

# An Overview of Sustainable Ocean Resources for Socio-economic Development in Vietnam

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## Abstract

Vietnam is one of the nation with long coastal with many valuable resources, which is the basis for the economy development from the ocean-based activities. This paper outlined the main maritime resources and their contribution to the socio-economic development in Vietnam. The raw data was collected from the readable sources such as General Statistics Office of Vietnam, Vietnam meteorological and meteorological data center... as well as from the practical investigation. This raw data was processed and analyzed in order to have a general view on the majority marine resources in Vietnam. The results showed that there were 5 main resources (oil, fisheries, natural hydrate, green energy, and tourism) from the ocean, which significantly contribute to the economy development of Vietnam. The highest contribution of the oil value to the GDP was witnessed in 2011 with 26.6% of the GDP. While the value of the fisheries and tourism increased every year, the natural hydrate and energy from the ocean are still young areas, however, they come one step closer to the exploitation, which can greatly contribute to the Vietnam economy growth. With these valuable resources from the sea, Vietnam need to have reasonable policies and strategies for the management, exploitation, and export in order to able to effectively use of these resources for the sustainable economy development.

**Keywords:** Ocean resources, sustainable development, fisheries, crude oil exploitation

**DOI:** 10.7176/JRDM/69-05

**Publication date:** September 30<sup>th</sup> 2020

## 1. Introduction

The maritime sector is of an important role for the economy development of the coastal countries, which is increasingly being recognized and acknowledged by many countries.(Nuryadin et al., 2016; Rizal et al., 2018; Wang and Wang, 2019) In which, Vietnam has long coastline of 3.260 km, excluding islands, Vietnam claims 12 nautical miles as the limit of its territorial waters and possesses rich and diverse marine resources.(Baklanov et al., 2017; Dao, 2017; Hai et al., 2020; Nguyen and Nguyen, 2018) Like other coastal countries, Vietnam has many exploiting strategies for the ocean resources such as coastal agriculture, fisheries, aquaculture, offshore natural hydrocarbons, and sea transport services. Beside there are still many ocean resources, which have not been discovered and these resources are an important driving force for the sustainable development of the economy for Vietnam. However, until now there are only few industrial-scale activities for the exploitation of ocean resources such as the crude oil exploitation, marine transportation, fisheries, naval administration and defense, extraction of natural gas, and tourism.(Vincent et al., 2017) Especially, many nontraditional marine-related activities recently have been exploited including, but not limited to sports, marine research and education, seafood processing, marine energies...

It has been well-known for centuries that the ocean sector always plays a significant role to the socio-economic development for Vietnam. However, the challenges still remain which need to overcome in order to further effectively employ the marine resources for the economic growth of Vietnam. The significant contributions of the marine resources to the socio-economic development of Vietnam are outline below.

## 2. Oil resource in the Vietnam ocean - motivation for the socio-economics development, especially for the coastal cities

The geological and geophysics report indicates that Vietnam consists of 7 sedimentary basins, which might have oils at the continental shelf, such as Red reiver, Phu Khanh, Cuu Long, Nam Con Son, Ma Lai - Tho Chu, Tu Chinh - Vung May and Truong Sa - Hoang Sa. Oilfields in Vietnam were discovered and exploited from ground under the ocean from the continental shelf in the southern, where is 50 to 200 meters in the depth and in the geological structure with 1000 to 5000 meters in depth. Several oilfields at the Cuu Long (Bach Ho and Dai Hung) basin, which is considered as the best quality of oilfields, even contains oil at the foundation stone. Especially, Bach Ho oilfield is one of the exceptional cases, which the oil is moving freely in the cracks of the foundation stone. The oil sources in the Vietnam ocean region were discovered and estimated to be 4 billion cubic meters and the new discovery even predict much higher reserves of the oil in Vietnam. The oil mining operation in Vietnam at the present is maintaining for the 6 oilfields at the southern continental shelf including Bach Ho, Dai Hung, Rong, Rang Dong, Hong Ngoc and PM3 (Bunga Kekwa). The quantity of raw oil exploited increased around 30% at the beginning stage and tends to decrease in recent years with 16.03 million tons in 2016, which is 8.8% decrease in comparison with the year of 2015 (Figure 1). The quantity of raw oil only reached 15.52 and 11.31 million tons

in the years of 2017 and 2018, respectively. As prediction to 2025, the quantity of the raw oil will continue decrease of approximately 10%.

