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Analysis of the Development Path of Hainan's Food Tourism Empowered by Digital Technology

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Abstract:
Against the backdrop of deep integration between culture and tourism, dining consumption has become an increasingly significant component of overall tourism expenditure. Cuisine is no longer merely a supplementary service to tourism but has evolved into a core element of destination marketing and competitiveness. As a pillar industry of the Hainan Free Trade Port, tourism—guided by the province's consumption revitalization policies—has embraced the demand for diversified culinary experiences. Leveraging Hainan's cultural, technological, and institutional advantages provides a strong foundation for the digital transformation of its culinary tourism. However, current challenges persist, including limited innovation in online promotion of food culture, shallow application of digital technologies, and insufficient integration of smart tourism systems.
To address these issues, this study identifies a three-tiered market segmentation strategy—mass, mid-range, and high-end—to ensure the alignment of technological investment with market specialization, thereby optimizing Hainan's culinary consumption ecosystem. Strategies include establishing a digital knowledge base of Hainan's food culture, developing immersive VR/AR culinary scenarios, issuing digital collectibles, and implementing gamified marketing to attract online engagement. Moreover, by capitalizing on Generation Z's growing preference for healthy and social consumption patterns, culinary tourism can achieve stronger social dissemination. The functions of existing digital platforms such as "e-Travel Hainan" and "Safe Travel Hainan" should also be enhanced through blockchain-based "one enterprise, one record, one code" traceability and sandbox supervision mechanisms to ensure safety and transparency. Data-driven precision recommendations and coordinated services can further promote industrial upgrading and sustainable development of Hainan's culinary tourism.

Keywords:
digital technology; Hainan cuisine; culinary tourism; digital experience

1. Introduction

With the rapid development of global tourism and the upgrading of consumer demand, culinary tourism has become an important breakthrough point for the integration of culture and tourism. In recent years, regional specialties such as Tianshui Spicy Hot Pot, Zibo Barbecue, Northeast Frozen Pears, and Rongchang Braised Goose have become trending topics online. Local cuisines are gradually evolving into distinctive city symbols and pivotal drivers of regional cultural and tourism industries. Taking Rongchang Braised Goose as an

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example, during the May Day holiday in 2025, Rongchang District in Chongqing launched the cultural tourism theme of "Braised Goose + Intangible Cultural Heritage + Warmhearted Service." The district received approximately 2.25 million visitors, a 157% year-on-year increase in overall tourist traffic, while the proportion of secondary consumption within scenic areas rose from 23% to 41%. According to the 2024 China Culinary Tourism Development Report—Cultural Drivers for High-Quality Culinary Tourism, published by the China Tourism Academy, food has become a key factor influencing travelers' itinerary planning: 93.1% of respondents stated that culinary experiences were a major motivation for traveling. Both governmental and corporate tourism stakeholders have thus recognized that cuisine is not merely a complementary service but a core component of city marketing and tourism competitiveness. Consequently, each region must leverage its unique culinary characteristics to stimulate domestic demand, define its market positioning, and seek differentiation to attract tourists.

The concept of culinary tourism emerged in the 1950s alongside the rise of wine tourism, farm tourism, and rural tourism internationally. In China, the roots of culinary tourism can be traced back to the inaugural Guangzhou International Food Festival in 1987. From a scholarly perspective, foreign research on culinary tourism is far more mature and systematic than that in China. Studies have demonstrated that cuisine exerts a strong attraction on tourists and serves as one of the motivations behind destination choice. Regional foods also contribute to sustainable tourism development and destination marketing by boosting local economies and preserving culinary heritage. For urban tourism, local cuisine functions as a window into the region's culture and customs. Beyond satisfying physical needs, culinary experiences offer tourists tangible, sensory encounters with local culture. From a marketing standpoint, destinations enhance visitor satisfaction through culinary festivals and events, while user-generated content (UGC) and new media platforms influence travel decisions through real-time engagement. Under the influence of the digital economy, emerging technologies are profoundly reshaping the landscape of traditional culinary tourism. For example, Nanshan District in Hegang City has integrated local culinary resources into an "Intelligent AI Food Travel Map." Using AI-powered panoramic technology, the system displays local eateries and, through cooperation with Tencent Maps, optimizes tourist routes to enhance culinary exploration. This initiative, combined with social media promotion, has fueled a "check-in" tourism boom, linking food culture with growth in local accommodation industries. Clearly, digital technology, with its focus on quality and efficiency, has significantly optimized the culinary tourism experience.

