Analysis of Inter-Regional Relationship between Vietnam Coastal Zones and the Rest of Vietnam

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Abstract

The paper presents the importance of Vietnam's coastal economy, including 28 of the 63 provinces and cities and analyzes six priority economic sectors according to Resolution 36/TW/2018 "About the sustainable development strategy of Vietnam's marine economy to 2030, vision to 2045". Based on the Resolution, the Interdisciplinary Balance sheet with 2 areas—coastal and the rest of Vietnam—is used (separate use of products in each region and imports) to analyze the spillover effects and sensitivity to income and related issues. Many new findings show that the efficiency of coastal economic zones already plays an important role in the Vietnamese economy and needs to be further exploited. This article is the result of the research conducted in the framework of the independent topic KC09.26/16-20 "Scientific foundations and breakthrough solutions for sustainable coastal economic development in focal economic regions in Vietnam" chaired by Dr. Hoang Ngoc Phong.

Keywords

1. Introduction

Vietnam has an area of 332,212 km^2 with a coastline of 3260 km, which means that on every 10 km^2 of mainland has 1 km of coastline, 6 times higher than the global average. These are making Vietnam one of the 10 countries with the highest

coast length to territory index. The coastal region includes 28 of the 63 provinces and cities of Vietnam (Figure 1), home to 1/2 of the country's population, and the gross regional domestic product (GRDP) on the coastal zones accounts for more than 50% of the GDP of the Vietnam economy. The coastal zones is also directly connected with 4 focal economic regions throughout the country (the northern focal economic region, the focal economic region of the central region, the Southern focal economic region and the focal economic region of the Mekong River delta), where the economy is the most developed. It is estimated that these four focal economic regions account for 45% of the population and 3/4 of the nation's GDP (including some inland provinces such as Hanoi, BacNinh, Dong Nai, Binh Duong, but excluding some of the provinces in the North Central provinces).

The emerging marine economy is increasingly important, especially since the 1982 UN Convention on the Law of the Sea. Table 1 shows the Coastal Governance Index 2015 compiled by the EIU, Vietnam achieved a good ranking of 15th in the world with 57/100 points.

In the Vietnam marine strategy identified in 2018, there are 6 particularly important coastal economic sectors, in the following order of priority:

1) Tourism and marine services: Vietnam has great tourism development potential thanks to its long and beautiful coastline, with many famous monuments and landscapes dotting its 5 coastal tourist areas, along with many world Heritage Sites such as Ha Long Bay, Co Dinh Hue capital, My Son Holy Land,
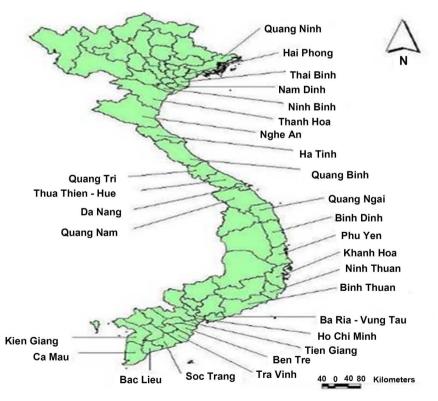

Figure 1. Coastal area (Source: The names coastal provinces in Vietnam) [1].

Table 1. Ranking of coastal management.

Rank/20		Score/100	Rank/20		Score/100
1	New Zealand	86	10	Chile	67
2	United States	85	12	China	61
3	France	82	13	Mexico	60
4	Spain	80	14	Philippines	59
5	Norway	79	15	Indonesia	57
6	Japan	78	15	Vietnam	57
7	Canada	76	17	India	56
8	South Korea	72	18	Peru	55
9	South Africa	68	19	Nigeria	50
10	Brazil	67	20	Russia	42

Source: EIU. Coastal Governance Index [2].

and Hoi, An Ancient Town. Recently, tourism has been announced as a spearhead economic sector for the country and the coastal economic region. The Resolution No. 36-NQ/TW [3] on the marine economy clearly states, "all economic sectors participate in developing eco-tourism, scientific exploration, community tourism, high-quality sea resorts in coastal areas; build, develop, diversify products, product chains, and world-class marine tourism brands on the basis of biodiversity conservation, promote the value of natural, cultural and historical heritage specialties of regions and regions, connecting with international tourist routes" to make Vietnam a world-leading tourism destination. Researching and developing offshore island and sea tourism will open up new prospects, especially when the offshore service and transport system is in place. Facing the adverse impact of global climate change and the rising sea level, the Resolution also set the task of "strengthening the capacity of search and rescue; promoting scientific exploration activities; attaching importance to education and maritime health.... Support and create conditions for coastal people to change jobs from potentially dangerous activities, negatively impact the sea to protect and preserve, creating sustainable livelihoods, stable new jobs, and increasing people's income".