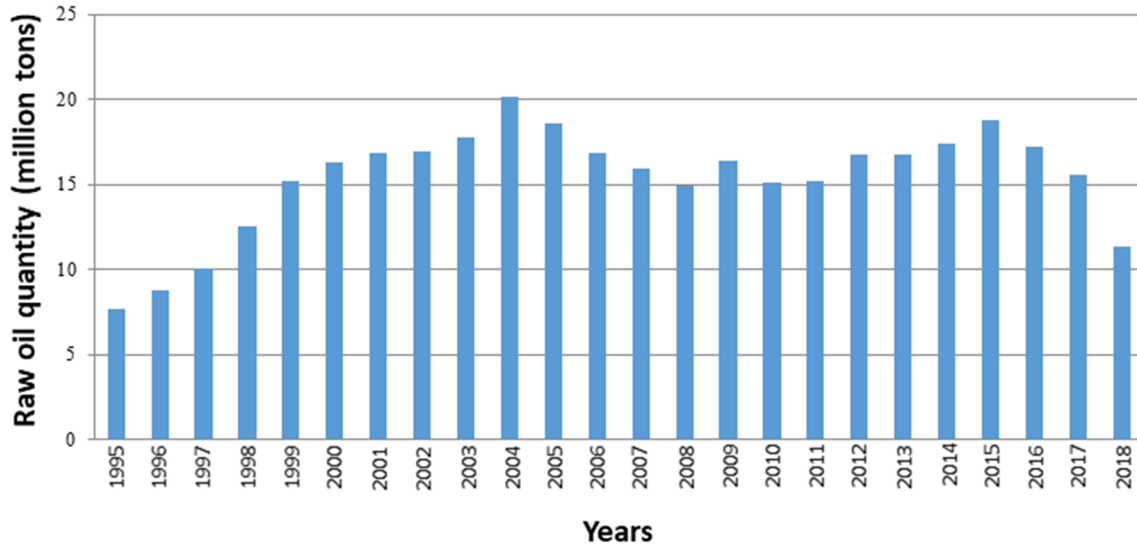


Figure 1. Quantity of raw oil from 1995 to 2018 (million tons)

Source: General Statistics Office of Vietnam.

The raw oil-produced quantity reached 7.6 million tons in 1995 with the value of 1 billion USD, 6 year later (2001) this quantity was 17 million tons with the estimated value of 3 billion USD along with 1.72 billion cubic meters of the associated gas supplied for Phu My and Ba Ria electric factories as well as Dinh Co gas processing factory. Later in the year of 2003 and 2009, the quantities of the raw oil were around 17.6 and 16.3 million tons with 3 and 6 billion cubic meters, respectively, which contributed to the GDP of above 7 billion USD. In 2010, Vietnam introduced 3 new oilfields for the operation, which enabled the total oil-estimated quantity of 24.4 million tons with the raw oil of 15 million tons and the associated gas of 9.4 billion cubic meters. This value brings the oil and gas industry as one of the main economic sectors in Vietnam in general, and coastal cities in particular with the highest exported value (Figure 2). Even though there was unpredictable about the price of the raw oil in the end of 2008, which lead to the economics recession in 2009, the oil and gas industry of Vietnam still evidenced the growth in the gross quantity and value. In 2012, the total value of Vietnam Oil and Gas Group (Petrovietnam - PVN) was approximately 15.6 billion USD, which increased 12% in comparison to 2011 with the contribution to the GDP of 7.8 billion USD accounted for 24.4 % of the GPD in 2012. The gross value of the PVN in 2013 increased 7% in comparison to the previous year with the contribution of around 16 billion USD to the government budget.

