Scientific Research Publishing

Open Journal of Applied Sciences, 2026, 16(6), 2254-2281
https://www.scirp.org/journal/ojapps
ISSN Online: 2165-3925
ISSN Print: 2165-3917

Mapping International Yacht Tourism Research with Knowledge Graphs: Knowledge Structure, Dynamic Evolution, and Theoretical Underpinnings

Meiling Zhao[1,2], Dongyang Tang[1], Jinhua Shao[3]

[1]School of Tourism, Hainan Tropical Ocean University, Sanya, China
[2]Cruise and Yacht Research Base of Hainan Free Trade Port, Sanya, China
[3]School of Humanities and Social Sciences, Anhui University of Science and Technology, Huainan, China
Email: 214630351@qq.com

How to cite this paper: Zhao, M.L., Tang, D.Y. and Shao, J.H. (2026) Mapping International Yacht Tourism Research with Knowledge Graphs: Knowledge Structure, Dynamic Evolution, and Theoretical Underpinnings. *Open Journal of Applied Sciences*, **16**, 2254-2281.
https://doi.org/10.4236/ojapps.2026.166128

Received: May 21, 2026
Accepted: June 23, 2026
Published: June 26, 2026

Abstract

Against the backdrop of global sustainable development and the transition toward a blue economy, yacht tourism, as a composite industry, has long suffered from knowledge fragmentation in academic research, which constrains theoretical synthesis and the realization of practical value. To clarify the intellectual landscape and reveal evolutionary patterns, this study conducts a systematic bibliometric and visual analysis of 619 international articles from the Web of Science Core Collection (2000-2026) using CiteSpace (version 6.4.R1). Multi-dimensional methods—including keyword co-occurrence analysis, temporal mapping, burst detection, and document co-citation analysis—are employed to characterize the knowledge structure, development trajectory, and theoretical roots of the field. The results show that international yacht tourism research has undergone a three-stage spiral evolution: 1) The Ecological Foundation Stage (2000-early 2010s), focusing on ecological impact assessment and management framework construction; 2) The Management Scientification Stage (mid-to-late 2010s), oriented toward sustainable development, marking a transition from qualitative to quantitative research; and 3) The Market Deepening and Integration Stage (2020-present), which fosters the deep integration of market logic and sustainability principles. The study identifies ten core research themes and clarifies the knowledge base, which relies on multidisciplinary theories and a "trinity" system of literature. By developing a "structure-evolution-roots" framework and a dynamic association model, this research addresses the long-standing problem of knowledge fragmentation, offering clear guidance for theoretical innovation and practical ap-

plication both in yacht tourism and in analogous interdisciplinary fields.

Keywords

Yacht Tourism, Scientific Knowledge Graph, Bibliometrics, Sustainability, Knowledge Evolution, Blue Economy

1. Introduction

As the global economy transitions toward sustainable development and the experience economy, marine and waterfront spaces have moved beyond their traditional roles in transportation and production to become core leisure tourism destinations and growth poles of the "blue economy". Yacht tourism, integrating high-end consumption, coastal vacations, and marine cultural experiences, represents a typical composite industrial form, providing significant impetus for economic growth, employment expansion, and infrastructure upgrading in coastal regions [1]-[3]. In recent years, with the advancement of the United Nations Sustainable Development Goals (SDGs) and the global "blue transformation" strategy, how yacht tourism can achieve a dynamic balance among economic vitality, social equity, and ecological health has become a key concern for both the international community and academia [4] [5].

Nevertheless, compared to the intensity of international industrial practice and policy attention, the academic knowledge system in the field of yacht tourism remains notably fragmented and dispersed. Relevant research is scattered across multiple disciplines—including tourism management, marine policy, environmental science, leisure sociology, and economic geography—with a lack of effective theoretical dialogue and integration. Meanwhile, existing literature largely focuses on case descriptions of specific regions such as the Mediterranean and the Aegean Sea in Türkiye [1] [3] [4], or is confined to single-dimensional analyses of economic benefits, environmental impacts, tourist satisfaction, etc. Other studies revolve around specific management issues such as marina operations and customer segmentation [6] [7]. A holistic framework capable of systematically revealing the knowledge structure, evolutionary trajectory, and intrinsic theoretical linkages of the field has yet to emerge. This situation not only constrains a deep understanding of yacht tourism as a complex socio-ecological-economic system but also fails to provide a solid theoretical foundation for differentiated industrial policy-making and future research directions worldwide.

To integrate the long-dispersed knowledge system in the field of yacht tourism and systematically reveal its internal development patterns, this paper adopts the method of scientific knowledge mapping to conduct a comprehensive bibliometric review of international research. Unlike traditional narrative reviews, this study is grounded in bibliometric principles. Using the Web of Science Core Collection as the data source, a sample database of 619 publications was constructed

through systematic retrieval and rigorous screening, followed by visual analysis using CiteSpace. Keyword co-occurrence and cluster analysis are employed to delineate the knowledge structure of the field; temporal mapping and burst detection are used to track the dynamic evolution of research hotspots; and document co-citation analysis is applied to trace the deep theoretical roots that underpin this evolution. Ultimately, this paper aims to construct an integrated explanatory framework that combines "structure-evolution-roots", thereby systematically addressing three core questions: "What is the intellectual landscape?", "Where has it come from?", and "Where is it heading?"—thus mapping the dynamic development panorama of the field.

2. Research Design

The Web of Science (WoS) Core Collection was identified as the data source for this study, with the retrieval operation completed on December 21, 2025. The Social Sciences Citation Index (SSCI) within the WoS Core Collection, underpinned by rigorous journal selection and quality control, has become a primary vehicle for high-quality research output in the social sciences. Its constituent journals form the core arena for academic dialogue in the field of yacht tourism and represent the optimal data source for capturing high-impact literature and conducting precise bibliometric analyses. Co-citation network analysis imposes stringent requirements on data standardization; thus, the adoption of a single, standardized data source is critical to avoiding bias. The well-structured metadata provided by WoS helps mitigate the data heterogeneity problems arising from merging multiple databases, thereby laying a solid foundation for the purity and comparability of network structures. Although WoS has limitations in its coverage of non-journal publications such as conference papers and book chapters, this aligns well with the study's objective of focusing on the core knowledge system of mainstream international journals. For bibliometric research aimed at clarifying the main disciplinary structure, such a data source strategy—focusing on authoritative core literature—represents a rational choice that balances validity and rigor.

Regional preferences in academic terminology and variations in the framing of research constructs often create "invisible barriers" to literature retrieval. How can this challenge be addressed to ensure the completeness and systematic nature of the search scope? This study developed a composite search strategy consisting of four logical layers (see **Figure 1** for the detailed design), achieving comprehensive coverage of the literature through multi-dimensional term inclusion.

The core activity layer uses "yacht OR boat AND tourism" as the search term, accurately anchoring research directly focused on yacht and boat tourism; At the macro conceptual level, three sets of terms, namely "nautical tourism", "marine tourism", and "maritime tourism", are included to examine yacht tourism within a broader spectrum of water tourism and avoid overlooking cross conceptual research. The commonly used terms "recreational boarding" and "leisure boarding" in North America form a synonymous activity layer to compensate for regional

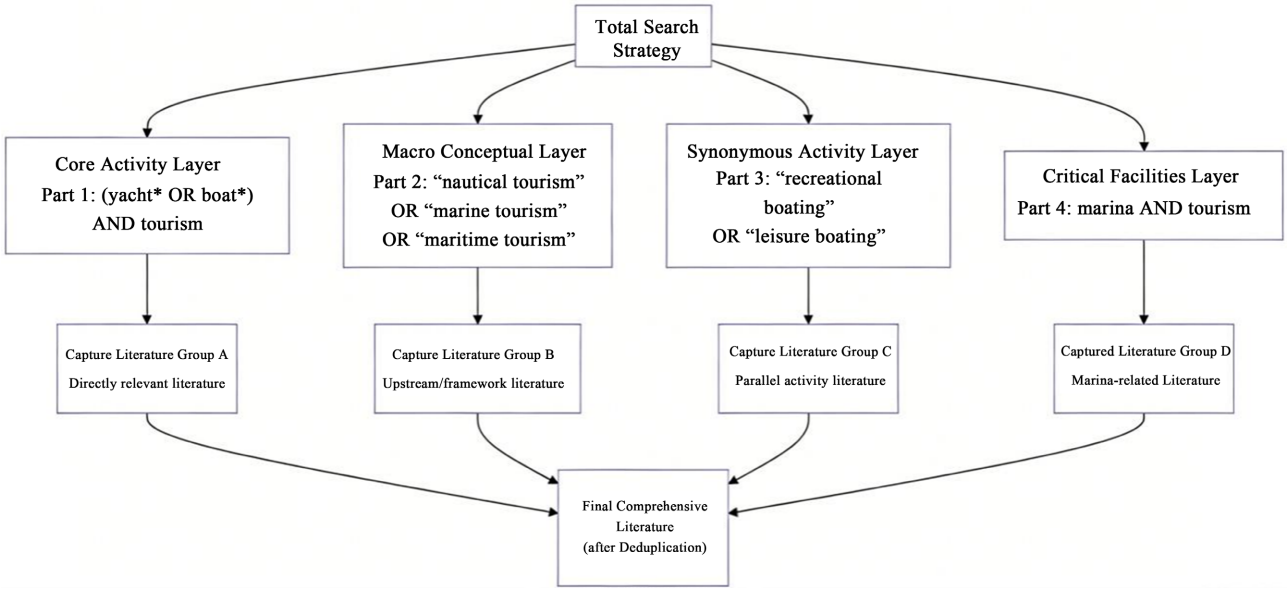

Figure 1. Literature retrieval process for yacht tourism research.

differences in terminology usage; The key facility layer is centered around "Marina AND tourism", focusing on the core hub of yacht tourism—the dock, to ensure that facility oriented research is not excluded.

