Selection of Spaceport Site in Indonesia:
Good Economic Efficiency and Contribution to
Local Economic Development

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ABSTRACT

The purpose of this research is to determine a suitable location for establishing spaceport, in conformity with good economic efficiency, while contributing to the local economic development; two options seem feasible as of now: i.e. Papua (Biak District) or North Maluku (Morotai District). Descriptive-analytic method has been used as an analysis method of this research. Indicator of good economic efficiency would mean availability of infrastructure and investment, including investment support industry. Meanwhile, indicator of contribution to local economic development includes economic growth (GRDP), and investment potential by looking forward to commersialization (Integrated Economic Development Zone and Special Economic Zone). The result of the study shows that Biak District is more suitable, as according to the first indicator, (i.e. good economic efficiency) Biak is superior and well-planned as compared to Morotai District. Similarly, based on the indicator of contribution to local economic development, Biak District has a greater economic size and growth with better prospects as compared to Morotai District.

Keywords: Spaceport, Efficiency, Local Economic, Infrastucture.

INTRODUCTION:

To establish a spaceport is important, as a mandate in the article 44-50 of legislation No. 21 in 2013 on space technology to implement a Master Plan of 2016-2040. Therefore, it forms part of an urgent agenda for the National Institute of Aeronautics and Space (LAPAN) in Indonesia. Additionally, spaceport is needed by a country like Indonesia, as it is developing space technology, especially rocket and satellite technology. In the meantime, LAPAN Indonesia is expected to launch a low earth orbit (LEO) program. For satellite technology, Indonesia will run earth observation, telecommunication, and navigation satellites. Thus, Indonesia needs to have its own spaceport, otherwise it would have to depend on other countries.

To develop a spaceport a country must have all the requirements and support infrastructures to accomplish such a project, as it is liable to failure, is high risk and impacts the environment and community (Dachyar & Purnomo, 2018). Therefore, LAPAN needs to select a spaceport site for its construction design and planning, as well as keep in mind larger national interests such as safety, security in launching a satellite etc.

A feasibility study was conducted to choose alternative locations for space cities, namely between Biak Island (Biak District) in Papua Province and Morotai Island District, in North Maluku Province. Feasibility studies on spaceports have previously been carried out in various countries such as Florida, the United States by Futron, a consultancy agency Spaceport (Futron, 2005), which evaluates three dimensions of infrastructure feasibility,

potential market demand and projected economic impacts. The difference is that spaceports in America or spaceport in Kiruna (Sweden) are for commercial or space tourism, which is currently experiencing significant development, although the barriers to industrial entry are high (Benjamin, 2018), because spaceport is a capital-intensive industry (Kerolle, 2017). These spaceports conduct feasibility studies and preliminary investigations for the economy and facilities (Smith & Zervos, 2010).

Economic impact indicators refer to some general selection principles for the space and the launch sites (Xinhua, 2014); namely, good economic efficiency and contribution to local economic development. Contribution to local economic development refers to the Regulation of Republic of Indonesian No. 43 of 2010 concerning procedures for determining special areas, which include research and technology areas and missile launch areas. One of the requirements in determining special areas is the economic aspect, namely the economic capability factor (GRDP) and regional potential (estimated revenue from the planned use of artificial resources, apparatus resources, and community resources) as investment potential in each region. Whereas good economic efficiency refers to the determination of the area based on the lowest cost estimates issued, referring to the availability of infrastructure and investment, and the existence of supporting industries.

Other criteria set out in building a spaceport refer to FutureIST regarding 'key research areas' namely (1) technical infrastructure; (2) policy and law, (3) geography, environment & community; (4) medical & training; (5) business & Commercial; (6) facilities; (7) safety & security. These criteria are adjusted to the needs and abilities of countries that will build a spaceport.

Based on the background above, the purpose of this study is to determine the location of spaceport construction between Papua (Biak) or Maluku (Morotai) based on good economic efficiency and contribution to local economic development.

LITERATURE REVIEW:

Indonesia just began exploring the establishment of spaceport to achieve autonomy in space technology. Determining the right location is critical, since building a spaceport is risky and a capital-intensive investment. Before determining the best location, it is necessary to conduct feasibility study from various multidiciplinary views, primarily to to prevent unnecessary cost escalations (Yoon, 2018). Research (Dachyar & Purnomo, 2018) determines location criteria by using structured hierarchy based on technical operations, economics, security, meteorology and the environment. Using the Analytical Hierarchy Process (AHP), it results in a choice between Biak District and Morotai District. From the economic aspect, the criteria includes transportation and infrastructure.

Comparing the location selection is based on good economic efficiency, which looks at the availability of infrastructure and supporters. One indicator of regional economic development is infrastructure as a 'must have' aspect to be able to compete (Russ & Jones, 2008). Infrastructure enables entrepreneurs and individuals to produce goods and services more efficiently (Stupak, 2017). The level of efficiency according to Petrosyan, et al. (2016) is not only in terms of benefits and costs, but is the economic potency that can be used, which in turn can produce a series of products or services of a certain quality and quantity within a specified time. In order to achieve this, infrastructure and supporting facilities must be available.

