

The Role of the Blue Economy in Supporting the GDP of ASEAN Countries: A Case Study of Fisheries Revenues from 2013-2022.

دور الاقتصاد الأزرق في دعم الناتج المحلي الإجمالي لدول رابطة الآسيان
- دراسة حالة إيرادات منتجات الصيد البحري خلال الفترة 2013-2022

* Laib Ahcene

Abbes Laghrour- University of Khenchela

laib.ahcen@univ-khenchela.dz

Received:17/09/2025

Accepted:24/10/2025

Published:31/10/2025

Abstract :

This study aims to demonstrate the role of fishing and aquaculture activities, as one of the indicators of the blue economy, and their impact on increasing the GDP rates of the ASEAN. Standard modeling was used to analyze data from 2013-2022, relying on the Smart PLS-4 program. The study found differences in this impact regarding the individual contribution of each country, varying from weak, medium to strong, while the impact was more pronounced in the integration process, as the combined contributions of the countries had a strong effect on increasing ASEAN'S GDP rates.

Key words: Blue economy, ASEAN, GDP, integration

JEL classification codes:F150

1. Introduction.

The world is witnessing a major shift in attention towards water resources, known as the era of the Blue Revolution, which encompasses activities that represent a source of income for many countries and individuals. This collective set of activities is known as the Blue Economy. It includes various sectors primarily related to oceans, seas, and coastal areas, such as marine tourism, maritime transport, marine research and technology, marine resource extraction, marine renewable energy, marine waste recycling, marine environmental protection, marine agriculture, fishing, and aquaculture. The Blue Economy aims to balance economic development with environmental protection and promote sustainable growth for coastal communities.

On the other hand, international trade plays a prominent role in achieving economic development and driving growth, complemented by an increasing number of international organizations and unions that support forms of trade to enhance economic capabilities and strengthen cooperation regionally and globally. The Association of Southeast Asian Nations (ASEAN) is a contemporary model of economic integration that promotes intra-regional trade, similar to models in Europe and North America. Given its geographic location as coastal or island countries, ASEAN members have enormous potential to develop Blue Economy activities, especially fisheries, which constitute a major activity for many families in these countries. Therefore, fisheries activities can significantly contribute to increasing the GDP of ASEAN countries, improving individual incomes and living standards.

Problem Statement:

To what extent does the blue economy, through revenues from marine fishing products, contribute to supporting the GDP of ASEAN countries?

Main Hypothesis H:

The Blue Economy, through fisheries product revenues, contributes significantly to supporting the GDP of ASEAN countries at a 0.05 significance level.

Sub-Hypotheses:

-Sub-hypothesis H1: Exports of marine fishing products positively affect supporting the GDP of the ASEAN Association at a significance level of 0.05%.

-Sub-hypothesis H2: Exports of marine fishing products positively affect supporting the individual income of ASEAN countries at a significance level of 0.05%.

-Sub-hypothesis H3: Imports of marine fishing products positively affect supporting the GDP of the ASEAN Association at a significance level of 0.05%.

-Sub-hypothesis H4: Imports of marine fishing products positively affect supporting the individual income of ASEAN countries at a significance level of 0.05%.

-Study Objectives and Importance: This study aims to:

-Define the blue economy and its various activities, highlighting its importance as a key factor for development in the current era.

-Introduce the ASEAN Association and its role in achieving economic integration and enhancing inter-trade among member countries.

-Assess the volume of trade concerning fishery and aquaculture products as a prominent indicator of the blue economy, and evaluate its contribution to the GDP of ASEAN countries.

The scientific importance of the study lies in the significance of economic integration between countries today. ASEAN adopts a common strategy aimed at regional development, market opening among members, and enhancing the utilization of its potential in the blue economy sector, especially regarding aquatic resource products.

Study Methodology:

To address the research problem and test the study hypotheses, the descriptive-analytical method was used by presenting various concepts related to the blue economy and the establishment of ASEAN. Then, structural modeling was employed to study the relationship between marine fishing products, as a sub-variable within blue economy indicators, and the GDP of ASEAN countries.

Previous Studies: Many studies have addressed the topic of the blue economy and trade among ASEAN countries, with most linking the blue economy to sustainable development, including:

-(Chamia, Ben Abbas; Akram, Laour, 2019) aimed to define various concepts of the blue economy as representing the complete set of development forms and an alternative for achieving sustainable development in Algeria. It concluded that more of Algeria's coastal potential should be harnessed to support the shift toward this new development approach and ensure the sustainability of coastal activities.

