

THE FATE OF THE 'MARITIME GIANT': WHY HAS THE FISHERIES SECTOR'S CONTRIBUTION TO GDP REMAINED BELOW 3% FOR A DECADE?

Nasib 'Raksasa Maritim': Mengapa Kontribusi Sektor Perikanan Terkunci di Bawah 3% PDB Selama Satu Dekade?

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ABSTRACT

The fisheries sector is a vital pillar of Indonesia's maritime economy, yet its contribution to the national GDP continues to face structural stagnation. This study aims to analyze the influence of specific fisheries sector variables, namely: Domestic Investment (PMDN) in Fisheries, Foreign Investment (PMA) in Fisheries, Fisheries Production Volume, and Fisheries Export Value on the Fisheries GDP in Indonesia for the 2015-2025 period. The analytical method employed is multiple linear regression using the double log model. The results indicate that simultaneously, all independent variables in the fisheries sector significantly influence the Fisheries GDP. However, partially, only Domestic Investment (PMDN) in Fisheries has a positive and significant impact. Conversely, Foreign Investment (PMA) in Fisheries, Fisheries Production Volume, and Fisheries Export Value do not show a significant effect. The lack of significance among these variables suggests structural constraints, such as low product downstreaming, logistical inefficiencies, and the negative impact of Illegal, Unreported, and Unregulated (IUU) Fishing, which leads to a leakage of economic value-added before it can be recorded in the national GDP. This study recommends that the government strengthen the domestic capital base and tighten maritime surveillance to suppress fish poaching. A downstreaming strategy for fisheries export products is key to ensuring that physical production capacity can be optimally converted into economic value-added for national GDP growth.

Keywords: Domestic Investment (PMDN) in Fisheries, Fisheries Export Value, Fisheries GDP, Fisheries Production Volume, Foreign Investment (PMA) in Fisheries

ABSTRAK

Sektor perikanan merupakan pilar penting ekonomi maritim Indonesia, namun kontribusinya terhadap PDB nasional masih mengalami stagnasi struktural. Penelitian ini bertujuan untuk

menganalisis pengaruh variabel spesifik sektor perikanan, yaitu: Penanaman Modal Dalam Negeri (PMDN) Perikanan, Penanaman Modal Asing (PMA) Perikanan, Volume Produksi Perikanan, dan Nilai Ekspor Perikanan terhadap PDB Perikanan Indonesia periode 2015-2025. Metode analisis yang digunakan adalah regresi linear berganda dengan model double log. Hasil penelitian menunjukkan bahwa secara simultan, seluruh variabel independen sektor perikanan berpengaruh signifikan terhadap PDB Perikanan. Namun, secara parsial, hanya PMDN Perikanan yang memiliki pengaruh positif dan signifikan. Sebaliknya, PMA Perikanan, Volume Produksi Perikanan, dan Nilai Ekspor Perikanan tidak menunjukkan pengaruh signifikan. Ketidaksignifikanan variabel-variabel ini mengindikasikan adanya kendala pada hilirisasi produk, inefisiensi logistik, serta dampak negatif praktik Illegal, Unreported, and Unregulated (IUU) Fishing yang menyebabkan kebocoran nilai tambah ekonomi sebelum tercatat dalam PDB nasional. Penelitian ini menyarankan pemerintah untuk memperkuat basis modal domestik dan memperketat pengawasan maritim guna menekan pencurian ikan. Strategi hilirisasi produk ekspor perikanan menjadi kunci utama agar kapasitas produksi fisik dapat terkonversi menjadi nilai tambah ekonomi yang optimal bagi pertumbuhan PDB nasional.

Kata Kunci: Ekspor Perikanan, PMA Perikanan, PMDN Perikanan, PDB Perikanan, Produksi Perikanan

INTRODUCTION

Indonesia is a maritime nation, with approximately two-thirds of its territory covered by water, possessing vast and diverse fisheries resource potential. This sector should be a key driver of national economic growth. The fisheries sector contributes significantly to food security, particularly animal protein, and serves as a source of raw materials for industries such as the food, pharmaceutical, and cosmetics industries. Furthermore, this sector provides employment for coastal communities and traditional fishermen, of whom there are a significant number in Indonesia (Sari & Khoirudin, 2023). According to Regina & Fachru (2025), Indonesia even ranks second as the world's largest fish exporter, underscoring the fisheries sector's strategic position in international trade.

