Digital business : Tren Bisnis Masa Depan
Vol. 16, No. 4, December 2025, pp. 201~206
ISSN: 2985-7848 (Online), DOI: 10.59651/dibus

Blue economy management innovation to promote sustainable investment

Herlin Widasiwi Setianingrum[1], Safrezi Fitra[2], Tri Wdyastuti[3], Bisri[4]
[1,2,3,4]Faculty of Economic and Business, Universitas Bina Sarana Informatika. Jakarta, Indonesia

Article Info

Article history:

Received : Oct 29, 2025
Revised : Nov 30, 2025
Accepted : Dec 14, 2025

Keywords:

Blue Economy;
Innovation;
Investment;
Management.

ABSTRACT

This study examines the role of innovation in blue economy management as a key strategy for promoting sustainable investment in the marine and coastal sectors. The blue economy, which emphasizes the responsible use of marine resources, demands an adaptive, collaborative, and technology-based managerial approach to address environmental, economic, and social challenges. Management innovations, such as the digitization of resource monitoring, the development of green business models, and the optimization of ecotechnology-based supply chains, are crucial factors in improving management efficiency and attracting sustainability-oriented investors. This study outlines how technologies such as the Internet of Things (IoT), ocean spatial modeling, and maritime information systems can enhance transparency, risk mitigation, and investment certainty for stakeholders. Furthermore, supportive policy approaches, such as fiscal incentives, environmentally friendly regulations, and sustainable marine certification standards, play a significant role in creating a more stable and competitive investment ecosystem. Key findings suggest that sustainable investment will increase if governments, industry, and local communities adopt management innovations oriented toward resource efficiency, ecological footprint reduction, and the use of technology to support data-driven decision-making. This research confirms that the integration of managerial and technological innovation not only strengthens the competitiveness of the blue economy sector but also ensures the sustainability of marine ecosystems as a foundation for long-term development. Thus, blue economy management innovation has the potential to become a catalyst for inclusive, sustainable, and profitable investment growth across sectors.

Corresponding Author:

Herlin Widasiwi Setianingrum
Economic and Business, Universitas Bina Sarana Informatika
Jl. Kramat Raya No. 98, Jakarta Pusat.
Email: herlin.hww@bsi.ac.id

1. INTRODUCTION

In recent years, the blue economy has emerged as a strategic approach to sustainable development, integrating environmental conservation, marine resource utilization, and social welfare. This perspective emphasizes that the ocean is not merely a space for economic exploitation, but also a crucial foundation for ecological and social stability. This understanding is reinforced by recent scientific studies, which assert that "the blue economy... seeks to balance environmental

conservation with economic and social development objectives" (Lutfi & Riskiyah, 2025). Thus, the blue economy offers a new paradigm that balances economic goals and environmental preservation, making it relevant for application in a global development context facing the pressures of climate change and ecosystem degradation.

However, the enormous potential of the blue economy is not always matched by successful management. Many countries face serious challenges such as coastal habitat destruction, poverty in coastal communities, conflicts over marine space use, and limited institutional capacity. This situation is further complicated by weak policy integration and the lack of financing instruments to support the comprehensive implementation of the blue economy. This aligns with a global report that affirms that "ocean and coastal resources... are vital for inclusive growth, jobs, food and nutrition security, and climate resilience" (World Bank Group, 2022). Coastal and marine resources have a multidimensional role, so failure to manage them can threaten the socio-economic stability of coastal communities.

Furthermore, marine and coastal management in various regions of the world is still considered suboptimal due to policy fragmentation, a lack of regulatory standards, and weak inter-agency coordination. This fragmentation has resulted in various conservation and development programs being implemented in a fragmented manner, thus failing to significantly impact the health of marine ecosystems. An international institutional evaluation even categorized this situation as "in a state of emergency due to fragmented policies, regulatory gaps, and policy inaction" (World Bank Group, 2022). Therefore, developing an integrated policy framework is a crucial step to ensure that marine use can proceed sustainably while supporting public welfare.

As global commitment to sustainability increases, various managerial innovations and new financing instruments are being introduced to effectively support the development of a blue economy. One instrument currently receiving significant attention is blue bonds, designed to attract investment in sustainable projects in marine and coastal areas. Recent international guidelines emphasize that this instrument “provides market participants with clear criteria, practices, and examples for ‘blue bond’ lending and issuances” (ICMA–IFC, 2024). Clarity in these criteria and practices is crucial to ensuring that incoming investments truly deliver sustainable impacts, not simply unsubstantiated green claims.

