

Original Paper

Study on Promoting Marine Economic Development with New Quality Productivity

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Abstract

With the rapid development of the global economy, the marine economy has become a new engine to promote global economic growth. The purpose of this article is to explore strategies for developing new, high-quality productivity that will support the marine economy's quality development. New quality productivity refers to advanced productivity centered on scientific and technological innovation and characterized by high efficiency, intelligence, and green. The article describes the importance of the marine economy and its strategic position in national economic development. It proposes a strategy to promote the development of the marine economy with new quality productivity by analyzing the current challenges facing the development of the marine economy.

Keywords

new quality productivity, marine economic development, scientific and technological innovation, industrial upgrading, strategic suggestions

Against the backdrop of global economic integration and increasingly fierce competition for resources, the strategic position of the ocean economy is becoming more and more prominent as a new engine for national economic growth. The oceans are rich in natural resources, such as biological resources, mineral resources, and renewable energy; they are also an important channel for international trade and logistics and play an irreplaceable role in promoting regional economic development and strengthening the comprehensive strength of the state. However, with the deepening of marine development activities, traditional marine industries are facing serious challenges such as resource depletion and environmental degradation, and there is an urgent need to explore new development paths and models.

At the collective study meeting of the Political Bureau of the CPC Central Committee on January 31, 2024, General Secretary-comprehensively explained the concept of new-quality productivity. He pointed out that new-quality productivity is led by innovation, breaks through the traditional economic growth

model and productivity development trajectory, possesses high-tech content, high efficiency, and high-quality attributes, and is an advanced form of productivity that is compatible with the concept of development in the new era (Xinhua News Agency, 2024).

In light of this background, the concept of “new quality productivity” has emerged as a key force in promoting the transformation and upgrading of the marine economy. New-quality productivity refers to a new type of productive capacity characterized by high efficiency, intelligence, and sustainability, relying on emerging elements such as scientific and technological innovation, the digital economy, and green low-carbon. It emphasizes the protection of the marine ecological environment through technological innovation and model innovation to improve the efficiency and quality of the development and utilization of marine resources, promote the optimization and upgrading of the marine industrial structure, and achieve sustainable development of the marine economy (Zou & Ren, 2024).

1. Concept and Characteristics of New Quality Productivity

New-quality productivity represents an advanced production force that takes technological innovation as its core driving force, abandons obsolete modes of economic growth and modes of production, and exhibits high technology, high efficiency, and high-quality features, in line with the development concept of the new era. This concept covers breakthroughs in technological innovation, innovative combinations of production factors, and deep transformation and upgrading of industries. It is based on the significant improvement of laborers, labor tools, labor objects, and their combination methods and takes the significant growth of total factor productivity as its main feature (Xie & Li, 2024). The essence of new quality productivity lies in innovation, and the key to it lies in quality and excellence, which is essentially advanced productivity.

Further analysis of the connotation of the new quality of productivity can be found in its several significant features. First, it is innovative, and the development of new productivity cannot be separated from the support of scientific and technological innovation. Whether it is the breakthrough of information technology, biotechnology innovation, or the progress of energy technology, these cutting-edge technologies are an important driving force to promote the formation of new productivity (Zhang, 2024). For example, in the field of marine economy, the introduction of advanced marine exploration technology and marine resources development technology can greatly expand the development space and potential of the marine economy.

Secondly, it is high efficiency, and new-quality productivity focuses on improving the efficiency of the utilization of factors of production. Under the traditional productivity model, the efficiency of the utilization of resource factors is often subject to many limitations, while the new quality productivity breaks these limitations and realizes the efficient utilization of resource factors through technological innovation and management innovation. This efficiency is not only reflected in the speeding up of the production process and the reduction of costs but also the improvement of product quality and the increase of added value.

Lastly, there is sustainability, and the development of new quality productive forces must follow the principle of sustainable development. Against the backdrop of increasingly prominent global environmental problems, economic development can no longer be achieved at the expense of the environment. New quality productivity emphasizes the coordination and balance between economic development and environmental protection and promotes green, circular, and low-carbon economic development through the research, development, and application of green technologies. In the context of the marine economy, this means that while developing marine resources, attention should also be paid to protecting the marine ecosystem and realizing the sustainable development of the marine economy.