Against this backdrop, this study takes digital technology as a strategic enabler of culinary tourism. Drawing upon the current development of Hainan's cuisine, it explores pathways for digitally empowered culinary tourism in Hainan, aiming to provide practical insights for industry professionals and policymakers.

2. The Practical Foundations for Digitally Empowered Culinary Tourism in Hainan

2.1 Policy and Institutional Drivers of Culinary Tourism

The Three-Year Action Plan for Stimulating and Expanding Consumption in Hainan Province (hereinafter referred to as the Plan) proposes several initiatives, including "building the Hainan Culinary Brand," "promot-

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ing ethnic-themed rural tourism," "accelerating health and wellness tourism for senior groups," and "developing night-time leisure districts." The Plan creatively integrates multiple industries—gastronomy, duty-free retail, rural tourism, health tourism, and night-time economy—providing a systematic policy framework for the deep integration of cuisine and cultural tourism in Hainan. From a spatial perspective, the plan focuses on developing Haikou and Sanya into signature culinary tourism destinations, while encouraging counties and cities to establish rural tourism consumption zones that are "beautiful, delicious, enjoyable, and shareable." By cultivating local culinary brands and introducing high-end restaurant clusters in duty-free zones, Hainan aims to build a dual-tier catering ecosystem that blends premium and local brands, thereby driving growth in the province's catering economy. In rural tourism, the province leverages local cultural resources to identify marketable cultural elements and develop enduring tourism products. For instance, based on Dongpo culture, Hainan issued its first regional regulation—the Danzhou Dongpo Cultural Resource Protection and Utilization Regulation—which mandates the creation of digital display systems and resource-sharing platforms for cultural digitization. In Haikou, the Dongpo Old Wharf has been transformed into an immersive cultural and culinary street to stimulate nighttime consumption, while the Hainan Museum launched the Encounter Dongpo VR exhibition, and the Hainan International Communication Center produced the AI microfilm A Millennium Return: Dongpo Comes Back to Hainan. These developments indicate that Hainan's culinary tourism is transforming from traditional "dining-based" consumption to a "culture + technology + cuisine" immersive experience model. Statistically, Hainan's obesity rate stood at only 8.9% in 2025—the lowest in China—empirically validating the health value of its traditional diet and its synergy with wellness tourism. Thus, Hainan possesses a robust institutional, cultural, and locational foundation for the development of culinary tourism.

The Action Plan for Innovative Development of Smart Tourism, jointly issued by the Ministry of Culture and Tourism and four other departments, emphasizes using intelligent technologies to enhance tourism management, marketing, and service quality. Guided by this national framework, Hainan should harness digital technologies to empower food service, culinary marketing, cultural experience, and food safety management—promoting the integration of "culinary tourism + technology." The Plan also calls for the use of drones for food delivery and the expansion of cold-chain logistics hubs, both of which will accelerate the transition of Hainan's food industry from traditional to smart services.

2.2 Tourist Demand as a Driver of Culinary Industry Upgrading

The development of culinary tourism is rooted in local gastronomy. However, many destinations in China still suffer from homogeneous food streets and food safety concerns—such as "zombie meat" and artificial additives—that damage tourists' perceptions and destination image. Since cuisine plays a key role in shaping a destination's brand identity, culinary tourism must evolve from a simple food experience into a multidimensional product integrating culture, social interaction, and emotional value.

