

BIBLIOMETRIC ANALYSIS OF COMPETITIVE ADVANTAGE IN MARITIME INDUSTRY BASED ON SCOPUS PUBLICATIONS

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Abstract

The maritime industry plays a crucial role in global trade, and exploring the landscape of knowledge on port competitiveness is essential for enhancing their efficiency and sustainability. As the industry faces evolving challenges, examining the global body of research on port competitiveness has become increasingly important for both academic research and practical applications. This bibliometric analysis examines global research trends and key themes related to competitive advantage in the maritime industry, based on publications indexed in the Scopus database. A total of 268 peer-reviewed journal articles were analyzed using citation analysis and co-occurrence mapping through VOS viewer to identify prominent authors, countries, and emerging research directions. Three main research clusters were identified: the competitive advantage of seaports, the resilience of port authorities through strategic collaboration, and cost-effective and sustainable maritime supply chains. The findings emphasize the importance of innovation, collaboration, and sustainability in enhancing port competitiveness and optimizing maritime logistics. This study offers insights for future research, particularly in exploring the determinants of competitive advantage, the role of digital transformation and the integration of artificial intelligence in enhancing port efficiency and sustainability.

Keywords: Competitive Advantage, Port, Bibliometric Analysis, Scopus, VOS Viewer.

1. INTRODUCTION

The maritime industry serves as a foundational element of global trade, with ports functioning as essential nodes that facilitate the movement of goods worldwide. In an era where maritime logistics is crucial to economic development, understanding the complexities of port operations and their competitive advantages has become increasingly significant.

Ports must navigate not only volatile market conditions but also technological advancements and evolving stakeholder expectations to remain competitive (Mohiuddin et al., 2024; Saputra & Siregar, 2022).

Current challenges facing ports include increased global competition, stringent environmental regulations, and the necessity for digital transformation. Notably, the ongoing digitalization within maritime shipping poses both opportunities and threats; while it can enhance operational efficiency, it also demands significant investment in technology and workforce adaptation (Mudra et al., 2023).

Despite ongoing innovations in port management and logistics technology, there remains a substantial gap in cohesive strategies that integrate these advancements within a competitive framework (Razmjooei et al., 2023). Previous research has extensively examined various

aspects of maritime logistics, including the impact of big data (An, 2024), artificial intelligence in supply chain management (Munim et al., 2020), and autonomous shipping.

However, a bibliometric analysis focusing specifically on competitive advantage in the maritime industry—particularly pertaining to ports—remains markedly underexplored. While studies have been conducted in areas such as maritime cybersecurity and technological integration, they often lack a cohesive, structured review to crystallize insights on port competitiveness (Razmjooei et al., 2023; Selvaduray et al., 2023).

This gap highlights the need for an extensive, systematic bibliometric analysis to map the state of research concerning competitive advantage in ports and the maritime industry. Through this analysis, this study aims to synthesize existing literature, identify prevailing trends and patterns, and delineate future research directions. By doing so, the research will not only clarify the dominant themes within this field but also contribute to the strategic framework necessary for ports to enhance their competitive standing in the maritime sector.

2. MATERIALS AND METHODS

This study uses bibliometric and content analysis to examine global publication trends of competitive advantage in maritime industry field and identify areas for further research. The bibliometric method provides a quantitative assessment of research output, reflecting academic interest and influence. Citation analysis and co-occurrence mapping were employed to map publication networks and reveal trends, highlighting key articles, authors, countries, emerging topics, and potential future research directions. These methods help minimize bias and offer a comprehensive view of the research landscape (Napitupulu & Yakub, 2021).

The bibliometric analysis was performed in April 2025 using the Scopus database, known for its extensive coverage of citations and abstracts in fields like STEM (Zakaria et al., 2021). Scopus is recognized globally for its rigorous indexing of high-quality, peer-reviewed journals, making it a trusted resource in scientific research (Napitupulu & Yakub, 2021). Given its reliability and frequent use in bibliometric studies, Scopus was chosen as the sole database for this analysis.

