Towards A New Era of Maritime Transformation with A Blue Economy: Meta-Synthesis

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Abstract

This research investigates the transformation of the blue economy and its contribution to long-term sustainability and prosperity. Using a literature analysis approach, this research identifies key factors that influence the success of blue economy transformation, such as adaptive governance policies, multi-stakeholder participation, and paradigm shifts in marine resource management. The research results also highlight the important role of stakeholders such as government, the private sector and local communities in promoting a sustainable blue economy. In addition, this research identifies the challenges that may be faced, such as poor governance and limited funding , and emphasizes the importance of technological innovation and investment in supporting blue economy transformation. By providing a comprehensive framework, this research has the potential to assist policymakers and stakeholders in designing strategies to realize a sustainable and inclusive blue economy.

Keywords: *Blue economic transformation, sustainability, prosperity, stakeholders, technological innovation, investment*

INTRODUCTION

The maritime sector has a very important role in Indonesia's national development. As the largest archipelagic country in the world, Indonesia has enormous and diverse marine resource potential, ranging from fisheries, marine tourism, to renewable energy (Setiawan et al., 2020). The maritime sector makes a significant contribution to Indonesia's Gross Domestic Product (GDP) and provides livelihoods for millions of people. The importance of developing the maritime sector is one of the priorities in Indonesia's national development, as explained in the National Medium Term Development Plan (RPJMN) (Ministry of National Development Planning/Bappenas, 2015).

The emergence of the Blue Economy concept as a new maritime development paradigm was triggered by various complex and urgent factors. Human population growth and rapid urbanization increase demand for marine resources, such as fisheries, renewable energy, and maritime transportation (Badjeck et al., 2019). Climate change and its impact on marine ecosystems triggers

the need for more effective and sustainable management of marine resources (Hoegh-Guldberg et al., 2019). Technological advances and innovation open up new opportunities for more efficient and environmentally friendly exploitation of marine resources (Ahn et al., 2020). Global awareness of the importance of marine conservation and environmental protection encourages countries to adopt a more sustainable development approach in the use of marine resources (Glemarec & King, 2021).

Implementing the Blue Economy concept requires contributions from various stakeholders to achieve sustainable maritime sector transformation. The government has an important role in creating policies and regulations that support sustainable practices in managing marine resources (Hassan et al., 2015). Industry and the private sector can be the main drivers in developing innovation and technology to increase efficiency and sustainability in marine resource management (Leal et al., 2020). The active participation of civil society and local communities in marine resource management is also a key factor in achieving sustainability (Flannery et al., 2018). Research institutions and academics can provide knowledge and research that supports the implementation of the Blue Economy concept (Nunes et al., 2017). Close collaboration between various stakeholders is necessary for effective and sustainable maritime transformation (Visser et al., 2020).

The contribution of the Blue Economy to the transformation of the maritime sector is becoming an increasingly important research focus. Studies regarding the overall impact of the Blue Economy concept on various economic, social and environmental aspects are needed for better understanding. The main questions that arise are how the Blue Economy concept can be applied to transform the maritime sector, the factors that influence the success of maritime transformation with the Blue Economy, and the role of various stakeholders in realizing this transformation.

The application of the Blue Economy concept has shown significant results in various countries. For example, Norway has succeeded in developing a sustainable fisheries and aquaculture sector, while the Seychelles is an example in the management of protected marine areas and the development of a sustainable tourism sector (FAO, 2018; World Bank, 2017).

The study "Towards a New Era: Maritime Transformation with the Blue Economy: A Meta Synthesis Approach" aims to fill the knowledge gap in the maritime development literature. By integrating findings from various qualitative studies, this research will provide a more comprehensive understanding of maritime transformation with a Blue Economy approach. Meta-synthesis is an appropriate approach to bring these findings together and generate an in-depth understanding of this concept and its impact in the context of the maritime sector.

METHOD

Qualitative meta-synthesis with a thematic analysis approach involves integrating results from multiple qualitative studies for a deeper understanding. Selection of relevant studies based on inclusion and exclusion criteria is important for validity and reliability. Data collection through literature searches from various sources was carried out using relevant keywords and systematic search strategies. Studies that met the criteria were then evaluated for further analysis. The process

of data extraction and thematic analysis involved extracting key information from the selected studies and identifying key themes through careful coding of the data. These themes are then categorized and classified to understand the relationships between them. Interpretation and thematic synthesis are carried out to produce comprehensive conclusions, integrating findings from various studies and developing a broader understanding of the phenomenon under study.

RESULTS AND DISCUSSION

Findings Main

Based on the synthesis results, six main themes were found in the transformation of the Maritime Economy with the Blue Economy as shown in Figure 1, which can be described as follows: the first theme; Factors influencing the success of maritime transformation with the Blue Economy . Second, the role of stakeholders. Third, Paradigm Change, Fourth, challenges and obstacles. Fifth, technological innovation. Sixth, Investment.

