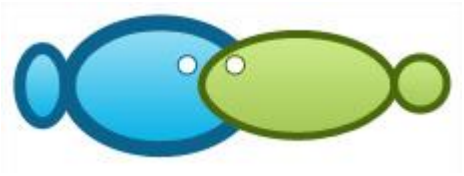

The economics of fish logistics: a systematic literature review

[1,2]Muchamad Hartanto, [3]Heti Mulyati, [1]Kastana Sapanli, [4]Akhmad Fauzi

[1] Graduate Program in Tropical Ocean Economics, Faculty of Economics and Management, IPB University, Dramaga, Bogor, West Java, Indonesia; [2] Study Program in Marine Logistics, Serang Campus, Universitas Pendidikan Indonesia, Bandung, West Java, Indonesia; [3] Study Program in Management Science, Faculty of Economics and Management, IPB University, Dramaga, Bogor, West Java, Indonesia; [4] Study Program in Regional and Rural Development Planning, Faculty of Economics and Management, IPB University, Dramaga, Bogor, West Java, Indonesia. Corresponding author: M. Hartanto, muchamadhartanto@apps.ipb.ac.id

Abstract. Research on the economics of fish logistics was conducted because the fisheries sector is a strategic commodity that significantly contributes to the economy and the livelihoods of the community. The purpose of this study is to conduct a systematic literature review analysis to evaluate the impact of various economic activities on fisheries logistics. A systematic literature search was conducted in Scopus and ScienceDirect on September 23, 2025, to report the financial outcomes of fish logistics based on the PRISMA 2020 checklist criteria (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Researchers identified 961 papers, comprising 108 from the Scopus database and 853 from the ScienceDirect database. After screening titles and abstracts and analyzing the full texts of all documents, researchers finally selected 39 papers for further analysis to identify potential research novelties in the economics of fish logistics. Almost all research on the economics of fish logistics addresses the topic of circular economy and resilience, thus ensuring research on this topic is at the forefront of formulating the current state of the art in fish logistics economics. However, in the future, research shouldn't just focus on resilience, as much research has already been done on this topic. A combination of high-tech and high-touch research is necessary, as data indicates a gap between IoT blockchain technology and the bioeconomics of fish stocks, which can help prevent overfishing. Further research on fisheries institutions is also necessary to integrate social and policy aspects into the economics of fish logistics.
Key Words: bioeconomics, research, supply chain, sustainable seafood.

Introduction. Research on the economics of fish logistics is conducted because the fisheries sector is a strategic commodity that contributes significantly to the economy and livelihoods of the community (McShane et al 2021; Umezu 2024). Efficiency in fish distribution and logistics management has a significant impact on product sustainability and quality, as well as minimizing losses due to spoilage and damage throughout the supply chain (Thompson et al 2025; Anuja et al 2025). Furthermore, global market dynamics and the need for more efficient resource management emphasize the importance of understanding the economics of fish logistics to improve the competitiveness of the Indonesian fisheries industry (Avento et al 2024; Cui et al 2024).

Several previous studies have examined various aspects related to the economics of fish logistics, from infrastructure and supply chains to factors influencing distribution efficiency (Brites & Braumann 2017; Sun et al 2025). However, a knowledge gap remains regarding the optimal integration of economic and logistics models in the local Indonesian context, particularly in terms of cost management and its impact on business profitability. Literature reviews of various studies (Cusimano et al 2025; Niu et al 2025) indicate that logistics optimization can improve the efficiency and sustainability of the fisheries sector. Still, the need for more comprehensive and integrated studies remains urgently needed (Berrios & Ortiz 2025; Morro et al 2025). The synthesis of these studies demonstrates the importance of a multidisciplinary approach to improving overall fish logistics performance.

The purpose of this study is to conduct a comprehensive literature review on the economics of fish logistics to understand the current conditions, challenges, and opportunities for developing efficient and sustainable economic models. Through this systematic literature review, a clear picture of the main factors influencing the economics of fish logistics can be obtained, as well as how these aspects can be optimized to support the growth of the fisheries sector.