The sea economy associated with sea island tourism services is growing [4]. During the promotion of island tourism, destinations should be linked with high-class resort services, just like island and sea economic sectors with aviation, maritime industry and hospitality venues... together with the chain and strip of coastal cities. Modern market and infrastructure systems will bring greater income and boost socio-economic development, taking the country closer to attracting 15 million international visitors and tens of millions of domestic customers in 2018.

However, tourism is a general industry that uses the services of other industries and it needs to be analyzed carefully on the scales of products, transport

services, restaurants, and hotels. The results of calculations are clearly stated in part 3 of this article.

2) Maritime economy: The more the seaport system and ship fleet develops, the more developed shipbuilding industry has done, and however, the performance has not been high. There is a disconnect between port systems and the services of localities. Therefore, in the coming time, state authorities' mission needs to be to ensure the effective exploitation of seaports and shipping services. This includes planning, building and organizing the synchronous and effective exploitation of general seaports, international transit ports and specialized ports associated with support services, while completing the logistics infrastructure and road system connecting sea ports with regions and localities in the country and internationally.

With a long coastline, it is necessary to "promote the development of the maritime transport fleet with a rational structure applied modern technology, improve service quality, meet the domestic transport market's demand and deepen participation into transport supply chains, as well as step by step increase international market share. The shipbuilding and the maritime industry have a long tradition in Vietnam. However, given the new conditions, these industries are making significant changes. The country has developed industries of shipbuilding and repair, seaport services and maritime transport, as well as inter-freight transportation, with an extensive network of cargo container ports. The formation of a seaport system and links to onshore industrial developments support the development of the marine economy". The resolution sets out major orientations, but the arguments in marine development plans and localities have not been fully validated. The analysis in this article is intended to contribute further evidence to the major views on coastal and marine economic development.

3) Exploiting oil and gas and other marine mineral resources: After many years of developing the oil and gas industry in an "extensive" manner, the sea has supplied more than 300 million tons of oil and billions of cubic meters of gas, but exploration has not been maintained at a stable level and the output of this industry plummeted. With the current known reserves, it is only possible to exploit oil and gas for the next 40 years [5]. Other marine mineral industries also achieved modest results. Therefore, Resolution 36/TW (2018) emphasized "Improving the capacity of the oil and gas industry and other marine resources and minerals sectors; step by step mastering the search, exploration and exploitation to meet the targets of marine economic development in the new period. Promote search, exploration and increase oil and gas reserves; study and explore new sedimentary basins and non-traditional hydrocarbon forms".

Apart from oil and gas, other types of minerals are in abundance but have yet to be exploited to a sufficient degree, thus the Resolution emphasizes "linking the search and exploration of oil and gas with investigation, survey and assessment of potential resources, including other marine minerals, deep-sea minerals, especially minerals with large reserves, high value, have strategic significance (not a sentence). Improving the efficiency of the exploitation of marine mineral

resources should associate with deep processing; harmoniously combining exploitation and processing with environmental protection and marine biodiversity conservation".

In the exploitation of oil and gas and minerals, the operational experience of Vietsovpetro Joint Venture between Vietnam and the Russian Federation has brought a lot of experience in locating and exploiting oil and gas, contributing greatly to the state budget of Vietnam for many years. This is also an effective international oil and gas unit of the Russian Federation. Based on this experience, Vietnam has established dozens of other joint ventures with foreign partners to boost the industry, process oil and gas, and construct national energy centers, among others. However, it is necessary to filter subsequent projects to ensure effectiveness. In current condition, the US company has a new large gas project in Central coastal Vietnam. With the rich natural gas reserves, the Resolution also emphasized that "Oil and gas processing industry is developing very well, including liquefied gas processing and electricity production. With the search for new energy sources from the sea, the oil and gas industry also has been developing diversified and strongly, associated with the coastal industry". While the Resolution 36/TW (2018) lays special emphasis on mineral exploitation, there has been little progress in the area. Even basic discovery is still poor, especially in deep waters, and there is no suitable technology to effectively explore, evaluate, and exploit known reserves. The coastal zones with oil and gas lots were shown in Figure 2.

As a "basic construction" industry, exploitation, and processing are closely related to the exploration and detection of new reserves, which contains a lot of risks, so the important issue is ensuring continuous sustainable development of the industry. That requires proper and continuous vision and investment to achieve results.

4) Cultivating and exploiting seafood

Vietnam has long been a nation that relies on the sea. However, output is still low and natural reserves are exploited without a second thought to conservation or recovery, reducing seafood resources. Therefore, Resolution 36/TW (2018) emphasized to "Shifting from farming, exploiting seafood by traditional to industrial and high-tech applications; Reorganize the exploitation of marine products in the direction of reducing near-shore exploitation; Boosting exploitation in offshore and oceanic areas suitable to each sea area and the ability of marine ecosystems to recover in parallel with synchronously and effectively training and changing jobs for fishermen".