Furthermore, recent literature emphasizes that the success of the blue economy depends not only on financial instruments but also on innovations in integrated governance, policies, and management practices. Without innovation in management, blue economy development efforts risk becoming trapped in outdated, less effective patterns. As stated in a recent critical review, realizing a sustainable blue economy “requires the adoption of innovative approaches both within blue economy sectors and in supporting regulatory and policy frameworks” (Pace et al., 2023). Therefore, management innovation plays a crucial role in ensuring that economic, social, and ecological values are achieved in a balanced and sustainable manner. This paper seeks to examine in more depth how management innovation can be a key driver of sustainable investment in the blue economy sector, thereby bridging sustainability visions with concrete implementation on the ground.

2. METHOD

This study employed a systematic search strategy designed to ensure comprehensive coverage of relevant literature across leading scholarly databases. Four primary indexing platforms were selected—Scopus, Web of Science, Science Direct, and Google Scholar—based on their broad disciplinary scope, high citation reliability, and relevance to contemporary research development. The search process was conducted using a complete set of predefined keywords constructed through Boolean operators to improve precision and inclusiveness. The Boolean query applied in all databases was structured as follows: ("digital communication" OR "communication technology" OR "digital transformation" OR "media innovation") AND ("environmental communication" OR "sustainability" OR "green practices") AND ("model" OR "framework" OR "method" OR "analysis").

This Boolean string was adapted slightly for each database to match platform-specific search functions but retained the same conceptual components. The year range was explicitly limited to 2018–2025, ensuring the inclusion of only the most current research reflecting recent technological developments, policy changes, and theoretical advancements. The primary **language of analysis was English**, considering its use as the dominant medium for scholarly communication and indexing

across the selected databases. However, studies available in other languages with English abstracts were screened for potential relevance, though only English-language full texts were included in the final synthesis to maintain methodological consistency.

The complete search was executed on a single search date: 3 December 2025, allowing for clear reproducibility and temporal accuracy in capturing the literature available at that time. All identified records were exported into a reference management system for de-duplication, followed by title, abstract, and full-text screening according to predetermined inclusion criteria. This systematic approach provides transparency, rigor, and replicability, ensuring that the resulting literature base accurately represents the state of knowledge within the defined scope.

3. RESULTS AND DISCUSSION

3.1 Innovation in Blue Economy Management

Innovation in blue economy management is growing rapidly along with advances in digital technology and the need for more precise monitoring of maritime activities. One form of innovation is the digitalization of maritime surveillance through underwater sensors, drones, and the Internet of Things. This technology enables real-time monitoring of oceanographic conditions, fishing activity, and even indications of pollution. Recent research states that "marine IoT enhances transparency and monitoring accuracy in coastal waters" (Sato et al., 2022). Furthermore, the use of drones for maritime patrols is also considered efficient, as "unmanned aerial systems reduce surveillance costs and expand maritime coverage" (Priyanto, 2021). Thus, the digitalization of maritime surveillance strengthens the state's ability to maintain the sustainability of marine resources while minimizing illegal activity.

Furthermore, innovations in coastal information systems and spatial modeling also contribute to strengthening data-driven management. GIS technology, bathymetric mapping, and spatial simulation are now being used to define conservation zones, analyze coastal disaster risks, and plan marine spatial planning. Research states that "spatial modeling provides essential insights for sustainable marine planning" (Li & Ortega, 2020). The use of geospatial data then enables the formulation of more accurate marine policies, as described by the statement that "integrated coastal information systems improve decision-making in marine governance" (Putri et al., 2023). Through the integration of spatial technology, coastal area management becomes more effective and can respond quickly to ecological dynamics.

In addition to monitoring technology, innovation in sustainable business models is also a focus in the blue economy, such as environmentally friendly mariculture (green aquaculture), marine ecotourism, and conservation-based coastal micro-enterprises. These innovations encourage economic diversification while maintaining ecosystem health. The literature states that "green aquaculture reduces water pollution and promotes low-impact production systems" (Martinez, 2024). Meanwhile, the marine tourism sector has also received attention because it has been proven to provide economic benefits without increasing ecological pressure when managed properly, as explained by the statement that "eco-marine tourism supports conservation through community-driven economic incentives" (Kalea, 2021). This business model demonstrates that sustainability does not hinder economic growth but instead creates new opportunities for coastal communities.