However, data shows that this substantial potential has not yet been able to optimally boost the fisheries sector's contribution to Gross Domestic Product (GDP). The sector's contribution to the macroeconomy remains relatively small and tends to stagnate (Sari & Khoirudin, 2023).

Table 1. Percentage of Fisheries GDP Contribution to Indonesia's GDP (Percent)

Year	Quarterly 1	Quarterly 2	Quarterly 3	Quarterly 4	Annual
2015	2.48	2.42	2.45	2.67	2.51
2016	2.6	2.5	2.52	2.61	2.56
2017	2.61	2.53	2.55	2.59	2.57
2018	2.66	2.56	2.55	2.64	2.60
2019	2.7	2.58	2.61	2.71	2.65
2020	2.79	2.82	2.73	2.83	2.79
2021	2.77	2.83	2.66	2.8	2.77
2022	2.52	2.59	2.55	2.66	2.58
2023	2.37	2.81	2.7	2.73	2.65
2024	2.34	2.54	2.54	2.59	2.50
2025**	2.29	2.54	2.56	2.84	2.56

Source: Data Processed by the Author (KKP, 2025)

According to Table 1, the fisheries sector's contribution to Indonesia's GDP from 2015

to 2025 shows a tendency to stagnate, remaining below 3%. For example, in 2015, the fisheries sector's contribution was 2.51%, then increased slowly to around 2.65-2.79% in 2019–2020, but then fluctuated again and remained below the 3% threshold until 2025, reaching 2.56% (KKP, 2025). These data show that despite increases in several periods, the fisheries sector's contribution has never significantly increased to exceed 3%. This indicates a phenomenon of structural stagnation, where a sector with significant potential is unable to develop into a major contributor to the national economy. This finding aligns with previous research, which stated that the fisheries sector's contribution to Indonesia's GDP tends to remain stable at a low level over the long term (Adriliansyah & Riofita, 2025). This situation indicates a gap between resource potential and resulting economic performance.

This low contribution is believed to be influenced by the dynamics of macroeconomic factors, particularly investment absorption and the sector's operational performance. Investment, consisting of Domestic Investment (PMDN) and Foreign Investment (PMA), is the primary driver of capital formation in the sector. PMDN reflects the participation of domestic business actors, while PMA indicates the sector's attractiveness to global capital. However, these capital flows are often hampered by regulatory and infrastructure issues (Nugroho *et al.*, 2025). Furthermore, fluctuations in production volume and the competitiveness of export commodities in the global market are also important determinants. Without synchronization between capital flows, production capacity, and international market expansion, the fisheries sector will continue to be overshadowed by other manufacturing sectors (Listiya, 2026).

The lack of synchronization between investment growth, production capacity, and export market penetration is suspected to be the main reason why this sector has not been able to make a significant contribution to the national economy. Therefore, an in-depth analysis is needed to evaluate the elasticity of these variables to sector output. Based on this description, this study aims to analyze the influence of Domestic Investment (PMDN) in fisheries, Foreign Investment (PMA) in fisheries, fisheries Production Volume, and Fisheries Export Value on the contribution of Fisheries GDP in Indonesia during the period 2015-2025.

Economic Growth Theory

According to Adam Smith, economic growth is a process of continuously increasing the production of goods and services, influenced by natural resources, population size, capital accumulation, and the division of labor. He argued that the division of labor can increase efficiency and productivity because each individual focuses on specific tasks, resulting in maximum production output. Adam Smith also believed that a free market system can drive economic growth through the invisible hand mechanism. This means that when individuals strive to achieve their own interests, they indirectly contribute to improving the welfare of society and the national economy.

Investment Theory

Investment theory, based on Modern Portfolio Theory (MPT), was developed by Harry Markowitz (1952), which explains the reciprocal relationship between the expected rate of return and the risk of an asset. Markowitz stated that investment decisions are not solely based on profit maximization but also on capital combinations through asset diversification to minimize risk. This model is crucial for identifying efficient portfolio formation to achieve optimal returns at a tolerable level of risk. Investment can come from Domestic Investment (PMDN) and Foreign Investment (PMA), both of which contribute to production efficiency and economic growth (Nugroho *et al.*, 2025).

H1 = PMDN Fisheries influences Fisheries GDP

H2 = FDI Fisheries influences Fisheries GDP

Production Theory

Production theory explains the relationship between inputs (capital and labor) and the resulting output. The Cobb-Douglas theory states that output is the result of a combination of capital and labor, where changes in inputs will impact the elasticity of output. This model is crucial for identifying the efficiency of production factors in increasing economic value added in the primary sector (Nugraheni *et al.*, 2022).