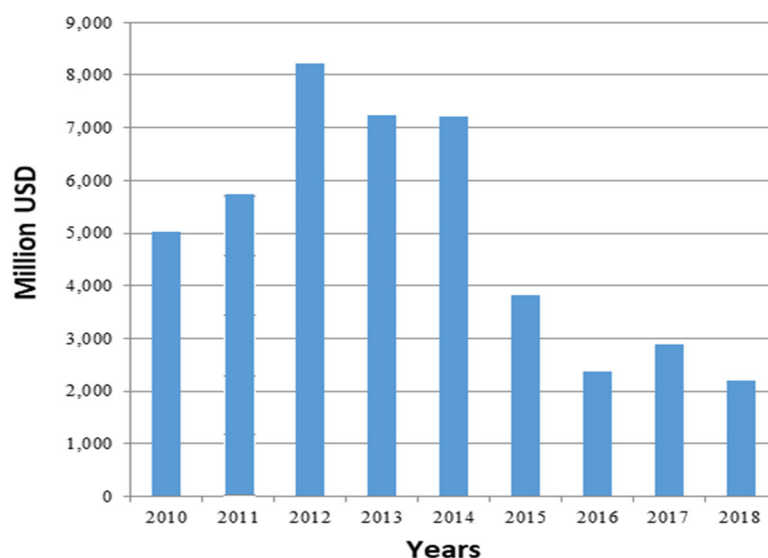


Figure 2. Exported value of the raw oil from 2010 to 2018

Source: General Statistics Office of Vietnam

In 2014, the world price of the raw oil decreased leading to the decline of 6% in annual revenue and continued

to reduced 15% in 2015. However, the oil and gas sector still significantly contribute to the growth of Vietnam economy accounted for 19.05% in the period of 2008 – 2015, with the peak of 26.6 % and 15.9% in 2011 and 2012, respectively (Table 1).

Table 1. Contribution of the oil and gas sector to Vietnam economy

Year	2008	2009	2010	2011	2012	2013	2014	2015
Gross avenue (thousand billions VND)	127.0	137.0	235.0	325.0	363.0	390.0	366.0	311.0
GDP (thousand billions VND)	1,477.7	1,700.5	1,980.8	2,537.5	2,978.2	3,139.6	3,937.0	4,192.9
Contribution to GDP (percentage)	18.9	16.0	24.0	26.6	25.9	24.3	9.3	7.4
National budget contribution (thousand billions VND)	121.8	88.0	110.4	160.8	186.3	195.4	189.4	115.1
Contribution of Petrovietnam in budget (%)	29.2	22.6	27.9	27.1	24.4	24.1	23.3	13.0
Contribution of raw oil in budget (%)	24.0	12.9	14.4	11.5	18.3	12.1	12.1	7.1

Source: Vietnam Journal of Energy.

However, every year Vietnam burns out approximately 1 billion cubic meters of the associated gasses in the oil-exploited industry, which is equal to the input materials for a power factory with the capacity of around 300 MW. In order to utilize this associated gasses source, Vietnam government built a power factory at Ba Ria (Vung Tau city) and introduced into operation in 1996. Two oil-refining factories were urgently built and introduce into operation at Dung Quat (Quang Ngai province) and Nghi Son (Thanh Hoa province). Beside, currently Vietnam still has nearly 10 oil-refining projects waiting for approval with total capacity of 60 million tons/year. In the near future, Vietnam focuses into searching and exploring the oil mines on the basin, off coast, and depth in the ocean, which have promising structure with high capacity of the raw oil for the exploration.

### 3. Fisheries resource in Vietnam in Vietnam ocean - a main outcome of the fishermen in the coastal cities

Vietnam waters is one of regions having the most abundant seafood resource in the world with highly biological diversity. According to the reported data, Vietnam waters have approximately 2458 fishes belonging to 206 fish groups and many other seafood except fish. The estimated seafood reserves in Vietnam waters are of 4.18 million including squids, shrimps, seaweed and others in near coastal sea. In the past few years, fisheries sector significantly contributes to the national economy in general and agriculture in general. The average proportion of fisheries in the period of 2015 - 2019 account for 22.38% in Vietnam agriculture value.