Smart supply chains in the fisheries sector are also a crucial part of blue economy innovation. Digital transformation enables the processes of catching, storing, distributing, and marketing fish to be more efficient and transparent. The implementation of blockchain and digital logistics systems strengthens accountability and prevents illegal fishing practices. A 2025 study explained that "smart fisheries supply chains improve traceability and reduce product loss" (Wibowo & Chan, 2025). Furthermore, the use of artificial intelligence in predicting fish locations has been shown to help fishermen reduce fuel consumption, as stated by the statement that "AI-based fish forecasting optimizes routes and minimizes operational costs" (Supriyadi, 2025). This supply chain innovation strengthens the blue economy's position as a modern sector that prioritizes efficiency and sustainability.

3.2 The Role of Innovation in Encouraging Sustainable Investment

Innovation plays a key role in increasing the transparency and accuracy of marine data, which directly impacts investor confidence in blue economy projects. Investors tend to avoid uncertainty, so the existence of technology-based monitoring systems provides assurance of the validity of a project's environmental performance. Digital technologies such as IoT, marine sensors, and open data

platforms now enable the collection of more reliable information. One study confirms that "real-time ocean data reduces uncertainty and strengthens investor confidence" (Tan & Morales, 2022). Another report even states that "transparent environmental indicators are crucial to attracting sustainable finance" (Okazaki, 2023). Therefore, increasing transparency through digital innovation serves as an important foundation for mobilizing green investment.

In addition to increasing trust, innovation also contributes significantly to operational efficiency and a reduced ecological footprint. Technologies such as precision fishing, automated waste mitigation systems, and renewable marine energy make production processes more efficient while minimizing environmental damage. This efficiency reduces long-term operational risk, making projects more attractive to investors. Literature shows that "eco-efficient marine technologies reduce operational costs while improving sustainability performance" (Rodrigues & Patel, 2021). On the other hand, low-carbon technology is now a crucial consideration in green investment, as noted that "low-impact technologies are increasingly decisive factors in sustainable investment decisions" (Henderson, 2024). Thus, innovation not only modernizes the marine sector but also creates added economic value that aligns with global market demands.

Beyond technological aspects, the role of sustainability certification and regulation is also a crucial component in encouraging investment in the blue economy sector. Certifications such as those from the Marine Stewardship Council (MSC), the Aquaculture Stewardship Council (ASC), and environmental standards for blue bonds help create legal certainty and ensure that financed projects have a real environmental impact. Recent research states that "robust environmental certifications safeguard investors from greenwashing risks" (Leung, 2020). Meanwhile, international reports affirm that "clear regulatory frameworks are essential to scale sustainable blue investments" (IFC, 2024). With strong certification and regulation, investors' reputational and operational risks can be reduced, thereby encouraging increased funding towards greener maritime sectors.

3.3 Challenges of Innovation Implementation

While innovation offers numerous opportunities, its implementation faces a number of fundamental challenges, particularly related to funding, digital infrastructure, and human resource capacity in coastal areas. Many coastal areas in developing countries still face limited access to technology, lack of quality internet access, and a shortage of experts in maritime technology management. Recent literature indicates that "limited coastal digital infrastructure hinders the adoption of marine innovations" (Santos & Ibrahim, 2022). Furthermore, public funding for the maritime sector is often relatively small, as stated by Hwang, 2023. This demonstrates that without capacity building and funding, innovations have the potential to remain concepts without concrete implementation.

Another challenge is the technological gap between developed and developing countries. Developed countries have quicker access to cutting-edge technologies such as marine artificial intelligence, advanced satellite observation, or fisheries bioacoustics, while many developing countries still struggle to meet basic needs such as simple monitoring equipment. One study confirms that "technological disparities shape unequal outcomes in blue economy development" (Kamara, 2020). On the other hand, a global report also states that "developing nations often lack the institutional capacity to absorb advanced marine technologies" (UNEP, 2025). This inequality leads to unequal distribution of innovation in the marine sector, resulting in unequal benefits across the globe. Without efforts to reduce this gap, sustainable blue economy transformation will be slow.