-(Marwan Youssef, 2023) focused on the literature of the blue economy, covering its origin, dimensions, impact on the macroeconomy, and major challenges such as pollution, overfishing, and climate change. The study called for greater cooperation and investment in research, innovation, and technology to overcome these challenges and ensure the long-term sustainability of the blue economy.

-(Zainab, Bougaa, 2021) examined the factors behind the success and weaknesses of ASEAN's integration experience, noting that ASEAN has achieved significant results in integration efforts, becoming the world's seventh-largest economy, with hopes to rank third by 2030.

-(Anwar, Aminuddin; Noor Mifrahi, Mustika; Muhammad Adidinizar, Bin Ahmed Kusaire, 2024) analyzed the impact of international trade on economic growth in eight ASEAN countries from 2000 to 2022. They found that exports positively influenced growth rates, while the impact of imports was weak. The study recommended that ASEAN countries promote broader intra-regional and external trade interactions and reduce trade barriers and administrative obstacles affecting export performance.

These previous studies generally address the two variables—blue economy and ASEAN—separately, either by describing the relationship between the blue economy and sustainable development at local or international levels or by highlighting ASEAN's role as a model for economic integration and intra-regional trade enhancement.

Our study differs by focusing on the trade exchange of marine fishing products as a sub-indicator within the blue economy indicators and assessing its significant role in supporting the GDP of

ASEAN countries. This is analyzed through structural modeling of data from 2013 to 2022.

2-Conceptual Framework of the Blue Economy and Historical Background of ASEAN Establishment:

There has been a rapid global increase in interest in oceans and seas due to their vast economic resources, which can diversify income sources and create millions of jobs worldwide. This is reflected in various UN initiatives that gave rise to a new economic concept capable of properly managing the world's water bodies, known as the "Blue Economy". On the other hand, regional economic blocs represent the primary means for addressing economic challenges from external powers in contemporary economies. Hence, some Southeast Asian countries have formed a bloc aiming to develop intra-regional trade and reinforce regional security, known as the Association of Southeast Asian Nations (ASEAN).

2.1 The Conceptual Framework of the Blue Economy:

The Belgian economist "Günther Pauli" was the first to introduce the concept of the Blue Economy following the "Rio+20" conference, defining it as "an economy that emphasizes the sustainable management of water resources for the sustainability of economies dependent on them, based on the premise that healthy marine ecosystems are more productive and essential for sustaining ocean-based economies" (Youssef, Marwan, 2023, pp. 12-13).

The Food and Agriculture Organization (FAO) defines the Blue Economy as "an economy based on marine activities in water bodies such as oceans, seas, lakes, and gulfs, investing these resources to achieve the best possible yield from economic activities like fishing, maritime transport, mining, logistics, tourism, and services" (Salah Eddin, Fikri Al-Sa'i, 2023, p. 426).

The World Bank defines it as "the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of marine ecosystems, affecting activities such as fisheries, transportation, renewable energy, waste management, climate change, and tourism" (Ali Gill, Shahzad; Jawad, Iqbal, 2021, p 29).

These definitions share common ground regarding the sources and types of activities encompassed by the blue economy. Accordingly, a

concise definition can be given as the totality of activities for which coastal, island, or oceanic water resources constitute the source. These activities must be conducted in a way that ensures resource conservation while providing additional or alternative income and economic growth for surrounding communities.

2.2 Importance and Activities of the Blue Economy:

The significance of the blue economy becomes clearer when defining its various activities, which offer numerous development opportunities. The global economic value of ocean and sea activities ranges between 3 to 5 trillion USD. These activities include: (Chamia, Ben Abbas; Akram, Laour, 2019, p. 368):

-Shipping and port facilities: Approximately 80% of global trade volume and 70% of its value pass through seas and global ports.

-Fisheries and aquaculture: Between 10% to 12% of the global population depends on fishing and aquaculture for livelihood, with about 58.3 million people working in primary fisheries and small-scale fishing sectors. This sector can provide around 350 million jobs, with potential economic gains from stock recovery estimated at 50 billion USD annually.

