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STATUS OF THE INDONESIAN OIL AND GAS BLOCKS ON BORDERS WITH NEIGHBORING COUNTRIES

SITUASI DAN KONDISI KEGIATAN BLOK MINYAK DAN GAS BUMI DI WILAYAH PERBATASAN NEGARA INDONESIA

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ABSTRAK

Pendapatan negara dari industri minyak dan gas bumi bukan lagi sebagai pendapatan utama negara, tetapi masih tetap berperan strategis. Industri minyak dan gas bumi diketahui sebagai industri berteknologi tinggi, beresiko tinggi, dan industri padat modal mempunyai kapasitas untuk pengembangan wilayah, khususnya pada wilayah sumberdaya migas di sepanjang perbatasan negara. Tujuan utama penelitian ini untuk identifikasi status sebagai pusat pertumbuhan pada blok migas dan cekungan sedimen yang terdapat sepanjang batas negara. Studi berdasarkan publikasi, penelitian terdahulu, data seperti peta kedalaman laut, peta geografi batas negara dan peta blok migas. Semua data dikelola dengan aplikasi sistem informasi geografi dan metode analisis komparatif-kualitatif tumpang susun (overlay) data. Beberapa blok migas yang berlokasi dekat perbatasan negara-negara tetangga seperti Singapura dan Malaysia, Brunei, Vietnam, Filipina, Papua Nugini, Timor Leste, dan Australia, dikategorikan dengan metode analisis skoring dan pemeringkatan untuk mendapatkan pusat pertumbuhan ekonomi baru. Tiga kategori yang disarankan: sangat penting, penting, dan kategori biasa sebagai pusat pertumbuhan. Blok Natuna, Iwur, dan Timor dianggap sebagai blok yang sangat penting.

Kata Kunci: *migas, perbatasan, negara tetangga.*

ABSTRACT

Although revenue from the oil and gas industry is no longer the main source of national income, it is still playing a strategic role. The oil and gas industry is known as a high-tech, a high-risk, and a high-capital industry, on which the country has limited capacity for regional development, especially of the resources in areas located along the national border. The main objective of this research is to closely identify the recent growth centre status of blocks and sedimentary basins located along the national border. The study relies on published reports, studies, and data such as bathymetry map, national geographic and jurisdiction map, and maps of existing oil and gas blocks. All data were managed under a geographic information system application in order to conduct comparative and qualitative analysis of those overlaying data. Some oil and gas blocks that are located near to neighboring countries, such as Singapore, Malaysia, Brunei, Vietnam, The Philippines, Papua New Guinea, East Timor, and Australia have been categorized based on these methods of scoring and ranking analysis to identify new economic centres of growth. Three categories are suggested: very important, important, and ordinary as new growth centres. The Natuna Sea blocks, Iwur, and Timor blocks are considered to be important.

Keywords: oil and gas, border, neighboring countries.

I. INTRODUCTION

The economic development of the Indonesian areas near neighboring countries should be pursued with the support of all parties. The Government's policies in developing such remote areas are included in current government's 'global maritime axis' concept where as a maritime nation, Indonesia should better defend its seas and boost maritime investment. Oil and gas resources are mostly located offshore and are expected to provide significant economic benefits to the surrounding areas. Discovery of oil and gas blocks in the border areas is strategic in supporting the development of regional economic centers. In addition, in relation to the sovereignty of the nation, development of oil and gas industries along the national border may function as a strong line of defense. However, given that oil and gas reservoirs do not recognize national borders, development of these blocks will then rely on the management of oil and gas reservoirs (Paju et al. 2015). Investors will require a firm legal guarantee despite lacking development infrastructures.