We used a keyword-based search strategy aligned with our research questions to identify relevant documents on competitive advantage in the maritime industry. Specifically, we searched the TITLE-ABS-KEY field in Scopus to ensure comprehensive retrieval of documents related to our topic. The search query was:

TITLE-ABS-KEY (“competitive advantage”) AND TITLE-ABS-KEY (port OR dock OR harbor OR anchorage OR haven OR bunder).

The initial search resulted in 385 documents. To ensure relevance and quality, we applied strict criteria: only English-language, peer-reviewed journal articles were included, excluding conference proceedings, books, book chapters, reviews, and other publication types. This filtering process excluded 117 articles, leaving 268 for in-depth analysis. Figure 1 visually represents the search and filtering workflow.

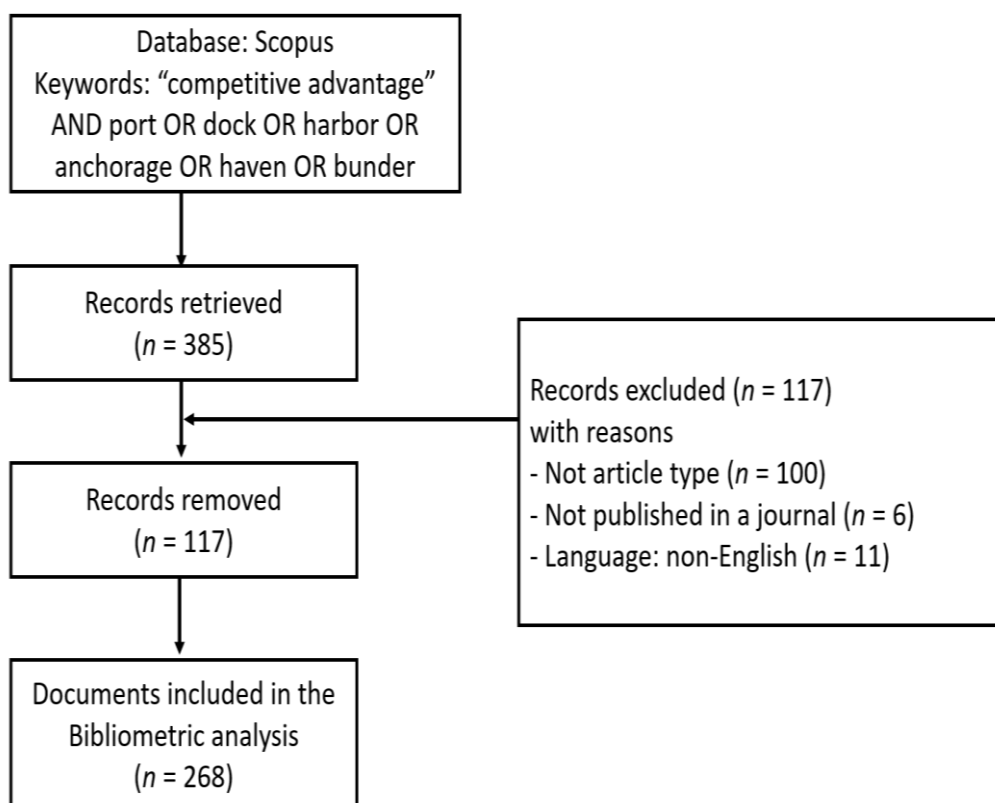


Figure 1: Data Processing Flow Diagram

Before analysis, we performed data cleaning and harmonization to ensure accuracy (Punj et al., 2023), focusing on keyword consistency. Using VOSviewer's Thesaurus function, we standardized terms like "competitive advantages" and "competitive advantage," "ports" and "port," and "corporate social responsibility (CSR)" and "corporate social responsibility" to improve data accuracy.

