BIBLIOMETRIC ANALYSIS OF RESEARCH TRENDS ON CATCH HANDLING ON PURSE SEINE VESSELS

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ABSTRACT

This study aims to analyze research trends related to the handling of catch on purse seine ships using a bibliometric approach. The fishing industry has a strategic role in food supply and global economic growth, where purse seine is one of the most commonly used fishing gear. The handling of catches on board ships has a great influence on fish quality, economic efficiency, and the sustainability of the fishery industry. However, there are still various challenges in the implementation of optimal storage methods, pre-processing, and sanitation and hygiene on board. Using data from the Scopus database, this study analyzes publication patterns, research collaborations, and main topics that develop in the study of handling catch on purse seine ships. The results of the analysis show that there is an increase in research interest in the aspects of storage technology and sustainability of fishery products. In addition, this study identifies a gap in studies related to technological innovations in handling fish on ships that are more efficient and environmentally friendly. The implications of this study provide insights for academics, industry practitioners, and policymakers to improve more effective and sustainable catch management systems.

Keywords: Bibliometrics, Catch Handling, Purse Seine Vessels, Scopus Database

INTRODUCTION

In the context of food resource provision, economic growth, and livelihoods for many communities worldwide, particularly in coastal areas, the fishing industry plays a crucial role. Purse seine is one of the most commonly used fishing methods. It is a type of fishing gear designed in the form of an encircling net, specifically structured to efficiently catch large quantities of fish (Sutono et al., 2022). The advantages of purse seine make it the primary fishing gear for the majority of fishermen, from small-scale to commercial operations worldwide.

In its operation, the quality of the catch on purse seine vessels is highly influenced by several post-harvest handling processes, such as storage methods, initial processing, and hygienic handling (Imron, 2024; Sukadiyana & Saraswati, 2024).

The success of using purse seine is not only determined by its ability to catch large quantities of fish but also by the handling processes of the catch onboard (Imron, 2024). Poor handling practices, such as delays in storage, inadequate use of cooling facilities, or lack of attention to sanitation and hygiene, can lead to a decline in

catch quality. This, in turn, results in economic losses, impacts the sustainability of fishing operations, poses risks to consumer health, and affects the marine ecosystem.

In line with the increasing global demand for high-quality and sustainable fishery products, research on catch handling aboard purse seine vessels has become increasingly relevant. Various aspects are involved in this topic, including innovations in storage technology, cooling systems, and environmental impact analysis of fishing activities. Therefore, it is essential to understand how research trends in this field have evolved over time and the scientific contributions that have been made.

One of the methods used to evaluate the development of scientific knowledge is bibliometric analysis. Bibliometric analysis enables the exploration of bibliographic data, such as publication trends and patterns, citation rates, researcher collaborations, international research partnerships, research trends over a specific period, and key findings that have been published (Donthu et al., 2021). By analyzing these trends, dominant research themes, leading researchers, prominent institutions, and future research directions can be identified. Additionally, bibliometric analysis provides insights into the dynamics of scientific collaboration, both at local and global levels. Through this approach, stakeholders—including academics, fisheries practitioners, and policymakers—can utilize research findings to improve catch handling systems, enhance supply chain efficiency, and reduce post-harvest losses.

This study aims to analyze research trends in catch handling aboard purse seine vessels over the past 25 years, from 2000 to 2024. The objective is to help researchers understand the global landscape of catch handling on purse seine vessels, including the publication profile, the most cited authors, publication trends, and the visualization of research trends over the last 25 years, from 2000 to 2024.

Through this bibliometric analysis, this study also aims to provide a valuable resource for researchers, practitioners, and policymakers interested in catch handling aboard purse seine vessels. By doing so, this research is expected to contribute to the field of fisheries capture, ensuring that findings in this area offer optimal benefits not only for academia but also for industry professionals. Furthermore, the results of this study are anticipated to serve as a foundation for understanding scientific developments, identifying research gaps, and fostering more sustainable innovations in fisheries catch management, particularly on purse seine vessels.

MATERIAL AND METHOD

Bibliometric analysis is a scientific discipline that employs statistical methods and data analysis to examine patterns, trends, and characteristics of scientific publications,

including research productivity and relevance (Salinas-Ríos, 2022). To evaluate these aspects, bibliometric analysis is conducted, covering citation count, citation patterns, researcher collaboration, and the distribution of scientific publications across various research topics or focal areas (De Bellis, 2009; Żarczyńska, 2012).

The bibliometric research method used in this study is adopted from Donthu et al. (2021) using the PRISMA framework (Page et al., 2021) which provides a structured and systematic approach to obtaining comprehensive and reliable research results. This research process involves several stages, starting with problem identification, determining keywords for data collection through metadata searches in databases, data filtering, data preparation and cleaning, data visualization, and finally, data interpretation, which involves drawing conclusions from the analyzed data (Wijaya et al., 2023).