With its innovative, efficient, and sustainable characteristics, new productivity is gradually becoming a leading force for economic development (Ma, 2024). In the field of marine economy, the introduction and promotion of new productivity is the key to realizing the transformation, upgrading, and high-quality development of the marine economy. Therefore, we should deeply study and explore the current situation and development prospects of the application of new quality productivity in the marine economy, to provide a strong theoretical basis and reference for relevant policy formulation and practice.

2. Definition and Development Trend of the Ocean Economy

The ocean economy, an economic system with marine resources as its cornerstone and marine industries as its mainstay, is gradually taking shape and growing through the development, utilization, and protection of the oceans. It is not only a product of global economic integration and rapid development of science and technology, but also represents an important direction for future economic development. As the global economy continues to deepen and marine science and technology breakthroughs continue, the rich resources, huge potential, and long industrial chain contained in the marine economy are increasingly showing their important role in promoting economic transformation and upgrading and realizing high-quality development.

The definition of the marine economy covers a wide range of areas, including but not limited to marine fisheries, marine transportation, marine oil and gas development, marine tourism, and emerging industries such as marine biopharmaceuticals and marine new energy. The development of these industries not only relies on traditional marine resources but also benefits from the integration and innovation of modern science and technology, thus forming a diversified and high-value-added marine economic system. In this system, science and technology innovation has become the core driving force to promote the development of the marine economy and has continuously spawned new growth points and development opportunities (Yang & Qu, 2023).

In terms of development trends, the marine economy is displaying the following major features: first, the depth and breadth of resource development are expanding, and the efficiency and economic benefits of the utilization of marine resources have been significantly enhanced; second, the structure of the marine industry continues to be optimized, with the proportion of high-tech and modern service industries gradually increasing; third, the development of the integration of the marine economy and the land

economy is accelerating, and several globally competitive marine industry clusters have been formed; Fourthly, the construction of marine ecological civilization has been promoted in-depth, realizing a virtuous cycle of economic development and environmental protection.

In China, the development of the marine economy has risen to the level of national strategy. In the 14th Five-Year Plan, China has set up a special chapter on “actively expanding the space for the development of the marine economy” and put forward the objectives of building a modern marine industrial system, creating a sustainable marine ecological environment, and deeply participating in global ocean governance, emphasizing the importance of scientific and technological innovation, industrial upgrading, ecological protection, and the coordinated development of the region. It also emphasizes the importance of scientific and technological innovation, industrial upgrading, ecological protection, and coordinated regional development (China’s National People’s Congress, 2021). General Secretary has also emphasized the importance of building a strong marine power on several occasions, including the development of the marine economy, the acceleration of marine science and technology innovation, and the protection of the marine ecological environment.

3. Status of the Application of NQP in the Ocean Economy

3.1 Marine Science, Technology and Innovation and New Quality Productivity

Marine science and technology innovation, as an important part of the new quality productivity, plays a pivotal role in the development of the marine economy. As global competition in marine science and technology continues to intensify, countries have increased their investment in marine science and technology innovation in an attempt to seize the commanding heights of marine economic development by mastering advanced technology and equipment.

In the field of deep-sea exploration, the promotion of new quality productivity is particularly significant. The deep sea is rich in mineral and biological resources, but due to the complexity of the deep-sea environment and the difficulty of exploration technology, the exploitation and utilization rate of deep-sea resources has long been low. However, with the continuous innovation and progress of deep-sea exploration technology, such as deep-sea robots, deep-sea exploration instruments, and other high-tech equipment research, development, and application, human cognition of the deep sea and the ability to utilize it have been greatly enhanced (Yu, Lu, & Li, 2024). CNOOC’s “Ocean Oil 720” large-scale physical exploration vessel equipped with the “Sea Scripture” system completed seismic exploration operations in the South China Sea in 3,000-meter ultra-deepwater waters and released the first ultra-deepwater three-dimensional geological exploration map, marking a breakthrough in the development of key core technologies and equipment for China’s deep-water oil and gas exploration (People’s Daily Online, 2023). These scientific and technological innovations not only help to discover more deep-sea resources but also provide technical support for the rational development and protection of deep-sea resources.