With the proliferation of mobile devices, tourists now enjoy personalized, precise, and intelligent travel experiences. In culinary tourism, real-time location data, consumption history, and behavioral analytics enable platforms to provide targeted recommendations and digital marketing strategies. Moreover, social media and online travel agencies (OTAs) serve as major sources of culinary information. Metrics such as check-in counts, bookmarks, likes, shares, and rankings all influence travelers' perceptions and decisions. Marketing methods such as livestreamed restaurant visits, social media check-ins, food group deals, and culinary lives-

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treaming help destinations promote their food culture. These strategies not only allow tourists to compare destinations quickly but also foster positive online word-of-mouth effects. As “check-in culture” strengthens the social dimension of culinary tourism, positive perceptions translate into viral digital advocacy through user sharing.

In terms of sustainability, digital empowerment allows culture to merge into culinary tourism through innovative experiential formats. Food is no longer confined to physical space or momentary taste experiences—it also holds collectible and symbolic value. In recent years, digital collectibles have gained popularity among younger consumers, particularly in intangible cultural heritage, tourism, sports, and art. Transforming high-value cultural IPs into digital assets has become a common business model.

To enhance the dissemination of Qiong cuisine, Hainan launched its first digital culinary collectible—the Lingao Roasted Suckling Pig NFT—in 2022. Blockchain technology ensures the authenticity and ownership of such assets, granting cultural symbols higher added value and allowing culinary IPs to exist digitally, thereby extending tourists’ travel memories and cultural experiences.

2.3 Resource Endowment Enhancing Culinary Market Competitiveness

Digital transformation is injecting new vitality into the preservation and innovation of Hainan’s culinary heritage while reshaping the connections among food, tourists, industries, and markets. Hainan is rich in culinary resources—its iconic dishes such as Wenchang Chicken, Jiaji Duck, Dongshan Goat, and Hele Crab are well-known nationwide and have strong potential as cultural IPs. The successful market performance of the Lingao Roasted Suckling Pig digital collectible demonstrates the high development potential of existing culinary IPs as digital cultural assets. By delving into the historical origins and craftsmanship of Qiong cuisine, Hainan can enrich culinary experiences, overcome homogeneity in marketing strategies, and stimulate creative service design. Furthermore, the Hainan Free Trade Port provides a favorable institutional environment for cross-cultural exchanges. Events such as the Hainan Food Culture Week during the China International Consumer Products Expo, the International Culinary Tourism Expo, the Taste of Hainan initiative, and the International Hospitality Industry Conference have established regular, high-level platforms for international culinary exchange. These events utilize “cloud kitchen” livestreaming and metaverse-based online exhibitions to expand Hainan cuisine’s visibility and encourage the adoption of advanced digital gastronomy technologies. From the perspective of smart service systems, Hainan has optimized its business environment and supervision mechanisms through digital platforms such as e-Travel Hainan and Safe Travel Hainan, which provide comprehensive urban tourism services. e-Travel Hainan serves as a digital information-sharing platform connecting fragmented services such as dining and accommodation, allowing tourists to access restaurant information, make reservations, and receive digital coupons, thus improving convenience and experience. Meanwhile, Safe Travel Hainan promotes data sharing across departments, unifies provincial supervision standards, and manages over 250,000 registered merchants to build a trustworthy tourism ecosystem. Its robust consumer protection and dispute-resolution mechanisms strengthen market regulation, governance quality, and public trust. These developments demonstrate that Hainan’s culinary tourism is evolving from a phase of quantitative expansion toward one of qualitative enhancement and connotative growth.

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3. Challenges in the Digital Transformation of Hainan's Culinary Tourism