Material and Method

Identifying relevant studies. A systematic literature search was conducted in Scopus and Science Direct on September 23, 2025, reporting on fish logistics economics outcomes based on the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist criteria. Researchers identified 961 published papers for inclusion in the analysis. An initial search identified 961 papers: 108 from Scopus and 853 from ScienceDirect.

Study selection. Studies on the researched papers were only included if they had a clear theme related to fish logistics economics in English, were open-access, and were published between 2020 and 2024. Exclusion criteria included studies of terrestrial animals, papers not relevant to fish logistics economics, papers written in languages other than English, papers with closed access, and papers published outside the years 2020 and 2024. The search terms used were: (economy OR economics OR valuation) AND (logistics OR supply chain OR management) AND (fish OR fisheries OR seafood).

The final search results from various databases were then screened using online systematic review software, Rayyan, to eliminate duplication in titles and abstracts. A total of 26 papers were excluded due to suspected duplication or failure to meet the requirements, leaving 935 papers for further screening. After eliminating duplicate papers, two researchers (Muchamad Hartanto and Heti Mulyati) independently reviewed all eligible titles and abstracts based on predetermined inclusion and exclusion criteria, deeming them potentially suitable for further analysis. As a result, 801 papers were excluded and not retrieved based on the inclusion criteria, leaving 134 papers for additional screening.

After screening the titles and abstracts, a full-text analysis of all remaining papers was conducted to identify publication trends, methods used, and key findings related to fish logistics economics from each paper. Full-text screening was performed manually by four reviewers for the final paper. If discrepancies arose between the three reviewers' results, the fourth reviewer would ultimately decide. The researchers ultimately selected 39 papers for further in-depth analysis to identify potential novel research on fish logistics economics (Figure 1).

Results. A systematic literature review was conducted to assess previous studies specifically related to the economics of fish logistics. Several aspects were identified and presented below in a diagrammatic representation.

Critical aspects of fish logistics economics. The findings in Figure 2 show that the distribution of aspects in research related to fish logistics economics is highly diverse, with most aspects pointing to the most dominant elements of supply chain resilience and transformation, which contribute 38% to the field of fish logistics economics. Many journals discuss how supply chain quality management can reduce environmental barriers and increase financial transparency. Future fish logistics will no longer involve moving goods, but also moving data to ensure sustainability. Cold chain quality management accounts for 36% of the economics of fish logistics. Economically, fish is a highly perishable commodity. Data shows a significant focus on inefficiencies at the depot level (such as the case of shrimp in Bangladesh). Logistical errors here result in hidden costs, manifesting as reduced selling prices due to declining quality.

Bioeconomics and market dynamics contribute 18% to the economics of fish logistics. Fish logistics is highly dependent on the availability of natural resources. These articles conclude that logistical efficiency is useless if overfishing occurs. Fishing operational

costs (fuel and supplies) are key variables in determining whether a fishing trip generates an economic profit or loss. Infrastructure inefficiencies and physical costs account for 8% of the fish logistics economy. Although this is the smallest percentage in terms of the number of articles, this aspect is crucial for Indonesia. High maritime logistics costs in the eastern region have been shown to hinder GRDP. This indicates that physical improvements (ports and connectivity) remain the primary foundation of the logistics economy.

The fish logistics economy is currently shifting from a mere transportation issue (Aspect 4) to a quality and data issue (Aspects 1 and 2). Investments in cold chain systems and digitalization have a greater economic impact in maintaining product value than simply reducing shipping costs. The most significant opportunities for increasing economic value lie in the integration of digital systems (Aspect 1) and mastery of cooling technology (Aspect 2). Don't waste energy solely on physical infrastructure (Aspect 4).