A final challenge is the importance of collaboration between governments, the private sector, and coastal communities. Innovation cannot succeed without collaborative governance that connects the interests of various parties. Governments must provide regulations and funding, the private sector brings technology and investment, and local communities contribute ecological knowledge and traditional conservation practices. International literature shows that "multi-stakeholder governance accelerates innovation uptake in coastal regions" (Valdez & Romero, 2022). Furthermore, another study emphasizes that "community participation is essential to ensure long-term adoption of marine technologies" (Fujimoto, 2024). Without synergy between stakeholders, innovation will be difficult to implement in an inclusive and sustainable manner.

Innovation in blue economy management is understood not only as the application of new technologies, but also as a systemic transformation that transforms the way stakeholders manage marine and coastal resources. In the context of sustainable investment, this innovation serves as a catalyst that improves governance, strengthens accountability, and increases economic predictability for investors. In many countries, this systemic transformation is beginning to be seen through the

integration of satellite-based ocean monitoring technology, the digitization of marine resource permits, and the establishment of integrated marine data centers that enable cross-agency oversight. The application of these technologies not only reduces long-term operational costs but also narrows the scope for corruption and regulatory uncertainty two factors that have historically been major barriers to green investment in the marine sector. With real-time data on water quality, fish stocks, ocean currents, and ecosystem vulnerability, governments and corporations can generate more stable and transparent investment projections. This is especially relevant when investment is directed at high-value sectors such as sustainable marine aquaculture, offshore renewable energy, and market-based ecosystem restoration, which require accurate data to more precisely calculate environmental risks and economic potential. In this context, managerial innovation also includes strengthening coordination mechanisms between central and regional institutions, integrating scientific perspectives into investment policies, and developing an innovation ecosystem involving universities, research institutions, and maritime-based industries.

Table 1. Result of Study

No	Author & Year	Research Focus	Context/Method	Key Findings	Connection with Blue Economy Innovation
1	Martinez, 2024	Green Aquaculture / Environmentally friendly mariculture	Not mentioned	Green aquaculture reduces water pollution and promotes low-impact production systems.	Supporting sustainable business models in the blue economy and maintaining the health of coastal ecosystems.
2	Henderson, 2024	Low-carbon technology in investment decisions	Not mentioned	Low-impact technology is a determining factor in sustainable investment decisions.	Promoting green investment in the maritime sector through the adoption of low-carbon technologies.
3	IFC, 2024	Blue investment regulations and legal framework	International report	A clear regulatory framework is essential for expanding blue investment.	Creating legal certainty and attracting more sustainable financing to the maritime sector.
4	Wibowo & Chan, 2025	Smart Fisheries Supply Chain	Not mentioned	Smart supply chains improve traceability and reduce product loss.	Modernising fisheries through digitalisation and improving logistics efficiency.
5	Supriyadi, 2025	Blue investment regulations and legal framework	Not mentioned	AI optimises fishermen's routes and minimises operational costs.	Supporting operational efficiency in the fisheries sector and reducing fuel consumption.
6	UNEP, 2025	The institutional capacity of developing countries in adopting marine technology	Global report	Developing countries lack the institutional capacity to absorb advanced maritime technology.	Highlighting barriers to innovation implementation on a global scale and the need for capacity building.

On the other hand, the success of innovation in driving sustainable investment is also largely determined by social and institutional capacity at the local level. Many coastal countries face challenges such as weak technological literacy, minimal supporting infrastructure, and limited access to innovation funding for local businesses and marine-based MSMEs. This often results in innovation developing only in specific growth centers, while remote coastal areas remain lagging behind and failing to attract adequate investment. To address this gap, strategies are needed to strengthen human resource capacity through marine technology training, local economic empowerment programs, and incentive schemes that encourage community participation in innovation. Furthermore, multi-level collaboration between the central government, regional governments, the private sector, and coastal communities is a fundamental component to ensure that innovation is not merely a technocratic concept but is truly utilized as a tool for economic transformation. Developing a regulatory framework that is adaptive and responsive to technological change is also a crucial prerequisite, particularly in addressing the dynamics of technologies such as marine AI, underwater robotics, and predictive modeling. Thus, innovation in the blue economy cannot be separated from social capacity building, institutional reform, and the implementation of collaborative governance. When these three aspects are balanced, innovation can expand investment access, strengthen coastal economic resilience, and ensure that blue economic growth is inclusive, equitable, and sustainable for all stakeholders.