Due to increasingly stringent seafood exploitation regulations rooted in environmental protection, Resolution 36/TW (2018) states to "Promoting sustainable aquaculture and aquaculture activities, strengthening protection, regenerating marine resources, eradicating exploitation activities; Modernizing the management of marine fisheries; Promote production links in the form of cooperative groups, cooperatives, cooperative unions to build a number of strong
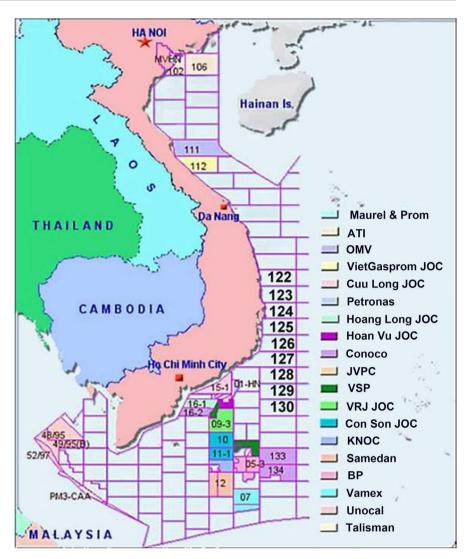
Figure 2. Coastal area with oil and gas lots. Source: PVN Petroleum-Vietnam Offshore Blocks [6].

enterprises to participate in offshore fishing and ocean exploitation cooperation".

The Resolution 36/TW (2018) also stated to "Investment in upgrading fishing ports, fishing berths, anchorage areas, well-organized fishery logistics, to step up the application of advanced science and technology in aquaculture, exploitation, preservation and processing of aquatic products, creating key products of high quality and high economic value, meeting market demands. Fishing and aquaculture, as well as the food processing industry is also very developed, but the requirement to protect natural resources is increasingly strict...".

Currently the implementation of the Resolution 36/TW (2018) on seafood has brought about certain changes, such as improved efficiency, but there is still ample space for development.

The analysis clearly shows the current advantages of coastal economic sectors, including seafood. However, Vietnam has yet to implement all the scientific and

technological advances available in the world of aquaculture, catching, and processing seafood, which restricts the sector's competitiveness on the global stage.

5) Coastal industry

This must be based on planning, considering the natural advantages of each region, prioritizing the development of environmentally friendly high-tech industries, industrial platforms, and technologies sources. Additionally, the government should work to ensure the reasonable development of the shipbuilding and repair, petrochemical, energy, manufacturing, processing, and supporting industries.

Vietnam has 28 coastal cities and provinces which are home to 17 strong economic zones with an area of over 800 thousand hectares and hundreds of industrial parks, occupying more than 80,000 ha of land. However, the IPs and EZs still operate at a low efficiency. The formation of special economic zones has not got a unified viewpoint, so particular strict law for these zones has yet to formulate.

The coastal industries should be closely linked to the construction of a coastal urban chain which is capable of promoting modern industrial and service development. The development of the marine industry should take into account the new factors of clean energy, green economy, and sustainable development, as well as focus on territorial governance.

Unfortunately, exports from these 28 coastal provinces in 2018 only accounted for 33% of the country's total exports (due to the export of high-tech industrial goods in the mainland provinces near the airports). However, analysis through the input-output table shows that the efficiency of coastal economic zones is better than those inland, especially in processing industry and using large material. This shows that there should be more changes to capitalize on the potentials and advantages of coastal areas and islands.

6) Renewable energy and new marine economic sectors

Promote construction investment, exploitation of wind power, solar power and other forms of renewable energy. To develop equipment manufacturing industry in service of the renewable energy industry, proceeding to master a number of technologies, designing, manufacturing and manufacturing equipment; prioritize investment in developing renewable energy on islands in service of production and daily life, ensuring national defense and security. Paying attention to developing a number of economic sectors based on the exploitation of marine biodiversity resources such as marine pharmaceuticals, farming and processing of seaweed, algae and sea grass... For new energy fields, there must be support policies. The initial support creates new, efficient energy industry development sectors.

Quantitative analyzes were carried out on the basis of input-output tables 2012 and 2016 of 28 coastal provinces (Appendix 1), including 26 sectors (Appendix 2) according to the national economic sector. The calculation results are shown in Section 4.

2. Analysis of Economic Relations Using I/O Tables

In 1906, Vilfredo Pareto [7] mentioned the General Concept of Economic Equilibrium. But, it was not until 1936, when the first input-output models were invented, that researchers could do this. Thanks to the input-output, we; models, people can begin to link economic figures and data to economic theory. And finally, it allows a comprehensive analysis of the economy. It was not until 1936, when the first I/O models were invented, that researchers could do this. Thanks to the I/O models, people can begin to link economic figures and data to economic theory. And finally, it allows a comprehensive analysis of the economy.