The four layers were combined using the Boolean operator OR. The initial retrieval yielded 2729 records. The results included a number of "Online First" publications from 2025-2026, which directly reflect cutting-edge developments in the field. All such articles were included in the analysis, ultimately forming a complete chronological sequence of literature spanning from 2000 to 2026.

Literature Screening and Processing Procedure

To identify high-quality, high-relevance social science research samples, the initial retrieval results were subjected to a systematic multi-stage screening process. The detailed procedure is presented in **Figure 2**. The first step involved refining the document types: priority was given to "Article" and "Review" documents, while "Early Access" publications reflecting cutting-edge developments in the field were also included. Concurrently, non-research items such as conference abstracts and editorials were excluded. This preliminary refinement yielded 2195 core academic publications.

Precise focusing on disciplinary fields also constituted a core step in the screening process. Given the interdisciplinary nature of the literature, it was necessary to anchor social science perspectives—including tourism management, economics, environmental policy, and planning—from a large and heterogeneous body of publications. Relying on the disciplinary classification system inherent to the WoS database, this study ultimately included nine core subject categories: Hospitality, Leisure, Sport & Tourism; Environmental Studies; Water Resources; Green & Sustainable Science & Technology; Geography; Management; Business; Economics;

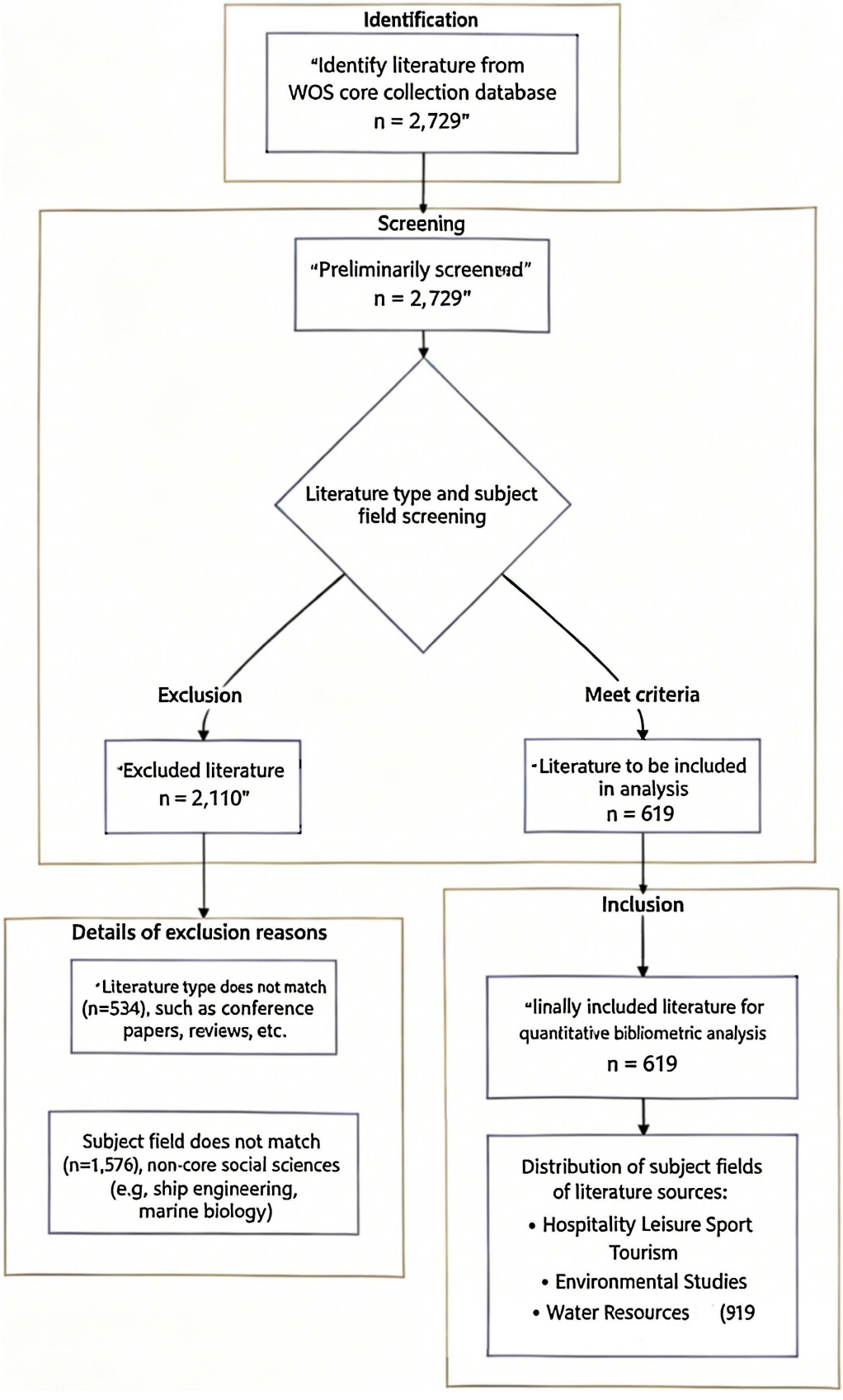

Figure 2. Literature screening and processing procedure for yacht tourism research.

and Regional & Urban Planning. This selection not only ensured inclusiveness for research related to resource management and sustainability policy but also precisely filtered out purely natural science and engineering literature (e.g., ship engineering, marine biology), thereby avoiding interference from non-target fields that could compromise analytical validity.

Following the above multi-dimensional rigorous screening, a final set of 619 highly relevant academic publications was obtained, constituting the core sample database for the knowledge graph analysis. All literature data were fully exported in the "Full Record and Cited References" format, laying a solid data foundation for subsequent analyses.

3. Analytical Methods

Guided by the research objectives set out in the introduction, this study adopts a bibliometric paradigm, employs scientific knowledge mapping as the core analytical tool, and uses CiteSpace (version 6.4.R1) to conduct visual and quantitative analyses of the 619 final sample publications. The analytical logic follows a dual progression—namely "macro-micro" and "static-dynamic"—and combines a four-dimensional stratified approach with standardized parameter settings to ensure the comparability and reproducibility of the results, thereby laying a methodological foundation for constructing the "structure-evolution-roots" integrated explanatory framework.

The first dimension concerns macro-level intellectual trajectories and collaborative patterns, focusing on the development history of the field and the regularities of scientific collaboration. Through an annual distribution analysis of the literature, evolutionary stages are delineated. Concurrently, collaboration networks of countries, institutions, and authors are constructed to accurately identify core research forces and their collaborative relationships, thus establishing a macro-level cognitive basis for subsequent micro-level analyses.

The second dimension involves the deconstruction of static knowledge structures, with the core emphasis on analyzing research hotspots and thematic structures. A co-occurrence network is constructed by extracting keywords from the literature. Based on clustering results, core research themes are synthesized. By combining keyword centrality and frequency characteristics, the intrinsic relationships among themes are clarified, thereby presenting a static picture of the composition of the field's knowledge system. This dimension corresponds to the "structure" component of the "structure-evolution-roots" framework.

The third dimension focuses on the tracking of dynamic research frontiers, achieved through timeline mapping, time-zone mapping, and burst detection algorithms. Based on keyword clustering, the two types of maps intuitively present the temporal positioning and rise-and-decline trajectories of each theme. Burst detection precisely captures core concepts that have experienced a surge in attention during specific periods, clarifying shifts in research hotspots and emerging trends. This dimension fully covers the "evolution" component of the "structure-

evolution-roots" framework.

The fourth dimension involves the tracing of theoretical roots, accomplished through clustering of the document co-citation network. By identifying clusters of highly co-cited documents, the study pinpoints the classic theories, foundational works, and key scholars that underpin yacht tourism research, thereby tracing the original logic of knowledge production. This dimension specifically addresses the "roots" component of the "structure-evolution-roots" framework, forming a complete methodological loop.

To ensure consistency in analysis and robustness of results, the CiteSpace parameters are uniformly set as follows: the time slice covers the years 2000-2026, and the slice length is set to 1 year; The selection criteria for nodes are based on the top 50 citation or appearance frequencies within each time slice; Using the Pathfinder algorithm to prune the network and streamline redundant connections to highlight the backbone structure. The above parameter selection follows the conventional CiteSpace methodology. One year slicing aims to preserve the annual evolution details of the research frontier to the greatest extent possible, avoiding masking stage turning signals due to a large slice span; Top 50 node filtering is the recommended starting standard by CiteSpace, which can balance network size and analysis efficiency, while ensuring node representativeness and avoiding redundant connections; The Pathfinder pruning algorithm is based on the principle of triangle inequality, which can ensure that the merged network with different time slices has a unique and stable solution while preserving the network backbone structure, ensuring the repeatability of the analysis results.

4. Results and Analysis

4.1. Annual Distribution and Evolutionary Stages of Publications (Publication Trends)

Based on the annual distribution data (2000-2026) of the 619 final sample publications (see **Figure 3** for publication trends), the stage-based evolutionary characteristics of international yacht tourism research are particularly evident. From sporadic emergence and steady accumulation to explosive growth in recent years, this complete evolutionary trajectory clearly demonstrates the field's transition from a niche topic to a core branch of tourism research.

In light of the changing patterns in publication volume, the development can be divided into three core stages. Embryonic exploration stage (2000-2010): Research activities were scattered and the total volume was low—only 73 publications were produced over the 11-year period, accounting for 11.8% of the total, with an annual average of fewer than 10 papers. A large-scale research momentum had not yet formed. Steady development and framework construction stage (2011-2019): In 2011, the number of publications reached 15, marking the starting point of increased attention to the field. Thereafter, the volume showed a fluctuating upward trend. In 2015, it exceeded 20 papers for the first time, representing a substantial leap in scholarly attention. In 2019, the number further rose to 34 papers.