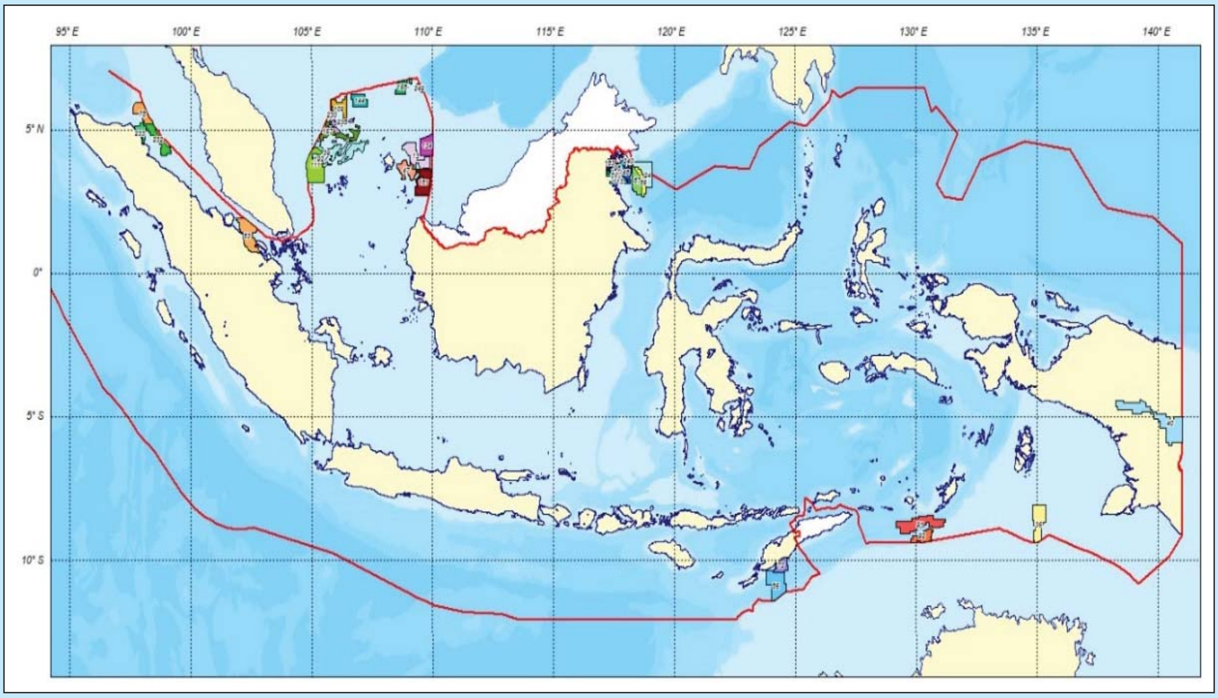
This paper shows existing oil and gas blocks in the areas adjacent to the national border and related basic data available, and the result of analyses regarding the category of regions. The main objective is to research the existing oil and gas activity which will be a key part of economic development in the new frontier regions.

II. METHODOLOGY

Published data from government institutions and non-government organizations were used as primary data. Those types of data are tabulated on Table 1.

Table 1
Types and source of data used in this study

No.	Data	Source
1.	Oil and Gas Block Map	Data and Information Technology Center (Pusdatin)
2.	Tertiary Sedimentary Basin Map	Special Task Force for Upstream Oil and Gas (SKK Migas)
3.	Bathymetry Map	Marine Geological Institute (PPPGL)
4.	The Unitary State of Indonesia Map	Geospatial Information Agency (BIG)



Source Data: Indonesia Petroleum Contract Area Map, Status May 01, 2015

Figure 1
Oil and gas blocks that lie near Indonesia's border.