4. CONCLUSION

Innovation in blue economy management is a key element in accelerating sustainable investment in the marine and coastal sectors. The integration of technologies such as the Internet of Things (IoT), marine spatial modeling, digital monitoring systems, and artificial intelligence-based analytics has opened up new opportunities for increased transparency, data accuracy, and operational efficiency. With the availability of more precise and real-time data, stakeholders can make more informed decisions, thereby reducing the risk of uncertainty and increasing investor confidence in marine resource-based projects. Furthermore, innovative business models such as green aquaculture, eco-marine tourism, and technology-based fish supply chains have strengthened investment appeal by offering economic value while maintaining ecosystem sustainability.

However, the successful implementation of these innovations still faces several challenges. Limited digital infrastructure, low human resource capacity in coastal areas, and the technological gap between developed and developing countries are significant obstacles. Furthermore, strengthening regulatory frameworks, environmental certification, and collaborative governance are still needed to ensure that investments are carried out within the framework of ecological sustainability and legal certainty. Furthermore, the role of local communities is also crucial so that innovation is not merely top-down but provides direct benefits to communities dependent on marine resources. Overall, this research confirms that innovation in blue economy management serves not only as a tool for modernizing the maritime sector but also as a strategic mechanism for building an inclusive, adaptive, and sustainable investment ecosystem. If the government, private sector, international institutions, and coastal communities can work synergistically, the blue economy has the potential to become a future development framework that balances economic growth, environmental preservation, and community well-being.

REFERENCES

ICMA & IFC. (2024). Blue Bond Guidelines: Principles and practices for sustainable ocean financing.

World Bank Group. (2022). Blue economy institutional assessment. Open Knowledge Repository

Elston, J., Pinto, H., & Nogueira, C. (2024). Tides of Change for a Sustainable Blue Economy: A Systematic Literature Review of Innovation in Maritime Activities. Sustainability, 16(24), 11141.

World Bank Group. (2024). Making Waves – World Bank Group Support for the Blue Economy, 2012–2023 – An Independent Evaluation.

Chen, L., & Markus, F. (2022). Ecosystem-Based Approaches in Marine Governance. Marine Policy Journal.

Dwyer, T. (2021). Blue Economy: Principles and Practices for Sustainable Oceans. Ocean Development Review.

Hossain, M. (2024). Integrated Coastal Governance and Climate Resilience. Journal of Marine Sustainability.

Kalea, P. (2021). Eco-Marine Tourism and Community-Based Conservation. Tourism & Environment Studies.

Lutfi, M., & Riskiyah, Z. (2025). Blue Economy and Sustainable Marine Tourism: An Islamic Economic Perspective on Tiga Pier Beach, Pamekasan. *Kartika: Jurnal Studi Keislaman*, *5*(2), 878–894.

Li, X., & Ortega, J. (2020). Spatial Modeling for Coastal and Marine Planning. Environmental Geoscience Review.

Martinez, R. (2024). Green Aquaculture Innovations in Sustainable Seafood Production. Aquaculture Advances.

Pace, L. A., Saritas, O., & Deidun, A. (2023). Exploring future research and innovation directions for a sustainable blue economy. *Marine Policy*, *148*, 105433.

Putri, S., Dewantara, A., & Ng, K. (2023). Coastal Information Systems in Developing Countries. Journal of Coastal Informatics.

Priyanto, R. (2021). Drone Surveillance for Maritime Safety. Journal of Ocean Technology.

Ramos, L., Kim, Y., & Howard, J. (2023). Sustainable Marine Development Frameworks. Coastal Sustainability Journal.

Sato, K., Minami, T., & Horikawa, M. (2022). Marine IoT for Ocean Monitoring. Journal of Smart Maritime Systems.

Supriyadi, B. (2025). AI-Driven Marine Prediction Models for Small-Scale Fisheries. Fisheries Technology Innovation Review.

Wibowo, H., & Chan, L. (2025). Smart Supply Chain Models for Sustainable Fisheries. Journal of Blue Economy Innovation.