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# Evaluation of the Madura Economy in the Blue Economy Perspective: Analysis of the Contribution of the Fisheries Sector and the Per capita Income Perspektif Blue Economy

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A B S T R A C T

The study aims to assess the influence of the blue economy and per capita income on Madura Island's economic growth. The analysis using panel data regression models revealed that the blue economy variable has a significant negative influence, while the per capita income variable has a significant positive influence on economic growth. These findings suggest that although the Blue Economy concept has enormous potential, its implementation in Madura still faces challenges that require immediate handling to ensure a positive impact on economic growth. On the contrary, increased per capita income clearly contributes to economic growth, stressing the need for policies that focus on raising wages, skills, and employment opportunities. The findings provide important guidance for policymakers to refine sustainable development strategies in Madura, with an emphasis on optimising the Blue Economy and improving public well-being

**Keywords: Blue Economic**, Fisheries Sector, Madura Island.

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## 1. Introduction

One of the key principles of sustainable development (SDGs) implemented by countries around the world is the 14th principle on marine ecosystems, which includes the concept of blue economy [1]. This concept emerges as a promising approach, in which the blue economy refers to the sustainable use of marine and coastal resources as well as the development of related sectors. The objective is to create inclusive economic growth, maintain ecosystem sustainability, and strengthen food and financial sustainability while protecting the environment [2].

The blue economy is one of the focus areas of the regional government in Madura for increasing economic growth. Several international studies highlight the importance of Indonesian efforts. The country has been pursuing a variety of blue economy initiatives, including sustainable fishing, marine tourism, and renewable energy development [3] and [4]. For example, the book "Developing the Blue Economy" discusses how Indonesia integrates sustainable practices in marine resource management and explores innovative technologies and funding mechanisms to support this transition [5].

The Blue Economy is a new development concept that focuses on the sustainable use of marine resources. The Blue Economy aims to achieve three key objectives: (1) Economic growth: increasing the economic value of the marine sector in an environmentally friendly way; (2) Improving welfare: creating jobs and improving the standard of living of coastal populations; and (3) Healthy marine ecosystems: preserving and maintaining marine health for present and future generations [6].

Madura's integration into Indonesia's blue economy involves a multi-faceted approach, including sustainable fishing, marine tourism, aquaculture, renewable energy, and marine conservation. By aligning local practices with national and international blue economy strategies, Madura can achieve sustainable economic growth while preserving its precious natural resources. This is in line with the findings stating that the blue economy has responded positively to sustainable maritime management policies, therefore supporting the need and effectiveness of the implementation of sustained maritime governance policies in the Asian and Pacific islands [7] .

One of the four districts on Madura Island that have become the focus of the blue economy implementation is that the region has made a significant contribution to the primary sector in the last decade. Primary sector data from the districts in Madura, namely Bangkalan, Sampang, Pamekasan, and Sumenep, show a varied but generally positive development during the period 2013–2023.

In Bangkalan district, the contribution of the primary sector increased from Rs 331.041.027 in 2013 to Rs 376.842.510 in 2022, although there was a slight decrease to Rs 361.717.472 in 2023. These fluctuations reflect the dynamics of resource management and local economic policies, with a general trend that tends to rise despite several years of stagnant or declining growth.

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Sampang district has experienced a consistent increase, rising from Rs. 344.130.160 in 2013 to Rs. 410.845.125 in 2023. Years such as 2020 and 2022 showed significant peaks in the contribution of the primary sector, indicating the success of local strategies in using natural resources effectively and sustainably. Improved infrastructure and technology supporting agriculture, fishing, and the maritime sectors are responsible for this growth.

The district of Pamekasan saw a significant increase in the primary sector's contribution, from Rs. 348.681.495 in 2013 to Rs. 661.649.472 in 2023. Large spikes in certain years, such as 2015 and 2022, indicate strong investment and intensive development in key sectors, such as agriculture and fisheries. This growth reflects the results of blue economy policies that encourage sustainable and innovative use of natural resources.