H3 = Production influences Fisheries GDP

International Trade Theory

International Trade Theory, specifically the Heckscher-Ohlin Theory, states that a country will tend to export commodities that utilize factors of production that are abundant and inexpensive domestically. As a maritime nation, Indonesia has a comparative advantage in marine resources, so the export sector is expected to be the engine of growth in the fisheries GDP.

H4 = Exports influence fisheries GDP



Figure 1. Framework

Based on Figure 1, this framework illustrates the logical relationship between fisheries sector input factors and national economic output. Domestic Direct Investment (PMDN), Foreign Direct Investment (FDI), Production, and Exports are positioned as independent variables, whose collective influence on fisheries GDP is tested as the dependent variable. Through this model, researchers aim to examine the extent to which capital flows, physical catch capacity, and international trade performance contribute to stimulating economic value added in the Indonesian fisheries sector during the study period.

RESEARCH METHODS

This study employed a quantitative descriptive research method. Quantitative descriptive research describes, examines, and explains what is being studied as it is, and draws conclusions from observable phenomena using numbers (Nurhabiba *et al.*, 2023). Furthermore, this study utilized secondary data obtained from official publications from relevant agencies, such as the Central Statistics Agency (BPS), the Ministry of Maritime Affairs and Fisheries (KKP), and the Investment Coordinating Board (BKPM). This data includes the fisheries sector's contribution to Gross Domestic Product (GDP), the value of fisheries exports, total fish production, and the amount of investment, consisting of Domestic Investment (PMDN) and Foreign Investment (PMA). The data period used in this study was 2015 to 2025.

To achieve the research objectives, the data was statistically processed using EViews 12 software. The analytical method used was multiple linear regression with the Ordinary Least

Squares (OLS) approach. The purpose of using OLS is to obtain efficient and unbiased parameter estimates (Best Linear Unbiased Estimator or BLUE) to evaluate the strength of the relationship and the influence of investment, production, and export variables on the stagnant contribution of fisheries GDP during the observation period.

Table 2. Variable Measurement Method

Variable	Variable Code
Fisheries GDP	Ln Fisheries GDP
Fisheries Domestic Investment	Ln PMDNP
Fisheries Foreign Investment	Ln PMAP
Fisheries Production	Ln PRODUCTION
Fisheries Exports	Ln EXPORTS

Data Processed by the Author

Based on Table 2, the use of natural logarithms (Ln) in this study aims to reduce data fluctuations. If capital expenditure values were simply used directly, the variable values would be very large, reaching billions or even trillions. By using the natural logarithm, these billions and even trillions are simplified without changing the proportions of the original values. Therefore, the regression formula in this study is formulated as follows:

$$\ln(\text{Fisheries_GDP}) = \beta_0 + \beta_1 \ln(\text{PMDNP}) + \beta_2 \ln(\text{PMAP}) + \beta_3 \ln(\text{PRODUCTION}) + \beta_4 \ln(\text{EXPORTS}) + e$$

Where:

- $\ln(\text{Fisheries_GDP})$: Natural Log of Gross Domestic Product in the Fisheries Sector
- $\ln(\text{PMDNP})$: Natural Log of Domestic Investment in the Fisheries Sector
- $\ln(\text{PMAP})$: Natural Log of Foreign Investment in the Fisheries Sector
- $\ln(\text{PRODUCTION})$: Natural Log of Capture Fish Production Volume
- $\ln(\text{EXPORTS})$: Natural Log of Export Value in the Fisheries Sector

RESULT

To ensure the validity and reliability of the resulting regression model, this study conducted a series of statistical testing procedures. The first stage was the Classical Assumption Test to ensure that the Ordinary Least Squares (OLS) estimate met the criteria. To ensure the validity and reliability of the resulting regression model, this study conducted a series of statistical testing procedures. The first stage was the Classical Assumption Test to ensure that the Ordinary Least Squares (OLS) estimate met the criteria for the Best Linear Unbiased Estimator (BLUE).