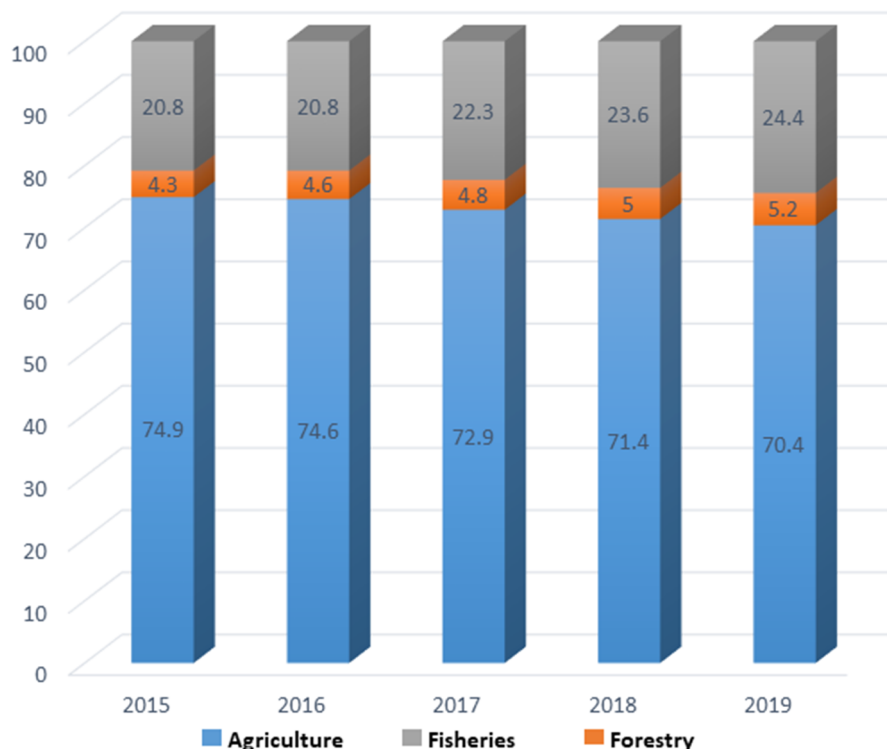


Figure 3. Proportion of Fisheries in Vietnam Agriculture Value

Source: General Statistics Office of Vietnam

Fisheries sector develops quickly and become one of the spearhead economy sectors of Vietnam. Total

fisheries products had been constantly increasing, particularly the fisheries amounts were around 0.8, 1.19, 1.99, and 2.06 million tons in 1986, 1995, 2005, and 2007, respectively. The total export value from fisheries sector also increased constantly with the total value of 1.04, 1.5, 1.8, and 9 billion US dollars in 2000, 2005, 2007, and 2018, respectively. In 2019, the export value tends to decrease, however, in first 10 months of 2019 the total value still reached 7.1 billion US dollars.

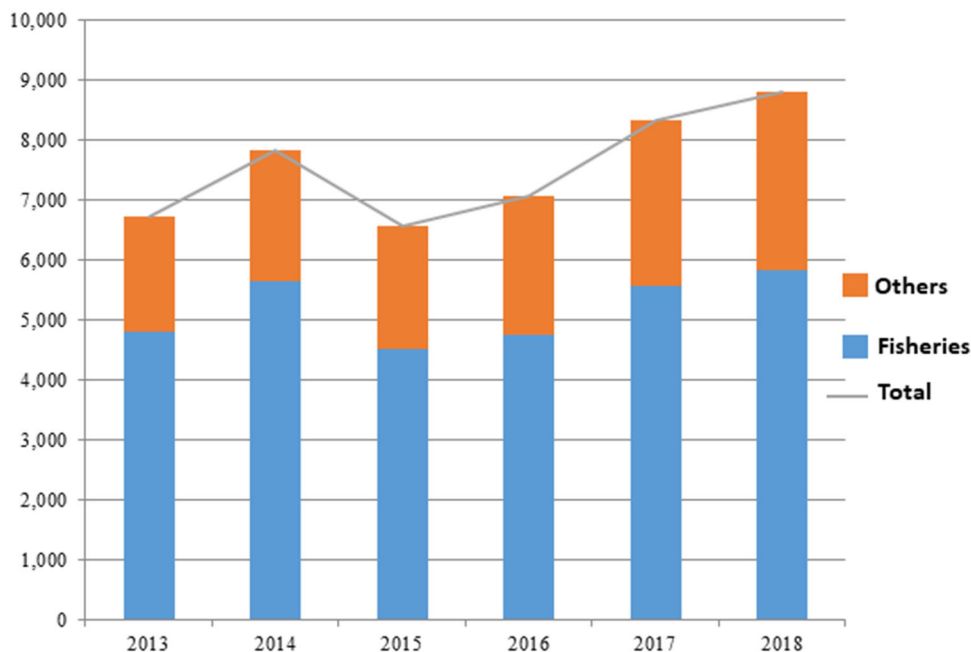


Figure 4. The total export value of the fisheries sector  
 Source: General Statistics Office of Vietnam

