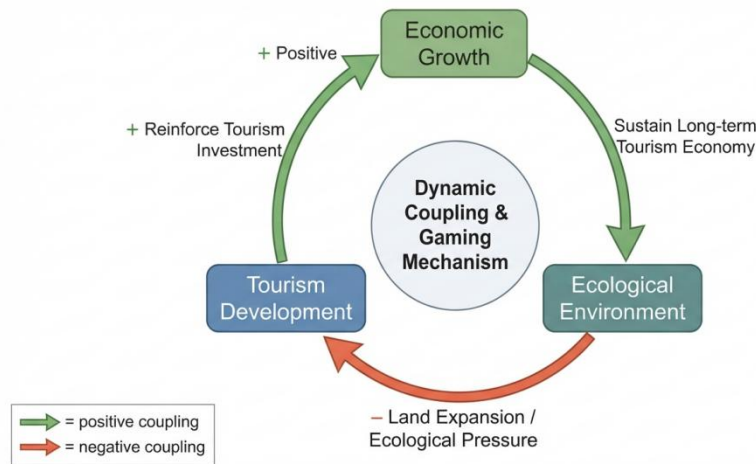


Figure 3 | Interactive coupling and restrictive mechanism of tourism, economy, and ecological environment in Hainan island scenarios

reflects the tension between “traffic monetization” and “ecological cultivation” in tourism consumption development.

Rural tourism and rural revitalization

At the intersection of rural revitalization strategy and FTP construction, rural tourism has become an important carrier for connecting urban and rural development and promoting common prosperity. Studies indicate that FTP opening-up dividends have injected new momentum into Hainan’s rural tourism market, and the upgrading of passenger source structure and consumption level has laid a market foundation for rural tourism transformation and upgrading [15,16]. Emerging business forms such as live-streaming tourism have been regarded as innovative paths to empower rural revitalization, realizing the linkage promotion of agricultural and tourism products through content e-commerce and broadening rural income channels [17]. Further research on tourism-cultural integration proposes that multi-dimensional integration of “tourism-culture-business” can promote the industrialization of cultural industries such as film and television, thereby feeding rural and regional economic development [14]. On the whole, existing research fully affirms the economic and livelihood value of rural tourism under the FTP context, but lacks in-depth reflection on tourism exploitation pressure, ecological carrying capacity and villagers’ subjectivity.

Tourism land use and ecological environment governance

Hainan’s ecological resources are both the foundation and constraint of tourism development. The relationship between tourism land use and ecological environment has become a key topic in environmental economic research. Spatial pattern research shows that the evolution of Hainan’s land use pattern in the past 40 years has produced significant ecological effects, and the improvement of tourism development intensity has squeezed ecological spaces such as

forest land and wetland [11]. Research on tourism land classification and pattern evolution further reveals the spatial heterogeneity and driving factors of tourism land expansion, indicating that the allocation conflicts among tourism, residential, industrial and ecological land have become increasingly prominent [18]. Relevant studies on coordinated development of tourism and economy emphasize the equilibrium between tourism growth and resource environmental carrying capacity, advocating coordinating industrial expansion and ecological protection under the concept of coordinated development [19]. This topic reflects the core contradiction of FTP tourism environmental economic research, namely the dynamic balance between releasing opening-up dividends and safeguarding ecological bottom lines (Figure 3).

Digital economy and high-quality tourism development

With the advancement of digital China construction, digital economy has become a new engine for high-quality tourism development. Provincial-level coupling coordination studies verify a significant synergistic relationship between digital economy and high-quality tourism development. The input of digital infrastructure, digital technology and data factors can effectively improve the supply efficiency and service level of tourism industry [10]. Research on high-quality development of coastal areas also points out that digital transformation is a vital support for the upgrading of regional open economy, which is highly consistent with the online and intelligent trend of tourism consumption [5]. Digital economic research has injected new productivity theories into FTP tourism economy, but most empirical studies remain at the macro provincial level, with insufficient research on the micro mechanism of digital factor allocation under the context of FTP customs clearance operation.