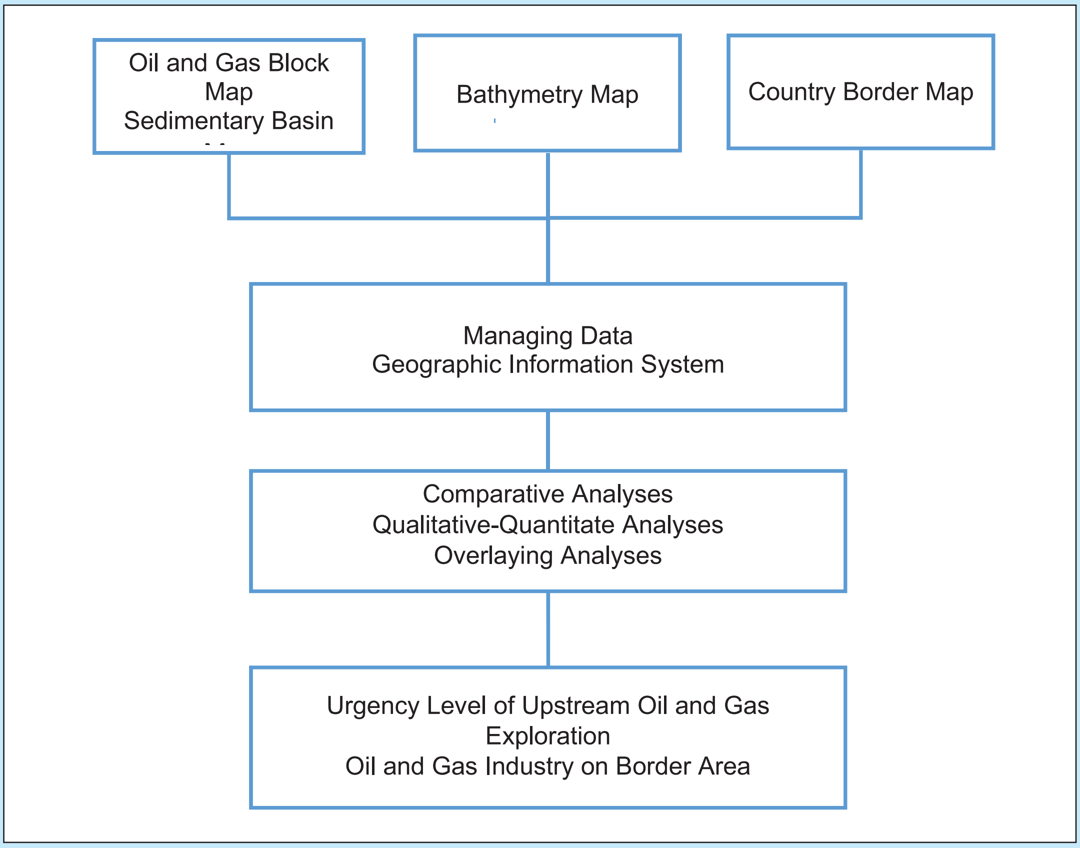


Figure 2
Work flow of the study.

Data are treated in two stages. In the initial stage all data are managed under a geographic information system to allow identification of existing blocks and possible new potential blocks adjacent to the national border. Figure 1 shows Indonesian jurisdiction and the existing oil and gas companies working along the national border line. Comparative and qualitative-quantitative analyses are carried out to produce recommendations to develop these areas. Several variables have been selected for mathematical analysis, such as scoring and ranking.

An overlay analysis is applied to the sedimentary basin geologically and geophysically with the expectation to find the highest probability to discover oil and gas. This analysis is conducted by using some data, i.e.: sedimentary basin, oil and gas block, seismic line, oil and gas seeps, oil and gas discovery, oil and gas field, and anomaly gravity. This analysis reveals 3 classed sedimentary basins to be developed (Suliantara and Susantoro 2013). In this study overlay and quantitative analyses were undertaken to determine the level of interest of the upstream oil and gas activities in the area near the border with neighboring countries. Some data that used are Oil and Gas Working Area Map, Sedimentary Basin Map, Bathymetry Map, and State Border Map. The workflow of this study is shown in Figure 2.

III. RESULTS

A. Basin Spreading

The spreading of a sedimentary basin is one of the key considerations. When the basin goes across borders then it has a higher value.