In recent years, the increase in fisheries exploration along with technical improvement, the modern catching equipment, which lead to high efficient for the fisheries, as a result, the fisheries reserve is seriously decreased, especially in the coastal area. In the period of 2000 to 2005, 36 investigations, studies, and evaluations of the fisheries reserve using various approaches were carried out in different Vietnam waters. The results indicated that the fisheries reserve between seasons and years fluctuate significantly. Generally, fisheries catching productivity in the South West season and offshore is higher than North East season and the shore waters. The fishing ground in the North East season tends to move to the South in comparison with main fishing grounds in the South West reason. The fisheries capacity in the whole Vietnam waters is estimated to be approximately 5 million tons with the sustainable capacity of 2.3 million tons per year. The fisheries consist of 51% small surface fishes, 21% big surface fishes, and the remaining is the deep fishes. In the Vietnam waters, there are 15 important large fishes zone, in which 12 are near the coast and 3 are offshore.

One of the main features of the valuable fisheries in Vietnam waters is that the breeding season occurs all year round, which focuses on the month period of from March to July. Vietnam fishes normally move with small groups: small fish group of lower than 5 x 20 m accounts for 84%, the big fish groups with diameter of approximately 20 x 50 m is only 0.1%. Thus, the Vietnam fishery is considered as multi-species and small-group fisheries, which is the main outcome of the people living in the coastal areas and offshore islands. The such high value of fisheries is an important foundation, which brings Vietnam to become one of the promising countries for the sustainable development in the fishery sector. In the past few years, 80% of the exploited fishery quantity come from the coastal areas and brackish coastal water, which provide the important protein for the human. In 2011, the fisheries exploitation reached 2 million tons along with fishes reared in brackish water with total export value of 6 billion US dollars. Until now, the total exporting value of fisheries is close to the 10 billion dollars per year.

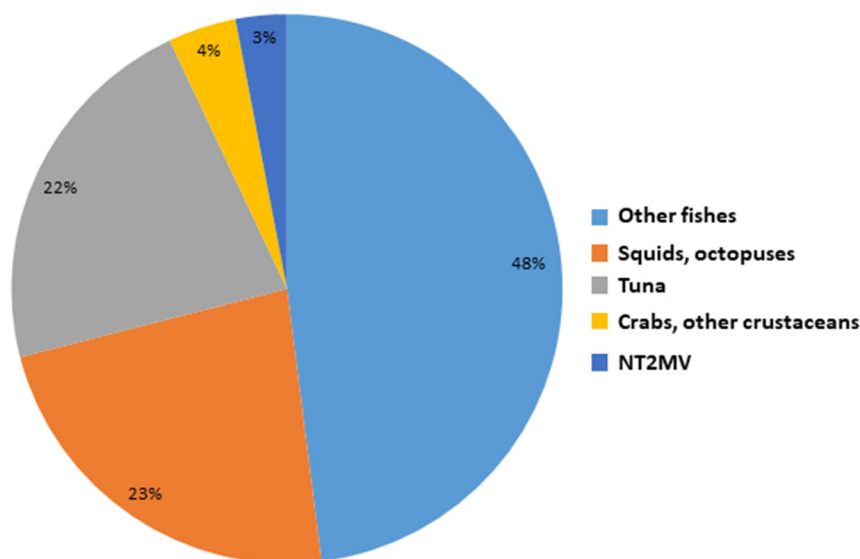


Figure 5. The export proportions of the fisheries products of Vietnam in 2018

Source: General Statistics Office of Vietnam

The fisheries export in 2018 reached 8.8 billion dollars, which increased 5.8% in comparison with 2017, however, this growth rate was lower than previous years as well as the predicted amount of 9 billion dollars. In 2018, the Vietnam catfish exported to 129 different markets with 8 big markets including China, USA, EU, ASEAN, Mexico, Brazil, Colombia and UAE with total export value of 80% in catfish exporting. In the same year, the tuna exported to 101 different markets with 8 big markets including USA, EU, Israel, ASEAN, Japan, Canada, Mexico and China with total export value of 84 % in tuna exporting. The squids and octopus products such as dried, smoked, fresh, frozen, processing, exported to 64 different countries in 2018 with 9 big customers such as Korea, Japan, EU, ASEAN, China, USA, Isarel, Taiwan, and Australia with with total export value of 98.3 % in squid and octopus exporting.