3.1. Limited Innovation in Online Promotion of Culinary Culture

The mere pursuit of sensory stimulation is no longer sufficient to meet the demands of contemporary cultural and tourism development. As a tropical island tourism destination, Hainan boasts an abundance of local delicacies. However, current culinary tourism experiences in the region remain largely confined to taste, with businesses focusing mainly on the preparation of ingredients and failing to explore the deeper cultural meanings embedded within local cuisine. Across Hainan's towns and food districts, vendors selling local specialties often reduce culinary identities to mere menu items. This simplification weakens visitors' curiosity and desire to explore the stories behind the food, thereby severing the link between cuisine and cultural context. Homogeneity is another pervasive issue: dish names, plating styles, interior designs, and even livestream marketing techniques are highly repetitive, reflecting a general lack of differentiation and cultural branding awareness among restaurateurs. Most businesses rely on mainstream online platforms such as Meituan, Douyin (TikTok China), and Xiaohongshu (RED) for promotion, while some attempt to create personal brands or engage in livestream commerce to increase audience interaction. Nevertheless, most promotional content emphasizes basic attributes—flavor, environment, color, ingredients, price, and location—while the cultural dimension often remains an empty slogan. In reality, many restaurateurs have limited knowledge of the connections between cuisine, local history, folklore, and culinary techniques. Some struggle to articulate these cultural elements due to educational or expressive barriers, resulting in the absence of narrative content within dining experiences and ultimately hindering the transmission of Hainan's culinary culture. Promotional narratives are often shallow, and short videos or livestreams tend to offer little more than brief dish introductions. The repetitive nature of such content makes it difficult for consumers to distinguish unique characteristics or form memorable impressions. Consequently, livestream viewers rarely convert into actual customers, and businesses find it difficult to attract or retain a precise target audience. To break through the homogenization of competition, innovative content marketing strategies must anchor on cultural values—transforming dining from a purely gustatory act into an immersive cultural encounter that elicits emotional resonance and transforms culinary tourism into a memorable, shareable, and enduring experience.

3.2. Shallow Application of Digital Technologies in Culinary Tourism

Although Hainan has made some progress in developing "smart tourism," the application of digital technologies in culinary tourism remains shallow and fragmented, with limited empowerment effects. First, in terms of infrastructure, most restaurants have implemented basic digital services such as online ordering, e-payment, and integration with lifestyle service platforms. While these systems enhance operational efficiency and convenience, they have yet to bring a qualitative improvement to the overall dining experience. For example, tourists in Sanya can use Alipay's AI recognition function to identify seafood prices and preparation methods, but such smart services mainly provide information rather than immersive experiences. Technologies such as smart guidance and AI-driven cultural narration are more common in scenic areas than in restaurants, making it difficult for visitors to experience culinary culture through intelligent systems. Second, the problem of data fragmentation remains severe. Large amounts of potentially valuable data remain isolated in "data silos," with their full potential yet to be realized. For large enterprises, data itself constitutes an asset, and under an

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underdeveloped data security framework, data sharing may pose risks of economic loss. Although platforms such as e-Travel Hainan and Hainan 安心游 ("Travel with Peace of Mind") exist, they mainly focus on travel information and consumer protection. A unified big-data system for analyzing dining consumption has yet to be established, limiting the ability of businesses to generate personalized recommendations for tourists. Moreover, as tourism involves six interconnected aspects—dining, accommodation, transportation, sightseeing, shopping, and entertainment—the disconnection of data across these sectors prevents comprehensive analysis of visitor preferences, hindering the provision of precision services. Third, the cost of technological innovation remains high. Smart technology evolves rapidly, requiring significant initial investment and ongoing maintenance. Many small and medium-sized enterprises (SMEs) continue to rely on traditional business models due to these cost pressures. For instance, in 2012, Sanya launched an electronic ordering system to prevent overcharging in seafood markets, yet only about 20 restaurants joined the initiative. This suggests that cost remains a key determinant of digital adoption. When businesses lack motivation or resources for digital transformation, it becomes difficult to achieve comprehensive data integration. Fourth, the structural transformation of the culinary industry is still in its infancy. While concepts such as unmanned restaurants and AI chefs are emerging as new industry trends, their feasibility within Hainan's tourism market remains uncertain. Given the relatively high per-capita travel cost in Hainan, tourists tend to seek personalized and warm service experiences commensurate with their spending. Thus, whether robot-operated dining can serve as an appealing selling point for culinary tourism is debatable—over-reliance on automation may even diminish the authenticity and emotional warmth of dining experiences.

3.3. Insufficient Integration of Culinary Tourism and Smart Tourism

In the context of the experience economy, culinary experiences act as both attractions for tourists and carriers of regional culture. Yet, the integration of Hainan's culinary industry with smart tourism remains at an early stage, with some related initiatives still in their infancy.