The metadata search process was conducted on December 31, 2024, by applying several limitations or filters and using the Scopus database. The limitations in the metadata search included the use of keywords in the title, abstract, and publication year range. The keywords used for the metadata search in the Scopus database were: (("handling catch" OR "fish handling" OR "onboard fish quality" OR "post-harvest handling") AND ("purse seine" OR "fishing vessel")) AND PUBYEAR > 1999 AND PUBYEAR < 2025. The complete metadata search process and the limitations applied during the search are presented in Figure 1 below (Page et al., 2021).
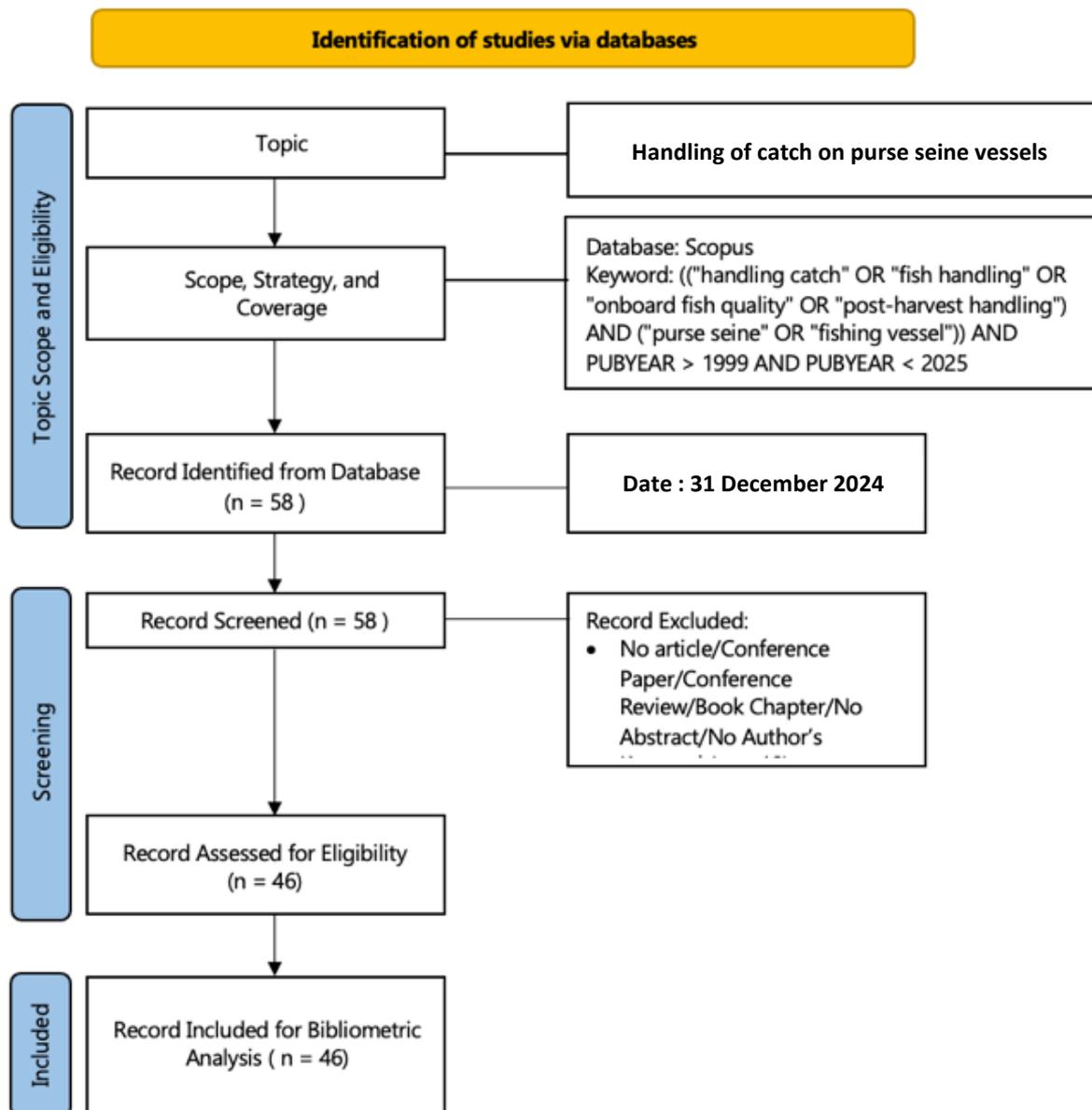
Figure 1. The document selection process adopts the PRISMA framework (Page et al., 2021).