Over this decade, a total of 182 publications were produced, accounting for 29.4% of the total, and establishing the core framework of the field's knowledge system. Rapid outbreak and frontier deepening stage (2020-present): This stage constitutes the main body of the current knowledge system (364 papers, 58.8% of the total). In 2020, the number of publications surged to 52, an increase of more than 50% compared with 2019, forming a significant turning point for growth. From 2021 to 2023, the volume remained consistently high in the range of 67 - 69 papers per year. During 2024-2025 (including Online First publications), the momentum of strong growth has continued, demonstrating the vigorous vitality of research in this field.

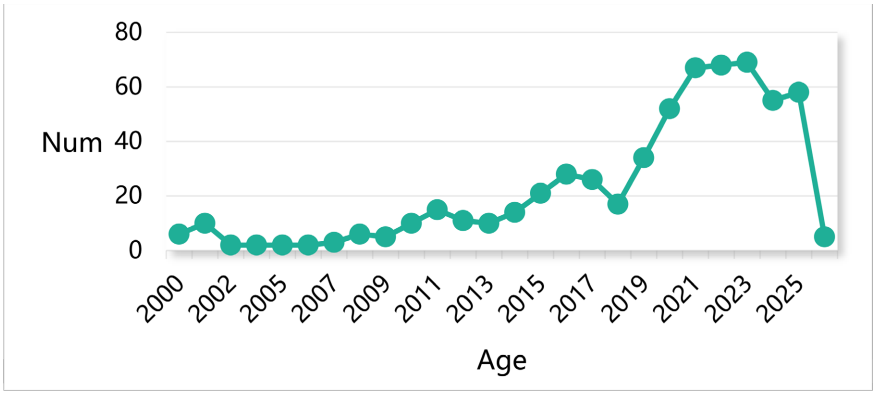

Figure 3. Publication year and number of publications on Yacht tourism.

4.2. Analysis of Scientific Collaboration Networks: Countries, Institutions, and Authors (High-Productivity Countries/Institutions/Authors)

4.2.1. Statistics on Publication Volume and Centrality of High-Productivity Countries

Based on the 619 sample publications screened above, this study further integrated and analyzed the publication volume and centrality indicators of each country. The detailed results are presented in Table 1. The comparison of the two indicators can accurately delineate the core country landscape and influence hierarchy in the field, providing key support for identifying the distribution of international academic discourse power.

In terms of publication volume, the United States, the United Kingdom, and Australia rank as the top three, with China ranking ninth, confirming the first-mover advantage of the English-speaking academic circle centered on the United States in this field. Mediterranean countries such as Spain, Italy, and Croatia also rank among the top, and their academic status is deeply tied to the industrial practice of core yacht tourism destinations, which is consistent with the trend noted earlier that the "outbreak stage" focuses on industry-related issues. Centrality serves as a key yardstick for identifying core hubs in a knowledge network. In the international collaboration network constructed in this study, countries with high centrality are the core links for academic dissemination and collaboration, possessing

the potential to lead research transformations in the field. The data in Table 1 show that the United States, the United Kingdom, Italy, Australia, Brazil, Spain, Croatia, and China have all entered the core echelon with significant centrality. Italy is particularly noteworthy: despite ranking fifth in publication volume, its centrality ranks third, demonstrating strong academic radiation and connectivity.

Table 1. Publication volume and centrality of high-productivity countries.

Rank	Country	Publication Volume	Centrality
1	United States	159	0.51
2	United Kingdom	86	0.29
3	Australia	67	0.21
4	Spain	49	0.14
5	Italy	39	0.27
6	Brazil	37	0.16
7	Croatia	31	0.14
8	Canada	21	0.08
9	China	19	0.13
10	Germany	18	0.07

4.2.2. Distribution Statistics of High-Productivity Institutions

To map the knowledge production landscape of international yacht tourism research, this study focuses on high-productivity academic institutions, analyzing them from three dimensions: publication output, network centrality (hub status), and geographic location. The performance of the relevant institutions not only reveals regional agglomeration characteristics but also exposes a lack of synergy between knowledge production volume and academic radiation. This misalignment is particularly typical in cross-regional yacht tourism research.

As shown in Table 2, In terms of publication output, the University of Rijeka in Croatia leads with 24 publications, confirming the academic-industrial linkage advantages of the Mediterranean region. Griffith University (16 publications) and James Cook University (15 publications) in Australia form a solid second tier, demonstrating the country's strength in marine tourism research. Multiple institutions in Spain, the United States, Ecuador, and the United Kingdom provide stable output, collectively forming the core camp of knowledge production. The core contradiction lies in the disconnect between the network centrality of high-productivity institutions and their publication volume. Among institutions with six or more publications, none have a centrality exceeding 0.1, and most have a centrality of zero. These institutions can supply knowledge but cannot act as intermediaries for cross-institutional collaboration. In contrast, the University of California System in the United States achieves a high centrality of 0.17 with only five publications, becoming a core hub. This pattern of "high-output but

Table 2. Statistics of major high-productivity institutions in international yacht tourism research.

Rank	Institution (English)	Publication Volume	Centrality	Country
1	University of Rijeka	24	0.00	Croatia
2	Griffith University	16	0.08	Australia
3	James Cook University	15	0.00	Australia
4	Universidad de Las Palmas de Gran Canaria	9	0.02	Spain
5	State University System of Florida	9	0.04	United States
6	Universidad de Especialidades Espiritu Santo	7	0.00	Ecuador
7	Universidad de la Laguna	7	0.00	Spain
8	Escuela Superior Politécnica del Litoral	7	0.00	Ecuador
9	Universidad Católica de Santiago de Guayaquil	6	0.00	Ecuador
10	University of Brighton	6	0.01	United Kingdom
11	Oxford Brookes University	6	0.00	United Kingdom
12	University of California System	5	0.17	United States

non-hub, hub but non-high-output" essentially reflects a differentiation between knowledge creation and knowledge integration functions. In terms of geographic distribution, high-productivity institutions closely overlap with active yacht tourism regions worldwide. The presence of multiple institutions in Ecuador among the high-productivity ranks confirms the synchronous resonance between academia and industry, marking the transition of emerging destinations toward becoming high-output knowledge hubs.

4.2.3. Distribution Statistics of High-Productivity Authors

Having clarified the distribution and influence pattern of high-productivity institutions in the field, this study further calculates the publication volume of authors in the sample literature to identify active researchers in international yacht tourism research. The relevant results are strictly organized based on tabular data (see Table 3). According to the objective ranking of publication volume, Marina Novelli (12 papers) and Marina Laskarin Azic (11 papers) rank as the top high-productivity scholars, representing the core active forces in the field.

A notable feature in the data is that three scholars sharing the surname Carvache-franco (Mauricio, Wilmer, and Orly) all rank among the top high-productivity authors, with a combined total of 24 publications. This forms a highly productive cluster of scholars identified by this surname—a characteristic that stands out prominently among the high-productivity author group in the field. Another distinct pattern observable from the data is that, among the high-productivity authors, the name "Marina" appears with extremely high frequency as a first or middle name. Scholars such as Marina Novelli, Marina Laskarin Azic, Marina Efthymiou, Marina Farr, and Catherine Marina Pickering all bear this name, constituting a unique onomastic distribution feature. This indirectly echoes the tendency to-

ward concentration within the research community of the field.

Table 3. Publication volume of high-productivity authors.

Rank	Authors	Publication Volume
1	Novelli, Marina	12
2	Azic, Marina Laskarin	11
3	Carvache-franco, Mauricio	9
4	Carvache-franco, Wilmer	8
5	Carvache-franco, Orly	7
6	Rasan, Dora	7
7	Efthymiou, Marina	6
8	Stoeckl, Natalie	6
9	Farr, Marina	6
10	Pickering, Catherine Marina	6

4.3. Research Hotspots and Thematic Structure: Keyword Co-Occurrence and Cluster Analysis

4.3.1. Keyword Co-Occurrence Analysis

Keywords are the condensation of the core content of academic literature, and their co-occurrence relationship can directly map the knowledge network configuration, core issues and focus direction of the research field. With the help of bibliometrics, this study analyzed the frequency and betweenness centrality of the key words in the sample literature. It should be noted that the centrality index used in this paper is intermediary centrality, which was proposed by Freeman (1977) [8] to measure the ability of a node to connect other nodes as a "bridge" in the network, that is, the proportion of the number of shortest paths through this node to the total number of shortest paths in the whole network. The larger the value, the stronger the knowledge hub function of the node. According to the empirical standard of bibliometrics, nodes with centrality greater than 0.1 are generally considered to have a significant "structural hole" function [9].

In the analysis process, we have completed the standardized integration of synonyms, singular and plural forms—such as the merging statistics of "impact" and "impacts", which is precisely to ensure the rigorous basis of the data. Refer to **Table 4** for details of high frequency and high and medium heart rate keywords.

From the perspective of frequency, "tourism" (100 times) and "management" (94 times) are the two keywords with the highest frequency, indicating that yacht tourism research has always been carried out around the core concept of "tourism", with "management" as the main problem orientation. Followed by "marine tourism" (63 times), which shows that the research is to a large extent placed in a broader context of marine tourism. "Conservation" (44 times) and "impacts" (44 times) ranked fourth, showing the importance of ecological protection and impact

assessment in the field. Keywords related to tourists' psychology and behavior, such as "behavior" (36 times), "satisfaction" (35 times), "perceptions" (35 times), also occupy significant positions, which together constitute the research dimension with "people" as the core. From the perspective of centrality, the bridge function of keywords shows obvious differentiation. The centrality of "impacts" is as high as 1.07, far more than other nodes, indicating that "impact" is the core hub connecting different sub topics in the knowledge network in this field, and undertakes the key function of linking the multi-dimensional effects of environment, society and economy with other research topics (such as protection, management, behavior, etc.). The centrality of "marine tourism" is 0.45, which also has significant cross sub domain connectivity. As an upper level concept, it links specific yacht activities with broader marine tourism issues. The centrality of "sustainable tourism" (0.31) and "perceptions" (0.24) also exceeded the empirical threshold of 0.1. The former played a bridge role in sustainable development issues, while the latter established a link between tourist psychology and other management issues. "Conservation" (0.10) just reaches the threshold, and also has certain structural hole function. By contrast, "tourism" (0.07), "management" (0.07), "climate change" (0.06), "satisfaction" (0.02), "behavior" (0.01) The centrality of these keywords were all lower than 0.1. Although these words appear frequently, they exist more as general tags or regular nodes in specific sub domains in the network, and do not play the role of structural holes connected across domains. On the whole, the data in Table 4 shows that only a few high-frequency keywords (impacts, marine tourism, sustainable tourism, perceptions, conservation) have significant intermediary centrality, while most keywords have low centrality. This pattern shows that the current knowledge network of yacht tourism research shows the characteristics of "a few hub nodes dominate the connection, and most nodes coexist dispersedly". It has not formed a highly centralized single core, but a number of key bridge words jointly maintain the structural

Table 4. High-frequency and high-centrality keyword.