One of the main factors that influence economic growth in effective and national competitiveness is the availability of infrastructure. The relationship between infrastructure and economic growth is a reciprocal relationship (Perkins, et al. 2005). Infrastructure according to Palei (2015) is determined by the quality of roads, the availability of railways, airports, air transportation, electricity and water procurement.

Contribution to the economy alludes to a gross contribution of economic activities related to the industry at large, and to the existing regional economy. Additionally, it also refers to regional GDP (Watson, et al. 2007). Local economic growth indicator (Leskovac, 2013) is using GDP per-capita and unemployment rate.

METHODOLOGY:

The analysis method used is descriptive-analytic method. Descriptive analysis is conducted by describing a comparison of economic aspects in both sites, Biak and Morotai District. Data source in this research is secondary data, collected through literature study and review. Limitation of this research are: (1) location to be studied as a spaceport construction sites are Papua (Biak) and Maluku (Morotai); (2) aspects to be reviewed is only economic aspect, which in turn will be studied using good economic efficiency indicators as follows:

a. Investment and availability of infrastructure (Guliver & Finger, 2014), (Koc-San , D.; San, B.T.; Bakis, V; Helvaci, M.; Eker, Z;, 2013), (Space Florida, 2013), (Finger & Gulliver, 2010), (Finger & McCleskey, 2010)

b. The presence of supporting industrial investment (Guliver & Finger, 2014), (Koc-San, D.; San , B.T.; Bakis, V; Helvaci , M.; Eker, Z;, 2013),   (Space Florida, 2013), (Cass & Schooff, 1999)

Indicators of contribution to local economic development are as follows:
a.Economic growth (GRDP) (Amin, 2015), Shelby Hunt (2011)
b.Investment potential with a view toward commercialization (Market) (Guliver & Finger, 2014), (Space Florida, 2013), (Finger & Gulliver, 2009), (Finger, Keller, & Gulliver, Public-Private Spaceport Development, 2008). Investment potential with a view toward commercialization can be reflected from what is reflected with the existence of Integrated Economic Development Zone (KAPET) and Special Economic Zone (KEK).

FINDINGS AND DISCUSSION:

Explanation of each indicator related to the selection of construction sites for spaceport in Biak and Morotai.

Availability of infrastructure and investment in Biak and Morotai:
Macroeconomically, the availability of infrastructure and its services affect the marginal productivity of private capital, while in the micro-economic level, the availability of infrastructure services has an effect on reducing production costs. First, the availability of macro infrastructure in the provinces of Papua and North Maluku; the more infrastructure available in the region is better prepared and has greater potential for the realization of spaceport.

Investment:
Investment in this study is investment planning. Based on the data, there is an investment infrastructure planning identified in Papua and North Maluku. Infrastructure investment is divided into 3 source of funds, including the government budget, state owned companies (BUMN), and combination of both. The details of infrastructure investment in both Districts are shown in Table 1, where it may be noted that plans for infrastructure development funded by the Government is (69%), greater than those funded by BUMN (4%), or the combination of both (Government and BUMN) (27%). Construction plan for infrastructure investment in Papua is 31 infrastructures with a total of Rp. 145.884 billion, greater than North Maluku with 14 infrastructures (2,2:1) with a total funds of Rp. 4.409 billion (33,1:1). This shows that infrastructure support of Papua province for its District is stronger, as compared to North Maluku province.

Available of Infrastructure:
Papua Province (Biak District)
Harbour:
There are seven harbours available in Papua: Jayapura Port Administration, Biak Port Administration, Merauke Port Administration, Nabire Port Office, Agats Port Office, Pomako Port Office, and Amahai Port Office. From those 7 ports, 1 is located at Biak.
Airport:
Papua has 81 airports and 2 of them are located in Biak, Frans Kaisiepo international airport and Numfoor/Biak Numfoor airport. 78 airports serve with domestic flights, while only 3 of them serve as international airports, including Frans Kaisiepo, Sentani and Mopah airports. One of the domestic airports, Lereh, Jayapura, is also a military base. The army manages 17 domestic airports; 41 others are under aiport organizer unit, and local government manages the other 18 airports. As for international airports, 2 are managed by airport organizer unit and 1 handled by Angkasa Pura 1.
The explanation above shows that the overall availability of infrastructure in Papua is sufficient. Similarly to those in Biak District with 2 airports (one of which is an international airport). This condition shows that Biak has a good potential for the growth of investment.
North Maluku Province (Morotai District)
Harbour:
There are 10 available harbours at North Maluku Province: Ternate Administration Port, Daruba Port Office, Buli Port Office, Sanana Port Office, Tobelo Port Office, Labuha Port Office, Gebe Port Office, Jailolo Port Office, Soa Sio Port Office, Laiwui Port Office. Daruba is locate at North Morotai Disctirct.
Airport:
North Maluku has 12 domestic airports which are Bobong, Buli, Dofa Benjina Falabisahaya, Emalamo, Gamar

Malamo, Gebe, Kuabang Kao, Oesman Sadik, Pitu Morotai, Sultan Babullah, Tepeleo, and Weda. North Maluku has no international airport. The army handles three of the airports, 7 are managed by airport organizer unit, and 2 are under local government management. It has a military base located in Morotai, Pitu airport, Morotai.