-Coastal or beach tourism: The majority of global tourism activities are concentrated in coastal areas, with visitor numbers growing daily.

-Energy: Over 30% of global oil and gas production is extracted from the sea. Oceans also offer renewable energy resources through advanced technologies harvesting wind and wave power, with projected energy generation of 175 megawatts by 2035 compared to 6 megawatts in 2012.

-Marine biotechnology: Marine biotechnology products contribute approximately 208 billion USD to global markets, increasing to 4.6 billion USD in 2017.

-Marine mining: Oceans and seas' floors contain important minerals used in renewable energy technology industries.

2.3 Historical Background of ASEAN: ASEAN was established by the Bangkok Declaration on August 8, 1967, initially as a political alliance to counter the spread of communism in Southeast

Asia. Over time, the association expanded its focus to cover broader cooperation politically, economically, security-wise, and culturally. It originally consisted of five countries: Malaysia, Indonesia, Singapore, the Philippines, and Thailand. Later, Brunei joined in January 1984, Vietnam in July 1995, Laos and Myanmar in 1997, and Cambodia in April 1999, bringing the total to ten members (Fawzi, Qadri; Suleiman, Zouari; Yazid, Farhat Blabel, 2019, pp. 48-49). Malaysia was a key proponent of this bloc which began emphasizing regional economic cooperation among member states, including harmonizing manufacturing policies, liberalizing intra-regional trade based on product lists, and implementing national policies to replace imports and protect emerging industries—especially after severe damage caused by trade protections imposed by developed countries like the US and Europe on these countries' exports (Ali, Khalfi; Abdelwahab, Ramidi, 2009, p. 82).

3. Study Modeling:

3.1 Methodological Procedures:

A-Study Population: The study population consists of the ten ASEAN countries mentioned earlier, with various data related to fisheries products, GDP rates, and per capita income for each country during the study period.

The significance of the Blue Economy in the ASEAN region is highlighted by the fact that many countries belong to globally important areas such as the Coral Triangle, which includes Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and East Timor. This area contains some of the richest biodiversity on Earth, equivalent to the Amazon forests, with 76% of all known coral species and over 3,000 fish species. Around 120 million people in the region depend directly on marine resources for income and food. The value of fisheries connected to coral reefs in Indonesia and the Philippines alone is estimated at around \$258 million annually (Chamia, Ben Abbas; Akram, Laour, 2019, p. 369).

Since its inception, ASEAN has recorded positive GDP growth except for 1998 during the Asian financial crisis. Since 1999, real GDP growth ranged between 2.5% and 7.5%, while ASEAN's share of global GDP doubled from 3.3% to 6.2% in 2016, reaching approximately \$3.1 trillion in 2019, supported by a common market of over 655 million consumers. Financial sector stability has

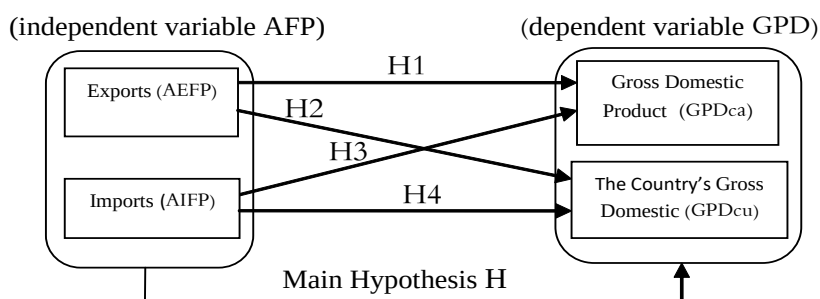
improved with higher asset values, better capital adequacy, and increased profitability of financial institutions. Projections indicate ASEAN will be the world's fourth-largest economy by 2030 (Zainab, Bougaa, 2021, p.119).

B-Sample: The sample consists of a time-series statistical data related to the study variables for the period 2013-2022.

C-Study Variables: The study includes two main variables: independent and dependent. The independent variable comprises exports and imports of the ten most important fisheries products in ASEAN countries (listed in attached tables). The dependent variable includes GDP and per capita GDP for the countries during the study period.

D-Study Model: To clarify the relationship between study variables and hypotheses, the following model was proposed:

Chart 1. The proposed model for studying the relationship
Between variables



Source: Prepared by researcher

E- Study Tool: The study model was built using structural equation modeling (PLS-SEM) with Smart PLS-4 program.