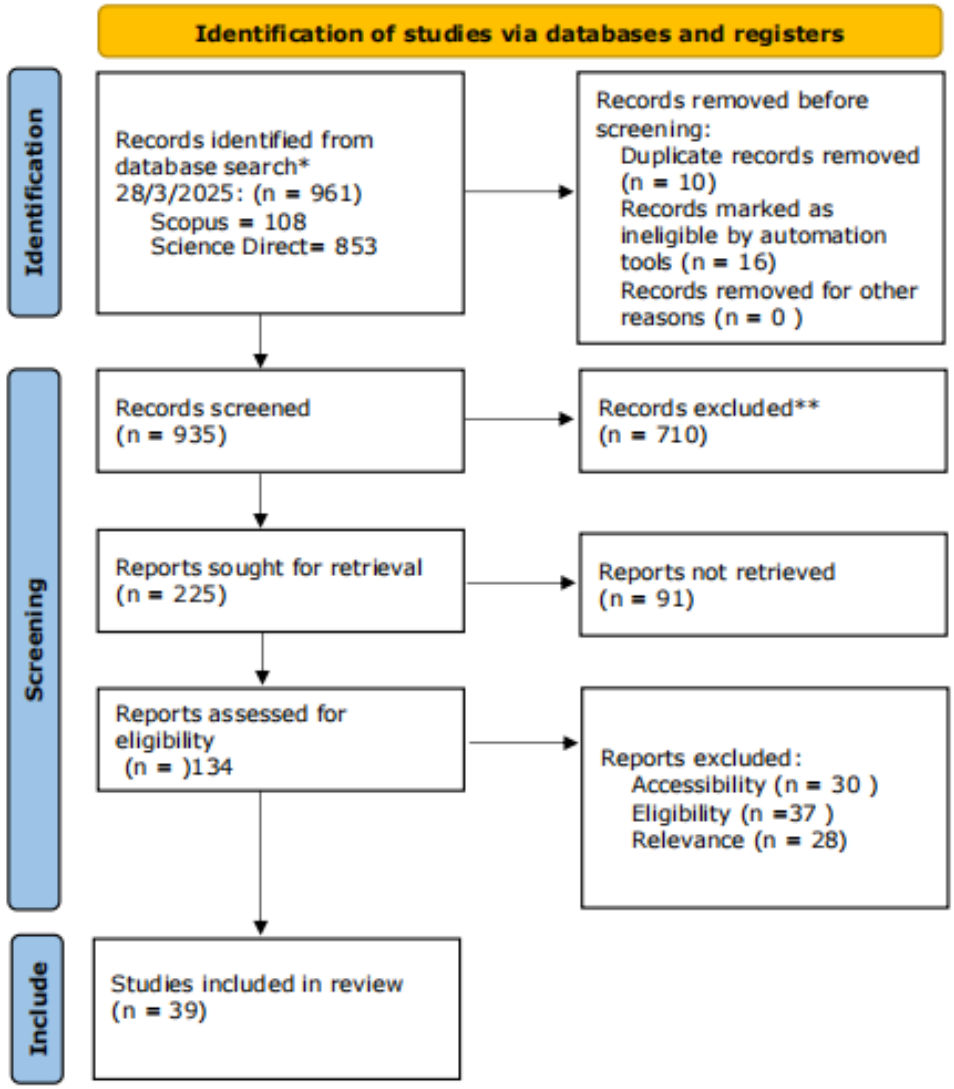

Figure 1. Results from the search and selection process (PRISMA 2020 flow diagram which included searches of databases and registers only).