Sumenep district, with the highest primary sector contribution among the four districts, shows stable and significant growth each year. From Rs. 668.101.105 in 2013 to Rs. 851.087.032 in 2023, the district managed to maintain a strong growth trend. The sector continues to strengthen through conservation, effective management, and adaptation to new technologies and practices in agriculture and fisheries, as evidenced by the significant increases in 2022 and 2023.

The next variable that will drive the increased growth of the blue economy is the per capita income of the population in the region [8]. Per capita income refers to the amount of income everyone generates Previous research has shown that percentage income has a positive and significant influence on economic growth in East Java, explaining that the per-capita income itself determines economic growth is per-capita income itself [9].

## 2. Research Methods

The research focuses on the four districts in Madura. Understanding and describing research problemOnce understood, we can solve discussions related to the influence of variable-variable research using a quantitative approach, following the methodology outlined in [10]. The Central Statistical Agency of East Java Province and the Department of Marine Affairs and Fisheries of Eastern Java Province provide the secondary data used as analytical material, utilizing a data balance panel that combines time series and cross-sectional data. For the data timer series presented in the form of annual data from 2014 to 2023, In Madura, the cross-section has four districts.

The research used three variables: the blue economy, which was derived from the primary sector's contribution of seafood in annual data, the per capita income, which was derived from the distribution of the regional gross domestic product at a constant price divided by the population, and the economic growth, which was derived from the comparison and rate of domestic products over time. The research model focuses on four variables: the blue economy (BE), per capita income (INCP), and economic growth (EGrowth).

## 3. Discussion

The basic material used in this research is silica. The silica used in this research was two different types of silica which were then mixed together. The silica materials used are mineral silica and MTMS precursors. The silica used is natural sand originating from the Bangka Belitung Islands. The mineral silica is then mixed with the MTMS precursor.

The study aims to analyze the extent to which the per capita income of the blue economy influences economic growth in the four districts located in Madura. To understand this relationship in depth, it is necessary to evaluate the models carried out through the Chow test. The test compares two types of models, the common effect and the fixed effect, to determine which model is most appropriate and effective in describing the available data. The results of the Chow test table are below, showing comparisons between the two models.

**Table 1. Chow Tests**

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| Cross-section F | 25.210254 | (3,34) | 0.0000 |
| Cross-section Chi-square | 46.830300 | 3 | 0.0000 |

**Source: Proceed Data (2024)**

The Chow test is an important tool for choosing the correct panel data regression model. If the significance value of the Chow test is below 0.05 or less than 0.05 [11], we can conclude that the FEM is more accurate in this case due to the significant difference between the common effect and fixed effect models.

**Tabel 2. Hasil Uji Hausman**

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 11.208466 | 2 | 0.0037 |

**Source: Proceed Data (2024)**

The results of the Hausman test shown in the "Correlated Random Effects—Hausman Test" table provide crucial information related to the selection of the correct model in this analysis. With a Chi-square statistical value of 11.208466 and a degree of freedom (d.f.) of 2, this result suggests that there is a significant difference between the estimates produced by the fixed effect model and the random effect model.) of 2. The very low probability value (prob.) is 0.0037, supporting this conclusion, as a figure below 0.05 indicates that the fixed effect model is more suitable for use.

Following the results, these big differences are a good reason to use the fixed effect model to better understand how the blue economy of fisheries and per capita income affects economic growth in Madura's four districts. Overall, the Hausman test not only serves to determine the most accurate model, but it also ensures that the analysis results will be more valid and reliable, thus providing a better understanding of the dynamics present in this research.