3.2 Evaluation of the Study Model:

3.2.1 External Factor Loading: The following table shows the external loadings of the indicators for the constructs included in the study model:

-Exports: Table1. External Loadings of Export Construct Indicators
(look :ASYB,2023,v1,p270)

N	Indicator	Arithme	Standard	Saturation	Saturation
---	-----------	---------	----------	------------	------------

°		tic average	deviation	coefficient before modification	coefficient after modification
f1	Fish and crustaceans, molluscs and other aquatic invertebrates	1,20817,800	3,7955,907	0,581	0,720
f2	Locust beans, seaweeds and other algae, sugar beet, sugar cane, fresh, chilled, frozen or dried, whether or not ground; fruit stones, kernels and other vegetable products (including unroasted chicory roots) used primarily for human consumption, n.e.c.	2,848,300	9,69,974	0,962	0,919
f3	Vegetable saps and extracts; pectic substances, pectinates and pectates; agar-agar and other mucilages and thickeners, whether or not modified, derived from vegetable products	3,758,200	1,110,379	0,952	0,912
f4	Fats and oils and their fractions of fish or marine mammals; whether or not refined, but not chemically modified	5,09,400	3,11,940	0,203-	-
f5	Prepared or preserved fish; caviar and caviar	3,6989,600	1,6826,615	0,571	0,701

*The Role of the Blue Economy in Supporting the GDP of ASEAN Countries:
A Case Study of Fisheries Revenues from 2013-2022*

	substitutes prepared from fish eggs				
f6	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	3,4973,700	3,286,940	0,843	0,893
f7	Flours, meal and pellets, of meat or meat offal, of fish or of crustaceans, molluscs or other aquatic invertebrates, unfit for human consumption; greaves	3,735,800	1,813,271	0,320	-
f8	Animal products; of fish or crustaceans, molluscs or other aquatic invertebrates; dead animals of chapter 03, unfit for human consumption	4,88,800	2,31,962	0,204-	-
f9	Animal fats and oils and their fractions; partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised, whether or not refined, but not further prepared	1,4600	1,2940	0,574-	-
f10	Edible mixtures or preparations of animal or vegetable fats or oils or of fractions of	1,1346,100	4,395,448	0,268-	-

	different fats or oils of this chapter, other than edible fats or oils of heading no. 1516				
	Total Exports	3.2310. 102	2.113.567	-	-

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

The mean values in the table show noticeable variation among the indicators, reflecting differences in the sample data's response to each item. Higher means indicate strong acceptance or positive experience, while lower means suggest less agreement or consistency. On the other hand, the factor loading values before adjustment show indicators with strong correlations to latent variables: key indicators such as f1, f2, f3, f5, and f6 have loadings exceeding 0.7, indicating high reliability and good standard values for these elements. Indicators with loadings below 0.4, such as f4, f7, f8, f9, and f10, were excluded due to their weak contribution to the theoretical construct. This underscores the need to review these items in terms of wording or relevance to the research content to ensure the accuracy and validity of the final results.

3.2.2 Imports:Table.2 External Loadings of Import Construct Indicators

(look :ASYB,2023,v1,p271)

N°	Indicator	Arithmetic average	Standard deviation	Saturation coefficient before modification	Saturation coefficient after modification
g1	Fish and crustaceans, molluscs and other aquatic invertebrates	6,0721,100	1,9025,538	-0,456	-
g2	Locust beans, seaweeds and other algae, sugar beet, sugar cane, fresh, chilled, frozen or dried, whether or not ground; fruit stones, kernels and other vegetable products (including unroasted chicory roots) used primarily for human consumption,	1,032,600	6,34,735	0,535	0,469

