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The Impact of Marine Tourism on Iran's Sustainable Economic Growth with Emphasis on Blue Economy Components

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ABSTRACT

Sustainable economic growth and development have increasingly become a central concern for economic policymakers and researchers at both national and global levels in recent years. In this context, the blue economy has emerged as a novel and strategic framework, playing a pivotal role in enhancing economic and environmental indicators. This study investigates the impact of selected components of the blue economy on sustainable economic growth, with a particular focus on coastal and marine tourism, during the period 1993 to 2023, using the Autoregressive Distributed Lag (ARDL) model. The key components examined include fisheries and aquaculture production, agriculture, forestry, and fisheries, and coastal and marine tourism. Additionally, inflation rate and capital are included as control variables in the analysis. The results indicate that, in both the short and long run, fisheries and aquaculture production, coastal and marine tourism, and capital exert the most significant and positive effects on sustainable economic growth. Furthermore, inflation rate and the broader agriculture, forestry, and fisheries sector also contribute meaningfully to stimulating economic growth. Overall, the findings underscore the importance of strategic planning in harnessing the potential of the blue economy—particularly in the fisheries and aquaculture sector. Such planning can drive economic growth in Iran through mechanisms such as attracting effective investments, enhancing productivity, and promoting the sustainable management of aquatic resources. Moreover, policymakers should place greater emphasis on developing infrastructure related to the blue economy to fully capitalize on its potential for boosting gross domestic product (GDP).

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1- Introduction and problem description

Sustainable economic growth is a primary development goal at both national and global levels, relying heavily on the efficient use of natural resources and key production factors. In this context, the blue economy—defined as the sustainable use of aquatic resources and areas such as oceans, seas, lakes, coasts, and islands—has emerged as a strategic domain that significantly contributes to economic growth, improved livelihoods, and job creation.

The blue economy encompasses a broad spectrum of activities, ranging from traditional sectors like fisheries, maritime transport, and tourism to emerging industries including renewable ocean energy, aquaculture, marine resource extraction, and marine biotechnology. This sector holds immense potential for economic expansion and employment, especially in developing coastal nations. Moreover, sustainable management of marine resources is crucial for ensuring long-term food security, preserving biodiversity, and mitigating climate change effects, as oceans play a vital role as carbon sinks and habitats for diverse ecosystems (Sufian et al., 2023).

Currently, over one-third of the global population lives within 60 kilometers of the coast, and more than two-thirds of the world's major cities are situated along coastlines. Approximately 1% of the global workforce is directly employed in ocean-related sectors, contributing about 2.5% to the world’s GDP, with maritime transport facilitating 90% of international trade. Despite this, countries like Iran—with over 5,800 kilometers of coastline along the Caspian Sea, Persian Gulf, and Gulf of Oman, and a strategic geopolitical position bridging Asia and Europe—have only harnessed a fraction of their marine economic potential. For example, only around 10% of Iran’s GDP originates from marine activities, indicating significant room for development (IRNA, 2023).

Coastal and marine tourism, as a vital subset of the blue economy, plays a key role in the economic structures of coastal

countries. It offers diverse opportunities through activities such as diving, surfing, marine cruises, and ecotourism. However, this sector is vulnerable to environmental threats like climate change and pollution, making sustainable development and smart management essential. International organizations including the World Travel & Tourism Council and the United Nations World Tourism Organization emphasize the need for sustainable tourism policies to maximize benefits while minimizing environmental and social impacts (WTTC, 2016; UNWTO, 2017).

Given Iran's rich coastal resources and underutilized tourism capacities, focusing on coastal tourism within the blue economy framework could significantly diversify the economy, boost employment, and help preserve coastal environments. Accordingly, this study aims to investigate the impact of blue economy components, with an emphasis on coastal and marine tourism, on Iran's sustainable economic growth from 1993 to 2023. The Autoregressive Distributed Lag (ARDL) model is employed to analyze both short-term and long-term relationships, providing insights to guide policymakers in harnessing marine tourism's potential for sustainable economic growth.

2- Theoretical Foundations

Origins of the Blue Economy

The concept of the Blue Economy emerged in response to growing global concerns over sustainable development, with its foundational roots traceable to the early 1990s. One of the historical milestones in this evolution was the United Nations Conference on Environment and Development (UNCED), held in 1992 in Rio de Janeiro, Brazil. This event led to the adoption of Agenda 21, a global roadmap for sustainable development. The document emphasized the importance of conserving and sustainably using oceans, seas, and coastal areas, highlighting the need for integrated marine resource management to ensure environmental sustainability (McCammon, 1992).

A decade later, the World Summit on Sustainable Development (WSSD) was held in 2002 in Johannesburg, South Africa. For the first

time, the summit brought serious attention to the role of ocean-based economies in reducing poverty, creating employment, and driving economic growth. It also introduced initiatives aimed at mitigating the negative impacts of human activities on marine environments, including the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (Nath, 2005).

In 2009, the term "Blue Economy" formally entered the policy discourse. That year, the U.S. Senate Committee on Commerce, Science, and Transportation introduced the term as a novel approach to fostering macroeconomic development through ocean-based opportunities. The discussions emphasized innovative marine businesses, renewable ocean energy, and climate change adaptation (Cantwell, 2009). In the same year, the International Symposium on Blue Economy for Green Growth was held in South Korea, promoting the idea of sustainable ocean resource use through environmentally focused technologies that align economic growth with ecological preservation (Joroff, 2009).

In 2011, Belgian entrepreneur and theorist Gunter Pauli played a pivotal role in popularizing the Blue Economy. He published the influential book "The Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs", which presented a new business model based on sustainable use of natural—particularly marine—resources. Pauli advocated for biomimicry and circular innovation, emphasizing reuse of waste, and showcasing the potential of sectors like aquaculture, marine renewables, and biotechnology to simultaneously advance economic growth, job creation, and environmental conservation (Pauli, 2010; Balboa & Somonte, 2014; Sakhuja, 2015; Bueger, 2015).

The momentum continued in 2012 with the Rio+20 United Nations Conference on Sustainable Development, again held in Rio de Janeiro. This conference highlighted critical themes such as food security, sustainable energy, consumption and production patterns, ocean conservation, and disaster resilience, thereby elevating oceans to a top priority in global development agendas (UNCTAD, 2014).

In 2014, the World Bank released an official report recognizing the Blue Economy as a tool for sustainable development, viewing it as a pathway to economic growth, livelihood improvement, poverty reduction, and marine ecosystem conservation. The report advocated for a transition from traditional exploitation models toward innovative, systems-based approaches to managing ocean resources.

Following this, in 2015, the United Nations adopted the Sustainable Development Goals (SDGs), where Goal 14 (SDG 14) specifically focused on conserving oceans and marine resources through sustainable practices. Since then, the Blue Economy has been widely acknowledged as a key driver of global sustainable development (Rees et al., 2018).

Over the years, related concepts such as "Ocean Economy", "Marine Economy", and "Blue Growth" have also gained traction in both academic and policy discourse, although their conceptual boundaries sometimes overlap. Lee et al. (2020) argue that these terms are often used interchangeably, and call for greater clarity in defining their distinctions. Furthermore, carbon-intensive sectors like oil and gas are sometimes mistakenly grouped under the Blue Economy, despite their incompatibility with sustainability principles (Voyer et al., 2018).