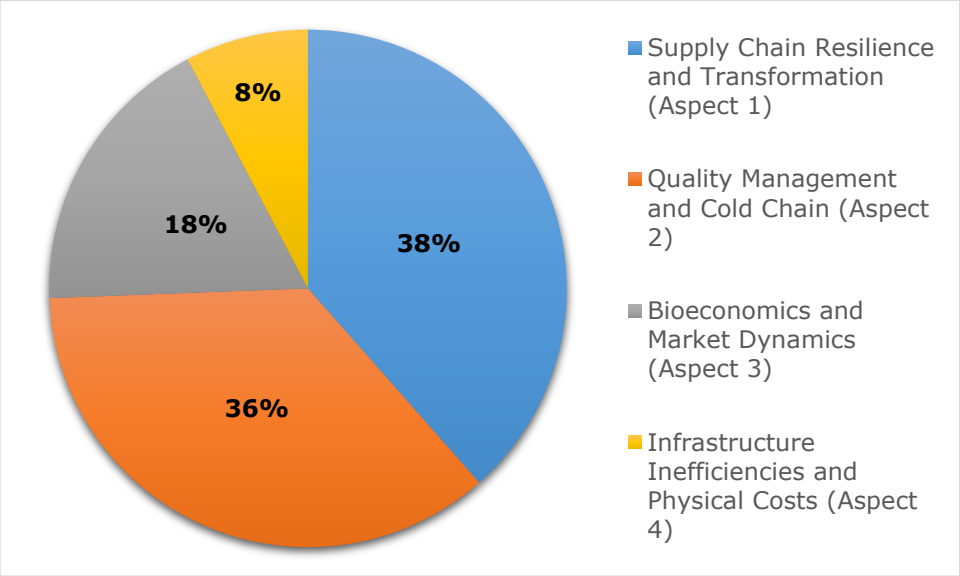

Figure 2. Essential aspects in fish logistics economics.

Distribution of research methods on the fish logistics economics. Based on Figure 3, the majority of research in this field is explanatory and predictive, with a numerical focus (51%). Researchers attempt to solve logistics problems, such as finding the shortest routes, minimizing costs, or determining optimal stock levels, using mathematical models. If you want your research proposal to be robust, using quantitative methods or modeling provides more measurable results and will be highly relevant to current trends.

The high theoretical consolidation rate from the literature review, at 31%, suggests that this field is rapidly developing, with many researchers attempting to chart new directions, such as the digitalization of the supply chain. This dominance indicates that this field of study is still in the conceptual consolidation stage, where researchers prioritize developing new frameworks, identifying global trends, and identifying theoretical gaps before proceeding to large-scale empirical validation.

The low share of qualitative research, at only 5% of total research, could present a unique opportunity (research gap) for developing qualitative research. A deeper understanding of human behavior, including institutionalization and informal costs, is also necessary for research on the economics of fish logistics.

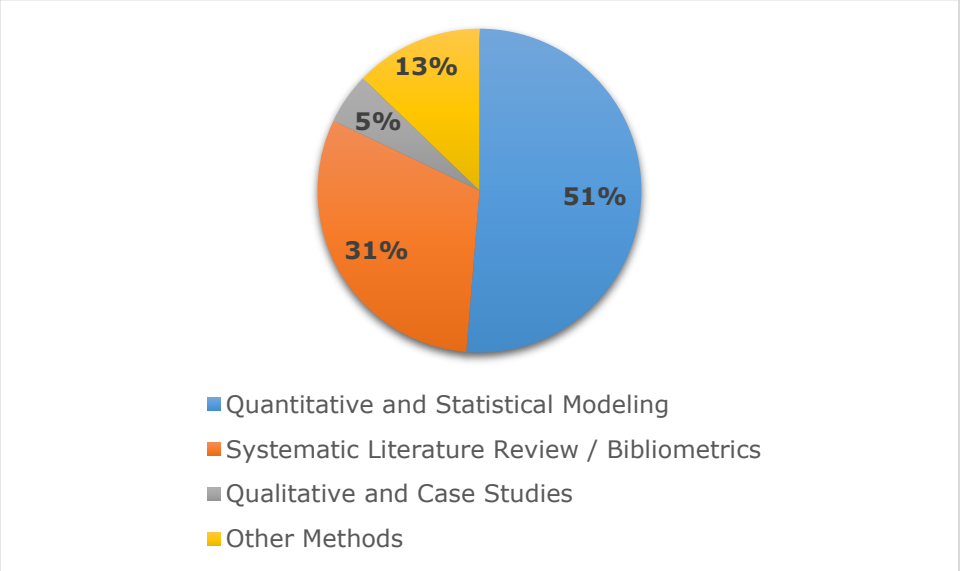

Figure 3. Distribution of research methods on fish logistics economics.