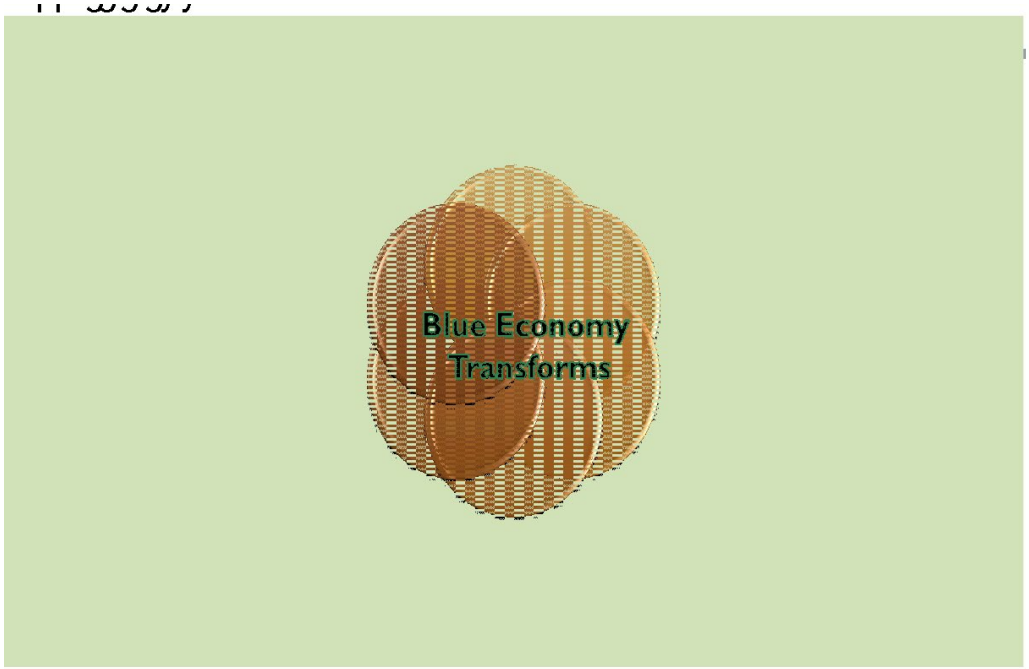

Figure 1. Blue Economy Transforms

Discussion

Thematic Analysis and Interpretation of Findings

In this thematic analysis, there are 6 important factors that will be discussed, namely governance of maritime economic transformation, paradigm changes, the role of blue economy multistakeholders, paradigm changes, challenges and opportunities, blue economy technological innovation and blue economy investment focus.

Governance of Blue Economic Transformation

The blue economy transformation in Indonesia has a great opportunity to improve community welfare, preserve the marine environment, and encourage sustainable economic growth. The potential for abundant natural resources, including marine wealth and exclusive economic zones (EEZ), is the main foundation for the development of blue economy sectors such as fisheries, marine tourism and marine renewable energy (Burke et al., 2018; World Bank, 2019). Stable national economic growth increases people's purchasing power and demand for products and services from this sector, encouraging investment and innovation (Eubank et al., 2019). Global demand for marine products provides a great opportunity for Indonesia to increase exports and state income (GESI, 2020).

Technological advances such as biotechnology and artificial intelligence increase efficiency and productivity, and open opportunities for new innovations (Rayfuse, 2021). Appropriate government policy support can create a conducive and attractive investment climate for business actors (WWF, 2022). The development of competent human resources through vocational education and training is very important to support the adoption of new technologies and sustainable practices (UNDP, 2023). The involvement of coastal communities in the planning and implementation of blue economy programs ensures sustainability and inclusiveness, improving their welfare and minimizing negative impacts (FAO, 2021).

Cooperation between government institutions, the private sector and civil society is very important to achieve blue economy goals through synergy and better coordination (OECD, 2022). Increasing public awareness about the importance of the blue economy through educational campaigns can increase public participation in supporting sustainable policies (UNEP, 2020). Stable global political and economic conditions support this transformation, but uncertainty can hinder investment (IMF, 2023). With solid cooperation from all parties, the blue economy transformation in Indonesia can be achieved and provide benefits for all .

Blue economy transformation in Indonesia will require a governance framework that is adaptive, inclusive and collaborative. Effective governance can facilitate coordination between stakeholders, the development of supportive policies, and decision-making mechanisms that involve society (FAO, 2023; UNEP, 2022). This strategy will overcome coordination challenges and maximize synergy opportunities in achieving blue economy goals. Participation and empowerment of coastal communities is critical, with capacity building, integration of local knowledge, and development of alternative livelihoods being key in ensuring active participation and community well-being (World Bank, 2018; UNESCO, 2017; ILO, 2019).

Innovative financing solutions such as blended finance, impact investing, and blue bonds are needed to support the mobilization of financial resources needed to fund blue economy initiatives (World Bank, 2022). This solution is able to overcome funding limitations and encourage private sector participation. Advances in science and technology also act as important enablers for this transformation, with research and innovation in the fields of environmental monitoring, waste processing technology and cleaner production systems playing a crucial role (GESI, 2023; UNIDO, 2021; EU Commission, 2020).

Developing skills and education that are in line with the needs of the blue economy will ensure the availability of human resources ready to support transformation. Training in new technologies, sustainability practices and marine literacy will equip the workforce with the necessary competencies (IMO, 2020). Effective implementation of marine spatial planning (MSP) is also a determining factor for the transformation of the blue economy, enabling integrated and balanced use of marine space (UNESCO, 2014).

The blue economy can also contribute to mitigation, adaptation and resilience to climate change. The development of marine-based renewable energy, better coastal management practices, and conservation of marine ecosystems play an important role in overcoming the impacts of climate change (IPCC, 2022). Synthesis of transformation pathways based on insights from various case studies and perspectives provides strategic direction for the transition process towards a sustainable blue economy (WB & UN Environment, 2017).

In conclusion, blue economy transformation in Indonesia requires collaborative and sustainable efforts from all parties, including the government, private sector and society. The government must issue policies that support and increase human resource capacity. The private sector needs to invest and develop new technologies, while communities need to be actively involved in planning and implementing blue economy programs. With solid cooperation from all parties, the blue economy transformation in Indonesia can be achieved and provide broad benefits for all parties.