RESULTS AND DISCUSSION

Publication Output, Document Sources, and Number of Documents per Year

From 2000 to 2024, a total of 58 documents related to fish catch handling on purse seine vessels were recorded in the Scopus database, encompassing five types of documents. In general, these documents are dominated by journal articles (31 documents, 53.4%), followed by conference papers (12 documents, 20.7%), review papers (9 documents, 15.5%), book chapters (4 documents, 6.9%), and books (2 documents, 3.4%). A detailed breakdown of the types and number of documents related to fish catch handling on purse seine vessels published from 2000 to 2024 is presented in Table 1 and Figure 2 below.

Table 1. Types and Number of Research Documents on Fish Catch Handling on Purse Seine Vessels from 2000 to 2024.

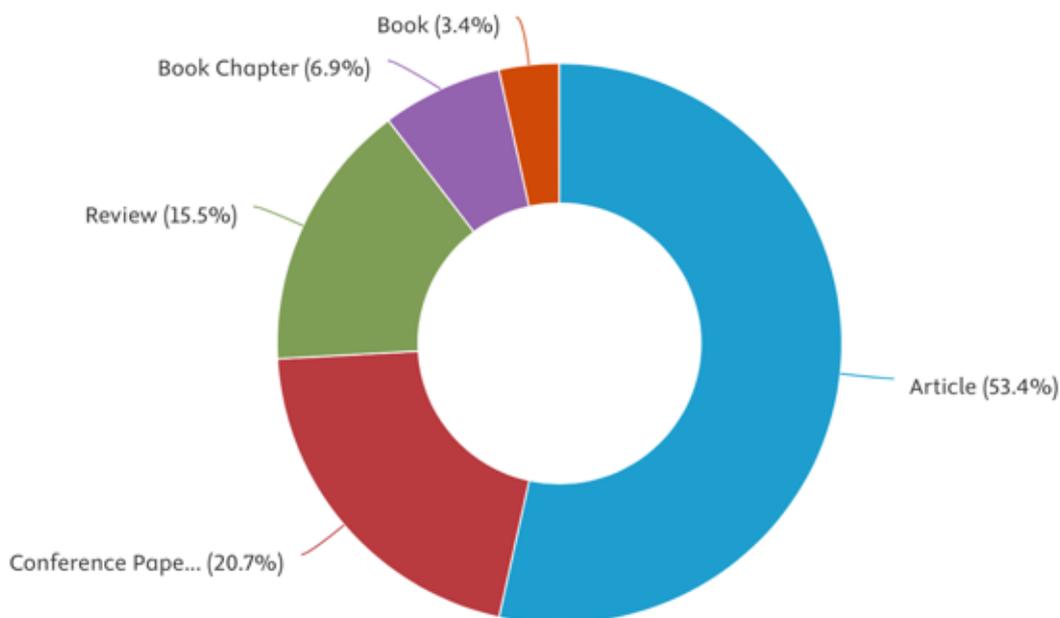| Document Type	Number
Article	31
Conference paper	12
Review	9
Book Chapter	4
Book	2

Documents by type

Figure 2. Document distribution by type

Figure 3 provides information on scientific publications in the field of fish catch handling on purse seine vessels from 2000 to 2024. Overall, the trend in the number of publications in this field has shown an increase over time, with a significant surge after 2018. This indicates that research in this area has gained attention from academics and researchers in recent years. Additionally, it highlights the growing importance of fish catch handling on purse seine vessels.
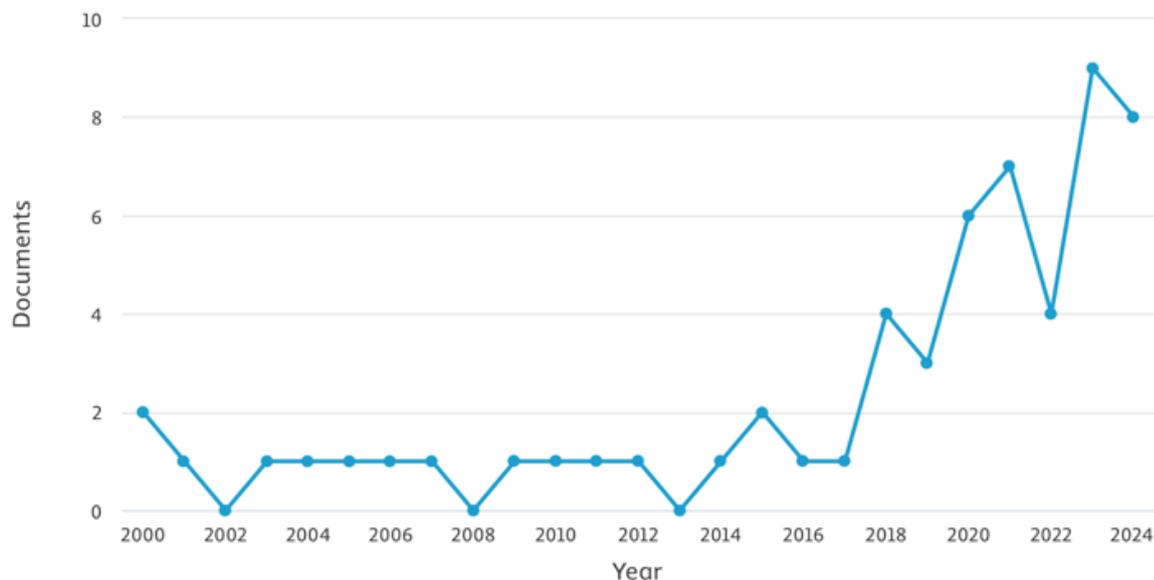
Figure 3. Number of documents from 2000 to 2024