### 3. Ocean energy in Vietnam: a renewable energy resource for the sustainable economy development

Ocean is of particular significance for the Vietnam climate control. Vietnam ocean is an open waters, which lays within the tropical belt of the Northern Hemisphere, where receive the highest solar radiation in comparison to other belts on Earth. Vietnam waters belongs to the typically tropical climate with strong wind and stable during all seasons of the year. The seasons changing in the circulation atmosphere leads to the formation and operation of weather systems as following: summer and autumn are stormy seasons, spring and winter are northern-wind seasons. Vietnam waters and eastern sea are in areas, which are affected by many important factors such as high pressure of Asia continent, tropical Pacific, and hot low pressure and Western wind. Thus, Eastern sea and Vietnam coasts are considered as valuable resources, especially in the development of wind energy at the coastal area and on the islands.

Table 2. Wind resource at Vietnam at the height of 80 meters

Average wind speed	< 4 m/s	4-5 m/s	5-6 m/s	6-7 m/s	7-8 m/s	8-9 m/s	> 9 m/s
Area (km <sup>2</sup> )	95.916	70.868	40.473	2.435	220	20	1
Area (%)	45,7	33,8	19,3	1,2	0,1	0,01	0
Potential (MW)	956.161	708.678	404.732	24.351	2.202	200	10

Source: Vietnam meteorological and meteorological data center.<sup>11</sup>

Apart from wind energy resource, due to belong to the tropical climate and hot weathers, Vietnam also has tremendous potential in the solar energy. Recent years, the solar energy started exploring in Vietnam, which mainly served for the people on the islands and the coastal areas. Furthermore, Vietnam also has huge potential for other ocean energies such as waves, tides, and flow, which are green and renewable energy for the future. As an open water, Vietnam is affected greatly by season winds leading to formation of two wave and flow seasons, which is important for the economy development of the cities in the central of Vietnam.

Table 3. Theoretical resource of the solar energy in Vietnam

TT	Areas	Average radiation kWh/m <sup>2</sup> /day	Area (m <sup>2</sup> )	Power of solar batteries	Power/day (MWh)
1	Northern East and Red River	3.95	65,637,000,000	8,204,625	21,065,375
2	Northern West	4.8	50,684,000,000	6,335,500	19,766,760
3	North Central	4.9	51,459,000,000	6,432,375	20,487,114
4	South Central and Tay Nguyen Highlands	5.3	99,018,000,000	12,377,250	42,639,626
5	Southern East and Cuu Long river	5.15	64,153,000,000	8,019,125	26,844,021
	<b>Total</b>		330,951,000,000	41,368,875	130,802,896

Source: AWS Truepower, Wind resource atlas of Vietnam, 463 new Karner Road, Albany, New York 12205.

#### 4. Natural hydrate in Vietnam waters – green energy source of the future

Natural hydrate, mainly consists of hydrate gases such as hydrate gases and hydrate methane, exists in the form of the solid mixture with the outer layer of similar to ice or dried ethanol, transparent or blurry, and the color of white, grey or yellow. The natural hydrate comprises hydrocarbon derivatives and water, which was formed at the high pressure and low temperature, thus, they can vaporize even at ambient conditions.

The scarce of the conventional energy sources such as coal, oils, peat...leads to the emergence of natural hydrate as the replaceable energy source, because of its high efficiency, relatively clean and renewability. Eastern sea is one of 4 regions in Eastern Asia having huge potential about the natural hydrate, only after Mexico and Nankai. Thus, great potential about ocean resources in general and the natural hydrate in particular has attracted great attention from the ocean and islands countries all over the world, which is also one of reason leading to the intensive disputation at the Eastern sea at the moment. Beside many advantages, the natural hydrate also contributes to the global climate change due to its sublimation phenomenon even at the ambient pressure and temperature as well as one form of geohazard. Many international organizations are warning that this disaster will happen if countries lack of responsibility in using old technologies for searching, probing, exploiting, storing and applying the natural hydrate.

Recently, there are several review works on the natural hydrate based on the available data such as geological, geophysics, gasification data on the sediment and other premises at the basin and the deep water of Vietnam sea. The data was based on the long-term collaboration with international organizations. The results show that Vietnam has huge potential about the natural hydrate. Thus, Vietnam government issues decisions No 196/QĐ-TTg about “Basis investigation and research program about the natural hydrate reserve at the Vietnam basins and waters”. Vietnam administration of Seas and Islands corporated with Vietnam national oil and gas group implemented this program in relationship with the experienced countries having advanced technologies.