The I/O model is a quantitative analysis tool based on I/O tables. I/O tables derive from the ideas in the book "Capital" of K. Marx [8] in which he identifies a direct relationship in the technical rules between relevant factors and production elements. His idea was then developed by Wassily Leontief [9] [10], who mathematized the relation between supply and demand in the entire economy. Leontief considers every production technology to be a linear relationship between the volume of production and the cost of inputs of products and services. This relationship is represented by a system of linear functions in which the coefficients are determined by the technical normative process. With this idea, the first I/O tables built by Leontief for the United States were the I/O, 1919 and 1929 tables in 1936. In 1941, this work was published under the name "Structure of the US economy". Today, the I/O model is considered the center of the United Nations' national accounts system (SNA) published in 1968, 1993 and 2008 [11].

Leontief's national interdisciplinary balance model (1936, 1941) mentioned and analyzed relations in interdisciplinary structures. Leontief's interdisciplinary balancing system was developed by Isard [12] into an interregional input-output model. The idea of the inter-regional input-output model was developed further by H. Richardson [13] and it is considered an important tool in regional economic research. The inter-regional input-output model describes not only the relationship between sectors, but also the relationship between regions based on the flow of trade between them and the flow of transactions between regions and foreign countries. Another inter-regional model was developed by Chenery-Moses [14] [15] and Miller-Blair [16].

For example, if a new economic activity has been created that increases the final demand of the industry in Zone 1, the increased demand in Zone 1 will generate increased output in that area. This increase in Zone 1 will also require new flows of goods and services from other Zones, leading to increased production in those regions. These effects are called spillover effects. To meet the demand for new goods and services in Zone 1, economic sectors in other zones will have to expand production. This may create new demand for goods and services produced in Region 1. Therefore, output in Region 1 may rise again due to increased activity in the first place. These additional effects are called interregional feedback effects.

In Japan, the inter-regional I/O model is applied and developed strongly in the analysis and evaluation of the regional economy and environment, and is also used to analyze the impacts of the earthquake Hanshin [17]. Currently, the state of Hawaii-US compiles an inter-district I/O model every four years, which is considered an official report on the state's economic situation. The most recent I/O table of this kind was Table I/O interdisciplinary 2012 was announced in 2016 [18].

In addition, there have been some researches on interregional input output analysis for Vietnam such as Secretario, FT, Trinh, B., Hung, DM, and Kim, KM [19], Francesco T. S. [20], Bui, T., Kiyoshi, K., & Thai, NQ [21], Bui Trinh, Duong Manh Hung and Nguyen Van Huan [22], Nguyen Quang Tung *et al.* [23].

The advantages of the inter-regional input-output model compared to the National model or single-region model

First, it can be used to better assess the impacts of specific regional economic activities. Each zone's input-output models are included in the larger inter-regional input-output structure. The specific representation of each region's intermediate and final demand structure allows users to take into account the fundamental differences in production and consumption structures across regions.

Secondly, the inter-regional input-output model can provide a useful tool in assessing the linkage between income groups and consumption in the economy. National policy sometimes focuses on directing economic impacts to less developed areas. The inter-regional input-output model allows observing and quantifying the connection between income and consumption groups. The effects quantified by the model are spillover and feedback effects across regions.

Third, the inter-regional input-output model provides a more suitable framework for creating medium and long-term economic and labor forecasts for regions better than single-zone input-output models. The interregional model has eliminated the need to have an additional mechanism to allocate state predictions for individual regions.

While these are certainly advantages to the inter-regional model, there are still some disadvantages in building an inter-regional input-output table. There are a number of organizations or activities of organizations which are not easily attributed to a specific region. Another problem is that companies may have factories or offices in one area, but their main office could be located in another. If company data is reported out of the main office, the allocation of corporate profits to different regions is a problem. Compared to the national's input-output table, the inter-regional input-output table requires much more detailed data on goods and services flows between sectors and across regions. The problem is that such data, especially bilateral services and goods flows between regions and transfers between institutional sectors, are unavailable or non-existent. The lack of sufficient data to produce this inter-regional input-output model has been overcome by using different mathematical methods to estimate inter-regional flows of

goods and services.

This study examines the internal structure of the coastal zones of Vietnam and the inter-regional structure of the coastal area and the rest of Vietnam based on the inter-regional input-output table between the periphery and the rest. The scope of the research includes 26 branches (**Appendix 1**) and 28 coastal provinces (**Appendix 2**).

3. Method

3.1. Basic Diagram (Table 2)

Table 2. Diagram simulating an Isard type interregional model.