This study uses bibliometric methods, combining citation and co-occurrence analysis, to explore the research question. Citation analysis identifies influential documents and trends (Ellegaard & Wallin, 2015), while co-occurrence analysis maps key topics and research connections. Using Ellegaard and Wallin (2015), MS Excel and Publish or Perish calculate publication impact, and VOSviewer visualizes bibliometric networks, offering insights into the field's structure (Van Eck & Waltman, 2014). These methods provide a comprehensive understanding of the intellectual landscape.

3. RESULTS

3.1. Research Trends

Figure 1 illustrates the trend of publications and citations related to corruption in economic from 1964 to 2025. Between 2000 and 2025, the number of publications on competitive

advantage in the maritime industry grew steadily, especially from 2018 onward. Initially, the number of publications was low, with most years having fewer than 10 articles. However, in 2024, the number surged to 28, indicating a growing academic focus on this area. Similarly, citations followed a similar upward trajectory.

Early years had few citations, but from 2019 onwards, citations increased significantly, peaking at 279 in 2020 (Figure 2). This rise suggests that the recent publications have had a notable impact in the field. While the number of publications in 2025 decreased, citations remained steady, showing that the research continues to be relevant and influential.

Table 1: Total Publications and Citations by Year

Year	Total Publications	Total Citations
2025	4	6
2024	28	70
2023	25	187
2022	16	140
2021	10	112
2020	22	279
2019	17	215
2018	17	244
2017	9	166
2016	15	344
2015	13	252
2014	6	138
2013	8	200
2012	6	127
2011	11	224
2010	6	271
2009	2	25
2008	5	195
2007	4	96
2006	5	215
2005	6	523
2004	8	197
2003	2	2
2002	3	60
2001	3	91
2000	3	110
1999	3	186
1997	2	87
1996	1	16
1995	2	56
1994	1	45
1993	1	24
1992	1	23
1986	1	14
1978	1	19
Total	267	4959

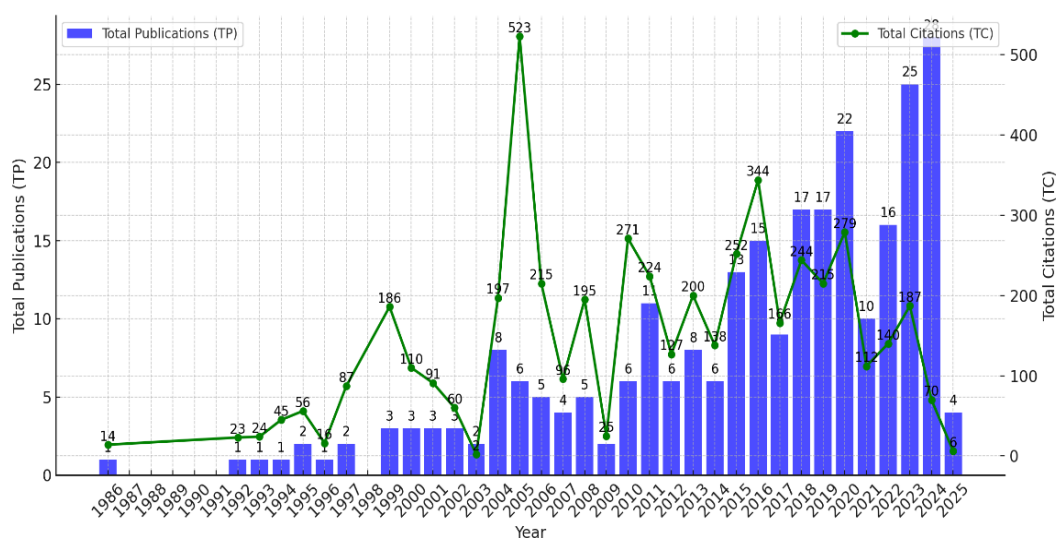


Figure 2: Research Trends

3.2. Most Prominent Authors

The data shows that a few authors have significantly contributed to the research on competitive advantage in the maritime industry. Choi, H.R., Haezendonck, E., and Lam, J.S.L. each published four articles, accounting for 1.49% of the total publications. Several others, including Ding, J.F., Jeevan, J., Ngah, A.H., Yap, W.Y., and Yip, T.L., contributed three publications, representing 1.12% of the total. A larger group of authors, such as Alajaleen, Y., Albtoosh, Q., and others, published two articles each, making up 0.75% of the total. This indicates that while the field is shaped by a broad range of contributors, a small group of authors are leading the scholarly discourse.