In the scientific literature on the blue economy, related concepts often overlap, and terms such as "Blue Economy," "Ocean Economy," "Marine Economy," and "Blue Growth" are frequently used interchangeably or complementarily (Lee et al., 2020; Kaczynski,

2011). The Blue Economy is defined as the sustainable use of ocean resources to promote economic growth, improve livelihoods, and maintain the health of marine ecosystems (World Bank, 2013; Phelan et al., 2020). Blue Growth is an approach aimed at fostering economic development in marine environments within the framework of sustainable management of social-ecological systems (Caswell et al., 2020). The Marine Economy refers to dynamic and complex systems encompassing all industries related to the sea (Qi & Xiao, 2019), while the Ocean Economy is an innovative concept focusing on the spatial development and functioning of coastal and marine areas with an emphasis on environmental sustainability and good governance (Bentlage et al., 2014; UNCTAD, 2014).

In recent years, many countries have adopted more strategic approaches to the Blue Economy. The European Union has introduced a Blue Growth strategy, while Small Island Developing States (SIDS) have embraced the Blue Economy as a cornerstone for economic survival and climate resilience. Similarly, the African Union has identified the Blue Economy as a key pillar of its Agenda 2063 strategy (Bond, 2019; Henderson, 2019).

In sum, the Blue Economy is a concept that has evolved over the past three decades—from a primarily environmental concern to a comprehensive strategy for economic growth, social equity, and marine resource sustainability. It is not only a response to the world's pressing environmental and developmental needs, but also a catalyst for innovation, employment, and a sustainable future for coming generations.

Components of the Blue Economy

- Fisheries and Aquaculture

Sustainable fisheries constitute a fundamental pillar of the blue economy, playing a critical role in both global food security and economic development. Worldwide, marine fisheries generate more than USD 270 billion in annual GDP, support the livelihoods of approximately 300 million individuals, and serve as a primary source of protein and vital micronutrients for over 3 billion people (World Bank, 2012; FAO, 2016). Their continued viability is essential not only for coastal communities but also for addressing broader challenges related to nutrition, poverty reduction, and ecological sustainability.

In Iran, aquaculture has shown notable progress, with over 23% growth in production over the past five years. Per capita consumption of aquatic products reached approximately 14.1 kg in 2023—an increase of more than 16% compared to 2018. In the same year, aquatic products contributed about 7.1 grams to the daily animal protein intake. Exports of aquatic goods amounted to 181,000 tons, valued at over USD 605 million, with a trade surplus of USD 565 million. Employment in the fisheries sector directly engaged 249,000 individuals, with an estimated total of over 700,000 people supported by the wider value chain. This 7% employment growth is largely attributed to aquaculture expansion and preservation of existing jobs (Iran Fisheries Organization, 2023).

Iran's southern and northern waters offer substantial capacity for the development of fisheries and aquaculture. Annual production exceeding 1.2 million tons signals the sector’s economic significance. Key development strategies include modernizing the industry, expanding exports, and implementing sustainable fishing practices (Salarvand, 2025).

Although fisheries development plays a crucial role in economic growth and food security, it can also have adverse impacts on marine ecosystems. Overfishing, habitat destruction, and pollution

from aquaculture operations can degrade marine biodiversity and disrupt ecological balance. Sustainable fisheries management, including regulated harvesting, habitat conservation, and pollution control measures, is essential to mitigate these negative effects and ensure long-term viability of fish stocks and marine environments.

- Tourism

Tourism, particularly coastal and maritime tourism, is a vital economic sector for many nations. It supports foreign exchange earnings and contributes to environmental and cultural conservation when managed sustainably. Activities such as scuba diving, cruise travel, recreational fishing, marine archaeology, and ecotourism are part of this growing sector. Sustainable ocean-based tourism can generate income for coastal communities, alleviate poverty, and preserve marine biodiversity and cultural heritage. It also fosters responsible consumption and production patterns (UNWTO, 2014).

Iran's Persian Gulf and Oman Sea coastlines hold significant untapped tourism potential. Development of hospitality infrastructure, easing visa regulations, international marketing, and attracting foreign investment are crucial for turning Iran's coastal areas into competitive tourism hubs (Salarvand, 2025).

Marine tourism expansion generates significant economic benefits, but it may also exert considerable pressure on fragile coastal and marine environments. Uncontrolled tourism activities can lead to habitat loss, increased waste and pollution, and disturbance to wildlife. Implementing sustainable tourism practices, such as environmental impact assessments, waste management, and visitor education, is vital to preserve coastal ecosystems while supporting economic development.

In addition to environmental concerns, tourism also entails substantial infrastructural costs that must be carefully considered. The development of transportation, accommodation, water supply, and waste management infrastructure requires significant investment and ongoing maintenance. Failure to account for these costs can lead to underestimation of the economic burden on local governments and communities. Therefore, a comprehensive analysis of tourism's impact should balance its positive effects with both environmental and infrastructural challenges to provide a realistic assessment of its sustainability.

- Maritime Transport, Ports, and Related Services

Maritime transport facilitates more than 80% of international trade volume, playing a pivotal role in global supply chains—especially in developing economies (UNCTAD, 2016). Projections suggest a doubling of global maritime trade by 2030 and a fourfold increase in port volumes by 2050 (QinetiQ et al., 2013; ITF, 2015).

Iran's maritime infrastructure includes seven major and over 20 smaller commercial ports. Its geographical position enables the country to become a regional transport hub. Strategic development of ports such as Chabahar and Shahid Rajaei, along with expansion of the national fleet, infrastructure upgrades, and regulatory reforms, are necessary for realizing this potential (Salarvand, 2025).

- Extractive Industries

Marine extractive industries—particularly offshore oil and gas—constitute an important component of Iran's ocean economy. Shared fields in the Persian Gulf offer substantial opportunities. Increasing Iran's share in joint resource extraction and investing in local technologies and downstream industries (e.g., petrochemicals and refining) are strategic priorities (Salarvand, 2025).

- Renewable Energy

Marine renewable energy plays a dual role in addressing climate change and fostering energy independence. Many coastal countries rely

heavily on fossil fuel imports, exposing them to market volatility. In some developing nations, fuel import costs have exceeded healthcare expenditures (UN-DESA, 2014).

Iran can benefit from harnessing wave and offshore wind energy resources, particularly along its southern coast. Key interventions include investment in energy infrastructure, support for clean-tech firms, and policy incentives for sustainable energy production.

- Marine Biotechnology

Marine biotechnology utilizes biological marine resources to produce pharmaceuticals, nutraceuticals, cosmetics, and industrial compounds. The sector demands substantial investment in research and development, alongside institutional support for knowledge-based enterprises.

Additional blue economy innovations include the reuse of marine plastic waste in artistic and commercial products, contributing both to environmental protection and local enterprise development.

To conclude, the concept of the blue economy provides a cross-industry framework aimed at promoting economic growth that is both sustainable and environmentally friendly. It holds considerable promise in advancing worldwide goals including reducing poverty, ensuring food availability, conserving biodiversity, and enhancing resilience to climate change. This research concentrates on assessing how major sectors within the blue economy—especially marine tourism—impact the economic development of Iran.

The Role of the Blue Economy in the Global Economy

According to the UNCTAD (United Nations Conference on Trade and Development) report in 2024, ocean-related economic activities

worldwide have grown at a faster pace than other sectors. The Ocean Economy Index nearly 2.5 times increased between 1995 and 2020, surpassing the average global growth rate. This expansion has been primarily driven by the development of trade and innovation within the sector.