For example, Masela Block, a gas block, was discovered by Inpex more than a decade ago, is located in Laut Timor Basin, east of Timor Island just on along the border line between Indonesia and Australia. The discovery has been seen as a driver of economic development in all sectors in the surrounding region which has long been suffering from very limited infrastructure. In this area there is a good management of upstream and downstream oil and gas in a surrounding region (Baik 2015). However, oil and gas industry development would likely face

Table 2
Oil and gas block near border line and distance to Jakarta

No.	Sedimentary Basin	Oil and Gas Blocks	Distance From Jakarta (Km)	Neighbor Country
1	Sumatera Utara	NSO-NSO EXT	1,620	Thailand and Malaysia
		East Seruway	1,500	
		Andaman III	1,760	
		Krueng Mane	1,690	
2	Sumatera Tengah	Malacca Strait	1,000	Malaysia and Singapore
3	Natuna Barat	Northwest Natuna	1,310	Malaysia and Vietnam
		Natuna Sea Block A	1,240	
		South Natuna Block B	1,200	
		Gurita	1,110	
4	Natuna Timur	Tuna	1,440	Malaysia and Vietnam
		Northeast Natuna	1,450	
5	Ketungau	No Available	-	Brunei
6	Tarakan	Sebatik	1,680	Philippines
		Nunukan	1,650	
		Ambalat	1,690	
7	Celebes	No Available		Philippines
8	Iwur	Warim	3,770	PNG
9	Arafura	No Available		Australia
10	Laut Timor	Masela	2,660	Australia and Timor Leste
		Palung Aru	2,630	
		Babar Selaru	2,600	
		Offshore Timor Sea I	2,000	
11	Timor	West Timor Block	2,010	Australia and Timor Leste
12	Sawu	No Available	-	Timor Leste
13	Sumba	No Available	-	Australia
14	Sibolga	No Avaiable	-	India

some constraints, such as greater distance from the capital city, a deep sea situation, high sea floor slope towards closest islands, a lack of infrastructure and facilities, and possibly a border dispute with neighboring countries. Even though the government has decided that development is to be based on the closest island, a firm agreement by the operator has not been indicated yet.

Natural constraints such as distance and the ocean depths may be resolved through a technological approach. Balogun et al. (2015) suggested that selecting suitable pipeline routes is essential to the success of any oil exploration and transportation project, and proper prioritization of the diverse routing criteria is an integral component of the route selection endeavor. However, recent research reveals that accurate prioritization of routing criteria, particularly in an offshore/subsea environment, has not been sufficiently addressed although global attention is rapidly expanding from terrestrial exploration to offshore and subsea oil pipeline operations. Haneberg (2015) pointed out that the safe and economical drilling of deep-water oil and gas wells requires operators to identify and avoid a variety of geo-hazards that can range from shallow-water flow to gas hydrates to strongly heterogeneous mass-transport deposits. With drilling spread costs for frontier-area deep-water wells in many cases exceeding \$1 million per day, drilling delays caused by unanticipated hazards such as shallow-water flow or pipe stuck in difficult formations can quickly become expensive propositions. If current prices persist, the importance of early investment in shallow drilling-hazard assessments and risk minimization will continue to increase as the economics of some deep-water projects become more marginal.

B. Number of Countries

The number of neighboring countries affects the degree of urgency of the upstream oil and gas activities. The greater the number of countries on the border oil and gas activities will have a higher value.

A useful case study is Anambas archipelago. This region is administratively under the Riau Archipelago Province, it lies just south of the West Natuna Basin, is bordered by three countries, where some oil and gas blocks are producing hydrocarbon. In fiscal year 2007, income from oil and gas was up to 225 billion rupiah, meanwhile local income is 4 billion rupiah (http://www.anambaskab.go.id/statis-31-kekayaanalam.html). It is evident that the oil and gas industry supports the economic development of the surrounding area. Star Energy as the operating company has an obligation to implement community development programs around the region which lead to the improvement in the region's economic conditions while maintaining the territorial integrity of Indonesia (Sunarjanto 2012).

C. Geographical Borders

The geographic location of the border is seen to be affecting the degree of urgency of the activities, and the location of the land has a higher value.