Distribution of research publication years on fish logistics economics. Articles on the economics of fish logistics were very high in 2023 and 2024, totaling 25 articles, or 64% of all research. This indicates that references to articles on the economics of fish logistics are becoming an increasingly interesting topic. In 2020, only one study was conducted on the economics of fish logistics. The significant increase in research on the economics of fish logistics from 2020 to 2025 suggests that interest in the economics of fish logistics is growing among the public (Figure 4).

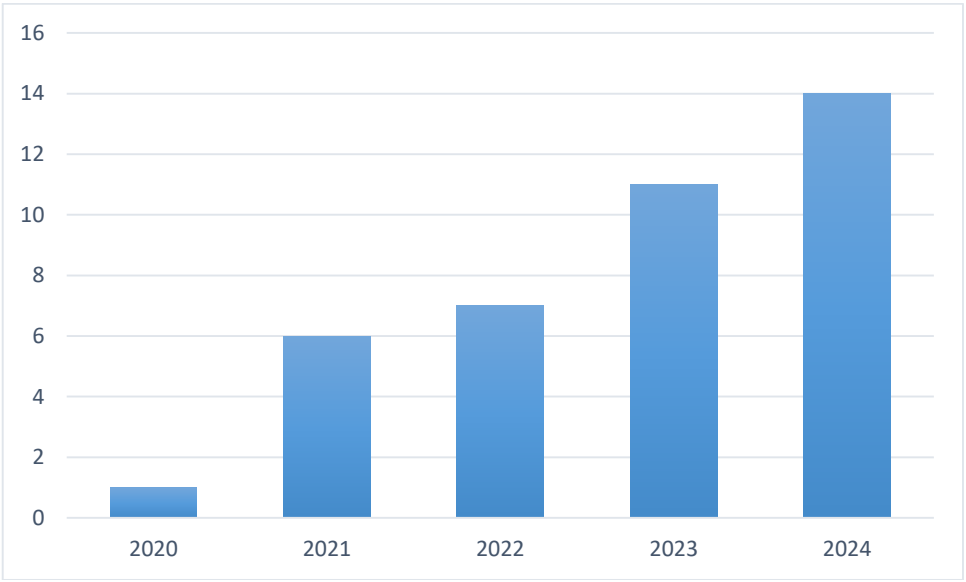

Figure 4. Number of research on fish logistics economics based on the year of publication.

Distribution of continents of origin of research on the fish logistics economics. Most of the publications on fisheries logistics economics, based on Figure 5, come from Europe, with 24 publications. Asia ranks second with 12 publications. European research often focuses on the development of advanced frameworks and technologies such as blockchain and IoT. In contrast, Asian research tends to focus more on empirical case studies and local economic development issues. Technology adoption offers technical insights into optimization and remanufacturing that can be adopted to modernize existing fish logistics systems. This combination of perspectives is ideal for further research.