Under the national strategy for cultural digitization, digital resource development has largely centered on libraries, museums, and archives, leaving culinary culture—often orally transmitted and regionally diverse—underrepresented and fragmented. Consequently, digital resources on Hainan's culinary culture remain limited. For instance, the province's coffee culture has developed relatively well, with establishments such as the Xinglong Coffee Museum in Wanning and the Hainan Coffee Museum providing physical spaces for cultural dissemination. However, innovations such as VR-based virtual exhibitions or AR interactive storytelling are still lacking. Take Hainan Rice Noodles as an example: they come in both dry and soup-based forms, with variations in ingredients, sauces, and texture across regions. The absence of standardized production processes hinders tourists' ability to form consistent taste memories. Hence, implementing intelligent quality control may offer a viable solution. According to research by the Huxiu Think Tank, some enterprises have adopted AI-powered systems to enhance culinary quality—checking pizza ingredient ratios or monitoring dumpling wrapper defects, for example—thereby improving visitors' sensory experiences both visually and gustatorily.

In rural tourism contexts, visitors often seek authentic local cuisine in farmhouses or rural restaurants. Hainan's short farm-to-table cycles ensure ingredient freshness and tenderness, yet promoting rural dining experiences remains challenging. On the one hand, ingredient freshness raises menu prices; on the other, rustic dining environments may dampen certain tourists' expectations for refined culinary experiences. This

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mismatch stems from information asymmetry—tourists lack digital tools to verify ingredient sources or participate in "farm-to-table" processes, leading to weaker-than-expected experiential satisfaction. Blockchain-based traceability systems, already mature in agriculture, offer a model for improvement. By scanning a QR code, diners could access detailed information about the origin and cultivation of their food. This transparency would help dispel doubts arising from price or environment discrepancies, ultimately enhancing visitor satisfaction and trust in rural culinary tourism.

4. Pathways for Digitally Empowering Hainan's Culinary Tourism

4.1. Reconstructing the Operational System of the Culinary Consumption Market

Driven by the dual forces of the digital economy and the Hainan Free Trade Port policy, digital technologies can be leveraged to ensure ingredient quality, enhance supply chain transparency, and strengthen infrastructure—collectively shaping a healthier, higher-end, and more convenient culinary tourism experience. Based on diverse visitor needs, Hainan can adopt region-specific management strategies to refine and optimize culinary experiences.

First, for the mass consumer market, premium local ingredients should serve as hallmarks of rural tourism. An innovative "smart farming + transparent supply chain" model—exemplified by Ding'an Cold Spring Capon and Wenchang Chicken Master—uses IoT systems to monitor and digitalize the entire farming process, improving product quality and reducing procurement risks. Given their verified quality and traceability, such products also hold strong potential as competitive culinary souvenirs that stimulate local consumption.

Second, for mid-range consumers, emphasis should be placed on creating comfortable and convenient dining experiences. Businesses can integrate AR/VR technologies to recreate Hainan's Li and Miao cultural scenes or marine ecosystems, enriching atmosphere and encouraging social media sharing to amplify digital visibility. Moreover, drone logistics—already operational at scale—could be deployed in major tourist areas to deliver tasting samples or local specialties, adding novelty and convenience to culinary tourism.

Third, for the high-end market, premium ingredients should underpin exclusive dining experiences. Leveraging the industrial clustering effect of the Yangpu International Healthy Food Port and Haikou's vision of becoming a "City of Gastronomy," Hainan can establish a consumption ecosystem that integrates "high-end ingredients + fine dining + digital services." Thanks to Hainan Free Trade Port's tax incentives, import costs for premium meats are reduced, while cold-chain infrastructure ensures freshness from processing to table. This allows tourists to enjoy globally sourced delicacies at competitive prices, significantly enhancing overall travel satisfaction.