GIS data management revealed comprehensive information and status of both onshore and offshore

Table 3
Scoring each variables in the interest area

BASIN SPREADING	
Description	Score
Crossing Country Border	2
No Crossing Country Border	1
NUMBER OF NEIGHBOR COUNTRY	
More Than One Neighbor Country	2
One Neighbor Country	1
GEOGRAPHIC BORDER AREA	
Onshore	2
Offshore	1
BASIN CLASSIFICATION	
Unexplored	3
Discovery	2
Production	1

Table 4
Scoring each variables within interest areas

No	Sedimentary Basin	Status	Neighbor Country	Basin Speading	Num. of Country	Geographic	Basn Class	Total Part	Final Urgency
4	Natuna Timor	Discovery	Malaysia, Vietnam and Philipine	3	3	1	2	9	Very Important
11	Timor	Indicator	Australian and Timor Leste	3	1	2	3	9	Very Important
3	Natuna Barat	Production	Malaysia, Vietnam and Philipine	3	3	1	1	8	Very Important
8	Iwor	Discovery	PNG	3	1	2	2	8	Very Important
10	Laut Timor	Production	Australian and Timor Leste	3	2	1	2	8	Important
1	Sumatrera Utara	Production	Thailand and Malaysia	3	2	1	1	7	Important
2	Sumatera Tengah	Production	Malaysia and Singapore	3	2	1	1	7	Important
5	Ketungau	No Discovery	Brunai	1	1	3	2	7	Important
6	Tarakan	Production	Philipine and Malaysia	1	2	3	1	7	Important
9	Arafura	No Discovery	Australia	2	1	1	3	7	Important
7	Celebes	No Exploration	Philipine	1	1	1	3	6	Ordinary
12	Sawu	No Discovery	Timor Leste	1	1	1	3	6	Ordinary
13	Sumba	No Discovery	Australia	1	1	1	3	6	Ordinary
14	Sibolga	Discovery	India	1	1	1	2	5	Ordinary

blocks. Spatial analysis was conducted with regard to the status, geographic distance to the closest major cities, and area of existing blocks and proposed new blocks. A list of sedimentary basins on which the blocks lie is shown on Table 2. Block names and the nearest national border and their distance from the capital city as support geographic data (onshore and offshore) are shown.

For example BP Tangguh which operates in the Bintuni Bay of the West Papua Province has been consistently carrying out CSR programs by always trying to empower local residents to work through technical training. The training provided is in line with the level of skill required by the oil and gas industry (Atmaja 2015). In addition, the company has always been insisting on high safety standard and behavior which are now part of local social culture.

D. Basin Classification

Production Basin; Discovery Basin, Indication Basin, Not Discovery, Passive Continental Margin, and not yet explore. Specially in this paper: Production, Exploration, and Discovery. Class of the basin shows the current upstream oil and gas activities, and the discovery of oil and gas production basins shows there are currently upstream activities, while the unexplored basins showed no activity, then the score will be higher.

E. Scoring

Besides the analysis of overlaying, in this study an assessment was also conducted of the four variables to determine the level of interest of the upstream oil and gas activities in the border areas of the country is taken into account. Variables