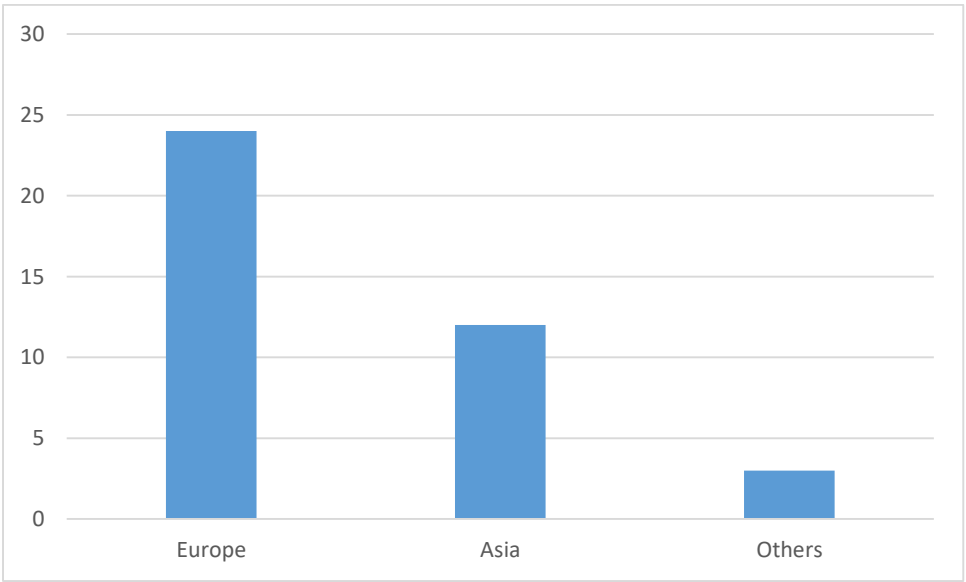

Figure 5. Continent of domicile research writing on fish logistics economics.

Articles originating from Asian countries (such as Indonesia, Bangladesh, and Vietnam) share similar socioeconomic conditions and logistical challenges, such as island infrastructure and tropical climates. The research gap and the limited research from the Americas, Australia, and Africa addressing the economics of fish logistics provide an opportunity to fill the global theoretical gap with specific case studies.

Discussion. Based on Table 1, which consists of 39 articles, it is clear that the primary focus of fish logistics economics has shifted from mere physical cost efficiency to the creation of digital blockchain, a circular economy, and sustainability. A circular economy can be defined as the utilization of fish waste that can be processed to generate income. Digital blockchain is a key tool for ensuring transparency, while sustainability allows fisheries consumption to be utilized without placing a significant burden on the ecosystem. The number of publications on fish logistics economics has doubled in the past two years. The 2020-2021 period marked the initial phase of research on fish logistics economics. In that year, seven articles discussed the basics of bioeconomics and the initial impact of the COVID-19 pandemic. In 2022, a transitional phase, seven articles began research on blockchain technology and the use of IoT in fish logistics economics. The peak period for research in fish logistics economics occurred between 2023 and 2024. A total of 25 articles discussed the economics of fish logistics. After the fishing industry was busy developing digital IoT systems (2022-2023), in 2024, researchers again realized that sophisticated systems in the fish logistics economy would be useless if the fish were rotten. Research began returning to its roots, namely, maintaining fish freshness, but with a new approach.

Research on the fish logistics economy now no longer solely addresses how fish reach consumers (linear), but also how fish waste can generate new economic value (circular). Sarkar et al (2023) and Hsieh et al (2024) demonstrated that the future profitability of fish logistics lies in waste utilization (converting skin/bones into collagen/pharmaceutical products), not just selling fish meat. Blockchain and IoT in the fish logistics economy are no longer just futuristic discourse, but operational needs for transparency and market trust (Pakseresht et al 2022; Ramírez et al 2022). At the global level (in developed countries), fish logistics research has moved towards algorithm optimization, artificial intelligence (AI), and supply chain decarbonization.

The economics of logistics remains stuck in survival logistics, namely how to prevent fish from spoiling before reaching the market. This creates an economic paradox, namely that prices at the consumer level are high but incomes at the fisherman level remain low. Research still focuses on primary physical variables (ice, clean water, and roads). Research by Alam (2024) in Bangladesh and Amin et al (2021) in Indonesia reveals that the primary challenges of the fish logistics economy in developing countries persist, namely the scarcity of ice, unsanitary fish auctions, and high shipping costs. There is an implementation gap between developed and developing countries. High-tech solutions (Blockchain) may not be implemented effectively if low-tech problems, such as electricity availability, are not addressed. Advanced digital solutions like Blockchain remain impractical in fisheries logistics if fundamental infrastructure gaps, specifically unreliable electricity grids and the absence of cold storage facilities, are not resolved first. The effective deployment of Blockchain-based tracking is contingent upon addressing primary logistical hurdles, such as the lack of consistent power supply and non-existent cold chain infrastructure in fish distribution centers.