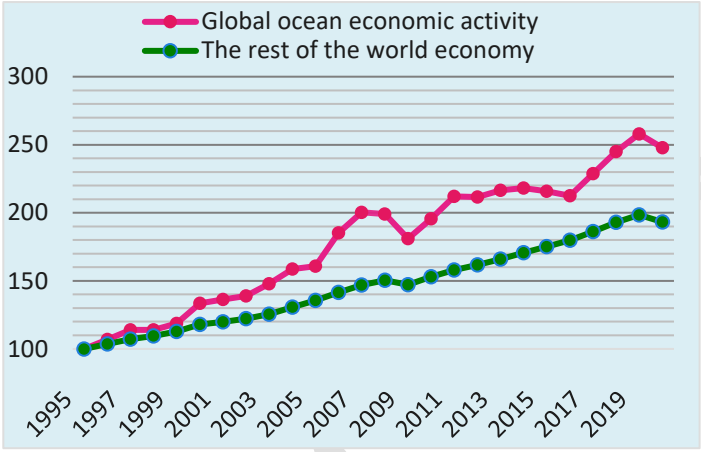


Chart 1. Growth of the Ocean Economy Compared to the Global Economy (1995–2020)
Source: (UNCTAD, 2024)

As illustrated in the chart 1, the ocean economy has shown strong global growth potential. According to the OECD (2016), ocean-related activities contributed approximately USD 1.5 trillion to global GDP—about 2.5% of the total. With appropriate policies and targeted investments, this share is projected to more than double by 2030. Emerging sectors such as offshore wind energy, aquaculture, and marine biotechnology are identified as key drivers of future expansion (Rigaud et al., 2018).

Complementing this, a 2019 report by WWF estimates that the blue economy could generate up to USD 3 trillion in value and create as many as 40 million jobs by 2030, provided sustainability principles are respected (Pendleton et al., 2020). Likewise, the European Commission (2019) reported that the EU's blue economy supported 5.4

million jobs and added EUR 750 billion to its economy in 2018—with projections indicating growth to EUR 1.3 trillion by 2030 (Dalton et al., 2019).

In 2023, the global trade volume of maritime goods and services reached record highs of $899 billion and $1.3 trillion, respectively, underscoring the growing importance of ocean-related activities for coastal and island nations. The fisheries sector alone currently supports the livelihoods of approximately 600 million people, mostly in developing countries.

Despite this significant economic growth, the Blue Economy faces major environmental challenges. Estimates indicate that the ocean economy accounts for about 11% of global carbon dioxide emissions; however, comprehensive and accurate data to monitor and track emissions across key sectors within this economy remain lacking. This data gap poses serious obstacles to effective global planning and policymaking.

Among these sectors, coastal and marine tourism alone contributes roughly 4% of global CO_2 emissions. Nevertheless, official data on emissions from this sector remain incomplete and fragmented. In contrast, information on some other sectors, such as maritime transport, offshore oil extraction, and fisheries, tends to be more precise and accessible. However, crucial industries like ports and shipbuilding are still significantly underrepresented in global carbon assessments.

These forecasts collectively highlight the transformative potential of the blue economy—economically, socially, and environmentally. Beyond GDP contributions, its value lies in improving food security, reducing poverty, and preserving marine biodiversity. Thus, achieving a sustainable blue economy requires a

balance between economic growth and responsible stewardship of marine ecosystems.

To better illustrate the complex interlinkages between blue economy sectors and economic growth, a conceptual framework is presented below. This diagram captures the multi-dimensional interactions among key components of the blue economy—including fisheries and aquaculture, marine tourism, shipping and ports, marine biotechnology, and offshore renewable energy—and their potential contributions to economic performance. The framework also integrates enabling factors such as good governance, investment, innovation, and sustainability, which mediate or reinforce these effects. This visual representation aims to clarify the mechanisms through which a sustainable blue economy can drive inclusive and long-term economic development.

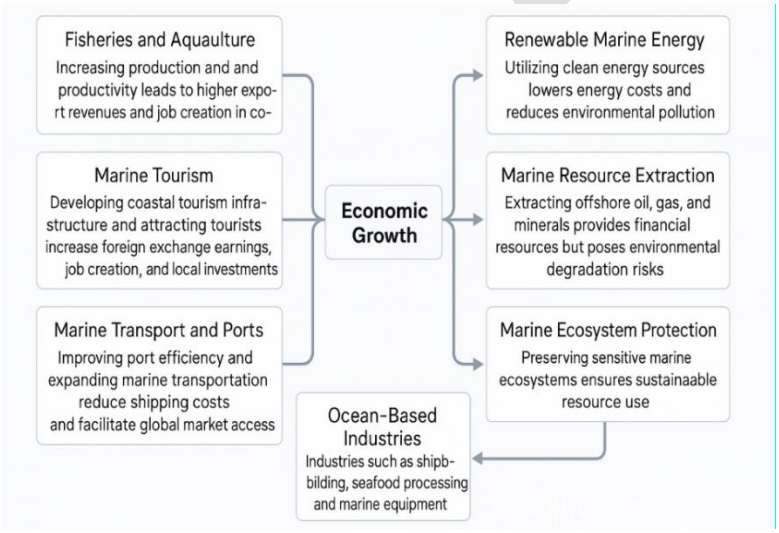


Figure 1. Impact Pathways of Blue Economy Components on Economic Growth
Source: (UNCTAD, 2024)

The Importance of the Blue Economy for Economic Growth in Iran

Iran, with about 40% of its borders adjacent to the sea from both the north and south, has significant marine access. However, in terms of

utilizing this divine blessing, it ranks among the lowest in the world. According to published statistics, the Blue Economy in the European Union employed more than 3.36 million people in 2014. This workforce is distributed across various sectors including trade, transportation, marine tourism, fisheries, exploitation of natural resources, energy, and regional as well as international commercial and economic cooperation. Additionally, coastal and marine recreational activities such as using sea waves for electricity generation, beach tourism, underwater recreation, and thalassotherapy are among the key sources of employment in these areas. It is estimated that for every direct job created in the marine economy, four indirect jobs are generated.

Figure 2 illustrates Iran's northern and southern coastal provinces, bordering the Caspian Sea, the Persian Gulf, and the Gulf of Oman. These areas represent key zones for marine economic development and offer strategic potential for tourism, trade, energy, and fisheries.

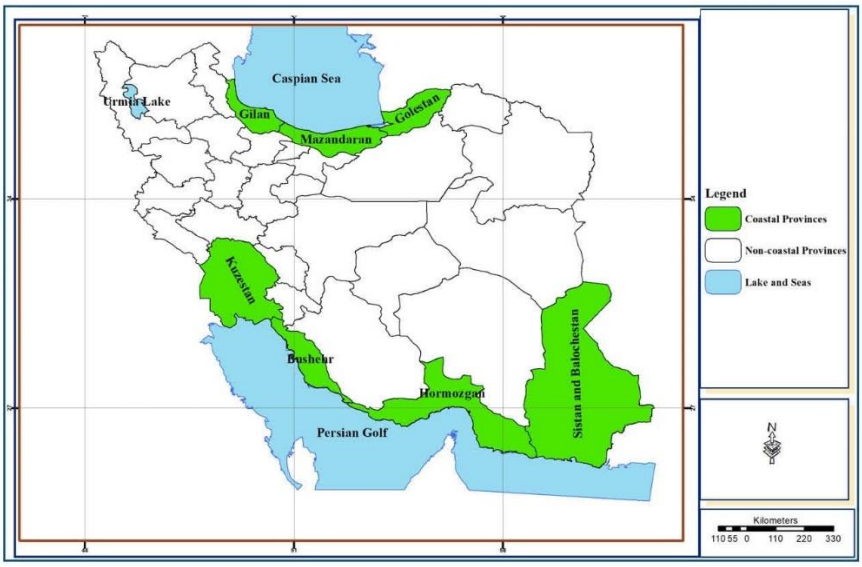


Figure 2. Distribution Map of Coastal Provinces of Iran

Most activities along Iran's coastal zones, particularly in urban and rural areas, are limited to port facilities and military installations, which occupy only about 5% of the coastline, leaving 95% of the country's coastal capacity unused. One important marine-based economic sector is agriculture and seawater utilization. The use of saline and brackish water is common worldwide, with cultivation of salt-tolerant plants and export of products like seaweed by some countries demonstrating successful employment and income generation through such practices. Given that Iran lies within the global arid belt and has limited freshwater resources, utilizing seawater for agriculture and desalination is a vital development priority.