*The Role of the Blue Economy in Supporting the GDP of ASEAN Countries:
A Case Study of Fisheries Revenues from 2013-2022*

	n.e.c.				
g3	Vegetable saps and extracts; pectic substances, pectinates and pectates; agar-agar and other mucilages and thickeners, whether or not modified, derived from vegetable products	3,450,000	1,293,643	0,559	0,632
g4	Fats and oils and their fractions of fish or marine mammals; whether or not refined, but not chemically modified	1,073,000	1,569,88	0,874	0,876
g5	Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs	4,412,900	1,674,842	0.701	0,703
g6	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	2,306,100	1,055,295	0,487	0.499
g7	Flours, meal and pellets, of meat or meat offal, of fish or of crustaceans, molluscs or other aquatic invertebrates, unfit for human consumption; greaves	1,1466,10 0	4,828,728	0,901	0,904
g8	Animal products; of fish or crustaceans, molluscs or other aquatic invertebrates; dead animals of chapter 03, unfit for human consumption	6,70,600	2,95,615	0,481	0,488
g9	Animal fats and oils and their fractions; partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised, whether or not refined, but not further prepared	3,6700	1,56812	-0,644	-
g	Edible mixtures	1,956,400	9,04,950	0,907	0,908

10	or preparations of animal or vegetable fats or oils or of fractions of different fats or oils of this chapter, other than edible fats or oils of heading no. 1516				
Total Exports		2.345.200	1.234.045	-	-

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

The mean values in the table display clear variation among the indicators, where some higher means indicate greater agreement or consensus among participants with those items, while lower means reflect variability in acceptance or response levels. Regarding the factor loadings before adjustment, several indicators such as g1 and g9 showed low loadings below 0.4, indicating weak correlation with the latent variable; therefore, they were excluded from the final analysis.

Conversely, most other indicators had adjusted loadings within an acceptable range exceeding 0.4, especially g4, g5, g7, and g10, whose adjusted factor loadings approached or exceeded 0.7, indicating these indicators reliably represent their latent variables. These results highlight the importance of reassessing low-loading indicators for wording or suitability to ensure measurement reliability and accuracy in the study.

3.2.3 GDP Indicators:

Table.3 External Loadings of Construct Indicators for ASEAN countries
(look :ASYB,2023,v1,p51)

N°	Indicator	Arithmetic average	Standard deviation	Saturation coefficient before modification	Saturation coefficient after modification
n1	Brunei Darussalam	1.05931.000	6,4270,522	-0,311	-
n2	Cambodia	2.26212.500	4,7076,061	0,967	0,974
n3	Indonesia	1.0319081.700	1,387220,856	0,956	0,967
n4	Lao PDR	1.62619.200	2,4071,393	0,668	0,669
n5	Malaysia	3.423611.400	3,21411,717	0,890	0,899

n6	Myanmar1)	5.80722.50 0	1,78892,791	-0,074	-
n7	Philippines	2.812953.7 00	1,295559,49 8	0,513	0,581
n8	Singapore	2.655657.5 00	1,5858078,6 04	0,330	-
n9	Thailand	4.278748.3 00	1,367228,15 0	0,560	0,936
n 10	Viet Nam	2.901072.7 00	7,35160,787	-0,311	-
Total GDP		3.23345.10 0	1.03456.201	-	-

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

The mean values in the table reflect variability in responses across the indicators, with some higher values indicating strong acceptance and agreement among participants, while lower means suggest variability or instability in responses. Regarding factor loadings before adjustment, several indicators such as n1, n6, and n10 recorded loadings below 0.4, indicating weak correlation with the latent variable; thus, they were excluded from the final analysis.

In contrast, most other indicators, including n2, n3, n5, and n9, showed adjusted loadings above 0.6, demonstrating reliable and good representation of the studied variable. Some indicators like n4 and n7 had lower but still acceptable loadings, which could benefit from wording review in future phases. Overall, these results emphasize the need to reevaluate and modify low-loading indicators to improve measurement accuracy and reliability in the study.

3.2.4 Per Capita GDP:

Table 4. External Loadings of Construct Indicators for GDP Per Capita (for each ASEAN country) (look :ASYB,2023,v1,p51)

N°	Indicator	Arithmetic average	Standard deviation	Saturation coefficient before modification	Saturation coefficient after modification
m1	Brunei Darussalam	3.00439.20 0	1,06730,548	0,932	0,769
m2	Cambodia	1.2652.400	4,209,901	-0,142	-
m3	Indonesia	2.5803.600	1,8259,727	-0,315	-
m4	Lao PDR	1.9035.700	8,785,484	0,726	0,864

m5	Malaysia	8.6341.700	3,7818,153	-0,562	-
m6	Myanmar1)	1.0920.700	3370,202	-0,231	-
m7	Philippines	2.9220.500	8887,442	0,039	-
m8	Singapore	5.68397.00 0	1,73720,478	-0,040	-
m9	Thailand	6.9883.200	7,975,519	-0,479	-
m 10	Viet Nam	2.4837.100	1,2669,980	0,718	0,765
Total per capita GDP		4.1105.102	1.4356.540	-	-

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

The mean values reflect notable variation in sample responses, with some indicators showing high acceptance rates indicating strong agreement with the presented items, while lower means indicate variability or weaker consensus. Regarding factor loadings before adjustment, several indicators such as m2, m3, m5, m6, m7, m8, and m9 recorded values below 0.4, indicating weak correlation with the latent variable and the need for exclusion or rewording.