Rank	Keywords	Frequency	Centrality	First Appearance Year
1	tourism	100	0.07	2001
2	management	94	0.07	2001
3	marine tourism	63	0.45	2001
4	conservation	44	0.10	2004
5	impacts	44	1.07	2007
6	behavior	36	0.01	2004
7	satisfaction	35	0.02	2012
8	perceptions	35	0.24	2001
9	climate change	28	0.06	2010
10	sustainable tourism	17	0.31	2012

integrity of the network. This finding is consistent with the conclusion that multiple topics coexist in the cluster analysis (q = 0.4969).

4.3.2. Keyword Cluster Analysis

To systematically clarify the core components of the knowledge structure in the field of yacht tourism, this study further conducted a keyword cluster analysis. The results are presented in Figure 4. Based on the core theoretical foundation of CiteSpace, modularity (Q value) and silhouette value (S value) are established as key yardsticks for cluster quality [10]. The clustering results exhibit favorable characteristics: the modularity Q = 0.4969, significantly exceeding the empirical threshold of 0.3, indicating that the thematic clusters in the field have clear boundaries [10]. The weighted mean silhouette value S = 0.794; according to classic interpretation criteria, this value is above the threshold of 0.7, sufficiently confirming that the internal consistency of each cluster reaches a good level [11]. The study identified ten major clusters. By combining the average publication year and thematic associations, a dynamic evolutionary path can be delineated—from "ecological phenomenon description" to "management tool application" and finally to "market value integration"—which closely echoes the core themes identified in the previous keyword co-occurrence analysis.

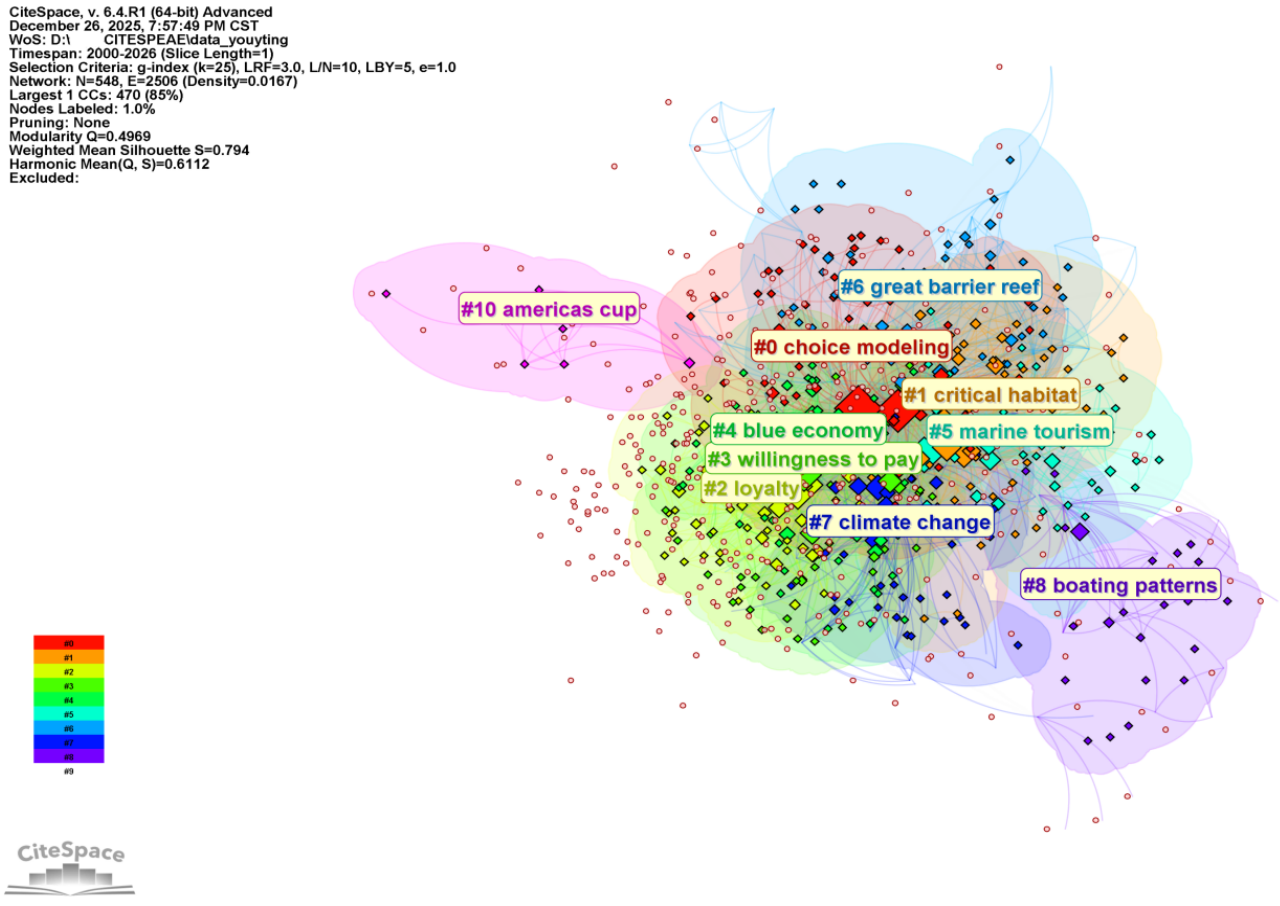

Figure 4. Keyword clustering map of yacht tourism literature.

1) First Stage (Early 2000s): Activity Definition and Ecological Impact Assessment Foundation

Early research focused on the spatial characteristics and ecological responses of specific activity formats. Cluster #8 boating patterns (average year 2004) and Cluster #10 americas cup (average year 2003) constitute the starting point of the research—the former focusing on spatial patterns and planning logic of recreational activities, and the latter using iconic events as an entry point to explore the comprehensive impacts of large-scale maritime events. Ecological concerns simultaneously became a core thread. Cluster #1 critical habitat (2013), Cluster #5 marine tourism (2011), and Cluster #6 great barrier reef (2013) established the ecological research framework, covering topics such as wildlife tourism, habitat protection, coral reef management, and assessment of the ecological effects of human activities. These clusters drove the field through a paradigm shift from "mere activity description" to "understanding of ecological interaction".

2) Second Stage (Mid-to-Late 2010s): Management Science Turn under the Sustainability Framework

As the concept of sustainable development deeply permeated the field, research focus shifted toward the application of scientific tools for refined management and policy evaluation, achieving a transition from qualitative exploration to quantitative support. The rise of Cluster #7 climate change (2017) brought climate adaptability and ecological resilience into the core agenda. The introduction of microeconomic and behavioral science tools pushed research toward greater precision: Cluster #0 choice modeling (2015) corresponds to "discrete choice models," and Cluster #3 willingness to pay (2019) corresponds to "contingent valuation methods". Both aim to quantify tourist preferences and environmental values, providing empirical support for ecological compensation, ticket pricing, and protected area zoning. Cluster #4 blue economy (2018) expanded the research perspective to the broader framework of marine economy. Concurrently, the emergence of Cluster #2 (tourist loyalty, 2019) laid the groundwork for a subsequent shift in research focus toward the in-depth management of tourist relationships.

3) Third Stage (Recent Trends): Deepening Integration of Market Logic and Tourist Relationship Management

Current research frontiers focus on market dynamics and the cultivation of long-term tourist value. Loyalty research (#2), which had emerged in the first stage, has now undergone systematic expansion—introducing the service marketing theory of "loyalty" into the yacht tourism context, deeply integrating with concepts such as "satisfaction" and "perceptions" identified in the previous co-occurrence analysis. This marks a shift of research focus from macro-level management down to micro-level tourist relationship maintenance and destination competitiveness enhancement. This cluster complements tools such as willingness to pay (#3) and choice modeling (#0), forming a complete chain of tourist behavior: "value assessment → behavioral choice → loyalty maintenance". At the same time,

it shows a deep integration of sustainable development goals with market value logic.

In summary, the keyword knowledge structure in the field of yacht tourism exhibits a "three-layer progression" model: the bottom layer is ecological interaction awareness (critical habitat, climate change); the middle layer consists of sustainable management tools (choice modeling, willingness to pay, blue economy); and the top layer is market-driven logic (loyalty, service marketing). This structure not only organizes the static knowledge landscape but also corresponds to the dynamic evolutionary timeline, confirming that the field has developed into an interdisciplinary applied discipline whose core objective is "to achieve management optimization and value maximization under the premise of ecological sustainability". Based on this, the following sections will further deconstruct the hotspot driving mechanisms of this structure, clarify the theoretical roots, and verify and deepen the spiral evolution model proposed earlier, using temporal mapping and burst word analysis.