Thus, a marine-oriented economic approach can open new horizons for Iran to transition from an oil-dependent economy. Development of maritime transport, focus on safety and security issues, enhancement of port logistics, and privatization aligned with the principles of a resilient economy, alongside environmental protection, can lay the foundation for sustainable national development.

In the aquaculture sector, Iran's aquatic production has grown by more than 23% over the past five years and remains one of the country's expanding industries. Per capita fish consumption reached approximately 14.1 kilograms in 2022, reflecting over 16% growth since 2018. Moreover, around 7.1 grams of daily animal protein intake came from aquatic products in 2022. That year, Iran exported approximately 181,000 tons of various aquatic and fishery products valued at over $605 million, resulting in a positive trade balance of about $565 million. Over the last five years, export volume and value have grown by over 26% and 14%, respectively. Also in 2022, about 249,000 people were directly employed in the fisheries subsector; including supporting industries, more than 700,000 livelihoods depend on fisheries. Employment in this subsector increased roughly 7% over the past five years, mainly driven by the growth of aquaculture and sustained fishing activities. Fishing and aquaculture in the northern and southern waters represent significant Blue Economy capacities. Annual production exceeds 1.2 million tons of fishery products, with 56% derived from capture fisheries (~751,000 tons) and 44% from aquaculture (>601,000 tons). In 2022, northern fisheries catch exceeded 32,000 tons, while southern fisheries catch surpassed 718,000 tons. Although there was a 3% decrease in fish catch over five years, catch volumes grew by about 7% compared to the previous year. Developing aquaculture, modernizing the fisheries industry, increasing fishery product exports, and promoting sustainable fishing are necessary measures.

With 7 major commercial ports and over 20 smaller ports, Iran has the potential to become a regional maritime transport hub. Enhancing the commercial fleet, increasing port capacity, improving port infrastructure, and reducing bureaucratic hurdles are key to this goal. Development of strategic ports like Chabahar and Shahid Rajaee in the Makran coast and Persian Gulf is particularly important. Iran's beautiful coastlines and islands in the Persian Gulf and the Sea of Oman are significant tourist attractions that can draw visitors worldwide. Infrastructure development such as hotels and recreational centers,

facilitation of visa issuance, effective marketing, and attracting foreign investment in tourism are essential steps.

Oil and gas extraction from shared fields in the Persian Gulf and development of related industries like petrochemicals and refineries are important marine economy sectors. Increasing Iran's share of oil and gas from shared fields and advancing indigenous extraction technologies hold special importance. Furthermore, harnessing wind and wave energy along coastal areas can contribute to clean energy supply and sustainable development. Investments in wind and wave power plants and support for knowledge-based companies are necessary.

Overall, Iran's natural assets such as the Sea of Oman and Persian Gulf in the south and the Caspian Sea in the north have turned the Blue Economy into a key driver for sustainable development. Unfortunately, these potentials, especially the Caspian Sea, have been neglected. While the average ocean and sea economy share in coastal countries worldwide ranges from 1.5% to 9%, Iran's share is only 1.6%. To realize the vast potentials of the Blue Economy and achieve sustainable economic growth, precise planning, innovative and up-to-date projects, and targeted investments across all marine-related sectors are essential.

Previous Research

- National/Iranian Studies

Table 1. Summary of Domestic Literature Review

No.	Authors (Year)	Research Title	Key Findings
1	Salarvand & Hasanvand (2024)	A Review of the Role of the Ocean Economy in the Development of Selected Countries	Through a comparative review of countries including Norway, China, the EU, Australia, the USA, and small island nations, the study identifies common challenges like climate change, pollution, and financial constraints. Despite these issues, it highlights significant opportunities in renewable marine energy, sustainable fisheries, and marine tourism.
2	Rahmani (2024)	Marine Economy; A Pathway to Achieving Sustainable	The marine economy plays a key role in food security, poverty reduction, employment creation, and sustainable resource

		Development Goals of Coastal Cities in Hormozgan	management, aiding coastal city development.
3	Khamar & Khodestan (2024)	Sea-Based Economy of Bandar Abbas Coastal Areas	The sea-based economy, through economic diversification, can strengthen regional growth and reduce dependence on oil economy; neglect of marine exploitation culture hinders sustainable development.
4	Matlabi Karbekandi & Zare Zardini (2021)	Strategies for Developing the Marine Economy towards Achieving Resistance Economy Goals	Development strategies presented for six sub-sectors including marine tourism and offshore industries; emphasis on education, centralized management, regional cooperation, and strengthening industry-academia links.
5	Pourrajabi & Bijani (2021)	Strategies for Developing the Blue Economy in Gilan Province	Five main strategies identified including marine tourism, maritime transport, innovative blue economy technologies, shipbuilding, and fisheries and aquaculture in the Caspian Sea.

- International Studies

Table 2 . Summary of Selected International Studies

No.	Authors (Year)	Research Title	Key Findings
1	Lisa et al. (2025)	Impact of Blue Economy Factors on Bangladesh's Economic Growth	Blue economy components like labor, capital, fisheries, and aquaculture positively and significantly affect growth.
۲	Danio et al. (2025)	Role of Blue Economy in Enhancing Economic Growth	Marine biotechnology, green shipping, and sustainable practices boost growth while protecting the environment.
۳	He et al. (2025)	Role of Blue and Green Economy in Economic Growth: Evidence from Pakistan	Both blue and green economies have significant positive impacts, supporting sustainable development strategies.
۴	Alsaleh & Wang (2025)	Aquaculture Growth and Coastal Tourism in Sustainable Blue Economy	Aquaculture growth threatens coastal tourism sustainability in some EU countries; recommends eco-friendly policies.
۵	Amarasinghe et al. (2025)	From Blue Growth to Inclusive Blue Economy in Bay of Bengal	Fisheries growth continues but illegal fishing, pollution, and inequalities hinder sustainable development.
۶	Ahmad et al. (2024)	Impact of Blue Economy Components on China's Sustainable Economic Growth	Fisheries, aquaculture, agriculture, investment, and trade positively contribute; seafood availability reduces poverty.

۷	Qubityana et al. (2024)	Blue Economy's Impact on National Economic Growth in Indonesia	Blue economy positively affects growth; key challenges include environmental sustainability and responsible use.
۸	Khan & Iman (2024)	Systematic Review of Blue Economy Potential in Bangladesh and Indo-Pacific	Significant growth in fisheries, aquaculture, shipping, and tourism; highlights need for integrated policies.
۹	Al-Harthy & Hanif (2023)	Impact of Blue Economy Components on Economic Growth in South Asian Countries	macroeconomic instability—especially inflation—along with weak institutional coordination and lack of investment incentives, are major barriers to blue economy development in GCC countries. Sustainable growth requires macroeconomic stability and secure investment environments.
۱۰	Betel et al. (2021)	Blue Economy and Marine Activities: Opportunities and Challenges in Bahamas	Coastal tourism, aquaculture, biotech, and bioexploration contribute to economic development; prioritizes policy support.