**Tabel 3. Panel Regression Output**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.512168 | 0.330027 | 1.551897 | 0.1299 |
| BE | -0.028759 | 0.009607 | -2.993538 | 0.0051 |
| INCP | 0.906752 | 0.075504 | 12.00938 | 0.0000 |

**Sourcer: Proceed Data (2024)**

**Table 4. Cross Section Fixed**

| | | | |
|---|---|---|---|
| R-squared | 0.990342 | Mean dependent var | 4.192500 |
| Adjusted R- | 0.988922 | S.D. dependent var | 0.132795 |

| | | | |
|---|---|---|---|
| squared | | | |
| S.E. of regression | 0.013977 | Akaike info criterion | -5.565311 |
| Sum squared resid | 0.006642 | Schwarz criterion | -5.311979 |
| Log likelihood | 117.3062 | Hannan-Quinn criter. | -5.473714 |
| F-statistic | 697.2866 | Durbin-Watson stat | 0.690341 |
| Prob(F-statistic) | 0.000000 | | |

**Sourcer: Proceed Data (2024)**

The R-squared (R2) output in Table 4 shows a value of 0.9903The panel data regression model uses R-Squared to measure the proportion of variability in the dependent variable that the independent variables, blue economy and per capita income, can describe. el. In this case, a very high R-squared value (0. 990342) indicates that 99.03% of the variability is in the modThis indicates that the model has excellent matches and can explain almost all the data's variability.

A very high F-statistic value (697.2866) along with a very low probability (0.000000) suggests that the overall regression model is very significant. This implies that the collectively independent variable has a significant influence on economic growth; in other words, there is strong evidence that at least one of the independent variables in the model has a significant effect on Madura Island's economic growth.

A constant coefficient (C) of 0.512168 with a standard error of 0.330027 and a statistical t-value of 1.551897 and a probability of 0.1299 indicates that when the blue economy and income per capita variables are zero, the underlying economic growth in Madura is 0.512168. However, because the probability value is greater than 0.05, this constant is not statistically significant, which means that we cannot conclusively state that the constant value differs from zero.

The Blue Economy variable has a negative coefficient of -0.028759, a standard error of 0.009607, a statistical t-value of -2.993538, and a probability of 0,0051. This indicates that an increase of one unit in the blue economy variable will decrease economic growth by 0.028759, assuming other variables remain constant. A very low probability value (0.0051) suggests that this result is statistically significant. These significant negative coefficients indicate that economic activities related to the Blue Economy, such as fishing, maritime tourism, and marine conservation, do not make the expected positive contribution to economic growth or may even have a negative impact.

The initial objectives of the blue economy, which aim to drive inclusive and sustainable economic growth, stand in stark contrast to these results. Therefore, despite the blue economy policy's immense potential, its implementation in Madura appears to encounter significant challenges that require immediate attention. To ensure that the blue economy really contributes positively to economic growth, there is a need for a thorough evaluation of current marine resource management practices, increased capacity and technology, and more effective and sustainable policy enforcement [5]. .

Thus, although the blue economy concept is very promising, the empirical results of this study show that there is an urgent need to improve the management and implementation of blue economy strategies in Madura so that the expected benefits can be realized. These include efforts to address environmental problems, improve sustainable fishing practices, and ensure that economic growth does not jeopardise the health of marine ecosystems [6].. Only a comprehensive and sustainable approach can achieve the goals of sustainable development, providing economic, social, and environmental benefits to the people of Madura Island.

In contrast, the per capita income variable (INCP) shows a very significant positive coefficient of 0.906752 with a standard error of 0.075504, a t-statistic value of 12.00938, and a probability of 0.0000. This suggests that a one-unit increase in the per capita income variable will boost economic growth by 0.906752 units, assuming other variables remain constant. Very low probability values indicate that this result is statistically significant. This positive and significant coefficient is consistent with economic theory, which states that increased per capita income will increase consumption and investment, which in turn boosts economic growth. It indicates that policies that focus on increasing per capita income, such as wage increases, skills improvements, and job creation, are highly likely to have a positive impact on economic growth in Madura [9].

## 4. Conclusions

The regression model in this study shows an excellent and significant correlation in explaining the variability of economic growth in Madura. The Blue Economy variable has a negative and significant impact on economic growth, indicating that the related economic activity may not be managed optimally. On the contrary, the per capita income variable is positive and significantly influenced, suggesting that an increase in per-capita income drives economic growth. It stresses the importance of policies that focus on raising wages, skills, and employment opportunities to support sustainable economic growth in Madura.

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