5. Dynamic Evolution of Research Frontiers: Timeline, Time-Zone, and Burst Analysis

To systematically reconstruct the full picture of knowledge evolution in the field, this study integrates timeline mapping (Figure 5), time-zone mapping (Figure 6), and keyword burst detection (Figure 7), constructing a multi-dimensional cross-validation system. Building on the previous keyword cluster analysis, this section deconstructs the internal logical layers of evolution and further verifies

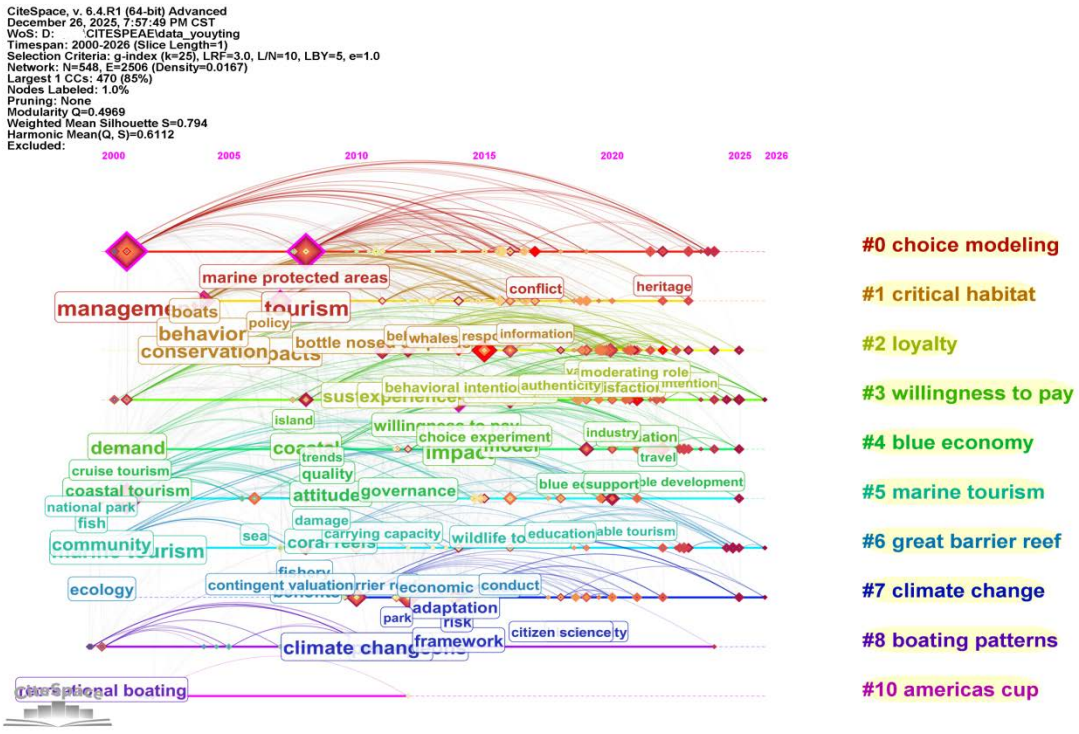

Figure 5. Timeline map of yacht tourism literature.

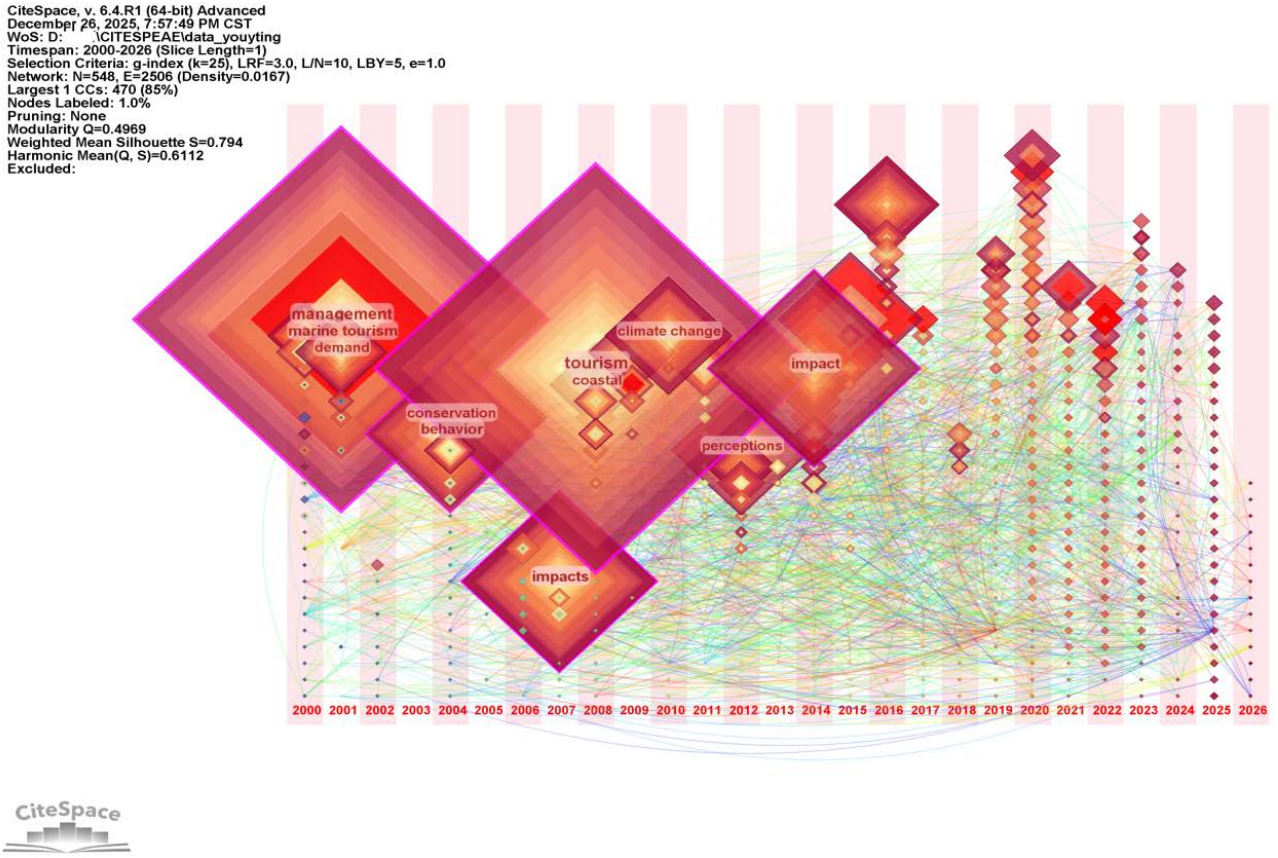

Figure 6. Time-zone map of yacht tourism literature.

Top 12 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2000 – 2026
coral reefs	2009	3	2009	2014	
conservation	2004	2.94	2015	2016	
management	2001	4.18	2017	2019	
conflict	2017	3.38	2017	2020	
motivation	2020	2.98	2020	2023	
quality	2009	3.47	2021	2023	
destination	2021	2.96	2021	2022	
behavioral intentions	2014	2.77	2021	2022	
segmentation	2022	3.06	2022	2023	
sustainable development	2022	2.93	2022	2026	
satisfaction	2015	3.38	2023	2024	
growth	2022	2.7	2024	2026	

Figure 7. Keyword burst detection map of yacht tourism literature.

the spiral evolution model of "ecological driver → management scientification → systemic integration". In this framework, the timeline map focuses on the rise-and-fall trajectories of macro-level themes; the time-zone map clearly indicates the directions of research force agglomeration and shifts; and burst analysis pre-

cisely captures the core signals of stage deepening and transition. Together, these three approaches provide complementary empirical support, effectively enhancing the robustness of the spiral evolution model.

5.1. First Stage (Approx. 2000-2010): Ecological Problem Driver and Basic Management Framework Construction

During this stage, primary concern with ecological issues served as the core driver, and research efforts concentrated on constructing basic management frameworks, echoing the first stage of the cluster analysis. The timeline map shows that core nodes such as "marine protected areas" and "conservation" emerged intensively in the early 2000s, outlining the initial landscape of "tourism-marine environment interaction". The time-zone map further confirms that "management" was a core hotspot, highlighting the fundamental task of establishing the concept and scope of management within academia. The strong burst of the keyword "coral reefs" (2009-2014) pushed the research focus from broad marine contexts to specific vulnerable ecosystems, representing the first deepening of ecological concern from macro-level advocacy to micro-level empirical investigation. Together with the specific explorations of Clusters #8 and #10, this period formed the initial paradigm of "responding to ecological issues with management frameworks," constituting the starting point of the spiral evolution.

5.2. Second Stage (Approx. 2011-2018): Management Scientification and Behavioral Science Turn under the Sustainability Paradigm

The concept of sustainable development drove a critical shift in research paradigm, deeply connecting with the "management science turn" identified in the cluster analysis. In the timeline map, the emergence of new clusters such as "climate change" and "choice modeling" visually presents the scientification and restructuring of the knowledge structure. The time-zone map shows that hotspots evolved from a single focus on "management" to a dual core of "conservation" and "behavior," reflecting the equal importance of ecological objectives and the study of human behavior. The sequence of burst keywords precisely marks the turning points: "conservation" (2015-2016) signals the peak of ecological issues at the policy level; "management" and "conflict" (2017-2020) appear in succession, pushing research deeper from "why protect" toward "how to manage and resolve conflicts." The introduction of environmental economics tools and behavioral theories marks the field's entry into a new era of refined management supported by scientific evidence.

5.3. Third Stage (Approx. 2019-Present): Systemic Integration of Market Logic and Sustainable Development

This stage exhibits a trend of "dual integration", building on the deepening of market logic from the cluster analysis. On the one hand, market and consumer research have expanded; on the other hand, sustainability concepts have been em-

bedded throughout the entire management value chain. In the timeline map, the close linkage between Clusters #2 and #3 completes the chain of "value perception → payment behavior → relationship maintenance." The time-zone map shows that "demand" and "perceptions" have formed a new hotspot cluster, making market and comprehensive impact assessment standard components of research. The burst keyword sequence progresses in layers: "motivation" and "quality" focus on the micro-level deconstruction of tourist experiences; "destination" and "segmentation" push research up to the level of strategic destination marketing; finally, "sustainable development" and "growth" become core frontiers, demonstrating the deep integration of market value and sustainable development.