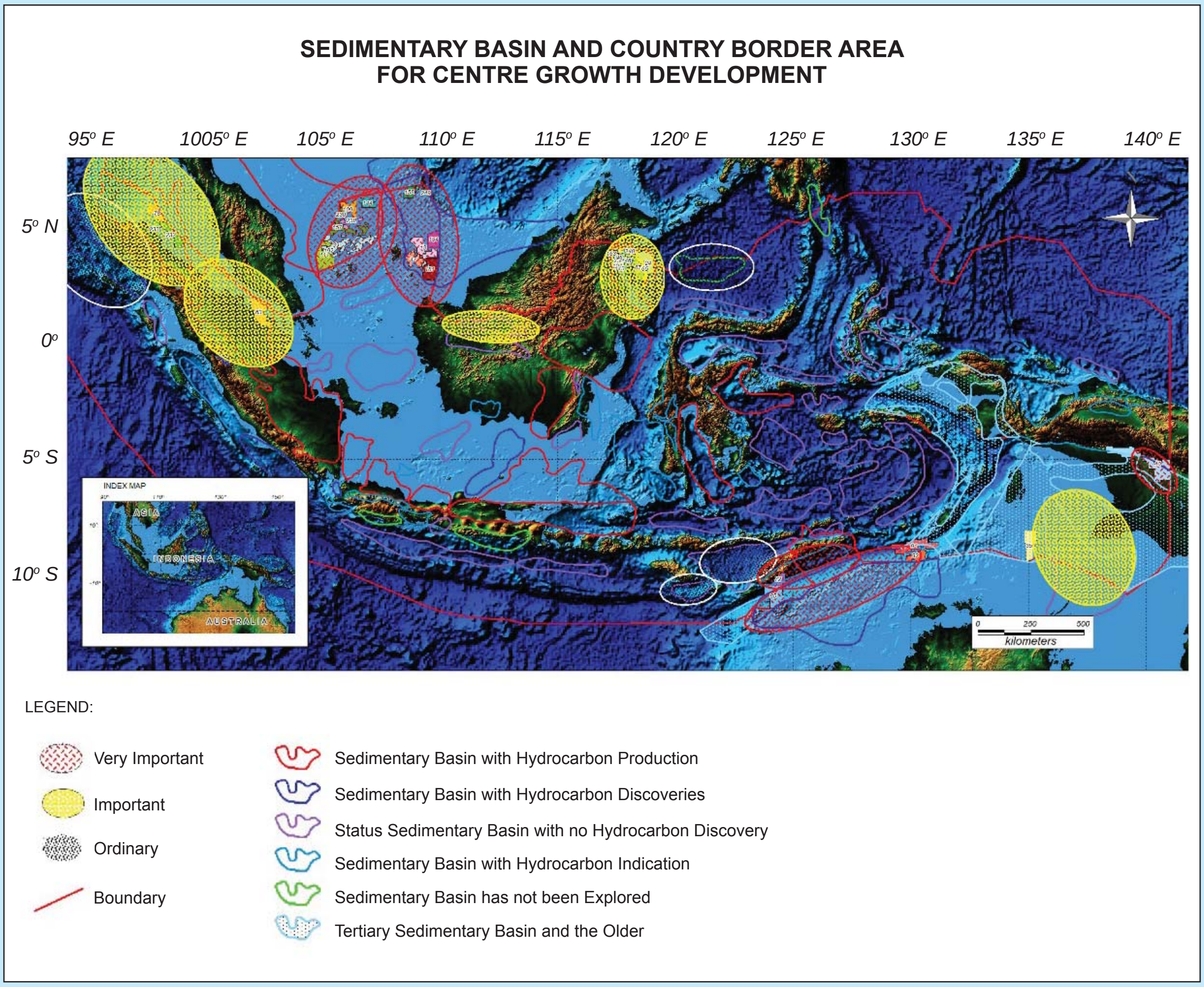


Figure 4
Sedimentary Basin and the level of urgency of economic centre growth.

Table 5
Identified basins as economic centre growth

No.	Sedimentary Basin	Neighbor Country	Onshore/Offshore	Urgency Category
1	Sumatera Utara	Thailand and Malaysia	Offshore	Important
2	Sumatera Tengah	Malaysia and Singapore	Offshore	Important
3	Natuna Barat	Malaysia and Vietnam	Offshore	Very Important
4	Natuna Timur	Malaysia and Vietnam	Offshore	Very Important
5	Ketungau	Brunei	Onshore	Ordinary
6	Tarakan	Philippines	Offshore	Very Important
7	Celebes	Philippines	Offshore	Ordinary
8	Iwur	PNG	Onshore	Very Important
9	Arafura	Australia	Offshore	Important
10	Laut Timor	Australia and Timor Leste	Offshore	Very Important
11	Timor	Australia and Timor Leste	On & Offshore	Important
12	Sawu	Timor Leste	Offshore	Important
13	Sumba	Australia	Offshore	Ordinary
14	Sibolga	India	Offshore	Ordinary

related to upstream oil and gas exploration activity are spreading of a sedimentary basin, the number of neighboring countries, geography, and the class of the basin. Scoring for each variable is shown in Table 3.