Infrastructure comparison of Papua Province (Biak) and Maluku Province (Morotai):
Based on the data of total infrastructure in each District, the strength of infrastructure in each region will be known. To be able to see more comparison in the two regions, refer Table 2, which shows the infrastructure comparison from Province and District data.

Total infrastructure in Papua is 88 greater than North Maluku with only 22 infrastructures (4:1). For the District, total infrastructure in Biak is 3, meanwhile there are 2 in Morotai, so, it is clear that the strength of available infrastructure in Biak District is greater than Morotai District. In conclusion, based on the capability and total infrastructure, Biak is more prepared and adequate than Morotai. If spaceport is to be built in Biak, it is expected to be more prepared and efficient, which also includes ease of development of raw materials for spaceport, both domestic or imported raw materials.

Total amount of infrastructure (the planning of infrastructure construction and available infrastructure) in each District are detailed in Table 3. The strength of total infrastructure (infrastructure development planning and available infrastructure) on each District shows that total infrastructure owned by Papua is greater than North Maluku. Data shows that total infrastructure in Papua is 119, while 36 are available in North Maluku. Therefore, infrastructure of Papua is greater than in Maluku with a ratio of 3,3:1. In terms of total investment value of infrastructure development planning, in Papua is Rp. 151.190 Billion, meanwhile in North Maluku is at Rp. 10.437 Billion. Therefore, investment value in Papua will be greater than in North Maluku with ratio at 14,5 higher in Papua than in North Maluku.

The data in Table 3 shows that the availability of supporting infrastructure for spaceport establishment in Papua is more supprtive than in Maluku, both during and after the establishment. The availability will affect both efficiency and innefiency of cost incurred in the development. Moreover, a lot of supporting infrastructure in one District will affect the reduction of production costs, and affect the marginal productivity of private capital.

Presence of Supporting Industries:

The area of spaceport development synergyzing with National Industry policy has a potential to grow better. Spaceport plays a role as a base in connecting multimode transportation. Just like airports, spaceport is a complex thing, which puts the community as an inseparable part from spaceport surroundings, as illustrated on Figure 1.

As stated in Space Act No. 21, 2013, Article 44 paragraph 4, Spaceport consists of danger zone one, danger zone two, and danger zone three. Article 46 specifies that the establishment of spaceport must be completed with basic facilities and supporting facilities (e.g. lodging and administrative area). Therefore, production units are needed to support the establishment of spaceport.

The development of spaceport will have an influence on the upstream and downstream industries in each region. Multiplier effect on upstream and downstream industries will occur in accordance with the roadmap of priority industry cluster development. Sub-sectors of the industries are; (1) transport equipment especially for aerospace industry; (2) electronics industry; and (3) manufacturing base industry.

Table 4 shows the relation between spaceport infrastructure development needs and industrial cluster, both before and after commencement of operations at the spaceport. During the construction of the spaceport, Table 4, details out the support needed from industries, as mentioned in the third column, manufacture industry basis, electronics and telematics industry, and conveyance industry for industrial cluster (no.14), which is shipping industry. Meanwhile, conveyance industry for industrial cluster (no.15) which is aerospace industry, will contribute on the economic growth when the spaceport operates.

In accordance to the roadmap of priority industry development on Table 4, Papua is one of the 18 provinces, which already has compile a roadmap. Papua is in the roadmap intended for development of national industry competitiveness that is synergized and integrated between the central and regional governments, which is at the top-down approach with 35-priority industrial cluster development by design and followed by regional participation chosen based on international competitiveness and potential of Indonesia. Meanwhile, North Maluku has not prepared a leading industry roadmap yet, which can be the basis in planning the development and investment of industrial sectors.

Therefore, Papua has far more potential to support both National and International investments. The development of Spaceport in Biak (Papua) will lead to a better economic potential if to compare with Morotai (North Maluku).

Distribution of supporting National industrial sectors on Spaceport Development:
Identification of supporting industrial units or sectors on spaceport development is available in Table 5. Table 5 shows the industrial sector that supports spaceport, as well as those affected by it. From each supporting industrial sector, it is visible of how much the Gross Regional Domestic Product (GRDP) contribution is. The contribution of the GRDP shows the magnitude of the industry share of the region's economy. The greater the GRDP, the greater the economic activity in the region. The GRDP generated from each industrial sector is depicted in Figure 2.