Top Authors and Most Cited Researchers

Figure 4 provides information on the top ten most productive authors in the field of catch handling on purse seine vessels from 2000 to 2024. During this period, Cooke et al. (2021) had the highest number of publications in this field, with a total of six documents, followed by Tadifa et al. (2022), Trahan et al. (2021), Montojo et al. (2020), Amir et al. (2024), Bambang & Wijayanto, (2020) each with two publications. A detailed overview is presented in Figure 4 below.
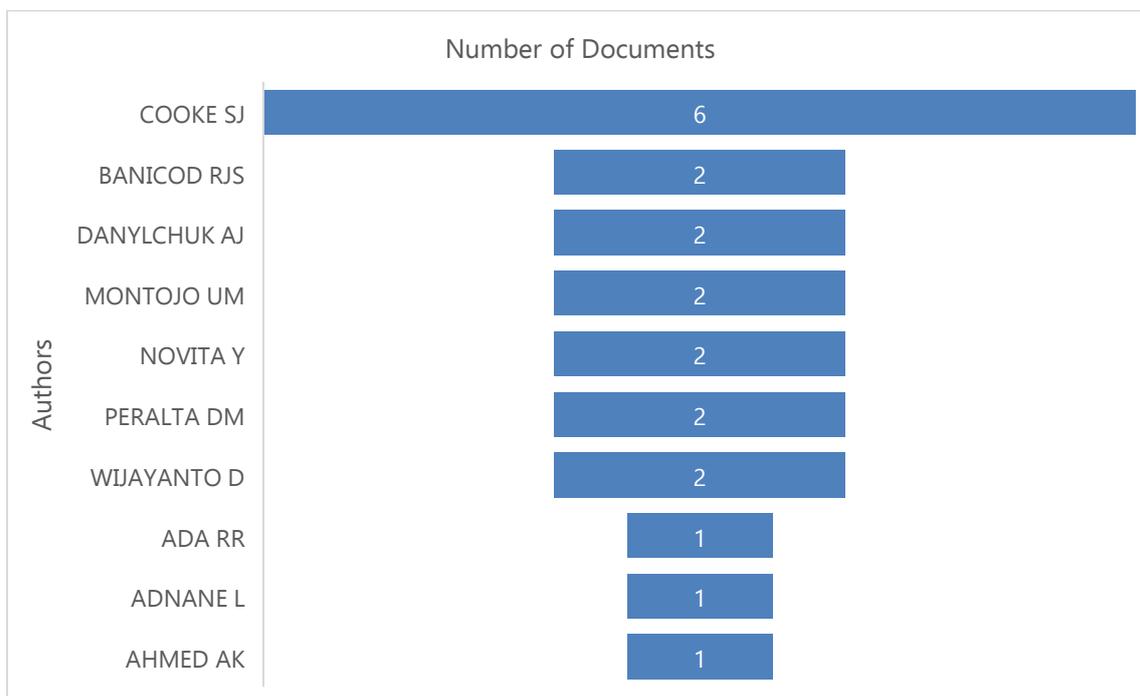

Figure 4. Number of documents from 2000 to 2024

The most cited publications in the field of catch handling on purse seine vessels from 2000 to 2024 are Ghaly et al. (2010) with 445 citations, Li et al. (2020) with 133 citations, and Molina & Cooke (2012) with 127 citations. The complete citation counts of publications in this field over the 2000–2024 period can be seen in Table 2 below.

Table 2. Types and Number of Research Documents on Fish Catch Handling on Purse Seine Vessels from 2000 to 2024.