Wijayanto et al (2021) and Novindra et al (2024) sound a strong warning against the bioeconomic ambitions of fish logistics. The ecological status of overfished regions, such as the Indian Ocean, is critical as it accelerates the depletion of marine resources. Consequently, economic strategies for fish logistics must be strictly aligned with maximum sustainable yield levels to ensure long-term viability. Economic strategies for fish logistics must be aligned with the maximum sustainable yield of fish stocks. In overfished areas, the focus of fish logistics is not on increasing volume, but rather on increasing added value (quality) to maintain fishermen's incomes despite low catches. Although the number of articles on fish quality management is limited, findings in this aspect are crucial because it can be a silent profit killer for fish entrepreneurs. The most significant loss of economic value occurs not due to high transportation costs, but rather due to the depreciation of

fishery product quality before it reaches the market. Investment in cold chains has been shown to have a higher economic return on investment than simply subsidizing fuel for transportation, as it directly saves the selling price of fishery products.

Table 1

Main focus of previous research on fish logistics economics

Critical aspects	*Authors*	*Main focus of research*
Supply chain resilience and transformation	Kelling et al (2023)	Transforming seafood supply systems for resilience against shocks.
	Ada et al (2023)	Towards a smart, sustainable, and circular food supply chain through digital technology.
	Pakseresht et al (2022)	How blockchain facilitates the transition to a circular economy in the food chain.
	Ramírez et al (2022)	A scalable cold chain logistics project with iot and blockchain for SMES.
	Panghal et al (2022)	Benchmarking the challenges of adopting blockchain technology from a circular economy perspective.
	Pan & Shan (2024)	Optimizing sustainable supply chain networks for perishable products.
	Nguyen et al (2023)	An overview of supply chain quality management 4.0 in the circular economy for environmental challenges.
	Binh et al (2024)	Integrating industry 4.0 with quality management for circular economy excellence.
	Zarreh et al (2024)	A comprehensive review of the integration of perishable products into a closed-loop supply chain.
	Hsieh et al (2024)	A circular economy and supply chain framework for remanufactured products.
	Smith & Fatorachian (2023)	Managing supply chain disruptions due to Covid-19 from a behavioral economics perspective.
	Gyarmati (2024)	Transforming the three pillars of agri-food sustainability around the Covid-19 crisis.
	Alam et al (2023)	The impact of Covid-19 on smallholder aquaculture farmers and their response strategies in Bangladesh.
	Maas et al (2022)	Consumer perceptions of the value of short food supply chains during the pandemic.
	Sarkar et al (2023)	A review of non-food industrial applications of fish (new value-added innovations).
	Saes et al (2023)	When do supply chains contribute to strengthening biodiversity and cultural diversity (socio-biodiversity bioeconomics)?
	Hoehn et al (2021)	A degrowth approach to circular economy policies for food production and waste management.
	Wandosell et al (2021)	Consumer and business perspectives on green packaging.
	Wang et al (2022)	A new decision framework for online reverse auctions for green supplier selection.
	Li et al (2024)	The impact of CSR implementation modes on sustainable supply chain pricing.
	Watanabe & Ubukata (2023)	Does international environmental certification change local production practices? A case study of Vietnamese shrimp in southern Vietnam.
	Thompson (2021)	Corporate payments for ecosystem services in theory and practice.
	Hossain et al (2022)	Plastic waste management in India: challenges and a roadmap towards a circular economy.
	Akbar et al (2024)	The role of water conditions in Jakarta Bay on the sustainability of capture fisheries production.
	Dutta et al (2024)	Assessing the gap in fish seed production in Assam and its implications for food security.