Table 2: Top Prominent Authors

Authors	TP	Percentage
Choi, H.R.	4	1,49%
Haezendonck, E.	4	1,49%
Lam, J.S.L.	4	1,49%
Ding, J.F.	3	1,12%
Jeevan, J.	3	1,12%
Ngah, A.H.	3	1,12%
Yap, W.Y.	3	1,12%
Yip, T.L.	3	1,12%
Alajaleen, Y.	2	0,75%
Albtoosh, Q.	2	0,75%
Bartosiewicz, A.	2	0,75%
Cahoon, S.	2	0,75%
Campbell, S.J.	2	0,75%
Carlan, V.	2	0,75%
Chou, M.T.	2	0,75%
Cullinane, K.	2	0,75%

Córdova, F.	2	0,75%
Durán, C.	2	0,75%
Ghani, M.A.A.	2	0,75%
Hamid, N.	2	0,75%

Note: TP=total number of publications

3.3. Most Prominent Countries

The bibliometric analysis reveals that the United States leads in publications on competitive advantage in the maritime industry, contributing 46 publications, which accounts for 17.16% of the total. China follows with 31 publications (11.57%), while the United Kingdom is close behind with 30 publications (11.19%). Other prominent countries include Australia and South Korea, both with 16 publications (5.97%), and Canada with 13 publications (4.85%). Several European and Asian countries, such as Belgium, Malaysia, Taiwan, Germany, and Singapore, each contribute 10 to 11 publications, making up a significant portion of the global research in this area. This distribution highlights the major role played by North American, Asian, and European countries in shaping the research landscape.

Table 3: Top Prominent Countries with at least 10 Publications

Country	Continent	TP	Percentage
United States	North America	46	17,16%
China	Asia	31	11,57%
United Kingdom	Europe	30	11,19%
Australia	Oceania	16	5,97%
South Korea	Asia	16	5,97%
Canada	North America	13	4,85%
Belgium	Europe	11	4,10%
Malaysia	Asia	11	4,10%
Taiwan	Asia	11	4,10%
Germany	Europe	10	3,73%
Singapore	Asia	10	3,73%

Note: TP=total number of publications

3.4. Highly Cited Documents

The data on highly cited documents reveals significant contributions to the field of competitive advantage in the maritime industry. The most cited paper, "Port privatization, efficiency and competitiveness: Some empirical evidence from container ports" by Tongzon and Heng (2005), has accumulated 432 citations, averaging 2160 citations per year, indicating its enduring impact. Other influential works include Hung, Lu, and Wang's (2010) study on the operating efficiency of Asia container ports, with 128 citations and 853 citations per year, highlighting its relevance in the field. Similarly, Carlan, Sys, and Vanelslander's (2016) research on port community systems and their impact on competitiveness has earned 102 citations, averaging 1133 citations per year. Other notable papers, such as Cullinane, Fei, and Cullinane's (2004) study on container terminal development in China, and Ellram, Tate, and Feitzinger's (2013) work on supply chain competition, also show strong citation performance, further emphasizing

the importance of these works in shaping the understanding of port competitiveness and efficiency.