3- Research Methodology

This study employed the ARDL approach, modeling the dependent variable as influenced by its own previous values along with both current and lagged values of the independent variables. This analytical framework is commonly applied for exploring dynamic interactions within time-series datasets using a single-equation approach. In the present study, an adapted model was employed to examine the interplay between economic growth and several contributing factors in Iran—including total fisheries and aquaculture output, agricultural and forestry activities, marine tourism, inflation rate, and capital formation. The formulation of the model was inspired by concepts and methodologies proposed in recent contributions by Abbasi and Erdebilli (2023), Abbasi and Choukolaei (2023), Emrouznejad et al. (2023), Uddin et al. (2022), Sadik-Zada (2021, 2022), Sethuraman (2017) and Lim (2015), Mourougan.

$$EG = f(FAP, AFF, MT, INF, CAPITAL) \quad (1)$$

EG stands for "GDP per capita (current USD)," which is adjusted for sustainability by subtracting the "Natural Resources Depletion (% of GNI)" to reflect sustainable economic growth, FAP stands for "Total fisheries and aquaculture production (metric tons)," AFF stands for "Agriculture, forestry, and fishing, value added (% of GDP)," MT

stands for “marine tourism (number of trips)” , INF stands for “Inflation rate (%)”,CAPITAL stands for “Gross capital formation (% of GDP)”.

Econometric model specification

The Autoregressive Distributed Lag (ARDL) model is a widely used econometric method valued for its versatility in analyzing time series data. One of its main advantages lies in its ability to capture both short-term fluctuations and long-term equilibrium relationships within a single framework. This makes it particularly effective for studying dynamic interactions among economic variables. Unlike traditional time series models, the ARDL approach remains reliable even in the presence of endogeneity and omitted variable concerns, often yielding consistent and unbiased estimates. Moreover, it accommodates variables with different levels of integration—whether stationary at level or first difference—without requiring pre-testing for unit roots. By incorporating lagged values of both the dependent and explanatory variables, the ARDL model allows for a more nuanced analysis of temporal relationships, making it a valuable tool for researchers investigating the evolving nature of economic systems.

This study applies the ARDL bounds testing approach, originally developed and further refined for cointegration analysis by Sadik-Zada (2021), to assess the effects of economic growth on marine tourism, agriculture, forestry, fisheries, and aquaculture production, along with other key variables. The ARDL method is especially suitable when the dataset includes a mix of variables—some stationary at level and others requiring first differencing. Furthermore, its effectiveness with small sample sizes makes it an advantageous choice for time series analysis. This suitability has been demonstrated in prior research, including studies by Voumik et al. (2023), Uddin et al. (2023), Rahman et al. (2023), Arnaud et al. (2023), Abbasi et al. (2021), Rahman and Majumder (2021), Hossain et al. (2019), and Shin et al. (2014).

Due to the mixed stationarity properties of the variables in our dataset, the ARDL model was the preferred choice for this research, enabling an effective analysis of both short-term fluctuations and long-term relationships among the variables.

The ARDL model was estimated to capture both long-run and short-run dynamics simultaneously. The econometric specification of the model can be represented as follows, following the estimation of Equation (2):

$$(EG)_t = \alpha_0 + \alpha_1(FAP)_t + \alpha_2(AFF)_t + \alpha_3(MT)_t + \alpha_4(INF)_t + \alpha_5(CAPITAL)_t + \mu \quad (2)$$

Unit root test

- Augmented Dickey–Fuller test

The appropriate technique for assessing stationarity in time series data is the "Unit Root Test," which encompasses the Augmented Dickey-Fuller (ADF) test. A defining feature of a non-stationary time series is the presence of a unit root. Mathematically, a time series exhibits a unit root if the coefficient alpha=1 in the following equation.

$$Y_t = \alpha Y_{t-1} + \beta X_t + \varepsilon \quad (3)$$

where X_t represents an exogenous variable (an independent explanatory variable that is also a time series), and Y_t denotes the value of the time series at time t.

- Phillips–Perron unit root test

The Phillips–Perron (PP) test is a widely applied method in time-series econometrics for testing the presence of a unit root, particularly in variables suspected to be integrated of order one. Developed by Phillips and Perron (1988) and further elaborated by Pesaran et al. (2001), the PP test builds upon the foundational logic of the Dickey–Fuller test, with the null hypothesis formulated as ρ = 1 in the equation $\rho = lin\Delta Y_t = (\rho - 1)Y_t - 1 + U_t$. Unlike the Augmented Dickey-Fuller (ADF) test, which addresses higher-order autocorrelation by incorporating lagged differences of the dependent variable, the PP test corrects the test statistic using nonparametric techniques. These

corrections make it robust against heteroskedasticity and serial correlation in the error terms without adding lagged variables. However, as Davidson and MacKinnon (2004) highlight, the PP test may be less reliable than the ADF test in finite samples, potentially leading to reduced statistical power and biased inferences. Despite this limitation, the PP test remains valuable for verifying stationarity when structural assumptions about the error term are uncertain.

- Autoregressive distributed lag approach

This research employed the Autoregressive Distributed Lag (ARDL) methodology, originally introduced by Pesaran et al. (2001), as a suitable econometric tool for analyzing dynamic relationships among variables with mixed integration orders. The ARDL model is particularly advantageous when the dependent variable is integrated of order one [I(1)], and the explanatory variables comprise a combination of level stationary [I(0)] and first-difference stationary [I(1)] series. This flexibility makes the ARDL framework especially effective for small-sample time-series analysis and robust to issues associated with non-stationarity and omitted variable bias.. The ARDL model is widely favored for analyzing time-series data due to its numerous advantages. Among its key strengths is the ability to handle a mix of stationary and non-stationary variables, allowing for the examination of time-series data regardless of their integration order. This flexibility makes the ARDL model highly adaptable and suitable for a wide range of empirical applications involving different types of data. When dealing with economic or financial datasets, which often suffer from limited sample sizes, the ARDL model proves highly valuable due to its robustness in small samples. This model can analyze data that include both stationary and non-stationary variables simultaneously. The ARDL bounds testing approach is designed to investigate long-run relationships among variables, a crucial feature when examining economic or financial data where such long-term linkages may exist. Furthermore, the ARDL framework is flexible, allowing the

incorporation of trend terms, exogenous variables, and lagged effects, making it well-suited for handling intricate time-series data. Overall, the ARDL methodology stands out as a powerful tool for time-series analysis, thanks to its adaptability and reliability across diverse empirical contexts.

Aligned with the goals of this research, the ARDL model excels over alternative techniques in capturing both immediate (short-run) and sustained (long-run) effects of explanatory variables on economic growth. Duasa (2007) highlighted the model's advantage in estimating short- and long-run elasticities, especially with small datasets. It uses the Ordinary Least Squares (OLS) technique to estimate variable relationships, simplifying the complexity related to different integration orders. Studies by Frimpong and Oteng-Abayie (2006) and Abbasi et al. (2022) confirmed that the ARDL model is appropriate when independent variables are integrated of order zero, I(0), order one, I(1), or are cointegrated; however, it is not suitable if any variable is integrated of order two, I(2).