These tests included:

1. Normality Test

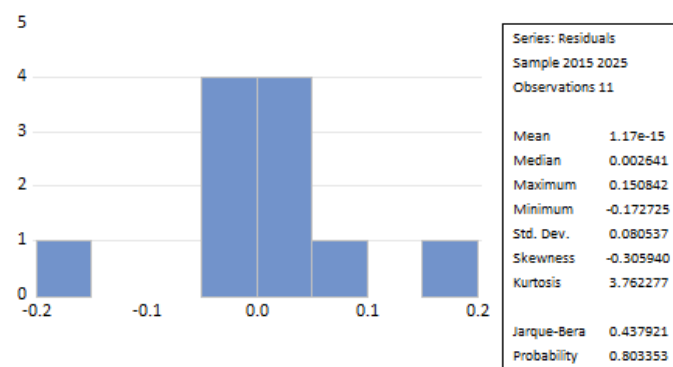


Figure 2. Normality Test

Based on Figure 2, the results of the normality test using the Jarque-Bera method, a probability value of 0.803353 was obtained. Given that this significance value is greater than the 0.05 level ($0.803353 > 0.05$), the null hypothesis (H_0) is accepted, indicating that the residuals in this regression model are normally distributed. Therefore, the resulting model meets the criteria for objectivity and validity for drawing scientific conclusions.

2. Multicollinearity Test

Table 3. Multicollinearity Test Results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	10.99204	11184.82	NA
LN_PMDNP	0.000815	315.1271	3.838782
LN_PMAP	0.001925	591.6418	1.974313
LN_PRODUCTION	0.002229	552.8932	1.046532
LN_EXPORTS	0.244490	18134.67	3.752251

Data Processed by the Author

Multicollinearity testing in this study was conducted by examining the Variance Inflation Factor (VIF) values for each independent variable. Based on the data processing results, the Centered VIF values for the LN_PMDNP variable were 3.838782, LN_PMAP 1.974313, LN_PRODUKSI 1.0046532, and LN_EKSPORT 1.752251. Considering that all variables had VIF values consistently below 10, it can be concluded that this regression model does not exhibit multicollinearity. This indicates the absence of a strong linear relationship or excessive interdependence between the independent variables, allowing each variable to independently explain variation in Fisheries GDP without creating overlapping information that could compromise the validity of the model's estimates.

3. Heteroscedasticity Test

Table 4. Heteroscedasticity Test Results: Glejser

F-Statistic	1.572317	Prob. F(4,6)	0.2951
Obs*R-Squared	5.629460	Prob. Chi-Square (4)	0.2286
Scaled explained SS	4.060294	Prob. Chi-Square (4)	0.3979

Data Processed by the Author

Based on the results of the heteroscedasticity test using the Glejser method, the Chi-Square Prob. (4) value was recorded at 0.2286. Because this significance value is greater than the 0.05 level of significance ($0.2286 > 0.05$), the null hypothesis (H_0) was accepted, indicating that there is no evidence of heteroscedasticity in this regression model. This confirms that the residual variance is homogeneous or exhibits homoscedasticity across the entire observation period from 2015 to 2025.

4. Autocorrelation Test

Table 5. Breusch-Godfrey Serial Correlation LM Test Results

F-Statistic	1.314018	Prob. F(2,4)	0.3642
Obs*R-Squared	4.361533	Prob. Chi-Square (2)	0.1130

Data Processed by the Author

The results of the autocorrelation test using the Breusch-Godfrey Serial Correlation LM Test show a Prob. The Chi-Square(2) value is 0.1130. Given that the significance value is above the 0.05 threshold ($0.1130 > 0.05$), it can be concluded that this model is free from autocorrelation problems. This finding indicates no correlation between the confounding errors

in period t and the previous period ($t-1$).

After the model is declared to have passed the classical assumption problem, the next step is to conduct statistical tests to evaluate the significance of the relationship between the variables.

This test includes:

1. t-Test (Partial)

Table 6. t-Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.13467	3.315424	7.279512	0.0003
LN_PMDNP	0.115606	0.028541	4.050580	0.0067
LN_PMAP	0.001937	0.043879	0.044154	0.9662
LN_PRODUKSI	0.041237	0.047217	0.873345	0.4161
LN_EKSPOR	-0.355059	0.494460	-0.718054	0.4997

Data Processed by the Author

Based on the estimation results in Table 5, the natural logarithm (ln) regression equation model in this study can be formulated as follows:

$$\ln(\text{FISHERIES_GDP}) = 24.134 + 0.115 \ln(\text{PMDNP}) + 0.001 \ln(\text{FISHERIES_PLAN}) + 0.041 \ln(\text{PRODUCTION}) - 0.355 \ln(\text{EXPORTS})$$

The constant value of 24.13467 indicates that if all independent variables (PMDNP, PLAN, Production, and Exports) are constant or zero, then the value of ln Fisheries GDP is 24.134.