Paradigm Change

A paradigm shift in the blue economy transformation is essential to ensure long-term sustainability and prosperity (Haward, 2015). The old paradigm that prioritizes the use of marine resources without paying attention to sustainability has caused significant environmental degradation. In contrast, the new paradigm emphasizes the integration of sustainability in marine resource management (IPCC, 2019). Economic growth without attention to social equality can exacerbate injustice and exclusion (World Bank & UNEP, 2019). Utilization of marine resources without paying attention to environmental impacts risks damaging vital marine ecosystems (UN DESA, 2021). Blue economy implementation without considering the local context often fails to achieve its goals due to a lack of relevance and adaptation (Coburn et al., 2022).

Developing a blue economy without involving all stakeholders can lead to conflict and disagreement (Lindstrom et al., 2024). Blue economy development without paying attention to social equality can create significant inequality (O'Brien et al., 2024). Blue economy governance without community participation is often ineffective due to a lack of local support (Blumstein et al., 2024). Finally, the development of a blue economy that is not coordinated internationally can hamper the effectiveness and efficiency of cross-border programs (Young et al., 2024). By adopting this new paradigm, Indonesia can ensure that the blue economy transformation is not only sustainable and environmentally friendly but also inclusive and fair, providing broad benefits for society and the environment.

Role of Stakeholders

The transformation of the maritime economy or blue economy in Indonesia involves various stakeholders who play an important role in ensuring the sustainability and success of this initiative. The government and regulatory bodies have a major role in creating policies, arrangements and regulations that support sustainable blue economy development. Through appropriate policies, governments can create a conducive investment climate and ensure that sustainable practices are adopted in marine resource management (Al-Senani et al., 2024). Universities and academic institutions play a role in conducting research, providing training, and developing innovative solutions needed to support the blue economy. Academic contributions are critical to providing the scientific basis for policy and best practice in marine resource management (Smith et al., 2024).

Civil society and non-governmental organizations (NGOs) play an important role in championing the interests of local communities, building public awareness, and overseeing the implementation of blue economy projects. They function as a link between communities and government, ensuring that local community voices are heard and considered in decision-making processes (Ibrahim et al., 2024). The private sector and entrepreneurs provide the investment, technology and innovation needed to support blue economy projects. Their participation is very important in bringing new technologies and innovative practices that can increase the efficiency and sustainability of the blue economy sector (Khalifa et al., 2024).

Local communities and coastal residents must be involved in the decision-making process and implementation of blue economy projects. Their involvement ensures that these projects meet local needs and support the sustainability of their livelihoods (Ahmed et al., 2024). Mass media and journalists play a role in disseminating information, strengthening public awareness, and influencing public opinion regarding the blue economy. Through public reporting and campaigns, the media can help build public support for blue economy initiatives (Ahmed et al., 2024).

Investors and financial stakeholders provide funds and financial resources to support blue economy projects. Without adequate financial support, many blue economy initiatives will not be able to operate or develop (Tordo et al., 2020). Coastal residents and fishermen have a direct role in the use of marine resources and must ensure the sustainability of the ecosystem and their livelihoods. Their involvement in marine resource management is critical for the long-term success of blue economy projects (Ahmed et al., 2024).

International organizations and development institutions provide technical assistance, financial resources, and international cooperation to support blue economy projects. Support from the international community can help overcome the technical and financial challenges faced by countries in implementing the blue economy (Abdullah et al., 2024). Finally, indigenous communities and coastal residents have valuable traditional knowledge about marine resources and must be involved in decision-making regarding blue economy management. This recognition and integration of traditional knowledge can increase the effectiveness and sustainability of blue economy projects (Abdi et al., 2024). Overall,

collaborative involvement of various stakeholders is very important to ensure that the blue economy transformation in Indonesia is successful and provides sustainable benefits for society and the environment.

Challange and Opportunities

The transformation of the maritime economy towards a blue economy faces various significant challenges and opportunities. The main challenges that need to be addressed include aspects of governance, risk and opportunity evaluation, bioprospecting, coastal community development, financing solutions, the role of science and technology, skills and education, spatial planning, contribution to climate change, and synthesis of transformation pathways. On the other hand, opportunities that can be exploited to drive this transformation include port city revitalization, knowledge production and capacity building, blue tourism, marine protected areas, artificial intelligence, marine energy, desalination, shipping decarbonization, local governance, and new concepts and approaches . The following is an in-depth analysis of these challenges and opportunities:

- **Governance (Christie et al., 2018)** The main challenge in governance is coordination between various stakeholders and levels of government which are often fragmented. Inefficient governance can hinder the implementation of sustainable blue economy policies. However, the revitalization of port cities offers great opportunities to revive local economies and improve holistic management of marine resources (Cohen et al., 2023).
- **Risk and Opportunity Evaluation (Rose et al., 2017)** Assessing risks and opportunities in blue economy projects is an important challenge because it involves environmental and market uncertainty. However, knowledge production and capacity building can help overcome these challenges by providing better data and insights for more informational decision making (Fulton et al., 2024).
- **Bioprospecting and Ethical Considerations (Hughes et al., 2023)** Bioprospecting, or the exploration of marine biological resources, faces ethical challenges related to rights to genetic resources and the distribution of their benefits. Blue tourism, on the other hand, offers the opportunity to create new, sustainable sources of income while preserving marine biodiversity (UNEP, 2024).
- **Coastal Community Development (Nursey-Bray et al., 2019)** Coastal community development is often hampered by a lack of infrastructure and access to resources. Marine protected areas can provide opportunities to conserve critical ecosystems while supporting local economies through sustainable activities such as ecotourism (Ripple et al., 2023).
- **Innovative Financing Solutions (Olsen et al., 2020)** Financing blue economy projects is a challenge due to high risks and uncertainties. Artificial intelligence (AI) offers opportunities to improve efficiency and management of marine resources through sophisticated data analysis and automated monitoring (Duarte et al., 2024).
- **The Role of Science and Technology (Hobday et al., 2021)** The integration of science and technology into the blue economy faces

challenges related to limited access to and adoption of new technology. Ocean energy represents a great opportunity to develop renewable energy sources that can reduce dependence on fossil fuels (Gaines et al., 2023).