Conversely, indicators m1, m4, and m10 showed adjusted loadings above 0.7, confirming they represent the variable well. These results call for a careful review of low-loading items to improve the accuracy and reliability of the study’s measurement tool.

3.2.5 Internal Consistency Reliability:

We will verify the internal consistency reliability using a set of tests summarized as follows:

Table5. Cronbach’s Alpha and RHO index value

Variables	Alpha Cronbach	Composite Reliability	RHO index	Convergent Validity
AEFP	0.891	0.929	0.919	0.697
AIFP	0.840	0.882	0.883	0.501
AFP	0.747	0.948	0.821	0.502
GPDca	0.721	0.742	0.842	0.641
GPDcu	0.899	0.941	0.926	0.655
GPD	0.723	0.947	0.752	0.536

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

From Table 5, Cronbach's alpha, composite reliability, RHO index, and Average Variance Extracted (AVE) were calculated and found satisfactory, with AVE values above 0.5 indicating good convergence among indicators.

3.2.6 Fornell-Larcker Criterion:

This criterion is used to assess the discriminant validity of latent variables, also known as the overlap between dimensions, where the correlation of a latent variable with itself should be greater than its correlation with any other latent variable. The study results based on the Fornell-Larcker criterion are presented in the following matrix:

Table 6. Fornell – Larker Criterion Results

	AEFP	AIFP	GPDca	GPDcu
AEFP	0.835			
AIFP	786	0.708		
GPDca	0.679	0.656	0.801	
GPDcu	0.831	0.610	0.796	0.809

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

From Table 6, it is observed that for all latent variables, the correlation with themselves is greater than their correlation with other latent variables. Therefore, the latent variables are independent.

3.2.7 Normality Test:

Table 7. Normality test (Cramér-Von Mises)

Variables	Cramér-Von Mises	P-Value
AEFP	0.467	0.620
AIFP	2.484	0.300
GPDca	0.234	0.103
GPDcu	1.587	0.089

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

From the table, the Cramér-Von Mises values range between 0.234 and 2.484 with p-values greater than 0.05. Thus, we accept the null hypothesis and reject the alternative, allowing us to conclude that all survey axes are normally distributed. Therefore, the study can proceed, and laboratory tests can be conducted to address the proposed hypotheses.

3.2.8 Goodness-of-Fit Criterion (GOF):

The GOF is calculated using the following formula:

GOF = $\sqrt{AVE \times R^2}$

Table 8. GOF Index

Variables	R ²	AVE
AEFP	0.697	0.901
AIFP	0.501	0.962
GPDca	0.641	0.878
GPDcu	0.655	0.977
	R ² =2.494	AVE=3.718
	R ² =0.6235	AVE=0.9295

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

GOF=

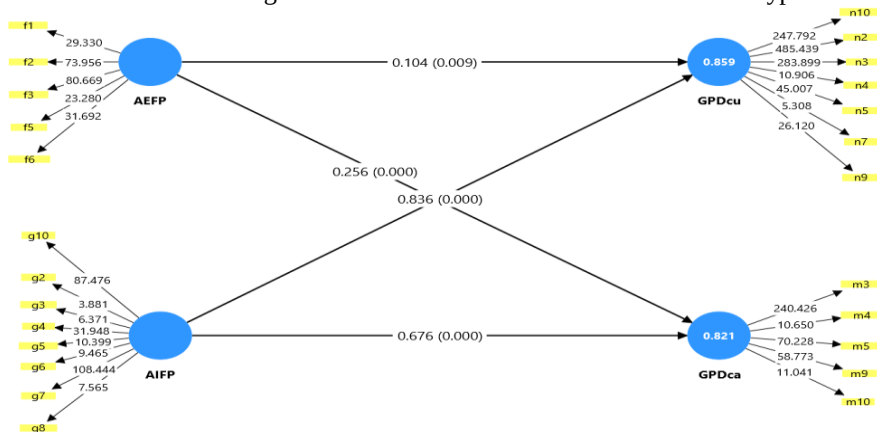
$\sqrt{0.6235 \times 0.9295} = 0.761$

The GOF (Goodness-of-Fit) value reached 0.761, which is greater than 0.36. This indicates that the study model is of **high quality** and fits the data well.