Author(s)	Source Document	$\sum$ Citation
Ghaly, A. E., Dave, D., Budge, S., & Brooks, M. S. (2010)	A. E. Ghaly, D. Dave, S. Budge, and M. S. Brooks, "Fish spoilage mechanisms and preservation techniques: Review," (in English), *Am. J. Appl. Sci.,* Review vol. 7, no. 7, pp. 846-864, 2010. [Online]. Available: https://www.scopus.com/inward/record.uri?eid=2-s2.0-77954367501&partnerID=40&md5=38012e75b4e18e0502938699107278d2.	445
Li, D., Hao, Y., & Duan, Y. (2020)	D. Li, Y. Hao, and Y. Duan, "Nonintrusive methods for biomass estimation in aquaculture with emphasis on fish: a review," (in English), Rev. Aquac., Review vol. 12, no. 3, pp. 1390-1411, 2020, doi: 10.1111/raq.12388	133
Molina, J. M., & Cooke, S. J. (2012)	J. M. Molina and S. J. Cooke, "Trends in shark bycatch research: Current status and research needs," (in English), Rev. Fish Biol. Fish., Review vol. 22, no. 3, pp. 719-737, 2012, doi: 10.1007/s11160-012-9269-3.	127
Steven J. Cooke, Paul Venturelli, William M. Twardek, Robert J. Lennox, Jacob W. Brownscombe, Christian Skov, Kieran Hyder, Cory D. Suski, Ben K. Diggles, Robert Arlinghaus & Andy J. Danylchuk (2021)	S. J. Cooke et al., "Technological innovations in the recreational fishing sector: implications for fisheries management and policy," (in English), Rev. Fish Biol. Fish., Review vol. 31, no. 2, pp. 253-288, 2021, doi: 10.1007/s11160-021-09643-1.	81
A. J. Borderías and I. Sánchez-alonso (2011)	A. J. Borderías and I. Sánchez-alonso, "First Processing Steps and the Quality of Wild and Farmed Fish," (in English), J. Food. Sci., Article vol. 76, no. 1, pp. R1-R5, 2011, doi: 10.1111/j.1750-3841.2010.01900.x.	56

Publication Pattern of Catch Handling Research on Purse Seine Vessels from 2000-2024: Based on Sources

Table 3 below provides information on the top five sources based on the number of documents from research on catch handling on

purse seine vessels from 2000 to 2024. The table shows that the *Agricultural and Biological Sciences* journal published 37 documents related to catch handling on purse seine vessels during the period from 2000 to 2024. The *Environmental Science* journal published 22 documents. Detailed information is shown in Table 3 below.

Table 3. Number of documents by source (2000-2024)

Journal Name	Number of Document
Agricultural and Biological Sciences	37
Environmental Science	22
Engineering	13
Earth and Planetary Sciences	9
Chemical Engineering	3

Distribution of Research on Catch Handling in Purse Seine Vessels by Country

The following Figure 5 illustrates the distribution of research articles on catch handling in purse seine vessels by country. The United States is the most productive country in publishing research on catch handling in purse seine vessels, with a total of 13 publications indexed in Scopus between 2000 and 2024. This is followed by Indonesia, which has 12 published documents in Scopus. The detailed distribution can be seen in Figure 5 below.

Documents by country or territory
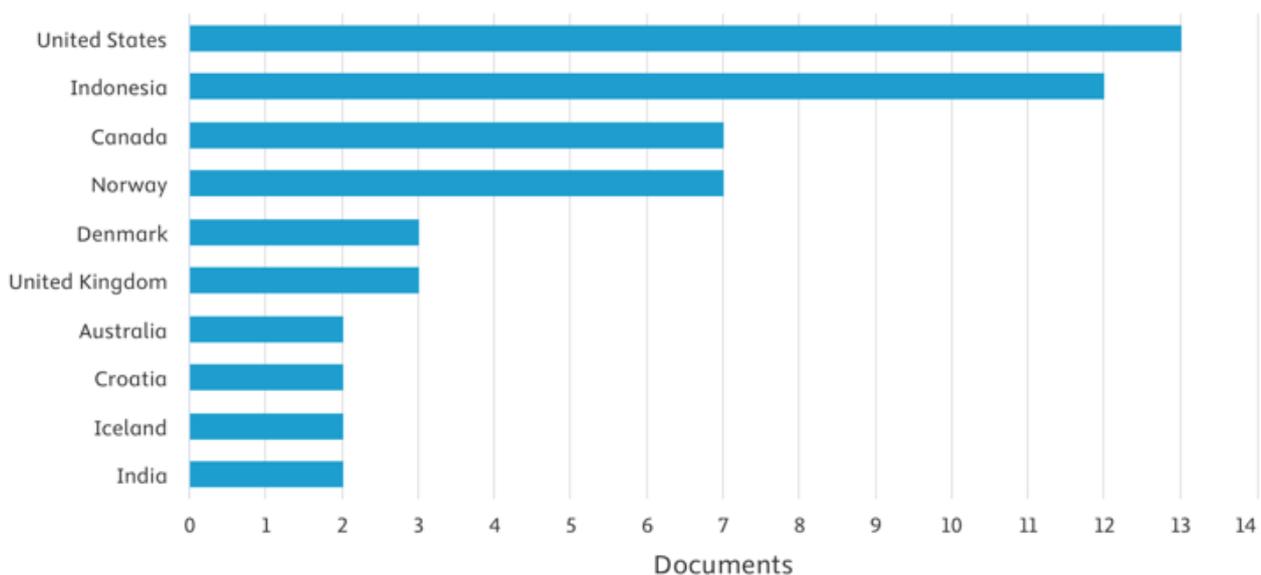Compare the document counts for up to 15 countries/territories.