In conclusion, the four hot topics correspond to demand-side expansion (duty-free consumption), supply-side opti-

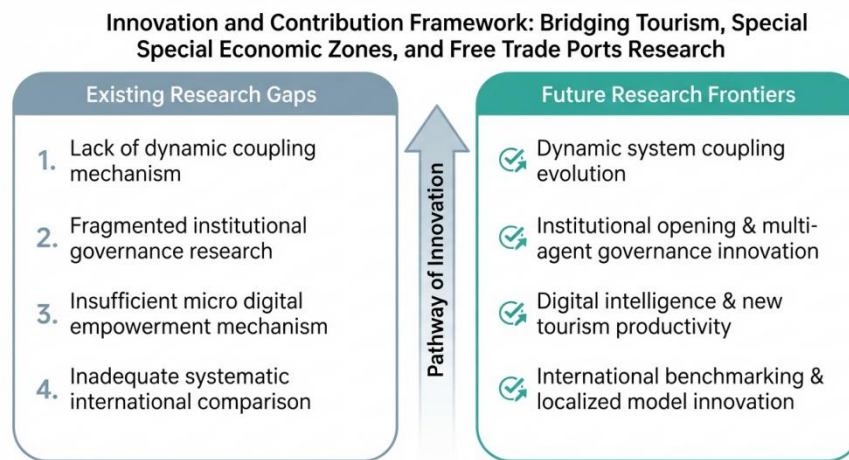


Figure 4 | Matching framework of existing research gaps and future frontier directions

mization (rural tourism), resource environmental constraints (tourism land and ecology), and technological empowerment (digital economy), jointly outlining the overall research landscape of FTP tourism environmental economy.

Research Gaps and Frontier Prospects (Figure 4)

Dynamic evolution mechanism of coupled tourism-environment-economy system

Most existing studies examine the three subsystems of tourism, environment and economy separately, lacking systematic modeling of their coupling and linkage mechanisms. Issues such as how tourism land expansion affects the sustainability of economic growth through ecological effects and how duty-free consumption dividends feed ecological protection investment need further dynamic evolutionary analysis based on system dynamics and coupling coordination models [10,11]. Future research should focus on the interactive transmission path and threshold effect of the compound system to make up for the deficiency of static and fragmented research.

Institutional opening and governance system innovation

Hainan has entered a new stage of full customs clearance operation, with profound changes in institutional arrangements for commodity, service and factor flows. How to transform FTP institutional dividends into sustainable driving forces for tourism environmental economic development requires in-depth research from the perspective of institutional opening-up. It is necessary to strengthen research on the compatibility between institutional innovation and environmental regulation, and construct a multi-agent collaborative governance framework adapting to high-level opening-up [3,9].

Digital intelligent transformation and new quality productivity

The coupling of digital economy and tourism environment will become a major growth point of future research. Subsequent studies should deeply explore the application of digital technology in ecological monitoring, passenger flow regulation and low-carbon tourism, quantitatively evaluate the contribution of digital transformation to the coordinated efficiency of tourism environmental economy, and provide theoretical support for the construction of “digital FTP” [10,15].

International comparison and experience reference

Hainan FTP presents distinct Chinese characteristics, while the development experience of mature international free trade ports and tourist destinations still has high reference value. Regional optimization experience of Florida, international duty-free industry management rules and world bay area development practices can provide references for Hainan’s institutional design and industrial upgrading [13,20]. Future research should strengthen transnational comparative analysis, summarize general laws and identify institutional differences, so as to form a localized development model suitable for Hainan.

Conclusions

This paper systematically reviews the research on Hainan FTP tourism environmental economy through evolutionary context combing and hotspot comment. The research finds that academic development has experienced a phased transition from resource exploitation to institutional innovation and from industrial expansion to high-quality development, forming rich research accumulation in duty-free consumption, rural tourism, ecological land governance and digital empowerment. However, existing literature still has

prominent deficiencies in dynamic coupling mechanism analysis, institutional governance innovation, digital transformation micro-mechanism and international comparative research. Most current studies belong to policy-responsive research rather than theoretical constructive research.

In the future, interdisciplinary perspectives and quantitative empirical methods should be strengthened to promote the transformation of tourism environmental economic research from policy interpretation to theoretical construction. It will help provide solid theoretical support and practical enlightenment for the sustainable and high-quality development of Hainan Free Trade Port.

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