Assessment of the four variables such as the spreading of a basin, the number of neighboring countries, the geographic location of the border, class basin, and ranking by total score are shown in Table 4.

IV. DISCUSSION

The analysis has indicated 14 out of 86 Indonesian sedimentary basins are located along the Indonesian national border. These basins spread from western to eastern Indonesia with various basin classes. The western Indonesian basins are dominated by the production basin class, in contrast to the eastern Indonesian basins which are mostly no discovery class. Overlaying of the oil and gas block over the country's boundary, identified some working area on those basins which varies from production blocks to exploration and discovery blocks.

The oil and gas industry is believed to effect economic growth in the surrounding area. This industry will add jobs and other support facilities. The study indicated three oil and gas regions adjacent to the national border are important to support regional economic growth. The following is a brief review of those regions as economic stimulus to the surrounding areas.

The above constraints and the fact that the geology of the Masela block extends beyond the national border have led the contractor to consider lining up its existing Australia projects (Preclude and Ichthys) rather than developing Masela, although its large reserves are promising (Batubara 2015). Environmental and associated risks are not a major issue at the strategic level in the oil company. Indonesia may usefully learn from the experience of Norwegian Arctic authorities and operating companies which have established environmental, economic and technical tools and decision criteria to address risks. The mitigation of environmental risks becomes an element in the technical and economic analyses that affect detailed design and operational procedures. A significant concern is to avoid delays in the permit granting process (Hasle et al. 2009).

Considering the need for economic growth and the national sovereignty, oil and gas industrial activities should be strongly encouraged. Comparative and qualitative analysis conducted have determined obstacles that could be encountered during the above activities. The ranking as results of the identification are shown in Table 5.

Based on the Perroux basic framework, an area can be stated as a growth pole when there is a key industry that has the important role to be the dynamic supporter because the industry has an ability to be innovative. A growth pole can be seen as industrial complexes gather around the key industry. The key industry is one that has a continuously strong effect in the future (Adisasmita 2012). In the current study poles or centre of economic growth were selected in the national border area on which an oil and gas contract area has already been in operation. This is a key industry which is expected to stimulate economic growth in the surrounding region. Such areas include north and Central Sumatra regions, Natuna and Tarakan of North Kalimantan.

On the balanced path, the sustained accumulation of physical capital and technological capital and technological knowledge in the North allows for a constant positive growth rate of production and consumption. Nevertheless, the wealthier North pays an increasing price for the natural resources based input. Therefore, international trade is the channel through which economic growth in the North is partially transmitted to the South. Trade revenues in the South grow contantly, as does consumption (Loulou et al. 2005). Status 2016: north path is Natuna Area very important for the oil and gas industry based input whose productivity continously grows, and Batam (and Singapore) as south path as does consumption. Other areas are as follows: Tarakan as based input whose productivity continously grows, and Balikpapan or Berau path as does consumption**.** Also studied was Masela Area as gas industry based input, and as a new centre for growth and development, could other area as a balanced path in Masela and surrounding.

V. CONCLUSIONS

The existence of active oil and gas blocks in the national border areas are important to be maintained particularly through special policies. By order of the block of oil and gas interests, there are three categories, namely Very Important (Natuna Sea, Iwur, and Timor), Important (Arafura and Timor Sea), and Ordinary (Sumba and Sibolga). Natuna in the most northern part of Indonesia is very important and strategic, the oil and gas industries there should be supported and encouraged to continously grow. Batam, on the other hand, would be the consumer of energy as non-oil and gas industries need to grow. Other areas are: Tarakan as based input whose productivity continously grows, and Balikpapan or Berau path as does consumption. Also studied Masela Area as gas industry based input, and as new centre growth of development, could search other area as a balanced path.

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