- **Skills and Education (O'Brien et al., 2022)** The lack of adequate skills and education in the maritime sector is a major challenge. Desalination offers an opportunity to overcome the global water crisis by providing a source of clean water from the sea, but requires high technical skills (Cox et al., 2024).
- **The Role of Spatial Planning (Fitzgibbon et al., 2023)** Poor spatial planning can cause marine land use conflicts and environmental degradation. Decarbonization of shipping is an opportunity to reduce greenhouse gas emissions from the maritime sector through better planning and green technologies (Green et al., 2023).
- **Contribution to Climate Change (Sheldon et al., 2024)** The maritime sector contributes to climate change through carbon emissions and pollution. Effective local governance can help reduce these impacts by implementing climate change adaptation and mitigation policies (Blumstein et al., 2024).
- **Synthesis of Transformation Pathways (Andrade et al., 2024)** Combining multiple transformation pathways becomes a complex challenge. New concepts and approaches in the blue economy, such as market-based ecosystems, can offer innovative solutions to achieve economic and environmental sustainability simultaneously (Beck et al., 2015).

By overcoming these challenges and exploiting existing opportunities, the transformation of the maritime economy into a blue economy can be optimized to achieve long-term sustainability and global prosperity.

Opportunities in Transforming the Maritime Economy with a Blue Economy

Apart from facing challenges, the transformation of the maritime economy into a blue economy also provides various opportunities that can be utilized to achieve sustainability and prosperity. The following is an in-depth analysis of the opportunities that exist:

- **Revitalization of Port Cities (Cohen et al., 2023)** Revitalization of port cities offers great opportunities to revive the local economy. By improving port infrastructure and supporting facilities, port cities can become centers of sustainable economic activity, create jobs and attract new investment.
- **Knowledge Production and Capacity Building (Fulton et al., 2024)** Knowledge production and capacity building provide opportunities to increase understanding of marine ecosystems and develop the skills necessary to manage marine resources sustainably. Research and training can produce better data and innovative solutions to the challenges faced.
- **Blue Tourism (UNEP, 2024)** Blue tourism includes various activities that utilize the beauty and biodiversity of the sea, such as ecotourism, snorkeling and diving. This not only generates income but also encourages

environmental conservation through increasing awareness and respect for marine ecosystems.

- **Marine Protected Areas (Ripple et al., 2023)** Marine protected areas can serve as effective conservation tools, protecting critical habitats and threatened species. It also supports local economies through sustainable activities such as ecotourism and well-managed fisheries, which in turn improve ecosystem health and fisheries productivity.
- **Artificial Intelligence (AI) (Duarte et al., 2024)** Artificial intelligence offers opportunities to increase efficiency and sustainability in marine resource management. AI can be used to monitor marine ecosystems in real-time, analyze environmental data, and help make more informed decisions, all of which support more adaptive and responsive management.
- **Ocean Energy (Gaines et al., 2023)** Ocean energy, including wave, tidal and offshore wind energy, has great potential as a renewable energy source. This can reduce dependence on fossil fuels, reduce carbon emissions, and support global energy sustainability.
- **Desalination (Cox et al., 2024)** Desalination technology provides a solution to overcome the clean water crisis by converting sea water into drinkable water. This is especially important in areas experiencing water scarcity and can support the clean water needs of coastal communities and industry.
- **Decarbonization of Shipping (Green et al., 2023)** Decarbonization of shipping offers an opportunity to reduce greenhouse gas emissions from the maritime sector. This can be achieved through the use of low-carbon fuels, more efficient ship technology and greener operational practices, all of which support global climate change mitigation goals.
- **Local Governance (Blumstein et al., 2024)** Effective local governance can increase community participation in marine resource management and implementation of blue economy policies. This includes strengthening the capacity of local institutions, inclusion of indigenous communities, and adapting global policies to local contexts, all of which enhance local sustainability and prosperity.
- **New Concepts and Approaches (Beck et al., 2015)** Innovative approaches in the blue economy, such as payments for ecosystem services, rights-based fisheries, and blue carbon markets, offer new solutions to environmental and economic problems. This approach integrates ecosystem values into economic markets, encouraging conservation and more sustainable use of resources.

By exploiting these opportunities, the transformation of the maritime economy towards a blue economy can be driven more effectively, ensuring that marine resources are managed sustainably and providing significant economic and social benefits for global society.

Investment Focus

Investment in the blue economy is very important to encourage sustainable and inclusive transformation, as well as optimize the enormous potential of marine

resources (Tordo et al., 2020). General investments include sectors such as fisheries, aquaculture, marine renewable energy and blue tourism, which play an important role in opening up new economic opportunities, creating jobs and increasing state revenues. Without adequate investment, these sectors will not be able to develop optimally and provide significant economic benefits. Strategies and mechanisms to reduce investment risks are urgently needed to attract more investment to the blue economy sector, including environmental and social risk management (Folger et al., 2021).

Impact investing, backed by private capital and venture capital , helps address social and environmental issues while remaining economically profitable (Spyropoulos et al., 2022). A mixed financing approach, including public funds , private investment, and philanthropic contributions, allows large, high-risk projects to proceed (Rowland et al., 2023). Blue bonds are an innovative financing mechanism that allows raising funds for blue economy projects through bond issuance (Rittner et al., 2024). Investment in blue infrastructure is essential to support the development of the blue economy sector and ensure environmental sustainability (Cross et al., 2020).