The variable LN_PMDNP has a regression coefficient of 0.115606 with a significance value of 0.0067 (<0.05). Because the model uses a double logarithm, this figure represents the elasticity value. This means that every 1% increase in Domestic Direct Investment (PMDN) will result in a 0.115% increase in Fisheries GDP. This demonstrates that domestic investment plays a crucial and effective role in significantly stimulating the economic output of the fisheries sector.

The LN_PMAP variable has a positive coefficient of 0.001937, but its probability value is 0.9662 (>0.05). This indicates that Foreign Direct Investment (FDI) does not have a significant impact on Fisheries GDP. This indicates that foreign capital inflows have not been able to provide significant economic leverage for the growth of this sector during the study period.

The LN_PRODUCTION variable has a positive coefficient of 0.041237 with a probability value of 0.4161 (>0.05). This means that production volume does not significantly influence Fisheries GDP.

The LN_EXPORT variable has a negative coefficient of -0.355049 with a probability value of 0.4997 (>0.05). These results indicate that export value does not significantly influence Fisheries GDP. This insignificant negative coefficient suggests that export performance during this period did not contribute directly to increasing the added value of the national fisheries economy.

This indicates that during the 2015-2025 period, only domestic investment (PMDNP) is the main driver of fisheries GDP growth, while foreign capital, production volume, and export performance have not shown a strong statistical influence in this model.

2. F Test (Simultaneous)

Table 7. F Test Results

F-Statistic	12.21640
Obs*R-Squared	0.004802

Data Processed by the Author

The F test results show an F-statistic of 12.21640 with a Prob(F-statistic) of 0.004802. Because this probability value is less than the 0.05 significance level ($0.0048 < 0.05$), it can be concluded that simultaneously (together) the PMDNP, PMAP, Production, and Export variables have a significant effect on fisheries GDP. Therefore, the natural logarithm regression model used is considered fit (goodness of fit) to explain the relationship between the variables in this study.

3. Coefficient of Determination (R^2) Analysis

Table 8. Coefficient of Determination (R^2) Results

R-Squared	0.890642
Adjusted R-Squared	0.817736

Data Processed by the Author

Based on the data processing results, the Adjusted R-squared value was 0.817736. This indicates that 81.77% of the variation in changes in Fisheries GDP can be strongly explained by the four independent variables in the model: PMDNP, PMAP, Production, and Exports. Meanwhile, the remaining 18.23% is influenced by other factors outside this research model. This high figure indicates that this model has a very good level of representation in explaining the growth phenomenon of Fisheries GDP during the 2015-2025 period.

DISCUSSION

In the Indonesian context, the national economic structure is still dominated by the manufacturing sector. Based on data from the Central Statistics Agency (BPS) in 2025, the manufacturing sector contributed 19.07% to national GDP, followed by the wholesale and retail trade sector (13.17%) and the agriculture, forestry, and fisheries sector (13.10%). This dominance of the manufacturing sector indicates that the structural transformation of the Indonesian economy is tending towards manufacturing-based industrialization, as emphasized by Siregar & Widjanarko (2023) who stated that regional economic structures supported by business sector diversification have a positive and significant impact on economic growth. Meanwhile, the agriculture, forestry, and fisheries sector, despite being the third largest contributor, still faces challenges in terms of increasing added value. Nababan and Nofrian (2020) indicate that the fisheries sector plays a strategic role in the Indonesian economy, but its contribution is not optimal due to weak inter-sectoral linkages and the dominance of upstream activities. Nababan & Nofrian (2025) further emphasized that downstream fisheries development has not been optimal because investment and capital expenditures have not significantly impacted production value, thus preventing natural resource-based sectors such as fisheries from becoming a primary driver of growth.

The study's findings indicate that only Domestic Investment (PMDN) has a positive and significant impact on Fisheries GDP. This aligns with the Harrod-Domar Growth Theory, which states that domestic investment is the primary driver of capital formation. According to research by Salsabila (2023), domestic investment in the fisheries sector is considered more effective because domestic business actors have a better grasp of local bureaucracy, supply

chain culture, and the characteristics of the Indonesian market compared to foreign investors. Conversely, Foreign Direct Investment (PMA) has been shown to have no significant impact. This indicates regulatory barriers or a lack of interest from foreign investors in the downstream fisheries sector. Consistent with Vita (2024), the limits on foreign capital ownership stipulated in investment regulations and the complexity of marine operational permits are key challenges that often hinder investment in the fisheries sector. Due to these obstacles, the realization of foreign capital is often held back, so its actual contribution to the national Gross Domestic Product (GDP) is considered suboptimal. Although production volume has increased, it has not statistically significantly impacted GDP. This is suspected to be due to price inefficiencies at the fisherman level. Prof. Akhmad Fauzi, in his book *Fisheries Economics* (2010), explains that increased production without being accompanied by price and supply chain stability will only result in high yields but with low economic added value. The export variable surprisingly has a negative and insignificant coefficient. This indicates that increased exports have not been able to directly boost GDP. According to Luhur & Tajerin (2016), this occurs because Indonesian fisheries exports are still dominated by raw materials (low value-added) and high international container logistics costs erode the sector's profitability (Hettinger, 2026).