Integrating the three analyses, the evolution of the yacht tourism field presents a dynamically ascending academic spiral that echoes the "three-layer progression" model: starting from ecological issues to build a management framework, undergoing a methodological revolution through economic-behavioral tools, and ultimately pursuing a high-order integration of market forces and sustainability. This trajectory confirms that yacht tourism research has matured into a well-established interdisciplinary field, which is expected to deepen further toward smart governance and the circular economy.

This section, through multi-dimensional analysis, has fully presented the dynamic evolutionary logic of research frontiers, providing solid empirical support for the "structure-evolution-roots" framework. The following section will focus on document co-citation cluster analysis to trace the structural characteristics and evolutionary patterns of the field's knowledge base, thereby closing the loop on the "roots" dimension of the framework.

6. Knowledge Base of the Yacht Tourism Field: Document Co-Citation Cluster Analysis

6.1. Structural Characteristics and Dynamic Evolution of the Knowledge Base in Yacht Tourism

The knowledge system in the field of yacht and marine tourism research is an organic whole that is jointly constructed by "knowledge producers" and "knowledge carriers" and evolves dynamically. Structural analysis of this system can be conducted from two basic dimensions—the community of scholars as the core drivers, and the publication sources as channels for solidifying and disseminating research outputs—thereby systematically revealing the knowledge production logic of this interdisciplinary field in responding to practical needs.

First, the evolutionary trajectory of knowledge producers (scholars) clearly outlines the generational shift in research themes and paradigms within the field. In the early period (2000-2010), scholars such as Hall, Orams, and Buckley laid the disciplinary foundation. Their work focused on the ecological impacts of marine tourism, tourist behavior, and management frameworks, establishing sustainable management as a core issue. At the same time, the extensive citation of methodologists (e.g., Hair) and classic theory founders (e.g., Ajzen) reflects the field's ac-

tive borrowing of interdisciplinary theories and empirical methods during its formative stage. Entering the period 2010-2020, research focus shifted significantly toward climate change and systemic sustainability transitions. Gössling emerged as a key scholar during this phase, while Prayag, Dolnicar, and others advanced theoretical deepening and expansion from perspectives such as tourist experience and destination resilience. In recent years (2020-present), emerging scholars including Nunkoo (community participation) and Buhalis (digital tourism) have become active, signaling that the research frontier is moving toward smart governance, social inclusion, and adaptive management. This intergenerational succession of the author network as a whole maps the theoretical deepening path of the field: from focusing on "resource management", to constructing "sustainable systems", and further to exploring "smart and inclusive tourism".

Second, with respect to the literature carriers that host and disseminate the above knowledge, a well-stratified, functionally complementary "pyramid" structure has emerged, deeply reflecting the highly integrated disciplinary characteristics and practice-oriented nature of the field. This structure consists of three functional clusters.

At the top is the core academic journal cluster that drives theoretical innovation. Leading journals in tourism and management (e.g., Tourism Management, Annals of Tourism Research) dominate the construction of foundational theoretical frameworks. Authoritative journals in environmental science and marine studies (e.g., Marine Policy, Ocean & Coastal Management) provide indispensable ecological perspectives and governance tools. Meanwhile, journals in business and consumer research (e.g., Journal of Business Research) contribute key models for understanding markets and behavior.

In the middle is the cluster of international and regional organization reports that provide policy frameworks and global perspectives. Reports and statistical data issued by United Nations agencies (e.g., UNWTO, UNEP), the World Bank, the Organisation for Economic Co-operation and Development (OECD), and the European Commission are frequently cited, establishing the macro-level policy context and regulatory standards for the field.

At the bottom of the knowledge system lies the cluster of national and industry documents that supply empirical materials and local knowledge. Documents published by national statistical agencies (e.g., Statistics New Zealand, STAT NZ), environmental departments (e.g., the U.S. Environmental Protection Agency, US EPA), tourism management authorities, and industry organizations (e.g., the Cruise Lines International Association, CLIA) serve as a critical bridge connecting macro-level theory with micro-level practice, providing indispensable case support, data, and hands-on regulatory experience.

The knowledge base of yacht tourism is a dynamic and multidimensional ecological system. Its evolution is not only driven by the core issues focused by scholars, but also deeply embedded in the linkage literature system of "academic journals (Theoretical Innovation) - International Organizations (policy standards) -

national industry reports (empirical support)". This feature can be interpreted as that the field has the cross attribute of "evidence-based, knowledge and practice oriented". The theoretical evolution and policy iteration, industry practice, and in-depth dialogue with real data seem to form a symbiotic pattern.

6.2. Knowledge Base Structure of the Yacht Tourism Field: Document Co-Citation Cluster Analysis

The preceding analysis has outlined the main contours of knowledge production. To further explore the latent knowledge structure embedded in the field, this study employs document co-citation cluster analysis—a technique widely used to identify disciplinary knowledge bases and trace academic evolutionary paths [10]—which is well suited to the need of uncovering the implicit knowledge structure of yacht tourism research. Based on the document co-citation network map generated by CiteSpace (Figure 8), the knowledge system of the field consists of multiple theoretical clusters with clear boundaries and high consistency. The modularity Q = 0.9531 and the mean silhouette value S > 0.9 confirm the clarity and stability of the structure. Moreover, the clusters exhibit an evolutionary logic from "micro-level user behavior" to "macro-level systemic governance and sustainable development," with some core clusters enjoying solid literature support.

First, "marine tourism destinations" and "pleasure boaters" constitute the core

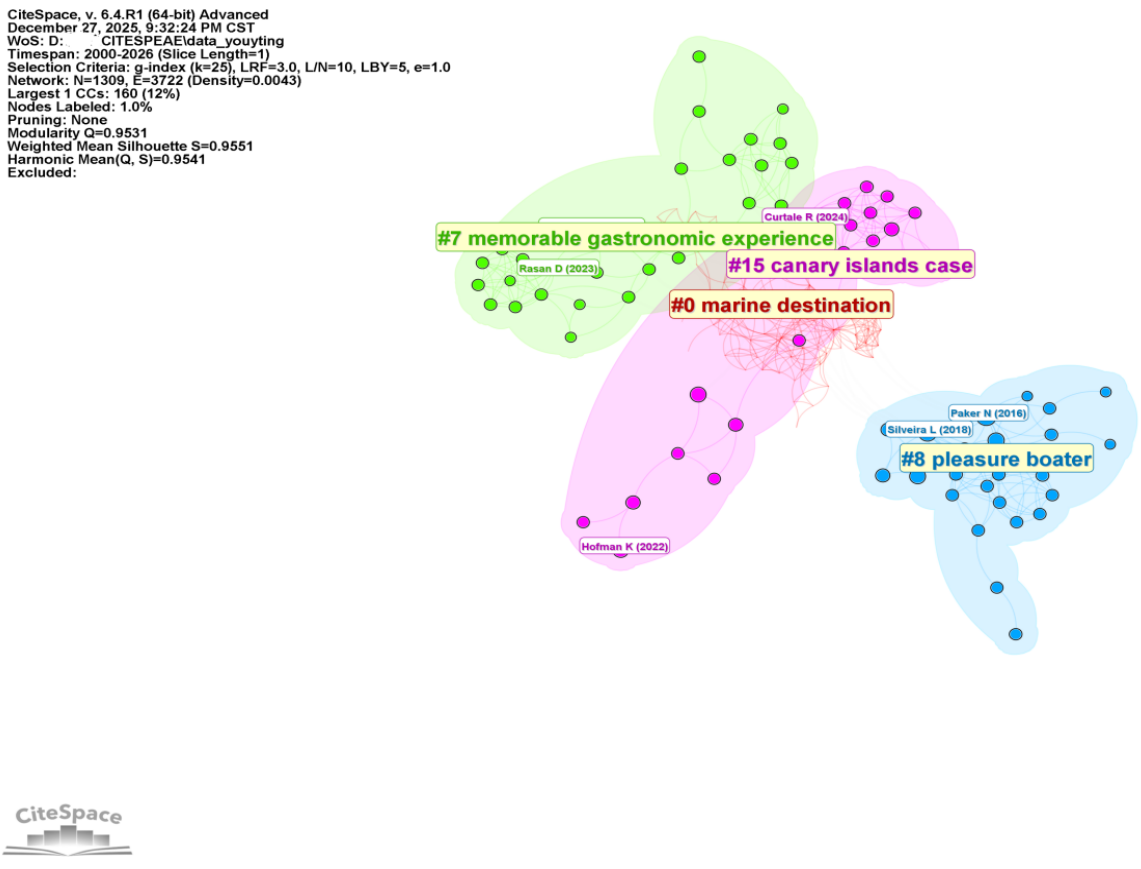

Figure 8. Clustering map of cited references in yacht tourism.

pillars of the knowledge base. Cluster #0 (marine destination, 75 documents) integrates macro-level frameworks such as destination management and environmental forecasting. Cluster #8 (pleasure boater) focuses on micro-level issues including boater behavior, marina attributes, and navigation experiences, with solid literature support. The studies by Benevolo & Spinelli (2021) [12] on benefit-based segmentation of pleasure boaters in Mediterranean marinas, Paker & Vural (2016) [13] on marina destination segmentation, as well as Shen *et al.* (2021) [6] and Christensen *et al.* (2021) [14] on analyzing navigation experience satisfaction using the Kano model, together constitute the classic knowledge core of "user behavior and experience."

Second, frontier research is driving the knowledge base toward sustainability, experience deepening, and case-specific specialization. Clusters from around 2021 represent new growth points. Cluster #7 integrates topics such as sustainable tourism destinations, memorable food experiences, and shared day-yacht rentals. The assessment by De-Juan-Vigaray *et al.* (2025) [15] of natural resource use in the Spanish recreational boating industry precisely echoes the core demands of sustainability. The studies by Sari *et al.* (2016) [16] and Shen *et al.* (2021) [6] provide solid theoretical support for constructing high-quality navigation experiences. Cluster #15 (the Canary Islands case) highlights the value of typical destinations for testing theories. The methodological labels of this cluster, such as "Kano model" and "preference heterogeneity exploration," are maturely applied in Christensen *et al.* (2023) [14] and Paker & Vural (2016) [13], confirming that the analytical tools and theoretical perspectives supporting this case study have formed a coherent system.