The industrial sector distribution graph based on Biak Numfor GRDP shows that agriculture, forestry, and fisheries sectors give the highest contribution in Biak Numfor, but tends to decline each year. The second top industrial sector is Wholesale and Retail Trade, Car and Motorcycle Repair with a tendency to increase from year to year. Government Administration, Defense and Mandatory Social Security is at the top three at giving the highest contribution which tends to be stable and increase in 2015. Transportation and warehouse also contribute substantially to the economic activity. The construction industry sector shows a contribution of 5-6% to the Regional GDP. Meanwhile, other industrial sectors have a small contribution that is between 0.14% - 5%. This shows that even though the industrial sector that provides the largest contribution is not related to the construction of spaceport, which is the Agriculture, Forestry and Fisheries sectors, but the industrial sector which supports the construction of spaceport is seen growing in its contribution to GRDP, namely the construction industry, information and telecommunications and Electricity and Gas Procurement.

The distribution of industrial sectors in Morotai District is shown in Figure 3. Further, it shows that the biggest and most dominated industry in Morotai is agriculture, forestry, followed by fisheries, with an average contribution of 49,63% for GRDP in the region. Wholesale and retail sectors contribute 17.77%, followed by the Government, Defense and Compulsory Social Security sectors at an average of 9.30% and the construction sector at 7.43%. While other sectors tend to have a lack economic growth. Figure 3 also shows that the distribution of industrial sector is less normally distributed, for the agriculture, forestry, and fisheries sectors are too dominant. The industrial sector supporting spaceport has less role in Morotai District.

From Figure 2 and 3, it is clear that industrial sector supporting spaceport in Biak is greater than in Morotai. It can be seen that the transportation, government and defense, processing, construction industries show a high economic activities in Biak. Meanwhile in Morotai, Agroculture, Forestry, and Fisheries industries are more dominant.

Economic Growth (GRDP):
Measurement of economic performance of a region within a given period is to look at the development of Gross Regional Domestic Product (GRDP) (Amin, 2015). Moreover, Shelby Hunt (2011) states that economic activity is relatively more common in the growth centers. High economic activity is reflected in the Gross Regional Domestic Revenue (GRDP) and GRDP rate. Economic growth becomes a quantitative measurement of economic development in a region. The amount of the GRDP reflects the increased investment and government spending in the region, which means the greater capital reserves used in the economy (Rahman, Zia Ur. 2014).

Provincial GRDP:
Economic growth in Papua is proven to be higher than the national economy. It reached 7,97% compared to 4,79% in 2015. Growth trend and forecast in Papua will be increasing from time to time. Meanwhile, Morotai with its leading sectors of agriculture, fisheries, marine and tourism is fluctuative with an average growth rate of 6.4 percent. This growth rate is still higher than the average national economic growth (GDP) in the same period. Table 6 describes the comparison of the National and Regional GDP of Biak Nunfor District and Morotai.

Comparison of the GDP per capita nationwide shows that Papua was ranked 9th with a GDP per capita of Rp. 39.850.480,- while North Maluku is ranked 31st with a per capita GDP of Rp. 21.124.260,-. Table 7 and table 8 show that the regional GDP (GRDP) at constant price in 2014 and 2015, Papua is 6 times higher than North Maluku. To further support the potential for local construction area of spaceport, the following data indicating the strength of each local area.

Gross Regional Domestic Product (GRDP):
Data on Table 9 show that the Regional Revenue and Expenditure Budget of Biak Numfor District is 2 times higher than that of Morotai District. Portions of central transfer for Morotai District is higher than Biak. It shows the independence of investment funding and spending is still very dependent on Morotai's central

government. It can be seen from the absence of Morotai capital spending, while capital spending of Biak has reached 16.6 percent.

To see data on economic conditions seen from the GRDP of 2014 in each District, table 10 provides a comparison of Biak Numfor and Morotai District economic data. In terms of providing a more comprehensive view regarding the economic conditions in each District where the spaceport will be established, figure 4 and 5 show data and analysis are presented regarding the GRDP of each District for 2010 to 2015. Morotai GRDP is still under Biak. If the construction of a spaceport is in Biak, it will be able to further boost the potential for Biak economic growth which can foster national synergy so that economic growth will grow faster.

Investment potential with a view toward commercialization (Market):

Investment potential with a view toward commercialization can be reflected from the existence of Integrated Economic Development Zone and Special Economic Zones. The concept of selecting the construction site for spaceport needs to notice that the chosen location is the one with no conflict with local development planning. Furthermore, the determination of the District will allow the region to be able to grow economic activity and potential investment faster in the region. Based on the priority industry development roadmap in Table 4, Papua is one of the 18 provinces that have compiled the roadmap. Papua is included in the roadmap aimed at building synergized and integrated national industrial competitiveness between central and regional governments, is in the top-down approach with the development of 35 industrial clusters that are planned from the central priority (by design) and followed by the participation of regions selected based on international competitiveness and the potential of the Indonesian people. This shows that Papua has more potential to support investment both nationally and internationally.