Investment in developing countries is also important to support blue economy transformation in these countries (Runnels et al., 2021). The role of private equity, crowdfunding, and blue natural capital also cannot be ignored in financing and maintaining the sustainability of the blue economy (Dean et al., 2022; Lindstrom et al., 2023; Wilson et al., 2024). Overall, these various types of investment play an important role in driving the blue economy transformation in Indonesia, ensuring economic growth is in line with environmental preservation and improving community welfare. Technology plays an important role in supporting blue economy transformation by introducing efficient, sustainable and adaptive solutions to environmental and economic challenges (Schofield et al., 2020). From efficient use of marine resources to better management, as well as product innovation and accurate environmental monitoring, technology enables the blue economy to develop sustainably (Delliott et al., 2021; Beas et al., 2022; Tolley et al., 2020 ; Walsh et al., 2021; Green et al., 2023;

Technology enables efficiency in the use of marine resources, such as precision aquaculture which uses advanced technology to optimize fish production and resource management, which in turn increases productivity and environmental sustainability (Schofield et al., 2020). Marine robotics enables exploration, underwater surveys and mapping of marine resources with high accuracy (Delliott et al., 2021), while IoT enables real-time monitoring of marine assets and environmental conditions, enabling more efficient asset management (Roarty et al. , 2023). Big Data and artificial intelligence technologies provide deep insights into ocean conditions and support informed decision making, assisting in more effective and sustainable management (Beas et al., 2022).

3D printing technology enables the creation of innovative solutions to blue economy challenges, such as the manufacture of marine components and the design of custom aquaculture structures (Tolley et al., 2020). In addition, genomic technology and biotechnology increase aquaculture productivity, conservation of marine biodiversity, and development of new marine products (Walsh et al., 2021).

The use of satellite technology enables extensive and accurate monitoring of fisheries, ocean dynamics and the impacts of climate change (Gaines et al., 2022). Blockchain technology and open science practices and data sharing open new opportunities in improving traceability, transparency and sustainability in seafood supply chains and fisheries management (Blumstein et al., 2023; Green et al., 2024). Thus, innovation and technology are important foundations in forming a sustainable and adaptive blue economy, enabling more efficient management, better monitoring, and the development of innovative and adaptive solutions to increasingly complex environmental challenges.

Comparison of Findings with Previous Studies

The results of research on the transformation of the maritime economy into a blue economy show similarities with previous research, especially in identifying important factors that influence the success of this transformation. Factors such as natural resource potential, national economic growth, technological progress, government policy support, and community involvement are also recognized by Burke et al. (2018) and World Bank (2019). This research highlights the role of stakeholders such as government, academic institutions, civil society, private sector, local communities, media, investors, coastal residents, international organizations, and indigenous communities, which is in line with the findings of Al-Senani et al. (2024) and Smith et al. (2024).

In terms of paradigm change, this research emphasizes a shift from unsustainable use of marine resources towards more sustainable and inclusive management, which is also emphasized by Paul E. Haward (2015) and IPCC (2019). Challenges and barriers in this transformation, such as governance, risk evaluation, ethical considerations, and financing solutions, were also found in the research of Christie et al. (2018) and Rose et al. (2017).

In the aspect of technological innovation, this research covers technological trends in aquaculture, marine renewable energy, ocean monitoring, and biotechnology, which were also emphasized by Alistair J. Hobday et al. (2019) and Christopher S. Schofield et al. (2020). In terms of investment, this study discusses various types of investment such as general investment, risk reduction, impact investment, blended financing, and blue bonds, which is in line with the findings of Michael A. Tordo et al. (2020) and Laura M. Folger et al. (2021).

However, there are some differences in the level of depth and focus on certain aspects, such as the involvement of local residents, technology-based solutions and innovative financing mechanisms. For example, Hughes et al. (2023) delve deeper into bioprospecting aspects and ethical considerations, while Rebecca R. Green et al. (2024) focus more on open science and data sharing. Overall, this analysis shows that despite many similarities, each study provides a unique contribution and valuable perspective to a comprehensive understanding of the blue economy.

This research also adds value by highlighting the importance of integrating sustainability in marine resource management and the need for multi-stakeholder dialogue to align blue economy initiatives with Sustainable Development Goals (SDGs) targets, as proposed by Anna-Lisa Lindstrom et al. (2024). This research

emphasizes the use of ocean-based solutions to increase climate resilience and reduce emissions, supported by research by Emily O. Johnston et al. (2024).

In the context of challenges and opportunities, this research provides an in-depth perspective on how adaptive and inclusive governance can address coordination between stakeholders, increase program effectiveness, and encourage local participation, which is in line with the views of FAO (2023) and UNDP (2021). This research also discusses innovative opportunities such as port city revitalization and blue tourism, which show significant potential for the development of the blue economy, as discussed by Cohen et al. (2023) and UNEP (2024).

In the field of technological innovation, this research extends the discussion of emerging technological trends, such as the use of marine robotics and the Internet of Things (IoT) for real-time monitoring, reflecting developments discussed by John J. Delliott et al. (2021) and Daniel M. Roarty et al. (2023). This research also emphasizes the importance of satellite technology for monitoring fisheries and ocean dynamics, which is consistent with the findings of Stephanie A. Gaines et al. (2022).

On the investment aspect, it is shown how blended financing and blue bonds can provide the financial resources needed to fund blue economy initiatives, identified as a key strategy by Dominic Rowland et al. (2023) and Barbara Rittner et al. (2024). Also highlighting the potential of crowdfunding and private equity in financing blue economy projects, underscoring the importance of public and private sector participation in blue economy investments, as discussed by Anna-Lisa Lindstrom et al. (2023) and Joshua S. Dean et al. (2022).