Table 4: Highly Cited Documents

No.	Author(s)	Title	TC	C/Y
1.	J. Tongzon, W. Heng (2005)	Port privatization, efficiency and competitiveness: Some empirical evidence from container ports (terminals)	432	2160
2.	S.-W. Hung, W.-M. Lu, T.-P. Wang (2010)	Benchmarking the operating efficiency of Asia container ports	128	853
3.	V. Carlan, C. Sys, T. Vanelslander (2016)	How port community systems can contribute to port competitiveness: Developing a cost-benefit framework	102	1133
4.	K. Cullinane, W.T. Fei, S. Cullinane (2004)	Container terminal development in mainland China and its impact on the competitiveness of the port of Hong Kong	93	443
5.	L.M. Ellram, W.L. Tate, E.G. Feitzinger (2013)	Factor-Market Rivalry and Competition for Supply Chain Resources	83	692
6.	M. De Martino, A. Morvillo (2008)	Activities, resources and inter-organizational relationships: Key factors in port competitiveness	74	435
7.	J.R.M. Gordon, P.-M. Lee, H.C. Lucas Jr. (2005)	A resource-based view of competitive advantage at the Port of Singapore	70	350
8.	D.W. Coltman, W.D. Bowen, D.J. Boness, S.J. Iverson (1997)	Balancing foraging and reproduction in the male harbour seal, an aquatically mating pinniped	63	225

Note: TC = total citations; C/Y = total citations per year

3.5. Thematic Analysis

Keywords represent the primary topic, central theme, or key area of an article within a specific research field (Ranjbari et al., 2021). To identify the main topics related to corruption in economics, we conducted a co-occurrence analysis to map the thematic areas in this field. Using VOSviewer, we visualized key topics, emerging trends, and potential future research directions based on author-provided keywords, revealing the interconnections among various research components. A total of 944 keywords were analyzed, and those appearing at least two times were selected, resulting in 81 mapped keywords, as shown in Figures 3. In the network visualization, the circles (nodes) represent individual keywords or topics, with their size reflecting the frequency of co-occurrences. The thickness of the links between the nodes indicates the strength of their connections, signifying the number of related research networks.

According to Figure 3 of the network visualization, several keywords appear frequently related to competitive advantage in the maritime industry research, including "competitive advantage" (28), "port" (16), "logistics" (6), "competition" (6), "maritime industry" (6), "efficiency" (5), "innovation" (4), "corporate social responsibility" (4), "sustainability" (4), and "port competitiveness" (4). These keywords are organized into distinct themes or clusters based on their relatedness. Figure 3 displays four clusters, each represented by red, green, and blue dotted circles, which correspond to different thematic areas within the research.

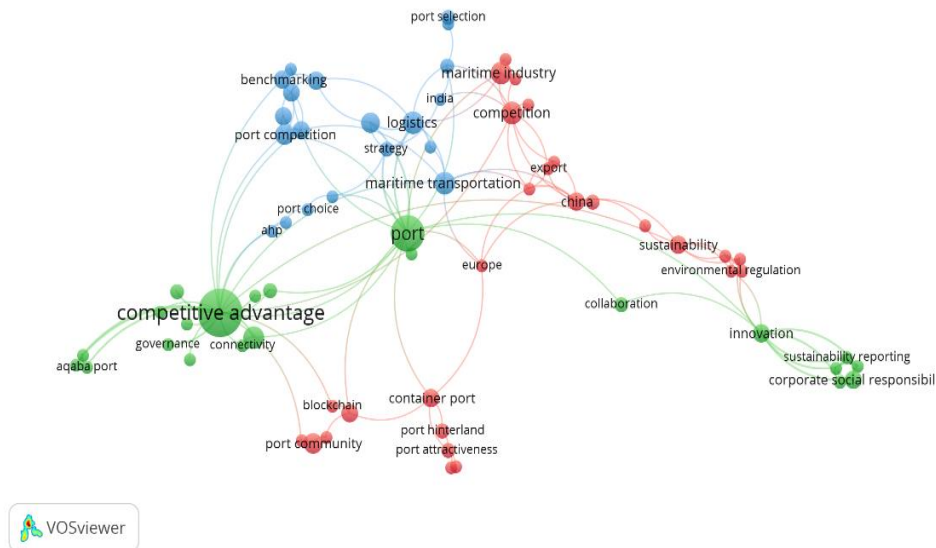


Figure 3: Network Visualization

The Vosviewer mapping results with the visualization overlay (Figure 4) illustrate the publication trends of keywords over time. The lighter the color of the link and circle, the more recent the publication. Noteworthy keywords from recent publications include "digital transformation", "human resource", "natural resources", "container throughput", "sustainable reporting", "greenwashing" and "port marketing".