Figure 5. Distribution of documents by country
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Researcher Collaboration Network

Figure 6 provides information about the researcher collaboration network in the field of catch handling on purse seine vessels. The figure represents an author collaboration network, showing the relationships between various researchers based on the number of joint publications in the study of catch handling on purse seine vessels. It is evident from the figure that Cooke et al., (2021) has a significant number of collaborations with other researchers and plays an important role in the research collaboration network.

Other authors in the same cluster, such as Trahan et al., (2021) and Reid et al., (2022) also appear to be fairly active, but with a smaller influence compared to Cooke et al., (2021). This pattern suggests that while some researchers have extensive collaboration networks, others tend to work within more limited scopes.

In general, this map provides insights into the collaboration structure within the academic community, helping to identify the most influential researchers, and opens up opportunities for broader collaborations in research.
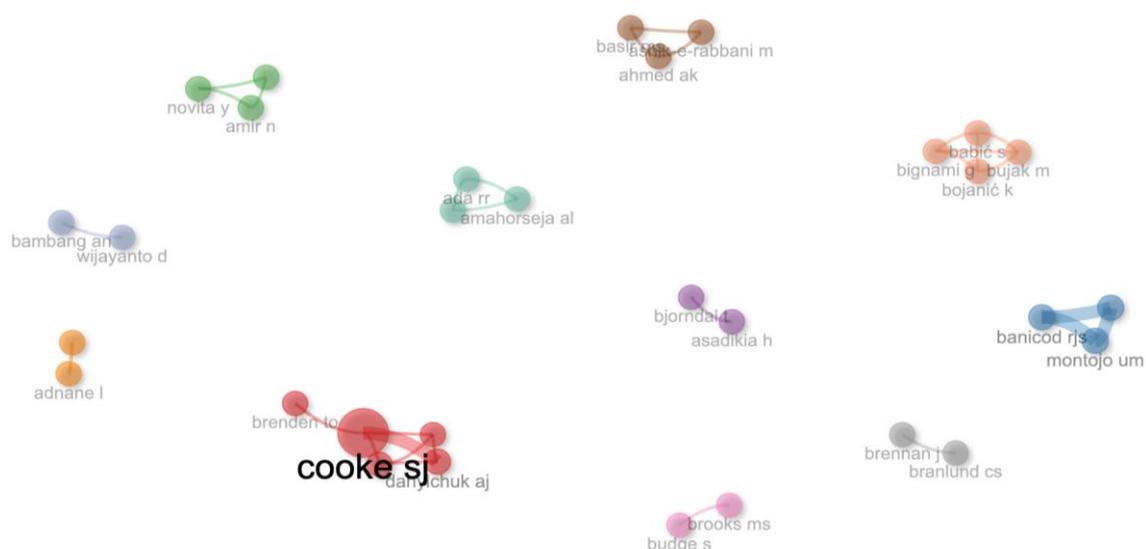
Figure 6. Researchers network

Visualization of Research Trends on Catch Handling on Purse Seine Vessels from 2000 to 202

Figures 7 and Figure 8 below represent the Conceptual Structure Map resulting from Multiple Correspondence Analysis. From this

analysis, it can be seen that on Dimension 1 (Dim 1 - 27.66%), the horizontal axis represents the dimension with the largest variance in the dataset, which is likely related to the main differences in research focus. The left side focuses on biological and ecological issues, such

as fish, animals, aquaculture, and water. The right side focuses on management, economic, and technological aspects, such as fish products, international trade, health risks, quality control, and energy efficiency. On Dimension 2 (Dim 2 - 21.34%), the vertical axis represents the second-largest dimension, which depicts more specific issues. The top part focuses on sustainability, risk management, and fishing gear technology, such as fishing gear, fishery management, survival, and bycatch. The bottom part focuses on physiology, microorganisms, and the environment, such as physiology, bacterium, animal, ice, and muscle. From the Conceptual Structure Map, it can be concluded that global trends in the topic of catch handling on purse seine vessels are centered on sustainability, energy efficiency, and food safety, which have become the primary trends in fisheries research.