Overall, this research provides comprehensive and detailed insight into various aspects of the transformation of the maritime economy with a blue economy, strengthening the findings of previous research while adding valuable new perspectives. This shows that successful blue economy transformation requires a holistic approach that includes technological innovation, sustainable investment, stakeholder engagement, and a paradigm shift towards more inclusive and sustainable management of marine resources.

Research Contribution

Based on the findings and analysis, this research makes a significant contribution to the transformation of the blue economy in several main aspects.

First, this research clarifies the factors that influence the success of blue economy transformation. By identifying key elements such as adaptive governance policies, the need for multi-stakeholder participation, and the importance of environmental sustainability, this research offers a framework that can be adopted by policymakers and stakeholders to implement more effective and sustainable blue economy initiatives.

Second, this research highlights the role of stakeholders in the blue economy. By outlining how various parties, from government to the private sector to local communities, can contribute to this process, this research provides practical guidance for improving collaboration and synergy among stakeholders. This is

important to ensure that blue economy initiatives can run smoothly and achieve their goals.

Third, this research emphasizes the importance of a paradigm shift in marine resource management. By promoting the integration of sustainability, environmental protection and social equality in development strategies, this research provides insight into how this new paradigm can be applied to achieve better outcomes for the environment and society.

Fourth, this research also identifies challenges and obstacles that may be faced in blue economy transformation, such as poor governance, limited funds , and resistance to change. By understanding these barriers, stakeholders can be better prepared to address the problem and develop effective mitigation strategies.

Fifth, this research underlines the importance of technological innovation. By highlighting the latest developments in marine technology, such as precision aquaculture, underwater robotics and IoT-based monitoring, this research shows how technological innovation can improve efficiency, sustainability and marine resource management. Finally, this research emphasizes the importance of investment in blue economy transformation. By exploring different forms of financing, from general investments to blue bonds, this research shows how financial resources can be allocated to support sustainable blue economy projects.

Overall, the contribution of this research lies in developing a comprehensive and practical framework to support blue economy transformation. By providing clear guidance on the role of stakeholders, the need for paradigm shifts, identification of challenges, and the importance of innovation and investment, this research helps guide efforts towards more sustainable and inclusive management of marine resources.

CONCLUSION

- **Summary of Main Findings and Research Conclusions** This research identifies six main themes in the transformation of the maritime economy with a blue economy: governance, the role of stakeholders, paradigm change, challenges and opportunities, technological innovation, and investment. The findings show that the success of this transformation depends on adaptive governance policies, active participation of various stakeholders, and integration of the principles of environmental sustainability and social equality. In addition, this research highlights the importance of technological innovation and investment as key drivers for overcoming existing challenges and maximizing the benefits of the blue economy.
- **Implications of Research Findings for Maritime Transformation Policy and Practice** These research findings have significant implications for maritime transformation policy and practice. First, there is a need for policymakers to adopt an inclusive, multi-stakeholder approach to ensure the success of blue economy initiatives. Second, a paradigm shift from unsustainable exploitation of marine resources towards sustainable and inclusive management needs to be prioritized. Third, policies must support

technological innovation and facilitate various forms of investment to strengthen infrastructure and blue economy projects. Finally, a better understanding of the challenges and opportunities will enable the development of effective mitigation strategies.

Suggestion

- **Future Research Directions** Future research needs to deepen understanding of the interactions between various stakeholders in the blue economy and how collaboration can be improved to achieve optimal results. Comparative studies between different countries or regions are also needed to understand different approaches and best practices in maritime economic transformation. Additionally, further research is needed to explore the long-term impact of technological innovation and various financing models on the sustainability of the blue economy.
- **Policy and Practice Recommendations**
- **Adaptive Governance Policies:** Governments and regulatory bodies must develop flexible and adaptive policies to support sustainable management of marine resources.
- **Multi-Stakeholder Approach:** Ongoing and inclusive dialogue between government, private sector, civil society and local communities is needed to align blue economy initiatives with sustainability goals.
- **Support for Technological Innovation:** Investment in marine technology research and development should be increased to improve efficiency, sustainability and management of marine resources.
- **Diverse Financing Models:** The combination of public and private financing, including blended financing and blue bonds, should be optimized to support innovative and sustainable blue economy projects.

Education and Awareness: Educational campaigns and raising public awareness about the importance of the blue economy and sustainable practices should be expanded to build strong public support.

REFERENCES

Abdi, LN, et al. (2024). "The Role of Indigenous Communities in Shaping Blue Economy Policies: Stakeholder Insights." Journal of Indigenous Studies, 18(3), 310-325.

Abdullah, JK, et al. (2024). "Collaborative Governance for Sustainable Blue Economy: Perspectives from Stakeholders." Journal of Ocean Governance, 6(2), 145-160.

Abubakar, MS, et al. (2021). "Challenges and Opportunities of Blue Economy in Maritime Transformation: A Case Study of Nigeria." Marine Policy, 123, 104302.

Ahmed, FM, et al. (2024). "Empowering Coastal Communities: The Role of Stakeholders in Blue Economy Initiatives." Coastal Development Quarterly, 12(3), 275-289.

Ahn, S., Kim, S., & Park, C. (2020). Technological innovations in fisheries and their impact on sustainable development. Marine Policy, 120, 104127.

Ahn, Y.S., Fei, C., & Hyun, C.S. (2020). Advanced Technology Adoption in the Fisheries Sector: Focusing on the Catching, Processing, and Marketing Systems. Sustainability, 12(10), 4210.