Through Presidential Decree Number 10 of 1998, Biak Numfor District was established as an Integrated Economic Development Zone. This position of Biak is quite strategic where it connects route to Australia, Papua New Guinea, countries in the South Pacific, Guam, Hawaii and New Zealand. It is also located in the world economic growth triangle, Japan - Australia - USA. However, Regional development based on the Integrated Economic Development Zone is currently not successful enough to synergize business preferences, so that the government now prioritizes economic development in regions that are categorized as a Special Economic Zone. Regarding the development plans of spaceport, Biak can be proposed as Special Economic Zone by proposing the area in Technology Zone that will have an impact on industry.

On the other hand, Morotai District is designated as a Special Economic Zone, based on the Republic of Indonesia Law Number 39 of 2009, with a focus on Tourism and Fisheries Industry sectors. In the case of determining the Special Economic Zone, Morotai Island has been designated as one of the National Strategic Areas in the National Spatial Plan, but the designation is intended for Tourism, Fisheries Industry, Port, and Business Zones. Therefore, the development plan of spaceport in Morotai will be contrary to the established regional development plan.

From the explanation above, the selection of spaceport sites in terms of investment potential, Biak District of Papua is more supportive as a location for building a spaceport compared to Morotai District of North Maluku.

CONCLUSION:

Based on the result of descriptive analysis of sites selection for spaceport construction in the view of economic aspect between Biak District, Papua and Morotai District, North Maluku, it shows that both indicators, i.e. good economic efficiency and contribution to local economic development, concluded that Biak is more supportive as a location to construct a spaceport. The first indicator, good economic efficiency, includes the availability of infrastructure and investment; the presence of supporting industries in Biak are way greater and well-planned than in Morotai. Likewise, for contribution to local economic development indicator covering economic growth (GRDP) and investment potential, it is clear that the magnitude and economic prospects in Biak are better than in Morotai District. Thus, the selection of spaceport development in Indonesia should be carried out in Biak, Papua.
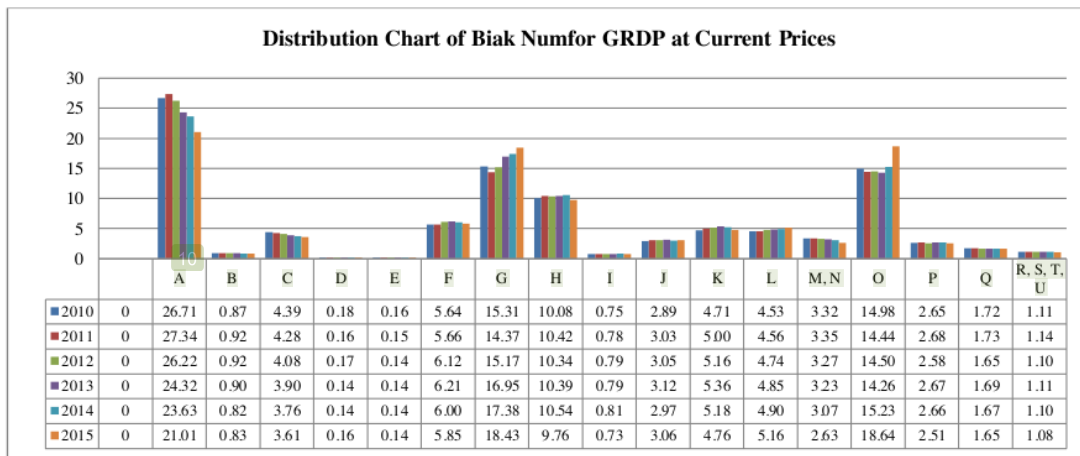
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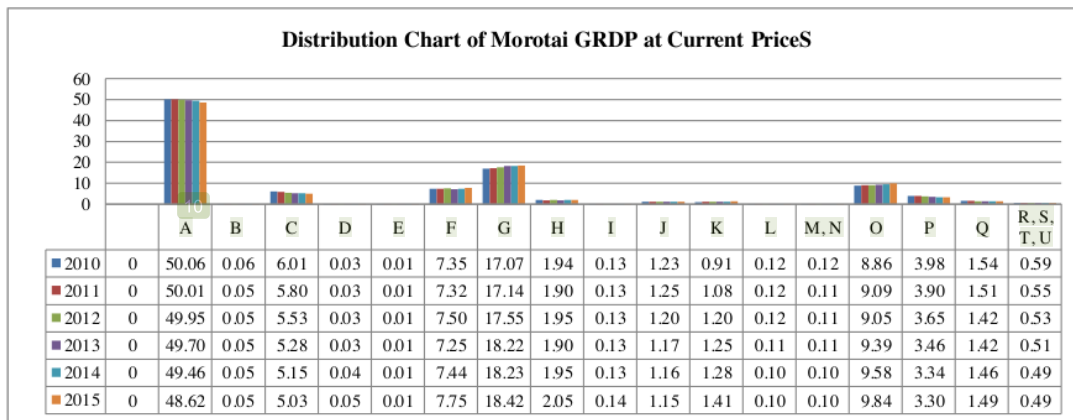
Figure 1: Spaceport Environment
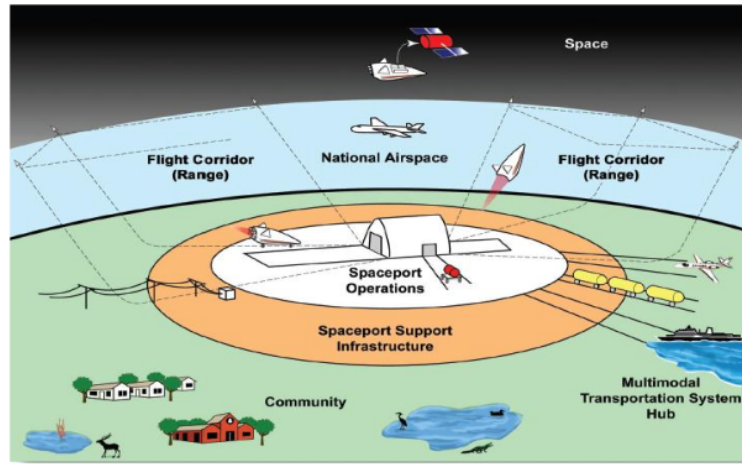
Source: Advanced Spaceport Technologies Working Group (2003)