Furthermore, the focus on catch handling reveals significant attention to processing, storage, and quality control of the catch. Additionally, in relation to ecosystems and aquaculture, biological research on marine ecosystems, microorganisms, and aquaculture forms an important foundation in catch-handling research on purse seine vessels. From the perspective of balancing technology and ecology, research in this field strikes a balance between technological development and ecosystem sustainability approaches. This concept can be used to identify new research opportunities, particularly in integrating sustainability, cooling technologies, and catch management. The detailed research trends in catch handling on purse seine vessels can be seen in Figures 7 and 8 below.
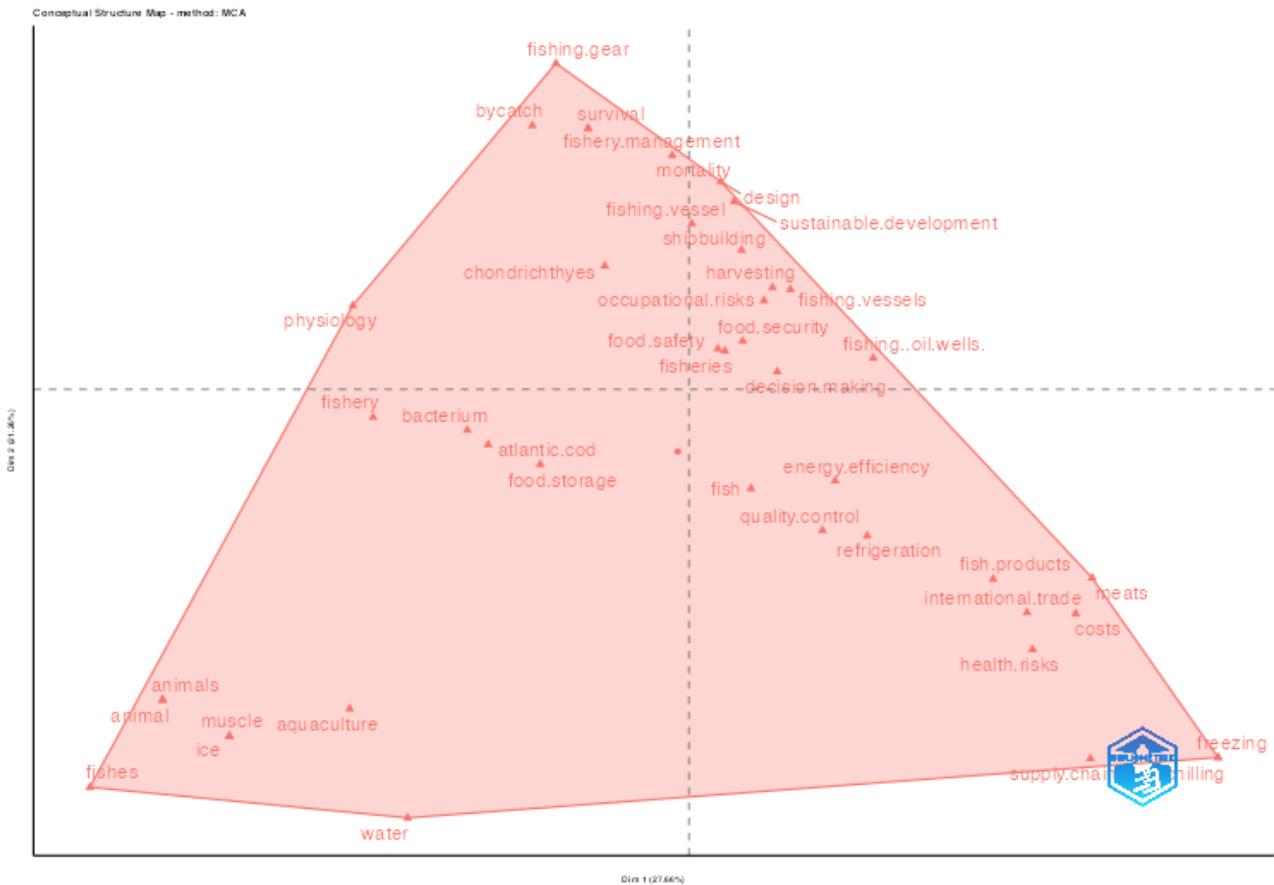
Figure 7. Conceptual Structure Map