	Hu et al (2022)	A logistic regression-based ecological technology evaluation model.
	Jokar et al (2021)	A logistic function for tracking time-dependent fish population dynamics.
	Loebmann et al (2024)	A passive fish sampling method that is representative for size but selective for parasite load.
	Maracle et al (2024)	Changes in coastal fish diversity due to sampling methods and human disturbance.
	Tani et al (2023)	The relationship between fish consumption frequency and healthy lifestyle behaviors in Japan.
Quality and cold chain management	Alam (2024)	Quality management practices and strategic approaches at Bangladesh shrimp depots.
	Alam (2024)	Portraying the Bangladesh shrimp industry (SWOT analysis).
	Loi et al (2024)	Factors influencing the development of agricultural product logistics service chains in the Mekong Delta.
Bioeconomics and market dynamics	Wijayanto et al (2021)	Analysis of the bioeconomy of demersal fisheries in West Java: a comparison of the Java Sea vs. the Indian Ocean.
	Novindra et al (2024)	Sustainable fisheries economic management strategies in Dumai city.
	Oktopura et al (2020)	Determination of priority aquaculture commodities based on market competitiveness.
	Urazbayev et al (2023)	Market dynamics of specialty food products: a cost-effectiveness analysis (gluten-free pasta case study).
Cost and infrastructure efficiency	Amin et al (2021)	The impact of maritime logistics on archipelagic economic development in eastern Indonesia.
	Amin et al (2024)	The impact of increasing local economic capacity on reducing maritime logistics costs in archipelagic provinces.

Conclusions. This study concludes that the adoption of technology, infrastructure, and supply chain management systems has a significant influence on the cost efficiency of fish logistics. Physical infrastructure development at fishing ports will not effectively reduce fish logistics costs without improvements to the land supply chain system and the bioeconomic management of fish stocks. Research on the application of simple, low-cost IoT technology in cold chain monitoring for small-scale fishers will bridge the gap between sophisticated fish logistics economics research in developed countries and the reality of local research in developing countries with limited technology. Nearly all research on fish logistics economics published between 2023 and 2024 addresses the circular economy and resilience, ensuring that research on this topic is at the forefront of formulating the current state of the art in fish logistics economics. However, in the future, research should not only focus on resilience, as there is already extensive research on this topic. By 2026, the fish logistics economy will no longer be viewed as a conventional transportation activity, but rather as a key determinant in maintaining the bioeconomic integrity of global fisheries stocks. The latest paradigm emphasizes that logistics efficiency must be aligned with maximum sustainable yield constraints by integrating real-time cold chain monitoring and blockchain-based traceability. Integrating high-tech and high-touch research is essential, as current data reveals a significant gap between IoT-Blockchain applications and the bioeconomics of fish stocks in preventing overfishing. Further research on fisheries institutions is also needed to integrate social and policy aspects into the economics of fish logistics.

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Author contributions. Muchamad Hartanto: Writing – original draft. Heti Mulyati: Writing – review. Kastana Sapanli: Review and Edit. Akhmad Fauzi: Conceptualization and Supervision. All authors have read and approved the published version of this manuscript.

Conflict of interest. The authors declare that there is no conflict of interest.

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Authors:
Muchamad Hartanto, Graduate Program in Tropical Ocean Economics, Faculty of Economics and Management, IPB University, Raya Darmaga Street, 16680, Babakan, Dramaga, Bogor, West Java, Indonesia, e-mail: muchamadhartanto@apps.ipb.ac.id; muchamad.hartanto@upi.edu
Heti Mulyati, Study Program in Management Science, Faculty of Economics and Management, IPB University, Raya Darmaga Street, 16680, Babakan, Dramaga, Bogor, West Java, Indonesia, e-mail: heti@apps.ipb.ac.id
Kastana Sapanli, Graduate Program in Tropical Ocean Economics, Faculty of Economics and Management, IPB University, Raya Darmaga Street, 16680, Babakan, Dramaga, Bogor, West Java, Indonesia, e-mail: kastana@apps.ipb.ac.id
Akhmad Fauzi, Study Program in Regional and Rural Development Planning, Faculty of Economics and Management, IPB University, Raya Darmaga Street, 16680, Babakan, Dramaga, Bogor, West Java, Indonesia, e-mail: akhmadfauzi@apps.ipb.ac.id

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