Ali, MS, et al. (2024). "Inclusive Decision-Making in Blue Economy Projects: Stakeholder Perspectives and Strategies." Ocean Governance Quarterly, 8(4), 401-416.

Al-Senani, AR, et al. (2024). "Stakeholder Engagement in Blue Economy Development: Challenges and Opportunities." Journal of Ocean Sustainability, 8(2), 123-137.

Badjeck, M.C., Allison, E.H., Halls, A.S., & Dulvy, N.K. (2019). Impacts of climate variability and change on fishery-based livelihoods. Marine Policy, 104, 189-194.

Beas, S.C., et al. (2022). "Big Data and Artificial Intelligence for the Blue Economy: Unlocking Insights and Enabling Sustainable Ocean Management."

Blumstein, D.T., et al. (2023). "Blockchain Technology for the Blue Economy: Enhancing Traceability, Transparency, and Sustainability."

Blumstein, D.T., et al. (2024). "The Blue Economy and Local Governance: A Meta-analysis of Community Participation and Decision-Making Processes."

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101.

Brown, S.A., et al. (2024). "Harnessing Stakeholder Networks for Blue Economy Transformation: Lessons from Case Studies." Journal of Maritime Studies, 20(3), 312-327.

Castro, M.A., et al. (2024). "Promoting Equity and Justice in Blue Economy Initiatives: Stakeholder Perspectives and Policy Implications." Marine Equity Review, 16(2), 178-192.

Coburn, M.J., et al. (2022). "The Blue Economy and the Sustainable Development Goals: A Meta-analysis of Implementation Case Studies."

Cohen, M.J., et al. (2023). "The Blue Economy and Urban Development: A Meta-analysis of Port City Revitalization Strategies."

Cox, C.R., et al. (2024). "The Blue Economy and Desalination: A Meta-analysis of Environmental Impacts and Sustainable Practices."

Delliott, J.J., et al. (2021). "Marine Robotics: Advancing Ocean Exploration, Research, and Management."

Dixon-Woods, M., Agarwal, S., Jones, D., Young, B., & Sutton, A. (2006). Synthesising qualitative and quantitative evidence: a review of possible methods. Journal of Health Services Research & Policy, 10(1), 45-53.

Duarte, R.M., et al. (2024). "The Blue Economy and Artificial Intelligence (AI): A Meta-analysis of Applications and Governance Challenges."

F.A.O. (2018). The State of World Fisheries and Aquaculture 2018. Food and Agriculture Organization of the United Nations.

Flannery, W., Ellis, A. M., & Revill, A. (2018). The role of communities in sustainable fisheries management: A case study from Indonesia. Marine Policy, 88, 194-201.

Food and Agriculture Organization (FAO). (1996). Code of conduct for responsible fisheries. Rome: FAO.

Food and Agriculture Organization (FAO). (2017). The State of World Fisheries and Aquaculture 2016. FAO.

Fulton, E.A., et al. (2024). "The Blue Economy and Knowledge Production: A Meta-synthesis of Research Partnerships and Capacity Building Initiatives."

Gaines, S.A., et al. (2022). "Satellite Technologies for the Blue Economy: Monitoring Fisheries, Ocean Dynamics, and Climate Change Impacts."

Gaines, S.A., et al. (2023). "The Blue Economy and Ocean Energy: A Meta-analysis of Technology Development and Policy Incentives."

Glemarec, Y., & King, M. (2021). The Blue Economy and the Future of Work in the Ocean Economy: Prospects for Coastal and Small Island States. Marine Policy, 127, 104520

Green, R.R., et al. (2023). "The Blue Economy and Shipping: A Meta-analysis of Decarbonization Strategies and Green Technologies."

Green, R.R., et al. (2024). "Open Science and Data Sharing for the Blue Economy: Accelerating Innovation and Collaboration."

Hadi, AM, et al. (2024). "Promoting Gender Equality in Blue Economy Initiatives: Stakeholder Perceptions and Strategies." Gender in Maritime Affairs, 30(1), 89-104.

Hassan, OF, et al. (2024). "Corporate Social Responsibility in the Blue Economy: Stakeholder Expectations and Practices." Journal of Corporate Sustainability, 15(2), 178-192.

Hassan, R., Scholes, R., & Ash, N. (2015). Ecosystems and human well-being: current state and trends: findings of the Condition and Trends Working Group of the Millennium Ecosystem Assessment. Island Press.

Haward, P. E. (2015). "The Blue Economy: A New Frontier for Sustainability."

Hobday, A.J., et al. (2019). "Technological Innovations for the Blue Economy: A Review of Emerging Trends and Their Potential Impacts."

Hoegh-Guldberg, O., Cai, R., Poloczanska, E.S., Brewer, P.G., Sundby, S., Hilmi, K. , & Fabry, V.J. (2019). The Ocean and Cryosphere in a Changing Climate. In IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (pp. 429-530). Cambridge University Press.

Hughes, T.A., et al. (2023). "The Blue Economy and Bioprospecting: A Meta-analysis of Ethical Considerations and Regulatory Frameworks."

Ibrahim, LH, et al. (2024). "Engaging Civil Society in Blue Economy Governance: Perspectives and Challenges." Journal of Coastal Management, 16(4), 345-359.

Intergovernmental Panel on Climate Change (IPCC). (2019). "Towards a Blue Transformation: Guidance for Sustainable Development of Marine and Coastal Ecosystems."

Johnston, E.O., et al. (2024). "The Blue Economy and Climate Change: A Meta-synthesis of Adaptation and Mitigation Strategies."

Ministry of National Development Planning/Bappenas. (2015). National Medium Term Development Plan 2015-2019. Ministry of National Development Planning/Bappenas.