Third, global environmental ethics and management challenges have become a frontier concern. Cluster #28 focuses on the compliance challenges of ecotourism. The research by Martín & Yepes (2019, 2021, 2022) [17]-[19] on the integration of landscape ecology and management reflects the cutting-edge exploration of systematically incorporating environmental ethics into management frameworks.

Fourth, sustainable development and multi-dimensional integration have become the dominant paradigm. Recent literature concentrates on the Sustainable Development Goals (SDGs). The series of studies by Martín & Yepes (2019, 2021, 2022) [17]-[19] integrate environmental, social, and management issues. The assessment by De-Juan-Vigaray *et al.* (2025) [15] of resource use and sustainability communication in the Spanish recreational boating industry echoes the UN SDGs, driving the knowledge system toward a comprehensive and systematic paradigm shift.

In summary, the evolutionary logic of the field's knowledge structure is clear: research in Cluster #8 ("pleasure boaters") laid the micro-foundation, and together with the "destination" cluster formed a classic framework. Subsequently, the field diversified toward sustainability, in-depth experience, and typical cases. Currently, it is moving toward multi-dimensional systematic integration, providing solid root-level support for the integrative analysis below.

7. Integrated Discussion: Linking Research Frontiers, Dynamic Evolution, and Knowledge Base

Based on the three-dimensional analysis of keyword clustering, spatiotemporal evolution, and document co-citation, the knowledge system of the yacht tourism field can be deconstructed into a dynamic "stage-theme-signal-root" model (Table 5). This model shows that the evolution of the field is not linear accumulation but is driven by the cyclical interaction of theoretical roots, spatiotemporal foci, and research structures, and is always embedded in a specific socio-academic context.

The static knowledge structure (keyword clusters) defines three broad evolutionary stages and their core themes. During the Ecological Foundation Stage (early 2000s-early 2010s), research focused on four basic themes: recreational boating activity patterns (#8), mega-event impacts (#10), and ecological interaction/protection (#1, #5, #6). During the Management Scientification Stage (mid-to-late 2010s), the focus shifted to climate change adaptation (#7), tourist behavior modeling (#0), environmental value assessment (#3), and the blue economy framework (#4), achieving a leap in methodological quantification and systemic integration. Since 2020, during the Market Deepening and Integration Stage, the frontier has concentrated on tourist experience and loyalty management (#2), systematically embedding sustainability concepts into various themes.

The dynamic evolution analysis (timeline map, time-zone map, and burst keywords) provides key spatiotemporal signals for stage transitions. The Ecological Foundation Stage is marked by the hotspot "management" and the burst keyword "coral reefs." The Management Scientification Stage is characterized by a shift in hotspots from "conservation" to "behavior" and "climate change," with bursts of "management" and "conflict" defining the transition. The Market Deepening and Integration Stage is characterized by a burst sequence of "motivation" → "quality" → "satisfaction" → "growth," clearly outlining the path toward micro-level psychology and sustained growth.

Document co-citation clustering allows deep exploration of the theoretical pedigrees underlying research themes. The emergence and evolution of frontier research themes are all rooted in solid knowledge accumulation. The #8 pleasure boater document cluster is precisely the theoretical origin of research on "recreational boating patterns." The #0 marine destination destination management theory not only supports the exploration of "tourist loyalty management" and various management tools but also deeply intertwines with service marketing and environmental economics principles. This characteristic—multiple frontiers sharing a single root, and a single frontier integrating multiple foundations—precisely highlights the interdisciplinary nature of the field.

Taking "tourist loyalty" research as an entry point, the micro-level cyclical mechanism of "theory-driven → spatiotemporal triggering → structure consolidation" can be clearly unpacked. Service marketing theory constitutes the underlying driving force, which was activated after 2020 by the burst sequence of "motivation-quality-satisfaction" and eventually consolidated into the high-consensus

Table 5. Dynamic interplay of knowledge development in yacht and marine tourism research

Macro-evolutionary Stage (Keyword Clustering)	Core Research Themes (Knowledge Structure)	Corresponding Frontier Clusters (Keyword Clustering)	Key Spatiotemporal Evolution Signals (Timeline Map/Time-Zone Map/Burst Analysis)	Underpinning Theoretical Roots (Document Co-citation Clustering)
Stage 1: Ecological Foundation Stage (2000s-early 2010s)	1. Recreational boating activity patterns and planning	#8 boating patterns	Persistent hotspot: management; early marker: focus on basic activity patterns	#8 pleasure boater (research on pleasure boaters themselves)
	2. Impacts of large-scale marine events	#10 americas cup	Burst case: concentrated discussion as a landmark event by early scholars	Scattered across literature on large-event impact assessment
	3. Ecotourism and critical habitat protection	#1 critical habitat	Hotspot formation: conservation becomes a focus; key burst: coral reefs (2009-2014)	#1 critical habitat,#15 canary islands case (conservation biology and case knowledge)
	4. Ecological impact assessment of marine tourism	#5 marine tourism, #6 great barrier reef	Same as above, together constituting the ecological research axis	#28 world; assessing (global compliance and management frameworks)
Stage 2: Management Scientification Stage (mid-to-late 2010s)	5. Climate change adaptation and resilience	#7 climate change	Emerging hotspot: climate change becomes an independent focus area	Distributed across classical literature on climate science and tourism adaptation
	6. Tourist preference and choice behavior modeling	#0 choice modeling	Hotspot shift: rising interest in behavior; burst marker: management (2017-2019)	#0 marine destination (destination management theory), environmental and resource economics methods
	7. Environmental value assessment and willingness to pay	#3 willingness to pay	Burst marker: conflict (2017-2020), driving demand for quantitative assessment	#0 marine destination (destination management theory), environmental and resource economics methods
	8. Blue economy integration framework	#4 blue economy	Conceptual integration: widely adopted as the economic dimension of sustainable development	#0 marine destination (economic dimension), #7 memorable gastronomic exp. (experiential value dimension)
Stage 3: Market Deepening and Integration Stage (2020s-present)	9. Tourist experience value and loyalty management	#2 loyalty	Hotspot focus: demand, perceptions; burst sequence: motivation (2020) → quality (2021) → satisfaction (2023)	#0 marine destination (destination competitiveness), service marketing and consumer behavior theories
	10. Systemic integration of sustainable development	Embedded across #2, #3, #4 and other frontiers	Strongest burst: sustainable development (2022-2026); co-burst: segmentation (2022), growth (2024)	#0 marine destination (integrated management), #4 blue economy (economic framework), sustainable development theory

keyword cluster #2 loyalty. This internal logic is not an isolated case but applies to all themes in the field: the rise of the "blue economy" stems from the concretization of sustainability theory triggered by the "growth" hotspot; "willingness to pay" research is a instrumental response of environmental economics to the burst

issue of "management conflict," providing quantitative support for conflict resolution.

The essence of field development is an emergent process driven by the continuous relay of micro-level knowledge cycles. All core themes are stable cognitive structures formed by specific theoretical roots catalyzed by spatiotemporal signals. Their sequential emergence, synergy, and integration have pushed the research paradigm from ecological management and scientification of tools toward market deepening and systemic integration of sustainable development. The dynamic evolution model constructed in this study not only clarifies the internal logical of field development but also provides a reusable analytical framework and approach for understanding the evolution of applied interdisciplinary fields.

8. Conclusions

Using the CiteSpace scientific knowledge mapping tool, this paper conducts a systematic bibliometric and visual analysis of 619 international yacht tourism research literatures in the core collection of web of science from 2000 to 2026. Through the construction of keyword co-occurrence network and literature co citation network, combined with the time sequence evolution map and the detection technology of emergent words, this paper systematically reveals the knowledge structure, evolution trajectory and theoretical foundation of this field, and draws a dynamic and complete knowledge panorama, providing the final empirical closed loop forthe "structure evolution root" interpretation framework.

Based on the above analysis, it can be concluded that the study of international yacht tourism has experienced three identifiable stages of evolution, showing a spiral paradigm transition. In the early stage (2000-2010), the "ecological foundation period" focused on the ecological impact assessment of marine tourism and the construction of basic management framework, focusing on leisure boating mode, key habitat protection and other issues; During the "scientific management period" in the middle and late 2010, we introduced the tools of environmental economics and behavioral science to carry out quantitative research on climate change adaptation, willingness to pay assessment, blue economy framework, etc. under the guidance of sustainable development; In the recent (2020 to now) "market deepening and integration period", we will strengthen the market logic and the value mining of tourist experience, and promote the systematic integration of the concept of sustainable development with issues such as tourist loyalty management and destination competitiveness improvement. This context can be interpreted as the transformation of academic focus from phenomenon description to precise governance, and then to value co creation. At the same time, it also implies that yacht tourism, as a research field of social ecological economic composite system, is moving towards the direction of increasingly mature and interdisciplinary integration.

At the level of knowledge structure, this study identified that "management" and "influence" constitute two core pillars, as well as the hot network of in-depth

mining and exploration of the dimension of "people", and extracted ten core issues such as leisure boating mode, blue economy and tourist loyalty through cluster analysis. These issues do not exist in isolation. They all rely on the solid knowledge base composed of classic marine tourism destination geography, leisure boating behavior research, sustainable tourism framework and multidisciplinary tools. The literature co citation analysis further confirmed that the production of domain knowledge highly relies on the trinity of "academic journals - International Organization reports - national industry documents", highlighting the strong policy relevance and practice orientation, and echoing the previous knowledge-based analysis conclusion.

The core contribution of this study is to integrate the scattered knowledge fragments in the field with the help of the mapping method of scientific knowledge, and build a complete interpretation framework of "structure evolution root", which not only clarifies the internal development logic of the field from ecological drive to system integration, but also provides a reference paradigm for the analysis of the evolution law of similar applied interdisciplinary disciplines. At the same time, there are limitations in this study: the data are only from the core collection of WOS. Although the quality and consistency are guaranteed, some emerging or regional achievements may be omitted; Knowledge mapping focuses on macro structure disclosure, and the in-depth interpretation of specific theoretical disputes and local situational differences still needs to be supplemented by qualitative research.