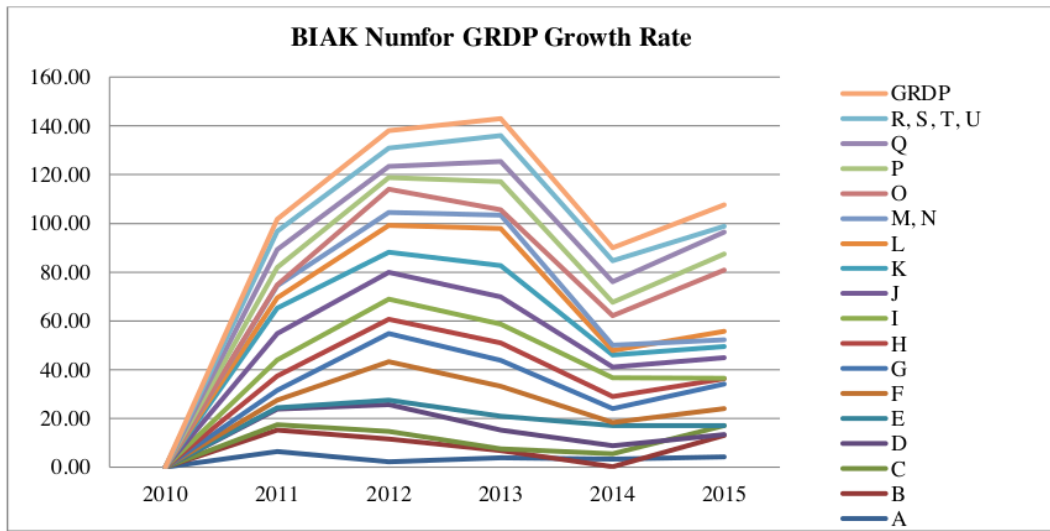**Figure 2: Distribution Chart of Biak Numfor GRDP at Current Prices**

Distribution Chart of Biak Numfor GRDP at Current Prices

	A	B	C	D	E	F	G	H	I	J	K	L	M,N	O	P	Q	R, S, T, U
2010	0	26.71	0.87	4.39	0.18	0.16	5.64	15.31	10.08	0.75	2.89	4.71	4.53	3.32	14.98	2.65	1.72	1.11
2011	0	27.34	0.92	4.28	0.16	0.15	5.66	14.37	10.42	0.78	3.03	5.00	4.56	3.35	14.44	2.68	1.73	1.14
2012	0	26.22	0.92	4.08	0.17	0.14	6.12	15.17	10.34	0.79	3.05	5.16	4.74	3.27	14.50	2.58	1.65	1.10
2013	0	24.32	0.90	3.90	0.14	0.14	6.21	16.95	10.39	0.79	3.12	5.36	4.85	3.23	14.26	2.67	1.69	1.11
2014	0	23.63	0.82	3.76	0.14	0.14	6.00	17.38	10.54	0.81	2.97	5.18	4.90	3.07	15.23	2.66	1.67	1.10
2015	0	21.01	0.83	3.61	0.16	0.14	5.85	18.43	9.76	0.73	3.06	4.76	5.16	2.63	18.64	2.51	1.65	1.08