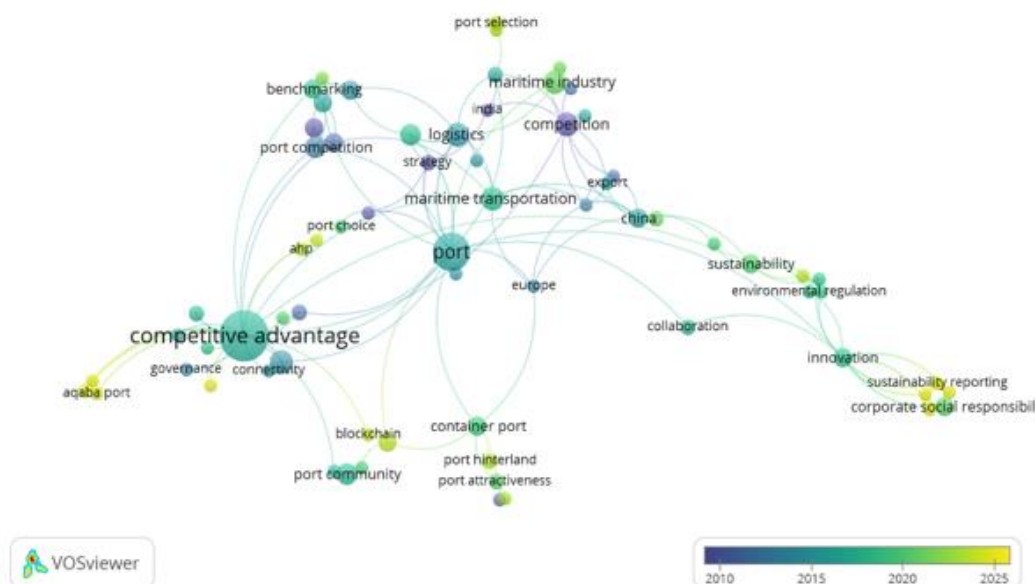


Figure 4: Overlay Visualization

4. DISCUSSION

Based on Figure 3, a thematic analysis was conducted to identify the main topics in competitive advantage research within the maritime industry. This analysis led to four primary research directions, which are represented as four clusters in VOS viewer. Cluster 1 focuses on the competitive advantage of seaports. This cluster aims to empirically identify the key location advantages that determine the competitive position of a port, particularly for containers and conventional cargo, when compared to its main competitors in a specific region.

Research in the cluster suggest that the port benefits greatly from the infrastructure used by forwarders, as well as the flexibility and productivity of its dockworkers. However, they identifies three key disadvantages: weak competitiveness in pilotage and inland navigation service providers, and limited maritime accessibility (Vanden Bossche & Gujar, 2010). Additionally, the pricing of dry ports and related infrastructure is a current issue, driven by the need to balance government investments with the pricing policies of dry port operators. With the shift from public sector monopolies to private sector involvement in logistics, competition has raised concerns about ensuring a level playing field. This paper highlights the importance of appropriate pricing for dry port infrastructure, which not only supports investment cost recovery but also protects users from predatory pricing practices by the private sector. It advocates for regulatory measures and port policy formulation to foster international trade growth (Haezendonck et al., 2000).