4.2. Enhancing Digital Experiences to Drive Online Engagement

Amid the digital transformation of cultural tourism, Hainan's culinary tourism can integrate cultural, gamified, and immersive experiences to align with the emerging trend of "Cultural + Culinary + Tourism" (CCT). By enriching storytelling and interactivity, culinary spaces can gain distinct identities and stronger online marketing potential.

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Practically, the province can coordinate efforts among hotel and restaurant associations, intangible cultural heritage committees, and vocational colleges to establish a representative culinary culture database. This would enable systematic and standardized utilization of culinary cultural resources, supporting digital projects such as food-themed districts or festivals. The goal is to build digital cultural spaces that provide multi-sensory, time-transcending experiences for visitors. Existing physical heritage venues, cultural centers, and university training bases can be digitized to showcase the origins, evolution, and craftsmanship of Hainan's cuisine. Inspired by Hunan cuisine's VR-based virtual kitchen, "pop-up kitchen" experiential stores could simulate cooking lessons for tourists. The growing market for digital collectibles also offers new promotional opportunities: businesses could issue NFT-style culinary collectibles tied to regional food culture, adding both brand value and consumer engagement incentives. Gamification can further enhance offline interactions—such as Haikou's "Snake Battle" H5 campaign, which connected dining, accommodation, shopping, and entertainment in a single digital experience. Tourists completing in-app challenges could unlock local food rewards, thereby merging digital play with physical consumption.

In online promotion, "health" can serve as a defining label for Hainan's culinary tourism. National policy documents have highlighted the development of health-oriented tourism for seniors, while recent reports—such as the 2025 Gen Z Health Consumption Trend Report—indicate that younger generations are increasingly concerned with mental well-being, nutrition, and weight management. Under the national Healthy China initiative, Hainan can merge its dietary traditions with light wellness concepts to appeal to younger consumers. As digital natives, Gen Z consumers drive new trends through social sharing and online influence. Meeting their expectations not only cultivates brand advocates but also enables cost-effective, viral promotion. This, in turn, compels the digital upgrading of Hainan's culinary industry—improving operators' digital literacy and fostering a younger, more dynamic service ecosystem.

4.3. Unlocking Data Value to Transform Culinary Tourism

From a data-driven business perspective, integrating lodging and dining data can foster coordinated development between food districts and hotels. Market data indicate that culinary consumption now accounts for a growing share of total tourism expenditure. For instance, travel platform data show that proximity to food districts significantly boosts hotel occupancy rates, especially during holidays when rooms become scarce—forming a self-reinforcing "dining + lodging" consumption loop.

Through spatial spillover effects, the cultural identity of culinary districts can extend into hotel offerings—for example, developing digital Li-ethnic-themed culinary streets alongside Li-heritage guesthouses to enhance the perceived value of integrated food-and-stay experiences. Drone delivery can further support this ecosystem by transporting meals directly to hotels, with in-hotel robots handling final delivery, preventing taste degradation caused by long delivery times. Combined data on customer demographics, stay duration, and dining preferences can feed back into dynamic pricing, service quality improvements, and tourism product innovation. Institutionally, Hainan has enacted several pioneering regulations—such as the Regulations on the Development of International Data Centers in the Hainan Free Trade Port and the 2024 Negative List for Cross-Border Data Management—establishing a robust framework for data governance. Applying a graded and categorized management approach to culinary data could support the creation of a "Culinary Tourism Data Exchange Center," unlocking latent value from aggregated data resources.

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In terms of data sharing, improving transparency can enhance the overall business environment. Drawing inspiration from Sanya's "One Code per Company, One Code per Guide" digital transparency platform, Hainan could expand its dynamic database system to include restaurants. Through the Safe Travel Hainan platform, blockchain-enabled "sandbox supervision" could record merchants' business integrity, hygiene grades, ingredient traceability, and customer reviews—ensuring market order and enabling reliable credit-based regulation. Furthermore, integrating culinary data into the e-Travel Hainan platform to launch a "Culinary Map" feature would allow tourists to plan food tours conveniently. The system could also interconnect with Safe Travel Hainan to prioritize high-credibility restaurants in search recommendations based on user preferences—optimizing both visitor satisfaction and the province's culinary tourism ecosystem.

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