In addition to the variables tested in the model, the insignificant effect of production and export volume on Fisheries GDP is strongly suspected to be due to the high level of Illegal, Unreported, and Unregulated (IUU) Fishing. Theoretically, GDP only records officially reported economic activity. When illegal fishing practices are rampant, many Indonesian marine resources are illegally exported without being recorded in national economic statistics, but physically reducing resource stocks (stock depletion) for local fishermen. This is supported by Takarinta *et al.* (2024), who stated that fish theft (IUU Fishing) results in state losses estimated at hundreds to thousands of trillions of rupiah annually, including the loss of potential economic catches, non-tax state revenues (PNBP), and ecosystem damage. Various literature highlights the magnitude of the impact of these losses and urges improvements in marine governance. According to the Ministry of Marine Affairs and Fisheries (2025), IUU Fishing practices cause data distortion between the volume of catches at sea and the economic value added to the state treasury. This asynchronous nature explains why the increase in production capacity in research data does not automatically contribute significantly to GDP, as a significant portion of the economic potential leaks through illegal channels not recorded in the national accounting system.

Furthermore, the development structure of the fisheries sector in Indonesia is still dominated by upstream activities, such as fishing, while the development of the downstream sector, which has high added value, is not optimal. This results in Indonesian fisheries exports tending to be dominated by raw products with relatively low economic value (Adriliansyah & Riofita, 2025). This phenomenon indicates that the Indonesian fisheries sector is potentially trapped in a low-value-added trap, a condition where the sector only produces output with low added value, thus preventing its contribution to GDP from increasing significantly. Furthermore, low added value is also closely related to weak value chain management in the fisheries sector. Studies show that a lack of understanding in processing, packaging, and marketing fishery products leads to the under-utilization of substantial economic potential. As a result, despite coastal areas possessing high resource potential, the resulting economic impact on communities remains relatively low (Ramadi *et al.*, 2025).

CONCLUSION

Based on the research results and discussion regarding the analysis of factors influencing Fisheries GDP in Indonesia for the 2015-2025 period, the following conclusions can be drawn:

1. Simultaneously (F-test), the variables Domestic Investment (PMDN), Foreign Investment (PMA), Production Volume, and Export Value have a significant influence on Fisheries

GDP. This is supported by the Adjusted R-squared value of 81.77%, indicating that this model has a strong ability to explain variations in Fisheries GDP.

2. Partially (t-test), only the PMDN variable has a positive and significant influence on Fisheries GDP. This indicates that domestic investment is the main driver of economic growth in this sector.
3. The variables FDI, Production Volume, and Export Value are shown to have no significant influence. The insignificance of this variable explains the stagnant contribution of the fisheries sector to below 3% of national GDP, which is caused by structural issues such as supply chain inefficiencies, the dominance of raw material exports, and leakage of economic potential due to Illegal, Unreported, and Unregulated (IUU) Fishing practices.

Based on the findings of this study, the government, through the Ministry of Maritime Affairs and Fisheries (KKP) and related agencies, is recommended to prioritize strengthening the domestic investment climate (PMDN), as it has been proven to be a major driver of fisheries GDP. Furthermore, the government needs to tighten oversight of Illegal, Unreported, and Unregulated (IUU) Fishing practices to prevent leakage of economic potential and ensure that all production volumes are accurately recorded in national statistics. A downstream strategy must also be implemented immediately to shift the export structure from raw commodities to processed products with high added value, making the fisheries sector more resilient to global price fluctuations.

For further research, it is recommended that researchers add other, more specific macro variables, such as the price of fuel oil (BBM) for fishermen, the Fishermen's Exchange Rate (NTN), or government policy variables to capture economic phenomena more comprehensively. Finally, given the vastness of Indonesia's waters, future research should consider using panel data based on Fisheries Management Areas (WPP) to identify disparities in economic contributions between regions in more detail.

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