3.3 Sub-Hypotheses Testing:

Using bootstrapping with 500 sub-samples, statistical significance of the hypothesis paths was tested, The results are illustrated in the following chart:

Chart2. Statistical significance of the structural model for the sub-hypotheses



Source: Prepared by the researcher based on the outputs of Smart Pls-4program

Table 9. structural model analysis of sub-hypotheses

structural model	Pls-sem		
	Path coefficient	T -Value	P -Value
~~AEFP~~ GPDcu	0.104	2,598	0.000
AEFP GPDca	0.256	4,908	0.000
AIFP GPDcu	0.836	25.317	0.000
AIFP GPDca	0.676	14.419	0.000

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

-The relationship between AEFP (Exports of fishery products) and GPDcu (GDP) is statistically significant at the 0.05 level, with a p-value of 0.000 confirming the first sub-hypothesis. The computed T-value (2.598) exceeds the critical T-value (1.948). The positive but weak path coefficient of 0.104 indicates a positive and weak impact of AEFP on GPDcu.

-The relationship between AEFP and GPDca (GDP per capita) is also statistically significant at the 0.05 level (p=0.000), confirming the second sub-hypothesis. The T-value of 4.908 surpasses 1.948. The positive but weak path coefficient 0.256 shows a positive and weak effect of AEFP on GPDca.

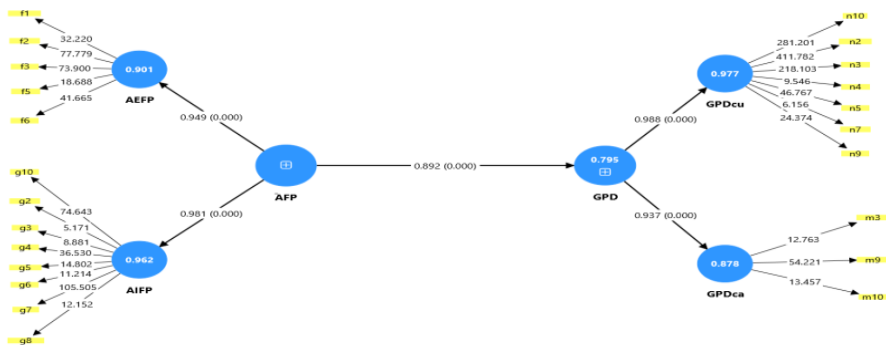
-The relationship between AIFP (Imports of fishery products) and GPDcu is statistically significant (p=0.000), confirming the third sub-hypothesis. The very high T-value of 25.317 ($>> 1.948$) and a strong positive path coefficient of 0.836 indicate a strong positive effect of AIFP on GPDcu.

-The relationship between AIFP and GPDca is significant at the 0.05 level ($p=0.000$), confirming the fourth sub-hypothesis. The T-value of 14.419 exceeds the critical value, and the path coefficient of 0.676 represents a positive and moderate effect of AIFP on GPDca.

In summary, all sub-hypotheses are supported with positive effects; exports have a weak positive impact, while imports have a strong to moderate positive influence on both GDP and GDP per capita in ASEAN countries. The structural model analysis shows that all four sub-hypotheses are statistically supported with positive effects at the 0.05 significance level. Export of fishery products (AEFP) has a **weak but positive impact** on both GDP (path coefficient 0.104, $T=2.598$) and GDP per capita (coefficient 0.256, $T=4.908$). Import of fishery products (AIFP) exhibits a **strong positive effect** on GDP (coefficient 0.836, $T=25.317$) and a **moderate positive effect** on GDP per capita (coefficient 0.676, $T=14.419$). All T-values exceed the critical value of 1.948, confirming the hypotheses' validity and the significance of these trade flows in supporting ASEAN's economic outcomes. This indicates that while both export and import activities in fishery products contribute positively, imports have a comparatively stronger influence on the economic indicators examined .