Source: Data Processed

Figure 3: Distribution Chart of Morotai GRDP at Current Prices

Distribution Chart of Morotai GRDP at Current PriceS

	A	B	C	D	E	F	G	H	I	J	K	L	M,N	O	P	Q	R, S, T, U
2010	0	50.06	0.06	6.01	0.03	0.01	7.35	17.07	1.94	0.13	1.23	0.91	0.12	0.12	8.86	3.98	1.54	0.59
2011	0	50.01	0.05	5.80	0.03	0.01	7.32	17.14	1.90	0.13	1.25	1.08	0.12	0.11	9.09	3.90	1.51	0.55
2012	0	49.95	0.05	5.53	0.03	0.01	7.50	17.55	1.95	0.13	1.20	1.20	0.12	0.11	9.05	3.65	1.42	0.53
2013	0	49.70	0.05	5.28	0.03	0.01	7.25	18.22	1.90	0.13	1.17	1.25	0.11	0.11	9.39	3.46	1.42	0.51
2014	0	49.46	0.05	5.15	0.04	0.01	7.44	18.23	1.95	0.13	1.16	1.28	0.10	0.10	9.58	3.34	1.46	0.49
2015	0	48.62	0.05	5.03	0.05	0.01	7.75	18.42	2.05	0.14	1.15	1.41	0.10	0.10	9.84	3.30	1.49	0.49

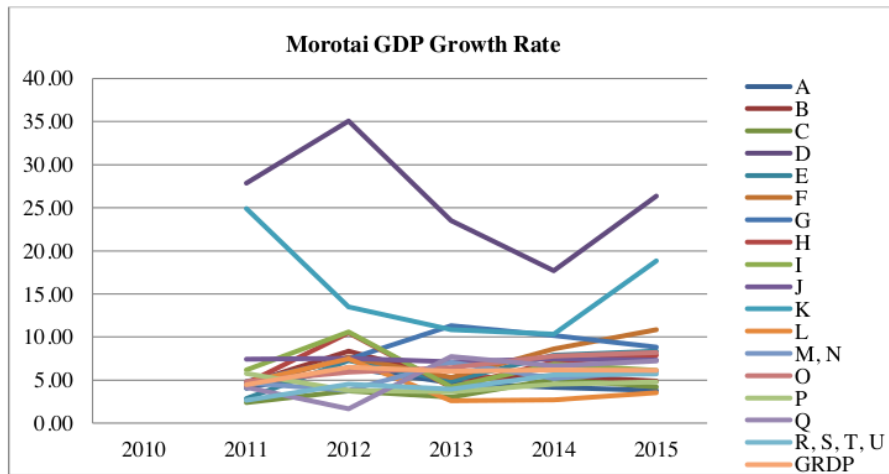**Source:** Data Processed

Figure 4: Graph of Biak Numfor GRDP Growth Rate for 2011 – 2015

Source: Data Processed

Figure 5: Graph of Morotai GRDP Growth Rate for 2011 - 2015

Source: Data Processed

Table 1: Infrastructure Development Plans in Papua and North Maluku

Description	Infrastructure						Comparison	
	PAPUA		North Maluku		Σ		PAPUA : North Maluku	
	Unit	IDR Billion	Unit	IDR Billion	Unit	IDR Billion	Unit	IDR Billion
Source of funds								
- Government funds	22	56,494	9	1,528	31	58,022	2,4 : 1	37 : 1
- BUMN funds	1	238	1	320	2	558	1 : 1	1 : 1,3
- Both funds	8	89,152	4	2,561	12	91,713	2 : 1	34,8 : 1
Total Project	**31**	**145,884**	**14**	**4,409**	**45**	**150,293**	**2,2 : 1**	**33,1 : 1**

Source: Data Processed

Table 2: Infrastructure comparison of Papua (Biak) and North Maluku (Morotai)

Infrastructure	Province		District	
	Papua	North Maluku	Biak	Morotai
Harbour	7	10	1	1
Airport:				
- Domestic	78	12	1	1
- Internasional	3	-	1	-
Total Airport	**81**	**12**	**2**	**1**
Total Infrastructure (harbour and airport)	**88**	**22**	**3**	**2**

Source: Data Processed

Table 3: Comparison of Infrastructure Planning with the Available Infrastructure

Infrastructure	Papua	North Maluku	Comparison
Infrastructure development planning	31	14	1,95 : 1
Available Infrastructure	88	22	1,92 : 1
Total	**119**	**36**	**3,3 : 1**
Investment Value for infrastructure plan (IDR Billion)	151.190	10.437	**14,5 : 1**

Source: Data Processed

Table 4: Linkage of Space Infrastructure with Roadmap for Priority Industry Cluster Development