Seabed mining is another area of the marine economy that benefits from new qualitative productivity. Traditional seabed mining methods are characterized by low efficiency, high costs, and serious environmental damage. With the help of advanced seabed mining technology and equipment, such as unmanned submersibles and seabed mining machines, it is possible to achieve the precise extraction and efficient utilization of seabed mineral resources while reducing the impact on the environment. The deep seabed is rich in mineral resources, such as polymetallic nodules, cobalt-rich crusts, and polymetallic sulfides. The development and utilization of these resources are of great significance in ensuring strategic resource security and developing a high-quality marine economy.

Additionally, new qualitative productivity is crucial in the field of marine biomedicine. Marine biological resources have unique medicinal value and biologically active compounds and are an essential source for the creation of novel medications and biological products. New kinds of medications and biological products can be created by extracting active compounds with therapeutic potential from marine organisms using contemporary biotechnology and pharmacological research and development techniques. In the area of marine biopharmaceuticals, China has achieved impressive strides in the study and creation of novel medications. For example, the anti-Alzheimer's drug HS971 has been successfully marketed, and the substance BG136 entered the clinical trial stage (Cheng, 2024). In addition to adding to the human drug library, these scientific and technological advancements have given the marine biomedical industry new life.

Overall, marine science and technology innovation, as an important embodiment of the new quality productivity in the marine economy, is injecting a strong impetus into the high-quality development of the marine economy by promoting technological progress and industrial upgrading in such fields as deep-sea exploration, seabed mining, and marine biopharmaceuticals. In the future, with the in-depth promotion of marine science and technology innovation and the acceleration of the transformation and application of the results, the marine economy will usher in a broader space for development and a brighter future.

3.2 Upgrading of the Marine Industry and New Quality Productivity

The upgrading of the marine industry is not only an inevitable trend in the development of the marine economy but also an important area in which the new quality of productivity plays a role. With the deep adjustment of the global economy and the acceleration of the scientific and technological revolution, the traditional marine industry is facing multiple challenges such as resource constraints, environmental pressure, and market competition. Therefore, promoting the upgrading of marine industries and enhancing their added value and competitiveness has become an important strategic choice for coastal countries and regions. In this process, new quality productivity, with its unique advantages and roles, has provided strong impetus and support for the upgrading of the marine industry. Specifically, by promoting scientific and technological innovation, facilitating management change, and optimizing resource allocation, the new quality productivity has profoundly affected all aspects of the upgrading of the marine industry.

Taking marine fisheries as an example, the introduction and application of new quality productivity has made fishery production gradually get rid of the excessive dependence on traditional production factors and turn to the direction of intelligentization and informationization. In modern sea farms, intelligent farming systems realize real-time monitoring through Internet of Things technology, use sensors to collect data on water quality, temperature, dissolved oxygen, etc., and provide a scientific basis for farming management through intelligent analysis. For example, in the modernized sea ranch project in Guangdong Province, the intelligent management of the sea ranch is realized through cooperation with scientific research institutions and universities to strengthen the research and application of marine science and technology. The information management of marine fisheries analyzes and manages fishery resources through big data and cloud computing technologies. For example, research results from the Yantai Coastal Zone Research Institute of the Chinese Academy of Sciences have monitored and assessed fishery activities in the northern Indian Ocean by analyzing ship AIS and satellite remote sensing data (Yantai Coastal Zone Research Institute, 2024).

In the field of marine oil and gas, the impact of new quality productivity is equally far-reaching. With the increasing scarcity of oil and gas resources and the increasing difficulty of extraction, the traditional mode of oil and gas exploration and development has made it difficult to meet the needs of the industry's development. The introduction of new productivity, especially the enhancement of independent innovation capability and core technology, has injected new vitality into the sustainable development of the offshore oil and gas industry. China National Offshore Oil Corporation (CNOOC) has successfully implemented the "Deep Sea No. 1" ultra-deepwater atmospheric field project, realizing a historic leap to 1,500 meters of ultra-deepwater and demonstrating China's remarkable progress in deep-sea oil and gas exploration and development (Flag, 2024).