To thoroughly explore the dynamic association between the dependent and independent variables, the model was specified as shown in Equation 2. Economic growth, indicated by EG, is examined over the period from 1993 to 2023, represented by t. In this equation, α_0 denotes the intercept, while α_1 through α_5 represent the coefficients for explanatory variables including total fisheries production (FAP), agriculture, forestry, and fisheries (AFF), marine tourism (MT), inflation rate (INF), and capital (CAPITAL). The error term is denoted by μ_t. Thus, the ARDL form of Equation (4) can be expressed as follows:

$$\Delta(EG)_t = \alpha_0 + \sum_{k}^{n} \alpha_1 \Delta(EG)_{t-k} + \sum_{k}^{n} \alpha_2 \Delta(FAP)_{t-k} + \sum_{k}^{n} \alpha_3 \Delta(AFF)_{t-k}$$
$$+ \sum_{k}^{n} \alpha_4 \Delta(MT)_{t-k} + \sum_{k}^{n} \alpha_5 \Delta(INF)_{t-k} + \sum_{k}^{n} \alpha_6 \Delta(CAPITAL)_{t-k}$$
$$+ \sum_{k}^{n} \alpha_7 \Delta D_{t-1} + \lambda_1 (EG)_{t-1} + \lambda_2 (FAP)_{t-1} + \lambda_3 (AFF)_{t-1}$$
$$+ \lambda_4 (MT)_{t-1} + \lambda_5 (INF)_{t-1} + \lambda_6 (CAPITAL)_{t-1} + \lambda_7 D_{t-1} + \mu_t \quad (4)$$

where the drift term is denoted by α_0 , the first difference operator by Δ, and the white noise error term by μ_t. After establishing the existence of a long-term relationship among the variables, this study utilizes the Error Correction Model (ECM) to analyze the short-term dynamics. The general specification of the ECM associated with Equation (5) is given below:

$$\Delta(EG)_t = \alpha_0 + \sum_{k}^{n} \alpha_1 \Delta(EG)_{t-k} + \sum_{k}^{n} \alpha_2 \Delta(FAP)_{t-k} + \sum_{k}^{n} \alpha_3 \Delta(AFF)_{t-k}$$
$$+ \sum_{k}^{n} \alpha_4 \Delta(MT)_{t-k} + \sum_{k}^{n} \alpha_5 \Delta(INF)_{t-k} + \sum_{k}^{n} \alpha_6 \Delta(CAPITAL)_{t-k}$$
$$+ \sum_{k}^{n} \alpha_7 \Delta D_{t-1} + \theta ECM_{t-1} + \mu_t \qquad (5)$$

In this context, θ denotes the error correction coefficient that reflects the short-run adjustments, while Δ indicates the first difference operator. The ECM demonstrates the rate at which the system returns to its long-term equilibrium following a short-term shock.

4- Research Findings

Preliminary Tests of the ARDL Model

- Unit Root Test

The stationarity of the variables was assessed using the Augmented Dickey-Fuller (ADF) test. The findings are presented in Table 3:

Table 3. Unit Root Test Results
Source: Research Result

Variable	ADF (t-Statistic)	P-Value ADF	Order of integration
EG	-4.594529	0.0010	I(1)
FAP	-3.485371	0.0180	I(0)
AFF	-5.552435	0.0001	I(1)
MT	-6.320718	0.0000	I(1)
INF	-5.639753	0.0001	I(1)
CAPITAL	-5.585526	0.0001	I(1)

The results indicate that all variables, except for FAP, are non-stationary at their levels but become stationary after first differencing, confirming the existence of a unit root. FAP is stationary at its original level. Therefore, the ARDL model is suitable for analyzing both short-term and long-term relationships among these variables.

ARDL Model Estimation

After ensuring that the initial conditions are met, the model is estimated using the collected data, analyzing the short-run dynamics, bounds test results, long-run relationships, and diagnostic tests. Accordingly, using EViews 12 software and as shown in Figure 3, the ARDL(1,1,0,0,0,1) model was selected as the optimal specification due to having the lowest value of the appropriate information criterion statistic. Therefore, the selected empirical model is structured as follows:

$$EG_t = \beta_0 + \beta_1 EG_{t-1} + \beta_2 FAP_t + \beta_3 FAP_{t-1} + \beta_4 AFF_t + \beta_5 MT_t + \beta_6 INF_t + \beta_7 CAPITAL_t + \beta_8 VAPITAL_{t-1} + \varepsilon_t$$

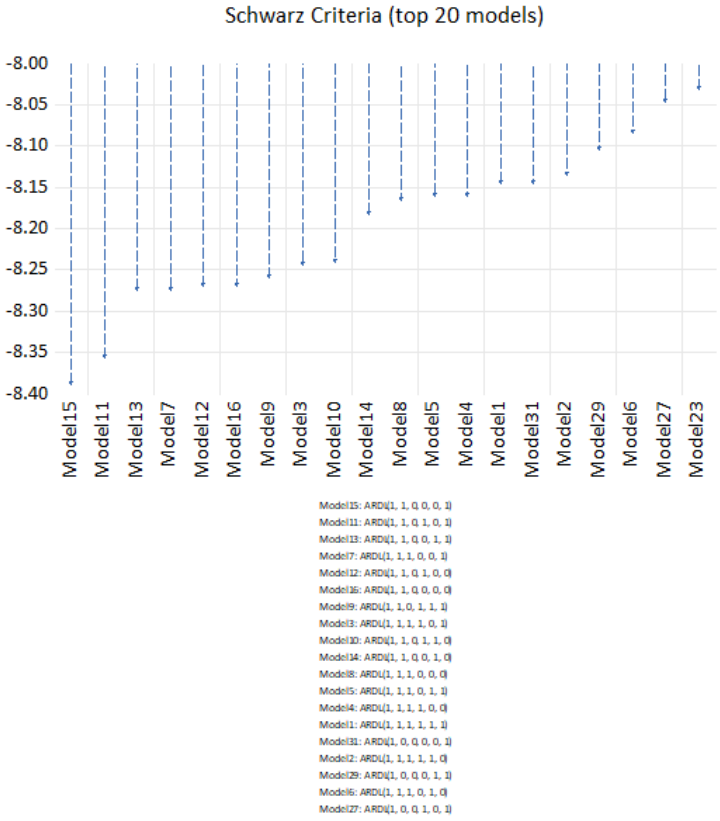


Figure 3. Selection of the Optimal ARDL Model
Source: Research Findings

- Estimation of the Short-Term Relationship

Table 5 presents the ARDL(1,1,0,0,0,1) model results for short-term effects:

Table 5. ARDL(1,1,0,0,0,1) short-run model
Source: Research Result

Variable	Coefficient	Std. Error	t-Statistic	p-value
LEG(-1)	0.353954	0.172467	2.052304	0.0528
LFAP	0.058803	0.001276	46.09734	0.0000
LFAP(-1)	0.025225	0.010628	2.373535	0.0272

LAFF	0.003275	0.001505	2.175675	0.0411
LMT	0.000496	0.000183	2.712120	0.0131
LINF	0.010909-	0.003571	-٣,٠٥٤٨٨٧	0.060
LCAPITAL	0.011437	0.003836	2.981292	0.0153
LCAPITAL(-1)	0.011437	0.003836	٣,٧٠٧٤٠٩	0.0071
C	11.26905	3.039603	3.707409	0.0013
R2=%99		F=12276	DW=2.016	

Table 6. Short-Run Effects of Blue Economy Components on Economic Growth
Source: Research Result

Variable	Coefficient	Prob.	Interpretation (Brief)
LEG(-1)	0.3539	0.0528	Moderately significant; shows GDP persistence
LFAP	0.0588	0.0000	Strong positive effect on GDP
LFAP(-1)	0.0252	0.0272	Positive effect with diminishing lagged impact
LAFF	0.0033	0.0411	Positive but relatively small contribution
LMT	0.000496	0.0131	Significant positive effect; confirms tourism's role
LINF	-0.0109	0.0600	Negative effect; weakly significant
LCAPITAL	0.0114	0.0153	Positive and significant impact on growth
LCAPITAL(-1)	0.0114	0.0071	Positive lagged effect of capital

The short-run results indicate that fisheries and aquaculture, as key components of the blue economy, play a crucial role in Iran's economic growth. This underscores the importance of targeted policies and investments to support marine-based sectors, which contribute significantly to employment generation and income. Coastal and marine tourism also significantly stimulate economic growth, reflecting the sector's potential to attract tourists, increase foreign exchange earnings, and create job opportunities. Particularly in coastal provinces with natural and historical attractions, marine tourism can diversify the economy and reduce reliance on traditional sectors.