From: \ To:			Intermediate consumption								Final demand								M	Gross output
			Region 1	....			Region k				Region 1				....		Region k			
			1 2 j	n		1	2	j	n	C	G	I	E		C	G	I	E		
Intermediate input	REGION 1	1		....								....								
		:																		
		I	X^{11}	....			X^{1k}			F^{11}		....			F^{1k}				0	X^i
		:																		
		N		....								....								
	:	:	:	:			:			:		:			:			:	:	:
	:	:	:	:			:			:		:			:			:	:	:
	REGION K	1		....								....								
		:																		
		I	X^{k1}	....			X^{kk8}			F^{k1}		....			F^{kk}				0	X^8
		:																		
		N		....								....								
	IMPORT 1 : I : N	:	X^{W1}				X^{Wk}			F^{W1}				F^{W8k}			F^{Wk}		0	
	CE PT-S D OS		V^{p1}	....			V^{pk}			0		....			0				0	GVA
Gross input			$X^{0.1}$	....			$X^{0.8}$			$F^{0.1}$		....			$F^{0.8}$				(M)	

Source: Authors design based on Isard model. Type: CE: Compensation of employees; C: Household consumption; PT-S: Indirect taxes (excluding subsidies); G: Government final consumption; D: Depreciation; I: Gross capital formation; OS: Operating surplus; E: Export of goods and services; M: Import; GVA: Total value added. X^{ii}: Intermediate consumption of region 1 using the product itself; X^{ij}: Intermediate cost of region *j* using regional products *i*; F^{ii}: final demand area *i* using the product itself; F^{ij}: final demand region j using regional products *i*; X^{Wi}: Import region i for intermediate costs; F^{Wi}: Import region *i* for the last bridge region I; (M): Total import; V^{pi}: Value added of region *i*; GVA: Total value added; F^{-ik}: Final demand for using regional products.

3.2. Basic Equations

To analyze inter-regional feedback effects and the extent of change originating from anregion affecting levels of activity in other regions, Bui, Kim and Francisco T. Secretario [24] applied an inter-regional I/O model on a case study of Ho Chi Minh City and the rest of Vietnam. Harries *et al.* [25] separated Lincoln County into Caliente area and the rest of Lincoln County. Following the procedures outlined by Robinson [26], Holland [27], and Robinson and Lark [28], Harries *et al.* (1998) used an inter-regional model to provide local decision makers with an idea of potential socio-economic and economic impacts from changes in regional economic activity. The first model of interregional input-output is often used to analyze economic impacts and descriptions of product lines between regions to allow an estimate of the interplay between regions.

The basic relationship Leontief takes the form of:

$$A \cdot X + Y = X \tag{1}$$

Here: A is matrix of direct cost co-efficient, X is the production value vector, Y is the final use vector. In the inter-regional model, matrix A is divided as follows:

$$A = \begin{bmatrix} A_{cc} & A_{cr} \\ A_{rc} & A_{rr} \end{bmatrix}, \ X = \begin{bmatrix} X_c \\ X_r \end{bmatrix}, \text{ and } Y = \begin{bmatrix} Y_{cc} & Y_{cr} \\ Y_{rc} & Y_{rr} \end{bmatrix}$$

With: $A_{ij}(i,j=c,r)$ is a sub-matrix of matrix A representing the region j using the region's product at intermediate cost; X_c is the production value vector c and X_r is the production value vector of region r; $Y_{ij}(i,j=c,r)$ is the final use of regional products i.

$$\text{Call } B = (I - A) - 1$$

We have:

$$X = B \cdot Y$$

And:

$$B = \begin{bmatrix} B_{cc} & B_{cr} \\ B_{rc} & B_{rr} \end{bmatrix}$$

In principle, in case X is the production value matrix spread by the final use of each region, X is defined as follows:

$$X = \begin{bmatrix} B_{cc} \cdot Y_{cc} + B_{cr} \cdot Y_{rc} & B_{cr} \cdot Y_{rr} + B_{cc} \cdot Y_{cr} \\ B_{rc} \cdot Y_{cc} + B_{rr} \cdot Y_{rc} & B_{rr} \cdot Y_{rr} + B_{rc} \cdot Y_{cr} \end{bmatrix}$$

According to Miyazawa (1976) matrix B can be represented:

$$B_{cc} = \left(I - A_{cc} - A_c r \cdot (I - A_{cc})^{-1} \cdot A_{rc} \right) \tag{2}$$

$$B_{rr} = \left(I - A_{rr} - A_{rc} \cdot (I - A_{rr})^{-1} \cdot A_{cr} \right) \tag{3}$$

$$B_{cr} = B_{cc} \cdot A_{cr} (I - A_{rr})^{-1} \tag{4}$$

$$B_{rc} = B_{rr} \cdot A_{rc} (I - A_{cc})^{-1} \tag{5}$$

Otherwise:

B_{cc} includes *the multiplier effects:*

$$\left(I - A_{cc}\right)^{-1}$$

And *interregional feedback effects* (production value of region *c* is stimulated by production of other regions using input of region *c*):

$$B_{cc} - \left(I - A_{cc}\right)^{-1}$$

B_{rc} is *spillover effects*, meaning that one end user unit of zone c not only stimulates production of region c but also stimulates production value of other regions (region *r*).