#### 5. Famous beaches – the huge potential for the economy development of Vietnam

With meandering coastal, many bow bank interleaved with original protruding stone, Vietnam has many beautiful and famous beaches from North to South, which becomes familiar with domestic as well as international travelers. In total of 100 beaches in Vietnam, there are 26 well-known beaches (long, wide, fine with sand, clean water, beautiful landscape with no hazardous creatures as well as dangerous animals...). These beaches include, but not limited to, Trà Cô, Quan Lạn, Thanh Lân (Quảng Ninh); Cát Cò, Đồ Sơn, Cát Bà (Hải Phòng), Sầm Sơn (Thanh Hóa), Cửa Lò, Cửa Hội (Nghệ An), Thiên Cầm (Hà Tĩnh), Đá Nhảy (Quảng Bình), Cửa Tùng (Quảng Trị), Lăng Cô (Thừa Thiên - Huế), Mỹ Khê (Đà Nẵng), Quy Nhơn (Bình Định), Nha Trang (Khánh Hòa), Ninh Chữ (Ninh Thuận), Cà Ná (Ninh Thuận), Mũi Né (Bình Thuận), Bãi Trước, Bãi Sau (Vũng Tàu), Phú Quốc (Kiên Giang), Côn Đảo (Bà Rịa - Vũng Tàu) ...

The beautiful beach is one of the crucial factor for the tourist development in the tropical countries, especially small beaches with the pristine islands such as the silent Cat Ba archipelago (Hai Phong). Each beaches have their own charm and advantages, which can attract the domestic and international traveler. Belonging to the tropical climate, the majority of Vietnam beaches and islands has sun shining all seasons of the year, along with the long fine white sand and clean water, which are critical advantages for the 3S tourist development “sun, sea, sand”. Thus, reasonable-utilizing planning and effective management of the beaches will contribute to maintain the advantage for the sustainable development of the sea and islands tourism. During past few year, Vietnam is one of 10 countries having the highest growth rate in the tourism development, which contributes to the GDP accounted for 8 - 10 % of the total GDP.

Table 4. The outcome of the tourism sector in Vietnam

Year	2010	2014	2015	2016	2017
<b>Total (billion VNĐ)</b>	<b>44447.</b>	<b>66846.</b>	<b>75155.</b>	<b>81054.</b>	<b>90495.</b>
	<b>1</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>1</b>
- Accommodation facilities	28907.	39047.	44711.	48524.	54383.
	8	5	5	6	3
- Travel facilities	15539.	27799.	30444.	32530.	36111.
	3	4	1	3	8
<b>Total travelers at accommodation facilities (thousands)</b>	<b>8234.2</b>	<b>11305.</b>	<b>12601.</b>	<b>13651</b>	<b>15173</b>
	<b>9</b>	<b>9</b>	<b>7</b>		
- Domestic traveler	5415	8552.8	9288.7	9477.6	9918.4
- International traveler	2385.8	2323.5	2820	3584.5	4556.4
- Vietnam traveler going abroad	433.4	429.6	493	588.8	698.3

Source: General Statistics Office of Vietnam.