3.4 Main-Hypothesis Testing:

chart3. Statistical significance of the structural model paths for the main-hypothesis



Source: Prepared by the researcher based on the outputs of Smart Pls-4program

Table 10. structural model analysis of the main hypothesis

	structural model		Pls-sem
	Path coefficient	T -Value	P -Value
AFP  GDP	0.892	43.696	0.000

Source: Prepared by the researcher based on the outputs of Smart Pls-4program

The table shows that the relationship between AFP (Aggregate Fishery Products) and GDP is statistically significant at the 0.05 level with a p-value of 0.000, confirming the main hypothesis of the study. The computed T-value (43.696) is much greater than the critical T-value (1.948). The path coefficient of 0.892 indicates a strong positive effect of AFP on GDP. Therefore, the effect of AFP on GDP is both positive and strong.

4. Conclusion:

The blue economy represents a new concept focused on the optimal utilization of water resources, relying on seas and oceans to achieve development. It has become a central concern for countries in contemporary economies. Given their privileged geographic location and the fact that most belong to the Coral Triangle region, ASEAN countries strive to support their activities in this area. Accordingly, this study focused on fishing and aquaculture activities, demonstrating that integration among the countries within this bloc has contributed to increasing the GDP rate, despite some imbalances in the individual contributions of each country.

Study Results:

-Water resources have become a global focus in the new era, with competition shifting toward the Blue Revolution.

-Cambodia, Indonesia, Malaysia, and Thailand represent strengths within ASEAN due to their strong GDP contributions.

-Brunei, Myanmar, and Vietnam represent weak points regarding their GDP contributions to ASEAN, potentially weakening rather than strengthening the bloc.

-ASEAN's strength lies in achieving integration (The Singerie) among member countries, where the combined GDP is strong, even if individual contributions vary.

Suggestions:

-Efforts should focus on maintaining the bloc's strengths, especially supporting integration among member states.

-Improvement is needed in the GDP contribution indicators for weaker countries such as Brunei, Myanmar, and Vietnam, as they currently represent the bloc's weak points.

-Better utilization of fisheries and aquaculture indicators is essential for lagging countries like Brunei, Laos, Cambodia, and Myanmar.

-Supporting strategic partnerships between ASEAN members and external Asian or non-Asian countries is crucial to develop sectors in weaker economies, increase their total output, and positively reflect on ASEAN's overall GDP.

5. Bibliography List:

-Ali Gill, Shahzad; Jawad, Iqbal, (2021), Exploring the Role of Blue Economy in Sustainable Development : A Perspective From Pakistan, Journal of Maritime Research, pages 25-71.

-Ali, Khalfi; Abdelwahab, Ramidi, (2009), ASEAN as a model of open Regionalism for the developing countries,Journal of North African Economies, Volume 5,N°6, 81-94.

-Anwar, Aminuddin; Noor Mifrahi, Mustika;Muhammad Adidinizar, Bin Ahmed Kusaie,(2024), International Trade and economic Growth in ASEAN, Jurnal Kbijakan Ekonomi dan Keuangan, Volume3,N°1, 109-115.

-Chamia, Ben Abbas; Akram, Laour, (2019), To move towards the blue economy...as a new path to sustainable development in Algeria across the Mediterranean, Journal of Human sciencesof the university of oum el bouaghi, Volume6,N°1,361-383.

-Fawzi, Qadri; Suleiman, Zouari; Yazid, Farhat Blabel, (2019), ASEAN a pioneering Model in the Field of Free Trade Zones, Journal Araa for Economic and administrative studies, Volume 1,N° 2, 48-60.

-Hourn, Kao Kim, ASEAN Secretariat,(December 2023), ASEAN Statistical Yearbook 2023.

-Salah Eddin, Fikri Al-Sa'i, (2023), Fishery Extension Strategy for Transformation Requirements towards The Blue Economy in Egypt, Journal of Agricultural Economics and social sciences, Volume 14,N° 8, 425-435.

-Youssef, Marwan, (2023), Blue Economy Literature Review, International Journal of Business and Management, Volume18, N°3, Pages12-18.

-Zainab, Bougaa, (2021), Lessons learned from the economic Integration experience of ASEAN countries, The Algerian Review of financial and banking studies, Volume 7,N°1, 110-130.