In the case of studying a certain industry group in a region with other industry groups in that region and other regions, the matrix *A* is made into sub-matrices as follows:

$$A = \begin{bmatrix} A_{cc}^{ii} & A_{cc}^{ij} & A_{cr} \\ A_{cc}^{ji} & A_{cc}^{jj} & A_{cr} \\ A_{rc}^{ij} & A_{rc}^{ij} & A_{rr} \end{bmatrix}$$

And

$$X = \begin{bmatrix} X_c^{ii} \\ X_c^{j} \\ X_r \end{bmatrix}, Y = \begin{bmatrix} Y_{cc}^{i} & Y_{cr}^{i} \\ Y_{cc}^{j} & Y_{cr}^{j} \\ Y_{rc} & Y_{rr} \end{bmatrix}$$

From the relationship (1) we have:

$$X_c^i = \left(I - A_{cc}^{ii}\right)^{-1} \cdot \left(A_{cr}^{ii} \cdot X_c^{j} + A_{cr} \cdot X_r + Y_{cc}^i + Y_{cr}^i\right) \tag{6}$$

$$X_c^j = \left(I - A_{cc}^{jj}\right)^{-1} \cdot \left(A_{cc}^{ji} \cdot X_c^i + A_{cr} \cdot X_r + Y_{cr}^j + Y_{cr}^j\right) \tag{7}$$

$$X_r = \left(I - A_{rr}^{ii}\right)^{-1} \cdot \left(A_{hk}^{NR} \cdot X_c^R + A_{rr} \cdot X^R + Y_{rc} + Y_{rr}\right) \tag{8}$$

This shows that the production value of the *i* sector in a region depends not only on the final use of that sector but also on the production of other sectors in the same region and production in other regions.

Put:

$$v_i^c = V_i^c \big/ X_i^c \tag{9}$$

Here:

V_i^c s an added value vector of sector *i* region *C*;

X_i^c is the production value vector *i* of region *C*.

Rewrite according to the matrix we have:

$$V = v \cdot B \cdot Y \tag{5}$$

with:

$$v = \left(v^c, v^r\right)$$

$$v \cdot B = \left(V_c \cdot B_{cc} + V_r \cdot B_{rc}, \ V_r \cdot B_{rr} + V_c B_{cr}\right) \tag{10}$$

Final use of the area includes products manufactured in region c and products manufactured in region *r*; the area of ts own use of the product will spread to the

added value of region c: $V_c \cdot B_{cc}$; The region using the product area *r* spreads to the value of adding r area: $V_r \cdot B_{rc}$. The same is for the final use of region *r*.

4. Experimental Results

Table 3 and Table 4 show that the value-added ratio compared to the output of the coastal zones is higher than that of the rest of Vietnam (31% compared to 26%). This leads to the fact that the coastal zones' output makes up a lower portion of the nation's gross output than the rest of Vietnam (49% compared to 52%), but the total added value of the coastal zones higher than the value added of the rest of Vietnam (53% compared to 47%). This is because the coastal zones economy is more involved in the value chain of products than the rest of Vietnam, or in other words, the economy of the rest of Vietnam is a more comprehensive outsourcing economy than that of coastal zones.

Interestingly and more importantly, coastal zones use fewer imported products in the process of creating one product unit than the rest of Vietnam by quite a margin (7% versus 33%), but interest ROV's use of local products and use of products is quite high: the coastal area uses 48% local products to produce 100 product units, while ROV only uses 28% own products. The product utilization rate of the outer region of the coastal area is also higher than that of ROV. This suggests that the economic connectivity of the coastal area is quite strong and that the influence of the coastal area on the national economy is much higher than the rest of Vietnam.

Table 5 shows that coastal zones products are used as inputs for more sectors (intermediate consumption) than the products of the rest of Vietnam (63% versus 41%). However, ROV products are used more for final demand (consumption, accumulation and export) than the products of coastal areas (59% versus 37%). Thus, it can be seen that marginal contribution is very important in the product chain of finished products. When considering the spread index and sensitivity, Figure 3 shows that both the power and sensitivity of dispersion indexes of the coastal zones are higher than the ROV. This shows the relative importance of coastal areas to the economy of the country.

Table 3. Ratios of Intermediate input and value added per output of regions CZ and ROV.

		CZ	ROV
	CZ	0.481	0.137
Intermediate input	ROV	0.146	0.276
	ROW	0.068	0.331
Total intermediate input		**0.695**	**0.743**
Gross value added		**0.305**	**0.257**
Gross Output		1.000	1.000

Source: Calculated by authors. Unit: Times.

Table 4. Proportion of intermediate consumption, value added and output of regions in Vietnam economy.