Capital investment exerts a positive and significant effect, highlighting its role in enhancing infrastructure, technology adoption, and labor productivity, all of which are essential drivers of sustainable economic growth. Inflation shows a marginally negative impact on growth, suggesting that rising general price levels may hinder economic expansion. However, given the weak significance, monetary and fiscal policies should be carefully tailored to Iran's specific

economic conditions. Agriculture and forestry, while less influential, still contribute positively, indicating their complementary and stable role in the national economy that should not be overlooked.

Overall, these findings emphasize the significance of various blue economy components alongside traditional sectors in fostering economic growth. Coordinated development of these sectors can enhance economic welfare and sustainability in Iran.

- Examination of the Long-Term Equilibrium Relationship

To examine the existence of a long-term relationship among the model variables, the Bounds Testing approach developed by Pesaran et al. (2001) was employed. This method was chosen due to its capability to test for cointegration among variables with different orders of integration, whether I(0) or I(1).

In this test, the null hypothesis denotes the absence of a long-term relationship. If the calculated F-statistic exceeds the upper critical bound, the null hypothesis is rejected, confirming the presence of a long-term relationship.

Table 7. Bounds test for cointegration
Source: Research Result

F-Statistic	Critical Bound Values of the F-Statistic					
	%۹۰		%۹۵		%۹۹	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
7.794795	3	2.08	3.38	2.39	4.15	3.06

In this study, the F-statistic was calculated as 7.794, which is greater than the upper critical bound value of 4.15 at the 95% confidence level; therefore, the null hypothesis is rejected, and the existence of a long-term relationship among the model variables is confirmed.

- Estimation of the Long-Term Relationship

At this stage, the long-term relationships among the variables are analyzed. By applying the cointegration test and estimating the ARDL model, the long-term coefficients are derived. The estimation results of

the ARDL model for the long-run relationships are presented as follows:

Table 8. ARDL long-run model
Source: Research Result

Variable	Coefficient	Std. Error	t-Statistic	p-value
LFAP	0.051975	0.003294	15.77860	0.0000
LAFF	0.005069	0.002373	2.135916	0.0446
LMT	0.000768	0.000165	4.651695	0.0001
LINF	-0.016886	0.007190	4.919876	0.0143
LCAPITAL	0.035376	0.007190	4.919876	0.0001
C	17.44310	0.056390	309.3273	0.0000

Table 9. Long-Run Effects of Blue Economy Components on Economic Growth
Source: Research Result

Variable	Coefficient	Prob.	Interpretation (Brief)
LFAP (Fisheries & Aquaculture)	0.05197	0.0000	Strong and significant positive effect on GDP
LAFF (Agriculture & Forestry)	0.00507	0.0446	Positive but smaller contribution to growth
LMT (Coastal & Marine Tourism)	0.00076	0.0001	Positive and significant; highlights role of marine tourism
LINF (Inflation Rate)	-0.0169	0.0143	Negative and significant impact on economic growth
LCAPITAL (Capital)	0.0354	0.0000	Strongest positive driver of long-term growth

In the long run, capital investment emerges as the most influential driver of economic growth, reflecting the critical role of physical capital accumulation in enhancing productive capacity and technological progress. This highlights the importance of sustained investment in infrastructure, machinery, and related assets to foster long-term development. Fisheries and aquaculture production follow closely, indicating that the blue economy's resource-based sectors are vital for enduring economic expansion. This suggests that effective management and sustainable exploitation of marine resources can provide continuous economic benefits. Coastal and marine tourism also demonstrates a statistically significant positive effect, emphasizing its role as a key service sector within the blue economy. The sector's growth potential contributes to diversification and resilience of the economy by creating employment opportunities and generating foreign exchange revenues.

Although agriculture and forestry maintain a positive contribution, their relatively smaller impact suggests a shift in economic dynamics, possibly due to structural transformations and increased emphasis on maritime and industrial sectors. The significant negative effect of inflation underscores the necessity of maintaining stable monetary policies to mitigate inflationary pressures, which can erode purchasing power, increase uncertainty, and hinder investment and growth.

Overall, the long-run findings underscore the critical importance of balanced investment across capital, marine resources, and service sectors to achieve sustainable economic growth in Iran.

The short-run results highlight the immediate impact of key blue economy sectors such as fisheries, aquaculture, coastal tourism, and capital investment on economic growth. These sectors contribute significantly to employment generation and income, reflecting the importance of focused policies and investments to stimulate economic activities and diversify local economies. Conversely, the long-run analysis underscores the fundamental role of physical capital accumulation and sustainable management of marine resources in driving sustained economic development. Over time, the formation of fixed capital enhances productive capacity and technological progress, while responsible exploitation of fisheries ensures continuous economic benefits. This differentiation between short- and long-term mechanisms provides a comprehensive understanding of how blue economy components influence growth dynamics in distinct ways over varying time horizons.

- **Estimation of the Error Correction Model (ECM)**

To investigate the presence of a long-term relationship and the error correction mechanism within the ARDL framework, the error correction test was performed. This test enables the analysis of both short-term and long-term effects of the variables and assesses whether

they converge toward a long-term equilibrium. The results of the error correction model (ECM) are presented below:

Table 10. Error Correction Model (ECM) Test Results
Source: Research Result

Variable	Coefficient	Std. Error	t-Statistic	p-value
ECM(-1)	-0.646	0.0771	-8.3757	0.0000
R2= %99			DW= 2.016	

A negative and statistically significant coefficient on the Error Correction Term (ECT) signifies that deviations from the long-run equilibrium are gradually corrected over time. In particular, the negative and significant ECT value implies that roughly 65% of any imbalance is adjusted in the following period. These outcomes confirm the presence of a long-term relationship among the variables under study and indicate that the system naturally moves back toward its long-term equilibrium after experiencing short-term disturbances. Such evidence supports the validity of the ARDL model and the interconnections between the variables, offering a solid foundation for formulating economic policies.

- Normality Test

The Jarque-Bera test was employed to assess the normality of the model residuals. The null hypothesis assumes that the residuals are normally distributed. The results are presented in Table 2:

Table 11. Normality Test Results
Source: Research Result

Normality Test	
Jarque - Bera	p-value
*0.*78718	*0.*961405

Since the p-value (0.961405) exceeds 0.05, the null hypothesis cannot be rejected. Thus, residuals are normally distributed.

- Autocorrelation Test

The Breusch-Godfrey test was applied to detect autocorrelation in residuals. The null hypothesis assumes no autocorrelation. Results in Table 3 reveal:

Table 12. LM Test Results
Source: Research Result

Serial Autocorrelation Test	
F-Statistic	p-value
0.857139	0.4401

Given the p-value (0.4401) > 0.05, the null hypothesis holds, indicating no autocorrelation. This validates the model's reliability.

- Heteroscedasticity Test

Due to the time series nature of data, the ARCH test evaluated heteroscedasticity, where the null hypothesis assumes constant residual variance (homoscedasticity). Results are:

The test results are as follows:

Table 13. Heteroscedasticity Test Results
Source: Research Result

Heteroscedasticity Test	
F-Statistic	**p-value**
1.03937	0.3170

The p-value exceeds 0.05, so residuals are homoscedastic, confirming model adequacy.