From the perspective of practical empowerment, the dynamic evolution model built in this study can provide targeted support for the iterative upgrading and policy precise empowerment of China's yacht tourism industry, and form a deep echo with the in-depth promotion of the "blue economy" strategy. Focusing on the destination planning scenario, the core yacht tourism agglomeration areas such as Hainan free trade port and Guangdong-Hong Kong-Macao Bay area, the stage law of "ecological foundation building - management iteration - market integration" contained in the model can effectively avoid the blindness and homogenization hidden dangers in the development.

For ecologically sensitive Bay areas such as Beibu Gulf, it is necessary to anchor the core meaning of "ecological foundation period"—the key to this stage is the threshold assessment of ecological carrying capacity and the primary protection of key habitats. Specifically, the fragile ecosystem protection paradigm revealed by cluster \1 (critical habitat) and cluster \6 (Great Barrier Reef case) in this study can be used for reference to scientifically define the boundaries of yacht navigation ban areas and ecological buffer zones, and build a solid ecological base for industrial development. For areas with mature industries such as Shanghai and Qingdao, the two-stage context of "scientific management" and "market depth" should be integrated. We can refer to the quantitative tools represented by cluster \0 (choice modeling) and cluster \3 (willingness to pay), and introduce the means of tourists' behavior pedigree modeling and willingness to pay gradient assessment

to optimize the spatial adaptability and service pricing mechanism of the terminal, so that the concept of sustainable development can penetrate the whole chain of operation. At the policy-making end, the corresponding mechanism of "time and space signals - Theoretical traceability" constructed by the model constitutes the core of precise policy implementation. Facing the core obstruction of management conflict, it is necessary to integrate quantitative tools of Environmental Economics (such as ecological value accounting model) and destination management theory to build a market-oriented mechanism for yacht tourism ecological compensation—this idea directly echoes the research tradition of "resolving conflicts by quantitative assessment" embodied in cluster \7 (climate change) and cluster \0 (choice modeling). Aiming at the demands of cultivating tourists' loyalty, the differentiated customer group operation logic in the service marketing theory can be grafted to form a precise management strategy, which is the practical transformation of clustering \2 (loyalty) research.

The deepening direction of yacht tourism research should closely follow the dual demands of "blue economy" strategy and high-quality industrial development, and refuse to list simple dimensions. The localization and integration of interdisciplinary theories can be regarded as the primary breakthrough point. In frontier fields such as ecosystem service value assessment, circular economy empowerment, digital governance tool application, and community collaborative participation, it is necessary to closely follow the national policy guidance, break the path dependence of the international theoretical framework, and enrich the theoretical pedigree suitable for China's yacht tourism scene—Smart yacht wharf technology empowerment path, and digital regulatory landing paradigm, which should become the core focus of research.

The expansion of geographical research perspective cannot be generalized. The emerging yacht market in China's coastal economic belt, Hainan free trade port, Guangdong-Hong Kong-Macao Bay area and other strategic areas needs systematic research; The development experience of international mature regions is not a simple reference, but through comparative analysis, we need to refine the path model suitable for China's regional development characteristics, and fill the weak link of local research and the imbalance of regional research.

Micro mechanism analysis and policy tool innovation directly determine the practical transformation efficiency of research. The actual effect of behavior intervention strategy and the coordination mechanism of government, enterprises, communities and tourists' multiple stakeholders need to be further disassembled; Industry pain points such as insufficient supply of terminals, lagging regulatory system, and single consumption scene need to put forward policy optimization schemes and management tools that can be implemented, so that academic research can truly meet industrial demand.

Under the guidance of global climate change and SDGS goals, low-carbon transformation and ecological synergy have become a must for the development of yacht industry. Closely linked to the "double carbon" strategy and the deploy-

ment of marine spatial planning, the application of low-carbon technology in the yacht industry, the collaborative mechanism of marine ecological protection and spatial utilization, and the path to enhance industrial resilience, a systematic research framework needs to be built. Only in this way can we activate the vitality of the blue economy, realize the synergy and unity of ecological, social and economic benefits, and lay a solid academic foundation for the inclusiveness, resilience and sustainable development of the blue economy in China and even the world.

Funding

1) Supported by Hainan Provincial Natural Science Foundation of China (725RC786);

2) 2025 Philosophy and Social Sciences Planning Project of Hainan Province (NSK(JD)25-02);

3) Key Project of Philosophy and Social Sciences of Sanya City (SYSK2025-02);

4) Hainan Tropical Ocean University (RHDRC202211);

5) Supported by the Introduction to the Yacht Industry course, which has been designated as a 2026 Model Course for Curriculum Ideological and Political Education.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Alcover, A., Alemany, M., Jacob, M., Payeras, M., García, A. and Martínez-Ribes, L. (2011) The Economic Impact of Yacht Charter Tourism on the Balearic Economy. *Tourism Economics*, **17**, 625-638. https://doi.org/10.5367/te.2011.0045

[2] Mikulić, J., Krešić, D. and Kožić, I. (2015) Critical Factors of the Maritime Yachting Tourism Experience: An Impact-Asymmetry Analysis of Principal Components. *Journal of Travel & Tourism Marketing*, **32**, S30-S41. https://doi.org/10.1080/10548408.2014.981628

[3] Sariisik, M., Turkay, O. and Akova, O. (2011) How to Manage Yacht Tourism in Turkey: A Swot Analysis and Related Strategies. *Procedia—Social and Behavioral Sciences*, **24**, 1014-1025. https://doi.org/10.1016/j.sbspro.2011.09.041

[4] Chen, J.M., Chrysanthi, B., Nijkamp, P., *et al.* (2016) The Sustainability of Yachting Tourism: A Case Study on Greece. *International Journal of Culture Tourism & Hospitality Research*, **2**, 42-49.

[5] Hojnik, J., Biloslavo, R., Cicero, L. and Cagnina, M.R. (2020) Sustainability Indicators for the Yachting Industry: Empirical Conceptualization. *Journal of Cleaner Production*, **249**, Article ID: 119368. https://doi.org/10.1016/j.jclepro.2019.119368

[6] Shen, Y., Kokkranikal, J., Christensen, C.P. and Morrison, A.M. (2021) Perceived Importance of and Satisfaction with Marina Attributes in Sailing Tourism Experiences: A Kano Model Approach. *Journal of Outdoor Recreation and Tourism*, **35**, Article ID: 100402. https://doi.org/10.1016/j.jort.2021.100402

[7] Choi, E., Jang, W. and Park, T. (2025) Key Attributes Driving Yacht Tourism: Ex-

ploring Tourist Preferences through Conjoint Analysis. *Sustainability*, **17**, Article No. 3336. https://doi.org/10.3390/su17083336

[8] Freeman, L.C. (1977) A Set of Measures of Centrality Based on Betweenness. *Sociometry*, **40**, 35-41. https://doi.org/10.2307/3033543

[9] Chen, C. (2006) CiteSpace II: Detecting and Visualizing Emerging Trends and Transient Patterns in Scientific Literature. *Journal of the American Society for Information Science and Technology*, **57**, 359-377. https://doi.org/10.1002/asi.20317

[10] Chen, C., Ibekwe-SanJuan, F. and Hou, J. (2010) The Structure and Dynamics of Cocitation Clusters: A Multiple-Perspective Cocitation Analysis. *Journal of the American Society for Information Science and Technology*, **61**, 1386-1409. https://doi.org/10.1002/asi.21309

[11] Rousseeuw, P.J. (1987) Silhouettes: A Graphical Aid to the Interpretation and Validation of Cluster Analysis. *Journal of Computational and Applied Mathematics*, **20**, 53-65. https://doi.org/10.1016/0377-0427(87)90125-7

[12] Benevolo, C. and Spinelli, R. (2021) Benefit Segmentation of Pleasure Boaters in Mediterranean Marinas: A Proposal. *International Journal of Tourism Research*, **23**, 134-145. https://doi.org/10.1002/jtr.2403

[13] Paker, N. and Vural, C.A. (2016) Customer Segmentation for Marinas: Evaluating Marinas as Destinations. *Tourism Management*, **56**, 156-171. https://doi.org/10.1016/j.tourman.2016.03.024

[14] Christensen, C.P., Shen, Y., Kokkranikal, J. and Morrison, A.M. (2021) Understanding British and Danish Sailing Tourism Markets: An Analysis Based on Kano's Evaluation Matrix. *Tourism Recreation Research*, **48**, 30-42. https://doi.org/10.1080/02508281.2021.1891742

[15] De-Juan-Vigaray, M.D., Einsle, C.S., Dobson, J.Y. and Bordehore, C. (2025) Marine and Coastal Natural Resources in the Recreational Boating Sector in Spain: State of the Art and Changes Needed. *Ocean & Coastal Management*, **262**, Article ID: 107580. https://doi.org/10.1016/j.ocecoaman.2025.107580

[16] Sari, F.O., Bulut, C. and Pirnar, I. (2016) Adaptation of Hospitality Service Quality Scales for Marina Services. *International Journal of Hospitality Management*, **54**, 95-103. https://doi.org/10.1016/j.ijhm.2016.02.004

[17] Martín, R. and Yepes, V. (2019) The Concept of Landscape within Marinas: Basis for Consideration in the Management. *Ocean & Coastal Management*, **179**, Article ID: 104815. https://doi.org/10.1016/j.ocecoaman.2019.104815

[18] Martín, R. and Yepes, V. (2021) Bridging the Gap between Landscape and Management within Marinas: A Review. *Land*, **10**, Article No. 821. https://doi.org/10.3390/land10080821

[19] Martín, R. and Yepes, V. (2022) Assessing the Relationship between Landscape and Management within Marinas: The Managers' Perception. *Land*, **11**, Article No. 961. https://doi.org/10.3390/land11070961