		CZ	ROV	Vietnam
	CZ	0.768	0.232	1
Intermediate consumption	ROV	0.332	0.668	1
	Total	0.162	0.838	1
Total intermediate input		0.468	0.532	1
Gross Value added GVA		0.528	0.472	1
Gross output		0.485	0.515	1

Source: Calculated by authors. Unit: Times.

Table 5. Intermediate demand and final demand in gross output.

		Intermediate demand		Final Demand		Total Demand (Gross Output)
		CZ	ROV	CZ	ROV	
	CZ	0.481	0.145	0.338	0.035	1.000
Intermediate consumption	ROV	0.137	0.276	0.026	0.561	1.000
	ROW	0.048	0.248	0.258	0.446	1.000

Source: Calculated by authors. Note: CZ-28 province in coastal zones of Vietnam, ROV-The rest of Vietnam; ROW-Rest of the World; GVA-Gross value added.

Figure 3. Power of dispersion and sensitivity for dispersion indexes of coastal zones (CZ) and ROV. Source: Calculated by authors.

A detailed analysis of the 26 sectors of the coastal zones (Table 6) shows that most marine-related industries have a good influence not only on their that region but also on other regional production (ROV), but the industry shows a high level of stimulation to other sectors, such as agriculture and services, forestry, fishery, crude oil exploitation, as well as other mining, food processing and manufacturing and processing industries, road transport services, warehouse services, communication services and medical services.

The most stimulating sectors to the regional economy and the general economy are seafood processing and preservation, other food processing industries, aquaculture and water and public goods transport, manufacturing and processing enterprises, passenger service...

Table 6. Multiplier effects, Interregional feedback effects and spillover effects on coastal zones production.

	Output requiremenents	Multiplier effects	Interregional feed back effects	Spillover effects	Average of Output requiremenents	Average of Multiplier effects	Average of Interregional feed back effects	Average of Spillover Effects
1) Agriculture and agricultural services	2.364	1.978	0.0840	0.303	1.0698	1.0832	1.0097	1.005
2). Forestry	1.793	1.423	0.0369	0.333	0.8114	0.7797	0.4436	1.105
3) Aquatic products exploited	2.405	1.781	0.1412	0.483	1.0884	0.9757	1.6975	1.604
4) Aquaculture products	2.923	2.625	0.0644	0.233	**1.3225**	1.4381	0.7749	0.773
5) Crude oil exploitation	2.064	1.609	0.1023	0.353	0.9338	0.8811	1.2303	1.171
6) Natural gas or liquefied	2.062	1.981	0.0170	0.064	0.9329	1.0850	0.2041	0.212
7) Other mineral mining	2.297	1.792	0.1135	0.391	1.0395	0.9818	1.3648	1.300
8) Fishery and aquatic products processed and preserved	3.313	2.952	0.0797	0.281	1.4991	1.6169	0.9589	0.934
9) Other food processing industry	3.034	2.583	0.0959	0.355	1.3731	1.4149	1.1533	1.180
10) Other manufacturing and processing industries	2.471	1.858	0.1335	0.480	1.1181	1.0177	1.6054	1.593
11) Production of electricity, gas, hot water, air conditioning, water, waste water and waste treatment	1.717	1.481	0.0530	0.183	0.7768	0.8110	0.6377	0.608
12) Construction	2.416	1.824	0.1328	0.459	1.0933	0.9993	1.5963	1.524
13) Trade	1.863	1.613	0.0539	0.195	0.8428	0.8836	0.6484	0.649
14) Waterway passenger transport service	2.432	1.796	0.1436	0.492	1.1004	0.9839	1.7264	1.634
15) Waterway freight service	2.578	1.970	0.1365	0.472	1.1667	1.0788	1.6414	1.569
16) Other warehousing services	2.294	1.799	0.1112	0.384	1.0381	0.9856	1.3372	1.274
17) Delivery postage	1.653	1.419	0.0501	0.184	0.7480	0.7774	0.6028	0.609
18) Hotel, restaurant	2.425	2.045	0.0828	0.297	1.0972	1.1200	0.9957	0.986
19) Information and communication services	2.326	1.902	0.0942	0.330	1.0526	1.0420	1.1324	1.095
20) Banking and insurance financial services	1.830	1.653	0.0310	0.146	0.8282	0.9057	0.3729	0.484
21) Real estate business services	1.636	1.461	0.0385	0.137	0.7405	0.8004	0.4624	0.454
22) Other professional, scientific and technological services	1.900	1.616	0.0630	0.221	0.8599	0.8854	0.7576	0.733

Continued

23) Education and training services	1.612	1.422	0.0424	0.148	0.7296	0.7786	0.5096	0.492
24) Health services and social assistance	2.207	1.687	0.1175	0.402	0.9985	0.9240	1.4128	1.335
25) Art, entertainment and entertainment services	1.851	1.571	0.0615	0.219	0.8376	0.8603	0.7397	0.726
26) Other services	1.991	1.625	0.0818	0.284	0.9010	0.8901	0.9841	0.943
Total	2.210	1.826	0.083	0.301				

Source: Calculated by authors.