Cluster 2 describes Port Authority Resilience. This cluster focuses on the resilience of port authorities through strategic collaboration. Following the financial crisis, many organizations faced increased risks to their sustainability, and strategic collaborations in logistics networks, with ports as key nodes, help mitigate these risks. These collaborations enable organizations to gain efficiencies like economies of scale and foster opportunities for mutual learning (Haugstetter & Cahoon, 2010). Port authorities, being central in these networks, benefit from increased opportunities to learn and innovate. Three key factors are crucial for port authorities to integrate knowledge from networks: shared knowledge for effective communication, organizational routines that encourage knowledge sharing, and efficient structures within the port authority to minimize knowledge loss during integration. By strategically managing these elements, port authorities can balance their current competitive advantages with future resilience, positioning themselves for long-term success despite external risks (D'Agostino, 2015).

Cluster 3 focuses on Cost-Effective and Sustainable Maritime Supply Chains. It emphasizes the efficiency and sustainability of maritime logistics. To meet the renewable energy targets set by the European Union, cost-effective transportation methods for forest fuels are crucial. A study in Finland's Lake Saimaa region demonstrated that barge-based waterway transport offers a competitive advantage over truck transport, especially for distances of 100-150 km, due to its larger load capacity and higher energy density (Karttunen et al., 2012). By using a fixed barge system and shift-independent harbor logistics, waterway transport reduced supply chain costs and improved fuel efficiency. Maritime transport, as the primary mode for international trade, offers the lowest costs, largest transport capacity, and the ability to carry

goods over long distances. It is more profitable and cost-efficient than other transportation modes, with the expansion of container ports and the optimization of port systems boosting global competitiveness and contributing to a more sustainable supply chain (Kovačević, 2014).

5. CONCLUSION

This bibliometric analysis provides a comprehensive overview of the research trends and thematic areas related to competitive advantage in the maritime industry. By analyzing 268 publications retrieved from the Scopus database, we identified key topics, prominent authors, and countries contributing to the field. The findings indicate a growing academic focus on this subject, particularly from 2018 onward, with significant spikes in both publications and citations. The thematic analysis revealed three main clusters, each addressing critical aspects of maritime competitiveness, including the competitive advantage of seaports, the resilience of port authorities through strategic collaboration, and cost-effective and sustainable maritime supply chains. The results highlight the importance of continued research on port management, logistics, and sustainable practices to enhance global competitiveness in maritime trade.

The theoretical implications of this bibliometric analysis highlight the importance of expanding the understanding of seaport competitiveness and maritime supply chains by integrating concepts such as strategic collaboration, port authority resilience, and sustainability in maritime transport. This research also paves the way for the development of new theories in port management and logistics, particularly in the context of adapting to global market changes and environmental regulatory demands. Practically, the findings can provide guidance for policymakers, port managers, and logistics industries in formulating more effective strategies to enhance competitiveness, cost efficiency, and operational sustainability. By focusing on innovation in infrastructure and business models, stakeholders can design policies that support the growth of more sustainable and efficient international trade.

The limitations of this study include its reliance on a single database, Scopus, which, while comprehensive, may not capture all relevant publications from other sources such as regional journals or grey literature. Additionally, the analysis focuses primarily on bibliometric methods, which may not fully capture the qualitative aspects of research, such as the impact of individual studies on policy or practice. Future research could expand the scope by incorporating multiple databases to include a broader range of publications, as well as integrating qualitative approaches to gain deeper insights into the practical applications of competitive advantage theories in the maritime industry.

Future studies should explore the determinants of competitive advantage in seaports, including organizational change capability and corporate resilience. Understanding how ports adapt to external pressures and internal changes is crucial for maintaining long-term competitiveness, especially in an increasingly dynamic global trade environment. Organizational change capability enables ports to adjust effectively to evolving market demands, technological advancements, and regulatory requirements, while corporate resilience helps them recover from disruptions such as economic downturns, natural disasters, or geopolitical shifts. Investigating these factors will provide valuable insights into how ports can not only survive

but thrive in a competitive and unpredictable landscape, offering practical strategies for enhancing their sustainability and competitiveness. Moreover, further emerging topics like the role of digital transformation and the integration of artificial intelligence in enhancing port efficiency and sustainability, which were not extensively covered in this analysis.

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