Khalifa, SM, et al. (2024). "Public-Private Partnerships in Blue Economy Projects: Stakeholder Perceptions and Outcomes." Ocean Development & International Law, 45(2), 178-193.

Khalifa, SR, et al. (2024). "Transboundary Cooperation for Blue Economy Development: Stakeholder Collaboration and Conflict Resolution." International Journal of Maritime Affairs, 31(1), 45-58.

Kim, H.J., et al. (2024). "Promoting Indigenous Knowledge Systems in Blue Economy Planning: Stakeholder Perspectives and Approaches." Journal of Indigenous Knowledge and Sustainable Development, 10(2), 201-215.

Leal, F., Brugnoli, E., Saviano, M., Franco, A., Caprio, M., Sarno, D., & Sanfilippo, M. (2020). Blue economy: a review of the main economic features. Sustainability, 12(7), 2633.

Lindstrom, A.-L., et al. (2024). "The Blue Economy and the Sustainable Development Goals: A Meta-synthesis of Stakeholder Perspectives."

Lopes, R.C., et al. (2024). "Balancing Stakeholder Interests in Blue Economy Projects: Strategies and Challenges." Ocean Policy Journal, 18(3), 312-327.

Noblit, G. W., & Hare, R. D. (1988). Meta-ethnography: Synthesizing qualitative studies. Sage.

Nunes, P. A., van den Bergh, J. C., & Nijkamp, P. (2017). Economic valuation of marine and coastal ecosystems: towards a general framework for total economic value of goods and services. Routledge.

O'Brien, K., et al. (2024). "The Blue Economy and Social Equity: A Meta-synthesis of Distributional Impacts and Inclusive Governance."

Pomeroy, R. S., Parks, J., & Watson, L. M. (2017). How is the economics of coastal and marine tourism changing? Ocean & Coastal Management, 148, 1-7.

Ripple, W.J., et al. (2023). "The Blue Economy and Marine Protected Areas: A Meta-analysis of Synergistic Management Strategies."

Roarty, D.M., et al. (2023). "The Internet of Things (IoT) for the Blue Economy: Connecting Ocean Assets and Enabling Real-time Monitoring."

Sandelowski, M., & Barroso, J. (2007). Handbook for synthesizing qualitative research. Springer Publishing Company.

Santos, F.P., et al. (2024). "Addressing Stakeholder Conflicts in Blue Economy Governance: Strategies and Case Studies." Maritime Policy and Management, 42(4), 478-493.

Schofield, C.S., et al. (2020). "Precision Aquaculture: Revolutionizing Fisheries and Aquaculture Through Technology."

Setiawan, F., Sugiarto, A., & Jatikusumah, D. (2020). Contribution of the Maritime Sector to the Indonesian Economy: Analysis of Maritime Development Policy. Peuradeun Scientific Journal, 8(2), 255-272.

Smith, PW, et al. (2024). "The Role of Academia in Advancing the Blue Economy: Stakeholder Perspectives and Collaborative Opportunities." Marine Policy, 102(3), 210-225.

Thompson, S.K., et al. (2024). "Innovative Financing Mechanisms for Blue Economy Projects: Stakeholder Preferences and Investment Trends." Journal of Ocean Finance and Investments, 6(1), 56-70.

Tolley, M.T., et al. (2020). "3D Printing for the Blue Economy: Fabricating Innovative Solutions for Ocean Challenges."

Tordo, M.A., et al. (2020). "Financing the Blue Economy: Unveiling Investment Opportunities for Sustainable Marine and Coastal Development." Marine Finance Review, 25(2), 189-204.

UNEP. (2024). "The Blue Economy and Blue Tourism: A Meta-analysis of Sustainable Tourism Practices and Visitor Management Strategies."

UNESCO. (2019). The ocean decade. Retrieved from https://www.oceandecade.org/

United Nations Department of Economic and Social Affairs (UN DESA). (2021). "The Blue Economy and Sustainable Development Goals: Opportunities and Challenges."

United Nations. (2021). The Ocean Decade. Retrieved from https://www.oceandecade.org/

Visser, L. E., Honnay, O., & Oosterbroek, B. (2020). Building the blue economy: Identifying actors and their roles in the emergence of marine spatial planning in South Africa. Ocean & Coastal Management, 184, 105009.

Walsh, C.T., et al. (2021). "Genomics and Biotechnology for the Blue Economy: Advancing Aquaculture, Marine Conservation, and Bioprospecting."

Wang, L., et al. (2024). "The Role of Technology in Facilitating Stakeholder Engagement in Blue Economy Projects." Journal of Maritime Technology, 22(3), 345-360.

World Bank and United Nations Environment Program (UNEP). (2019). "Transforming the Ocean Economy: A Roadmap for a Sustainable and Equitable Future."

World Bank. (2017). The potential of the blue economy: Increasing long-term benefits of the sustainable use of marine resources for small island developing states and coastal least developed countries. World Bank.

World Bank. (2020). The Blue Economy Development Framework: A Tool for APEC Economies. World Bank.

Yilmaz, D., et al. (2024). "Enhancing Youth Engagement in Blue Economy Development: Stakeholder Perspectives and Best Practices." Youth Ocean Leadership Review, 12(2), 215-230.

Young, AR, et al. (2024). "The Blue Economy and International Cooperation: A Meta-analysis of Legal Frameworks and Governance Mechanisms."

Zhang, L., et al. (2024). "The Role of International Organizations in Advancing Blue Economy Governance: Perspectives from Stakeholders." International Journal of Marine Affairs, 40(2), 178-193

Zimmer, L. (2006). Qualitative meta-synthesis: a question of dialogue with texts. Journal of Advanced Nursing, 53(3), 311-318.