Therefore, new quality productivity plays a pivotal role in promoting the upgrading process of the marine industry. In the future, with the continuous development and improvement of new quality productivity, its application in the marine economy will become more extensive and in-depth, providing strong support for the sustainable and healthy development of the marine economy. At the same time, we should also see that the introduction and application of new quality productivity is a complex and systematic process that requires the joint efforts and collaboration of the government, enterprises, and all sectors of society. Only in this way can we ensure that the new quality productivity can play its greatest role in promoting the upgrading of the marine industry and making greater contributions to the economic and social development of the coastal areas and the country as a whole.

3.3 Marine Ecological Protection and New Quality Productivity

New-quality productivity plays an important role in promoting marine ecological protection, and it provides a completely new solution to marine ecological protection through the introduction of advanced scientific and technological means and management modes. Modern technological means such as remote sensing technology, drones, and unmanned ships are utilized to achieve real-time monitoring of the marine environment. In the area of marine ecological restoration, artificial reefs, reconstruction of

seaweed farms, and other ecological restoration techniques have been adopted to restore damaged marine ecosystems. China has also implemented the “Blue Bay” remediation program, which has improved the marine ecological environment by restoring coastal wetlands and shorelines (An, 2023). At the same time, new productivity has also promoted the development of green marine industries, reducing the pressure on the marine environment through the promotion of clean energy and the optimization of fisheries breeding methods, thus achieving a win-win situation in terms of economic and ecological benefits. Additionally, new qualitative productivity has demonstrated significant promise for early warning, prevention, and management of marine disasters. By reducing damage to the marine ecosystem and providing early warning of typhoons, storm surges, and other marine disasters, the establishment of an early warning system for marine disasters—facilitated by satellite remote sensing and marine monitoring networks—not only enables government agencies to take timely action to minimize losses, but it also gives decision-making a scientific foundation and enhances the relevance and efficacy of disaster prevention and control.

4. New Quality Productivity Strategies to Promote the Development of the Marine Economy

In the marine economy, new quality productivity is a key factor in promoting the ecological balance of coastal areas and is crucial to the implementation of the strategy of a strong marine nation. To enhance the overall competitiveness of the marine industry, it is necessary to strengthen the integration of new quality productivity with the marine industry, enhance the strength of scientific and technological research and development in the marine field, and emphasize the driving role of scientific and technological innovation in promoting the high-quality development of the marine economy. In addition, new quality productivity should be viewed as a green development force to promote the sustainable development of the marine economy.

4.1 Strengthening Investment in Marine Science and Technology Innovation

In the process of promoting the high-quality development of the marine economy, enhancing the investment in marine science and technology innovation, building a high-quality talent team, and optimizing the innovation environment are the three core strategies, in which the synergistic cooperation between the government and enterprises is crucial.

First, in terms of financial input, the government and enterprises should form a joint effort to significantly increase financial support for marine science and technology innovation. At the government level, enterprises can be effectively guided and encouraged to increase their investment in marine science and technology research and development through the establishment of special scientific research funds, the implementation of tax exemptions and subsidies, and other incentives. Enterprises need to deeply realize the strategic significance of scientific and technological innovation for enhancing core competitiveness, take the initiative to increase the investment in research and development funds, and actively participate in marine scientific and technological innovation activities, forming a virtuous circle (Agricultural Bank of China, Qingdao Branch Subject Group, Zuo, & Li, 2024). Secondly, the construction of human

resources is the cornerstone of marine science and technology innovation. On the one hand, higher education and scientific research institutions should be strengthened in the training of marine science and technology personnel in the main role, through optimizing the curriculum, strengthening the practice of teaching, and other measures to improve the quality and relevance of personnel training. On the other hand, it is necessary to actively broaden the channels of talent introduction to attract top marine science and technology talents from home and abroad to work in China, injecting fresh blood for marine science and technology innovation. At the same time, the establishment of a sound talent incentive mechanism for marine science and technology talents to create superior working conditions and broad space for development to fully stimulate their innovative potential (Lin, Zhou, & Li, 2024). Furthermore, optimizing the innovation environment is the key link to ensuring the sustainable development of marine science and technology innovation. The government should formulate and improve relevant policies and regulations to provide solid institutional support for marine science and technology innovation. This includes, but is not limited to, establishing a sound intellectual property protection system to ensure that scientific and technological innovation achievements are effectively protected; at the same time, promoting the deep integration of industry, academia, and research, strengthening the synergistic cooperation among enterprises, universities, and scientific research institutions, and accelerating the transformation and application of scientific and technological innovation achievements. In addition, modern information technology means should be fully utilized to promote the transformation of marine science and technology innovation to digitalization and intelligence. Through big data, cloud computing, and other advanced technologies, marine data should be deeply mined and analyzed to provide accurate data support for scientific and technological innovation; at the same time, artificial intelligence and other technologies should be used to improve the automation level and efficiency of marine scientific and technological innovation and to realize the in-depth integration of scientific and technological innovation and information technology.