The comparing the impact of the final products to the added value of Table 7 shows that the effect of the coastal area is much higher than the rest of Vietnam, which strengthens the perception of regional products. Coastal participation in the value chain of the final product is much more than the products of the rest of Vietnam. If the coastal area is more focused on industries such as aquaculture, seafood processing and transportation, it will provide more stimulus to the economy to grow stronger.

Table 8 shows that the spread from the final products of the coastal zones is higher in both output and value added than the rest of Vietnam.

5. Conclusions

The coastal zones economy is closely correlated with the rest of Vietnam economy, which is the spearhead of the national economy. This paper tries an attempt to not only provide analysis from a development perspective but also quantify detailed calculation by inter-regional input-output framework, 2012 and 2016 with 26 products sectors, divided into coastal zones and rest of Vietnam.

This study quantifies the relationship of coastal areas and the rest of Vietnam in terms from final demand and production of this region to other regions.

This research also shows that most marine-related industries have a good influence not only on their that region but also on other regional production (ROV); the sectors shows a high level of stimulation to other sectors to be not only intra region but also other region, such as agriculture and services, forestry, fishery, crude oil exploitation, as well as other mining, food processing and manufacturing and processing industries, road transport services, warehouse services, communication services and medical services.

The most stimulating sectors to the regional economy and the general economy are seafood processing and preservation, as well as other food processing industries, aquaculture and water and public goods transport, manufacturing and processing enterprises, passenger service...

The limitation of this study applies only to the inter-regional input-output model for the two regions, which is the coastal area of Vietnam and the rest of Vietnam, It would be better if it was possible to establish inter-regional input-output tables

Table 7. Value added induced by a unit of the final demand.

	The value added of the coast zones is induced by a unit of final demand	The value added of ROV is induced by a unit of final demand
1	0.767	0.603
2	0.795	0.487
3	0.621	0.379
4	0.762	0.666
5	0.721	0.527
6	0.865	0.804
7	0.659	0.465
8	0.747	0.610
9	0.719	0.545
10	0.622	0.380
11	0.833	0.718
12	0.635	0.419
13	0.837	0.716
14	0.614	0.370
15	0.623	0.401
16	0.693	0.501
17	0.838	0.740
18	0.749	0.607
19	0.740	0.569
20	0.862	0.742
21	0.887	0.789
22	0.820	0.699
23	0.880	0.795
24	0.683	0.483
25	0.834	0.718
26	0.771	0.615
Average of induced impact to value added	0.7529	0.5904

Source: Calculated by authors.

Table 8. Induced impacts of final products to output and value added.

	CZ	ROV
Output	2.40	1.87
Value added	0.73	0.48

Source: Calculated by authors.

between many regions of Vietnam. It would be even better if it would link Vietnam's coastal region with other parts of Vietnam and the Mekong sub-region, which includes Cambodia, Laos, Thailand and Yunnan-China.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix 1. 26 sectors in interregional input-output framework.

No.	Name
1	Agriculture and agricultural services
2	Forestry
3	Aquatic products exploited
4	Aquaculture products
5	Crude oil exploitation
6	Natural gas or liquefied
7	Other mineral mining
8	Fishery and aquatic products processed and preserved
9	Other food processing industry
10	Other manufacturing and processing industries
11	Production of electricity, gas, hot water, air conditioning, water, waste water and waste treatment
12	Construction
13	Trade
14	Waterway passenger transport service
15	Waterway freight service
16	Other warehousing services
17	Delivery postage
18	Hotel, restaurant
19	Information and communication services
20	Banking and insurance financial services
21	Real estate business services
22	Other professional, scientific and technological services
23	Education and training services
24	Health services and social assistance
25	Art, entertainment and entertainment services
26	Other services

Source: General Statistic Office. Input output table 2012. Hanoi.

Appendix 2. 8 provinces/city in coastal zones.

1	Quảng Ninh
2	Hải Phòng City
3	Thái Bình
4	Nam Định
5	Ninh Bình
6	Thanh Hoá
7	Nghệ An
8	Hà Tĩnh
9	Quảng Bình
10	Quảng Trị
11	Thừa Thiên-Huế
12	Đà Nẵng City
13	Quảng Nam
14	Quảng Ngãi
15	Bình Định
16	Phú Yên
17	Khánh Hoà
18	NinhThuận
19	BìnhThuận
20	Bà Rịa-Vũng Tàu
21	Hồ Chí Minh City
22	Tiền Giang
23	Bến Tre
24	Trà Vinh
25	Kiên Giang
26	Sóc Trăng
27	Bạc Liêu
28	Cà Mau

Source: Resolution N 36 (2018) from Communist Party of Vietnam.