Moreover, Vietnam also has thousands of festivals near or on the beaches, which attracts the domestic and international tourists. These festivals could be mentioned here such as Hội Đức Thánh Trần, Hội lễ Bạch Đằng, Lễ hội Đền Cửa Ông (Quảng Ninh), Hội Chơi trâu, Hội Đền Bà (Đò Sơn, Hải Phòng), Hội đua thuyền (Cát Hải, Hải Phòng), Hội Đền Độc cước, Đền Bà Triệu (Sầm Sơn, Thanh Hóa), lễ hội đền Công, đền Cờn, lễ hội Thái sư Cương quốc công Nguyễn Xí, Hội lễ Khai Canh (Yên Thành, Nghệ An); lễ hội Cầu ngư của ngư dân (Nghệ An); Hội lễ Nhượng Bạt (Cẩm Xuyên, Hà Tĩnh); Hội lễ Cầu ngư (Đồng Hới, Quảng Bình); Lễ Khao lễ thể lính Hoàng Sa (Lý Sơn, Quảng Ngãi); Hội lễ Hò khoan, Lễ hội đua thuyền truyền thống (Quảng Bình); Lễ hội đua thuyền, Lễ hội rước hén làng Mai Xá (Quảng Trị); Hội lễ Quán Thế âm (Đà Nẵng); Hội lễ Bà Thu Bồn (Quảng Nam), Hội lễ Long Chu (Hội An, Quảng Nam); Hội lễ Đồ Giàn (Bình Định); Hội lễ Pô Nagar, Hội lễ Yên Sào (Nha Trang, Khánh Hòa); Hội lễ Dinh Thầy (Ninh Thuận); Hội lễ Dinh Cố, Hội lễ đình Thân Thắng Tam (Bà Rịa - Vũng Tàu); Hội lễ Nghinh Ông (Quảng Ngãi, Bà Rịa - Vũng Tàu, TP. Hồ Chí Minh, Bạc Liêu); Lễ Cúng biển Mỹ Long (Cầu Ngang, Sóc Trăng); Lễ hội Vía Bà (Cà Mau); Lễ hội Nghinh Ông - Kiên Hải (Kiên Giang)... Beside the traditional festivals, majority of the coastal cities usually organize the fish-wishing and Nghinh Ông festivals, which wishes for the good weather, safe and sound during the fisheries of the people. The economy of the coastal cities will develop quickly if they can reasonably exploit the sea tourism, especially the culture tourism, ecological tourism...

## 6. Conclusion

In short, the huge potential of the resources such as fisheries, energy, tourism, oil, and natural hydrate from the sea will be the major driving forces for the socioeconomic of Vietnam, especially for the coastal cities with the near islands. Towards the sea, protect the diverse resources from the ocean will help the coastal cities to be able to quickly develop the economy. However, the exploitation of the ocean resources has to ensure the sustainable development of the resources. Meantime, the ocean exploitation should be in good agreement with the protection of maritime sovereignty. These abundant resources from the ocean urge the Vietnam government to have appropriate policies and strategies to reasonably manage and exploit for the sustainable economy development.

## Acknowledgement

This work was funded by the Key National Program on Science and Technology/ Vietnam Ministry of Science and Technology (Project code: KC.09.34/16-20).

## References

- AWS Truepower, Wind resource atlas of Vietnam, 463 new Karner Road, Albany, New York 12205.
- Baklanov, P. Y., Ermoshin, V., Karakin, V., Zharikov, V., Van Cu, N., and Cham, D. D.: Coastal-marine nature management in Pacific Russia and Northern Vietnam: Notions, structural features, and types, *Geograph. Nat. Res.*, 38, 333-340, 2017.
- Dao, H. H.: Assessment of Vietnam's capacity and commitment to ratify and implement the International Convention on Oil Pollution Preparedness, Response and Co-Operation (OPRC), 1990, 2017. 2017.
- General Statistics Office of Vietnam, 2018, p 3128.
- General Statistics Office of Vietnam, 2019.
- Hai, Y. H. P., Thanh, V. L. T., Thi, T. T., Thi, H. N., Trang, T. N. T., and Nguyen, T. T.: Develop Sustainable Livelihoods for Fishermen in the North Central Region of Vietnam-Case Study for Nghe An Province, *J. Agricult. Studies*, 8, 227-246, 2020.
- Nguyen, X. P. and Nguyen, P. Q. P.: Strategies for Maritime Development: A case in Vietnam, *Eur. J. Eng. Res. Sci.*, 3, 14-19, 2018.
- Nuryadin, D., Syaifudin, N., Handika, R., Setyobudi, R. H., and Udjiyanto, D. W.: The economic of marine sector in Indonesia, *Aquatic Procedia*, 7, 181-186, 2016.

- Rizal, A., Herawati, H., Zidni, I., Apriliani, I. M., and Ismail, M. R.: The role of marine sector optimization strategy in the stabilisation of Indonesian economy, *World Sci. News*, 102, 146-157, 2018.
- Viet Trung Le, Vietnam petro: Current situation and developing challenges, *Vietnam Journal of Energy*, 2017.
- Vincent, A., Foster, S., Aylesworth, L., Do, H., and Bat, N.: Seahorse exploitation and trade in Viet Nam, 2017. 2017.
- Wang, Y. and Wang, N.: The role of the marine industry in China's national economy: an input–output analysis, *Marine Policy*, 99, 42-49, 2019.