No	Type of infrastructure/facility	Industry related to the Construction of Spaceport	Influential industrial cluster after spaceport has been operating
(1)	(2)	(3)	(4)
1	Runway	Manufacturing Industry Base: 1. Basic Material Industry: (20) Iron and steel industry; (21) Cement Industry; (22) Petrochemical industry; (23) Ceramic Industry 2. Machinery Industry: (24) Industrial electrical equipment and electrical machinery; (25) Industrial machinery and general equipment. Electronics and Telematics Industry: 1. (17) Electronics Industry; 2. (18) the telecommunications industry; (19) Industrial computers and equipment	Spaceport (Transportation Equipment Industry: Industrial Classter No. 15: Space Industry)
2	Air traffic control tower		
3	Fuel/Oxidizer Loading Areas		
4	Fuel/Oxidizer Storage Areas		
5	launch pad		
6	Launch Vehicle		
7	Hangars		
8	Processing and assemblying buildings		
9	Office space and storage		
10	Visitor center		
11	Ancillary storage		
12	Onsite training		
13	Payload processing		
14	Engine testing		
15	Mission control		
16	Perimeter security		
17	Data/communication		
18	Taxiways		
19	Aprons		
20	Standard weather service		

Source: Data Processed

Table 5: Industrial Supporting Group for Space Development Industry

No	Industrial Group	Spaceport Development
1	Agriculture, Forestry and Fisheries	-
2	Mining and Quarrying	-
3	Manufacturing industry	V
4	Electricity and Gas Supply	V
5	Water Supply, Waste Management, Waste and Recycling	V
6	Construction	V
7	Wholesale and Miscellenious Services	V
8	Transportation and Logistic	V
9	Hotel and Restaurants	V
10	Information and Communication	V
11	Financial Services and Insurance	V
12	Real Estate	-
13	Company Services	-
14	Government Administration, Defense and Mandatory Social Security	V
15	Education services	-
16	Health Services and Social Activities	V
17	**Other services** Legal and accounting services, architectural and civil engineering services, scientific research and development, advertising and market research, as well as other professional, scientific and technical services. Leasing, (including leasing services without option rights), employment services, travel agent services, tour arrangements and other reservation services, security and investigation services, services for buildings and parks, office administration services, and office support services and other business support services.	V

Source: Data Processed

Table 6: Comparison of the National and Regional GDP of Biak Numfor District and Morotai

Rank	Province	GDP (Thousands Rupiah) per capita
—	Indonesia	42.432.08
9	Papua	39.850.48
31	North Maluku	21.124.26

Table 7: GRDP by Expenditure in Constant Prices, 2014

Province (GRDP)	Constant GRDP According to Spending (2010=100)(Billion Rupiah) GRDP (2014)				
	Quarter I	Quarter II	Quarter III	Quarter IV	Annual
North Maluku	4 684.97	4 743.96	4 858.14	4 919.25	19 206.33
Papua	29 625.25	29 921.42	31 595.19	30 438.26	121 580.12
34 Provinces	2 083 786.54	2 137 812.43	2 199 524.34	2 181 710.28	8 602 833.59

Table 8: GRDP by Expenditure in Constant Prices, 2015

Province	Constant GRDP According to Spending (2010=100)(Billion Rupiah) GRDP (2015)				
	Quarter I	Quarter II	Quarter III	Quarter IV	Annual
North Maluku	4 921.47	5 051.46	5 187.69	5 216.85	20 377.47
Papua	30 097.97	34 049.43	32 398.04	34 725.44	131 270.88
34 Provinsi	2 181 800.23	2 240 484.30	2 307 413.54	2 301 390.71	9 031 088.78

Table 9: Financial Data of Biak Numfor and Morotai Districts

		Biak Numfor District	Morotai District
Finance	Regional Revenue and Expenditure Budget (Rp Billion)	839.6	446.6
	Central Transfer (%)	79.8	95.0
	Capital Spending (%)	16.6	

Table 10: Economic Data of Biak Numfor District and Morotai in 2014

	Biak Numfor District	Morotai
GRDP Current Prices (Rp T)	3.8	0.9
GRDP Constant Prices (Rp T)	3.1	0.7
Economic Growth (%)	5.1	6.2
GRDP per capita in current prices (Rp Mill)	11.0	16.4
GRDP per capita in constant prices (Rp Mill)		13.1
Economic Structure	Agriculture (24.1%)	Agriculture (49.5%)
	Trading (16.4%)	Trading (18.2%)
	Gov Adm (14.9%)	Gov Adm (9.6%)

NOTE:
Figure 2, 3, 4, 5:

A	Agriculture, Forestry and Fisheries
B	Mining and Quarrying
C	Manufacturing industry
D	Electricity and Gas Supply
E	Water Supply, Waste Management, Waste and Recycling
F	Construction
G	Wholesale and Miscellenious Services
H	Transportation and Logistic
I	Hotel and Restaurants
J	Information and Communication
K	Financial Services and Insurance
L	Real Estate
M, N	Company Services
O	Government Administration, Defense and Mandatory Social Security
P	Education services
Q	Health Services and Social Activities
R, S, T, U	**Other services** Legal and accounting services, architectural and civil engineering services, scientific research and development, advertising and market research, as well as other professional, scientific and technical services. Leasing, (including leasing services without option rights), employment services, travel agent services, tour arrangements and other reservation services, security and investigation services, services for buildings and parks, office administration services, and office support services and other business support services.

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GENERAL COMMENTS

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