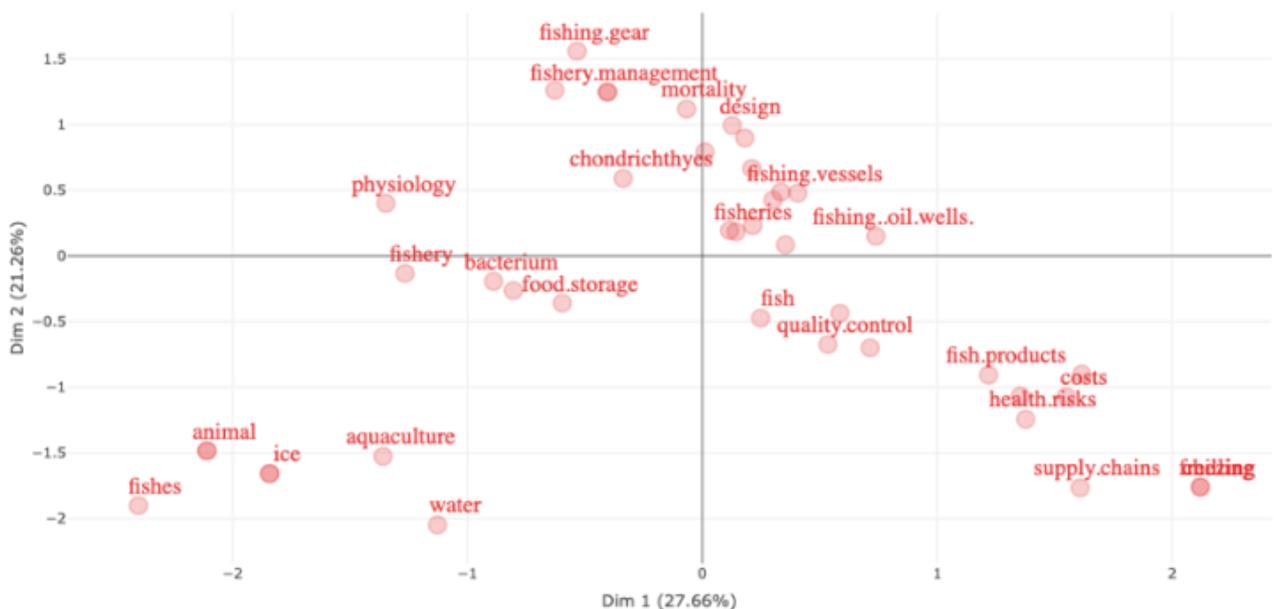**Figure 8.** Conceptual Structure Map

Figure 9 below provides an overview of the frequently occurring keywords in research related to catch handling on purse seine vessels. The words "fish," "fisheries," and "fishing vessels" appear the largest, indicating that these topics have the highest frequency in the analyzed literature. Other terms such as "fish products," "shipbuilding," and "food storage"

are also quite dominant, reflecting the research focus on production, storage, and fisheries infrastructure. Keywords like "occupational risks," "food safety," and "quality control" indicate attention to safety and sustainability aspects of the fisheries industry. Additionally, the presence of terms like "survival," "harvesting," and "bycatch" suggests research addressing the efficiency and ecological impacts of fishing activities. Smaller keywords such as "chitosan," "physiology," and "energy efficiency" demonstrate that technological and scientific aspects also play a role in this research, although on a more limited scale. Overall, this word cloud illustrates the landscape of fisheries research related to catch handling on purse seine vessels, with a primary focus on production, safety, and efficiency in the fisheries supply chain.

Figure 9. Word Cloud

CONCLUSION

The fisheries industry using the purse seine method plays a crucial role in the global economy and food security. Catch handling purse seine vessels significantly impacts fish quality and the sustainability of the fisheries industry. Research trends in this field indicate growing attention towards the efficiency of storage and the sustainability of fishery products. However, challenges remain in the implementation of storage systems, sanitation, and processing catch on vessels. Bibliometric analysis results show that publications related to catch handling on purse seine vessels have increased in recent decades, with research collaborations between institutions and countries playing a key role in the development of innovations in this area.

However, research gaps still exist in the development of more efficient and environmentally friendly technologies for handling catch-on vessels. Therefore, a multidisciplinary approach is needed to address the challenges in the fish handling systems on

purse seine vessels. The implications of this research can serve as a foundation for formulating better fisheries policies, aimed at enhancing the effectiveness, hygiene, and sustainability of fish handling methods on vessels. Further research is needed to develop more innovative methods to ensure the long-term resilience of the fisheries industry.

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