4.2 Promoting the Upgrading and Transformation of the Marine Industry

The upgrading of the marine industry is a key strategy for promoting the optimization of the new quality productivity structure and the high-quality development of the marine economy. To this end, the transformation and upgrading of the marine industry needs to be synergistically promoted from multiple perspectives.

For the transformation and upgrading of traditional marine industries, technological transformation and innovation should be the primary focus. Through the introduction of advanced technology and equipment, the traditional marine industry will undergo an in-depth transformation to improve its production efficiency and optimize product quality to strengthen its competitiveness in the market. At the same time, enterprises are encouraged to increase investment in R&D, actively carry out technological innovation activities, and explore and practice new production models and business strategies to inject new vitality and vigor into the traditional marine industry, which is the key driving force for realizing transformation and upgrading.

About the cultivation and development of emerging marine industries, focus should be placed on areas with great potential, such as marine biomedicine and new marine energy. These areas not only have high technological content and high added value but are also closely linked to the country's sustainable development strategy. For this reason, the government should increase policy support and optimize the environment for industrial development to attract more capital and talent into these emerging fields, with the expectation that new economic growth poles can be formed to provide a solid support for the high-quality development of the marine economy (Ma & Gong, 2024). In addition, strengthening the integration and optimization of the marine industry chain is also an important part of promoting the upgrading of the marine industry. Strengthening cooperation and synergy between upstream and downstream enterprises in the industry chain and promoting resource sharing and complementary advantages helps to enhance the operational efficiency and risk-resistant ability of the whole industry chain. At the same time, promoting the deep integration and development of the marine industry with other related industries and building a more complete industrial system is an effective way to enhance the overall competitiveness of the marine economy.

4.3 Strengthening Awareness of Marine Ecological Protection

Strengthening the construction of a marine ecological civilization is a key measure for maintaining the marine ecological balance, protecting marine resources, and ensuring the high-quality development of the marine economy. Against the backdrop of the deepening development of global economic integration, the marine economy has become an important force driving national economic growth, and the construction of a marine ecological civilization is the cornerstone for ensuring the sustained and stable release of that impetus.

The first and foremost task in promoting the building of a marine ecological civilization lies in strengthening the protection and governance of the marine ecosystem. This requires us to implement stricter environmental protection regulations and to severely punish illegal discharges, overfishing, and other acts that damage the marine ecology. At the same time, we should actively promote the application of clean energy in the marine economy and reduce our dependence on fossil energy to alleviate the burden of pollution on the marine environment. It is also crucial to strengthen the construction of a marine ecological monitoring and early warning system. With the help of advanced technologies such as satellite remote sensing and buoy monitoring, real-time monitoring and data analysis of the marine environment can be realized so that potential ecological risks can be detected and addressed in a timely manner. This will not only help to prevent the deterioration and spread of ecological problems but will also provide a more scientific and accurate basis for marine economic decision-making. Raising the awareness and participation of society as a whole in the building of a marine ecological civilization is also a link that cannot be ignored. Through science education, media reports, public participation activities, and other means, we can popularize knowledge of marine ecology, raise the public's awareness of environmental protection, and encourage them to actively participate in marine ecological protection actions. Only when

all sectors of society fully understand the importance of protecting marine ecology and put it into practice together can the ambitious goal of building a marine ecological civilization be truly realized.

5. Conclusion

New quality productivity is an important force to promote the high-quality development of the marine economy, through innovation-driven, synergistic integration and green development mechanisms, injecting new vitality and power into the marine economy, and promoting the transformation and upgrading of the marine industry as well as improving quality and efficiency, this discovery not only enriches the theoretical system of the new quality productivity and the marine economy, but also provides new perspectives and thoughts on the development of the marine economy in practice.

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