- Model Stability Evaluation

In this study, the CUSUM and CUSUMSQ tests are employed to assess the stability of coefficients. These tests help identify structural changes and evaluate the model's stability over time.

CUSUM Test

This test is used to examine the stability of model parameters over time. It helps in identifying structural breakpoints. The results of the CUSUM test are as follows:

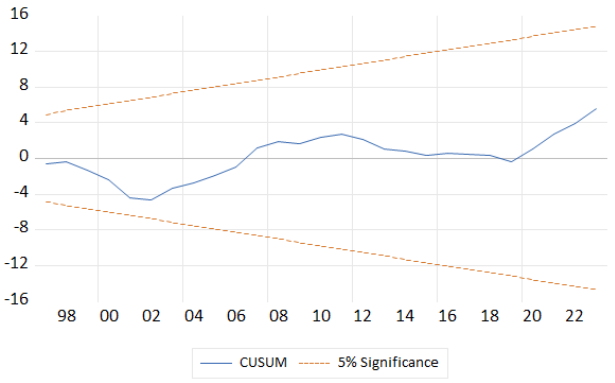


Fig 4. CUSUM test to check the stability of the model
Source: Research Result

Since the CUSUM statistic stays within the critical bounds, the null hypothesis of parameter stability cannot be rejected. Therefore, the model is considered stable over time, with no evidence of any structural break.

CUSUMQ Test

This test is used to examine heteroscedasticity and changes in the variance of residuals. The results of the CUSUMQ test are as follows:

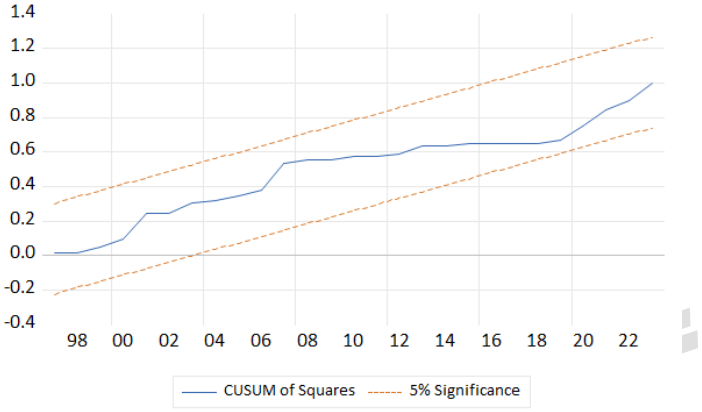


Fig 5. CUSUMQ test to check the stability of the model
Source: Research Result

Because the CUSUMQ statistic remains within the critical bounds, the null hypothesis of no structural break cannot be rejected. Thus, it can be concluded that the variance of the residuals is stable, indicating no evidence of structural changes.

Thus, the results of the CUSUM and CUSUMQ tests indicate that the model parameters remain stable over time, and there is no sign of structural breaks in the data. These findings validate the model and suggest that our estimation results are reliable.

5- Conclusion

This research examined the influence of marine tourism alongside other vital elements of the blue economy on Iran's economic growth. Findings from the ARDL model indicate that, in the short term, fisheries and aquaculture production (LFAP) exert a positive and statistically significant impact on economic growth, with this influence persisting even when accounting for a time lag. Similarly, the value-added from agriculture and forestry (LAFF), as well as marine tourism (LMT), also show significant and positive impacts on growth. In

contrast, inflation (LINF) exerts a negative and relatively strong effect, underscoring the adverse role of price instability. Furthermore, capital (LCAPITAL) demonstrates a positive short-run contribution to growth, which becomes even more pronounced over time.

In the long run, the role of fisheries and aquaculture production remains prominent, indicating its structural importance in driving sustainable growth. While the impact of value-added from agriculture and forestry slightly diminishes over time, it remains statistically significant. Marine tourism, on the other hand, exerts an even stronger positive influence in the long term compared to the short run, suggesting its strategic potential for sustained economic development. However, inflation continues to undermine economic performance, with its negative effect intensifying over time. Capital maintains a significant and growing contribution to economic expansion in the long run.

These findings align with various international studies that emphasize the positive impact of blue economy components on economic growth. For example, research in Bangladesh (Lisa et al., 2025) and Pakistan (He et al., 2025) similarly highlights the critical roles of fisheries, aquaculture, and marine tourism in promoting sustainable development. Additionally, studies from China (Ahmad et al., 2024) and Indonesia (Qubityana et al., 2024) confirm the substantial contributions of blue economy sectors to national economic growth, while also noting the challenges of ensuring environmental sustainability.

Comparatively, some regional differences emerge. For instance, Alsaleh and Wang (2025) find that in certain EU countries, rapid aquaculture growth may pose risks to coastal tourism sustainability, an issue less prominent in the Iranian context.

Moreover, Based on the findings of the ARDL model, inflation has a significant negative effect on economic growth in both the short and long term. This result aligns with studies such as Al-Harthy & Hanif (2023), which indicate that price instability restricts investment in emerging sectors of the economy, including the blue economy. In the case of Iran, chronic inflation—driven by factors such as fiscal deficits, dependence on volatile oil revenues, exchange rate instability,

and weak economic governance—increases the perceived risk of long-term investment in infrastructure sectors such as ports, fisheries, and marine tourism. Rising inflation leads to higher investment costs and expected rates of return, which in turn discourages private sector participation in blue economy-related projects.

Moreover, inflation indirectly affects demand for marine tourism services and fishery products by eroding household purchasing power and altering consumption patterns. This poses a challenge to the income sustainability of these sectors. Therefore, controlling inflation cannot be achieved solely through short-term monetary policies, but rather requires comprehensive structural reforms and improved economic governance—especially in key areas driving the blue economy.

To support effective implementation of these findings, we recommend:

1- Targeted Infrastructure Development

- Prioritize investment in underdeveloped coastal regions with high marine tourism potential.
- Upgrade port logistics, maritime transport networks, and basic services (e.g., waste management, emergency response) to support sustainable economic activity.
- Establish marine ecotourism corridors with integrated planning involving local communities.

2- Institutional Capacity Building and Reform

- Create a centralized Blue Economy Task Force to harmonize sectoral policies across ministries.
- Provide training programs for local authorities and stakeholders on sustainable marine resource management.
- Strengthen enforcement mechanisms against illegal fishing and unregulated coastal development.

3- Integrated Data and Monitoring Systems

- Launch a national blue economy data portal for transparent reporting of environmental, economic, and social indicators.
- Develop real-time monitoring systems using satellite and IoT technologies for marine ecosystem health and resource use.
- Regularly update regional development plans based on data-driven evaluations.

By implementing these structured and context-sensitive strategies, Iran can enhance the resilience of its coastal economies, ensure the sustainability of marine ecosystems, and align its national development goals with international blue economy standards.

Limitations of the Study

This study is subject to several limitations that should be acknowledged when interpreting the findings. First, the analysis relies on secondary data collected from official sources such as the World Bank, the Ministry of Cultural Heritage, Tourism and Handicrafts, and the Central Bank of Iran. Although these sources are reputable, long-term economic data in developing countries may suffer from issues such as missing values, changes in data collection methodologies, limited sectoral disaggregation, and potential inconsistencies over time. Moreover, the study assumes that the data are accurate and complete, which may not always hold true, especially in the context of emerging economies. These data-related constraints may influence the precision of the estimated relationships. Despite applying diagnostic tests and robustness checks, these limitations remain inherent to the nature of time series analysis in such settings.

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