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Readiness of Freight Transportation System at Special Economic Zone of Lhokseumawe

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Saleh2) Erlina1) 1Program Doktoral Perencanaan Wilayah, Universitas Sumatera Utara Padang Bulan, Medan, 20215, Indonesia 2Magister Teknik Sipil, Universitas Syiah Kuala, Darussalam, Banda Aceh, 23111, Indonesia a)Corresponding author: hfithra@unimal.ac.id Abstract. Geo-economic advantages of Lhokseumawe and Aceh Utara District lies on the geographical location of Aceh crossed by Sea Lane of Communication (Sloc), the Malacca Strait.

Located at the Malacca Strait, the Special Economic Zone (Kawasan Ekonomi Khusus/ KEK) of Arun Lhokseumawe has a comparative advantage to be part of the global production network or the global value chain. This study aims to determine freight transportation system to support KEK Lhokseumawe, especially the availability of multimodal transport and multimodal infrastructure.

The result shows that KEK Lhokseumawe driven by SOEs in Lhokseumawe and Aceh Utara is urgent to be realized for economic acceleration and to grow new economic growth in Aceh. Multimodal transport in KEK Lhokseumawe is also available, including Ro- Ro ships, train availability from Dewantara sub-district to Muara Batu Sub-district, various types of truck with small, medium and large capacity.

The available multimodal infrastructure includes international sea ports, road network connectivity with structure pavement rating of 94.62%, and railroad tracks indicating that multimodal transportation in KEK Lhokseumawe are ready to utilize. Regulatory requirements relating to the operation of all ports in KEK Lhokseumawe as export / import gate are required and serve the loading and loading activities of Containers, and as a place of origin of goods on the east coast of Aceh.

INTRODUCTION Lhokseumawe is a National Centre of Activities (NCA) in Aceh region that serves the flow of people, goods and services from outside into the city of Lhokseumawe or vice versa domestically and internationally. NCA is cantered in Lhokseumawe City and part of Aceh Utara District which serves as a national, regional and international service centre supported by Lhokseumawe Industrial Estate, Lhokseumawe Port and Malikussaleh Airport (located in Aceh Utara District area which is a support area of Lhokseumawe NCA).

In order to accelerate economic growth in Lhokseumawe and Aceh Utara District areas as well as supporting the acceleration and expansion of national economic development, it is necessary to develop the Lhokseumawe City and the Aceh Utara

District as a Special Economic Zone (Kawasan Ekonomi Khusus/ KEK). Decision of KEK Lhokseumawe in accordance with Government Regulation No.

5 Year 2017, where the area of Arun Lhokseumawe has the potential and advantages in geoeconomic and geostratetigic. KEK Lhokseumawe is expected to be a center for economic growth in Aceh in the future to. In line with the termination of gas production in Lhokseumawe, the government has initiated to use previously built industrial facilities.

This is a strategic step in stimulating a new economic growth in Aceh. The existence of the KEK Lhokseumawe is expected to transform Aceh's economic structure, especially the economic structure of Lhokseumawe and its surrounded area to have greater added value based on the processing, energy and logistics industries.

Besides, with the KEK Lhokseumawe will encourage more economic growth rate in the future. These three components of industry based on processing, energy and logistics are very feasible as the source of economic growth driver (economic growth driver) in Lhokseumawe and surrounded area.

Comparative and competitive advantages of KEK Lhokseumawe show the feasibility of this zone to be developed due to the following points: Proceedings of the 3rd International Conference on Construction and Building Engineering (ICONBUILD) 2017 AIP Conf. Proc. 1903, 060012-1–060012-8; https://doi.org/10.1063/1.5011566 Published by AIP Publishing. 978-0-7354-1591-1/$30.00

x (1) The geo-economic location that has the potential of marine and energy communications sector, x (2) Geostrategic position is on the path of Asia's international trade path.

The geostrategic location in question is the logistic / transhipment system that Lhokseumawe City is the gateway of logistic distribution system from Asian region, as well as from western Indonesia to other areas in Indonesia. One of the factors that determine the success of the KEK Lhoksumawe is the existence of a good transportation system, especially freight transportation.

Looking at the geographical location of Lhokseumawe, the freight transportation system developed is multimodal based. Multimodal transport may work well, if supported with adequate multimodal infrastructure. One of the multimodal infrastructure already available in KEK Lhokseumawe is an international standard port.

The objective of this study is to analyze the readiness of the existing freight transportation system in Lhokseumawe based on multimodal transport and multimodal infrastructure related to the determination of KEK Lhokseumawe. OVERVIEW OF LHOKSEUMAWE AND ACEH UTARA DISTRICT The City of Lhokseumawe The city of Lhokseumawe is located in the middle of the eastern route of Sumatra, between Banda Aceh and Medan. This makes the city becomes very important distribution and trading route for Aceh.

Lhokseumawe is decided to be a city government under Law No. 2 of 2001. The geographical location of Lhokseumawe is in the position of 04 ° 54 '-05 ° 18' North Latitude and 96 ° 20 '- 97 ° 21' East Longitude, flanked by the Strait Malacca. The city of Lhokseumawe has the following boundaries: x North by the Malaka Strait; x South by District of Aceh Utara (Sub-district of Kuta Makmur); x West by District of Aceh Utara (Sub-district of Dewantara); x East by District of Aceh Utara (Sub-district of Syamtalira Bayu) The city of Lhokseumawe has an area of about 181.06 km2. The administrative area of Lhokseumawe City consists of 4 (four) sub districts, namely Banda Sakti Subdistrict, Muara Satu, Muara Dua and Blang Mangat.

In addition there are 9 (nine) Settlements, and 68 (sixty two) villages. TABLE 1. Population, area and density Sub-district _Population (person) _Area (km2) _Density (person/area) _ _Banda Sakti _80.061 _11,24 _7.123 _ _Muara Dua _52.184 _57,80 _903 _ _Muara Satu _33.162 _55,90 _593 _ _Blang Mangat _26.000 _56,12 _463 _ _Source: BPS Kota Lhokseumawe, 2016 Aceh Utara District Aceh Utara District is located in the north region of Aceh.

Based on the 1: 50,000 scale Bakosurtanal Map, geographically the District of Aceh Utara is located at 96° 47'- 97° 31' East Longitude and 04° 43 '- 05° 16' North Latitude. The boundaries of Aceh Utara District with other regions are: x North by Lhokseumawe and Malaka Straits; x South by Bener Meriah District; x West by Bireun District; x East by Aceh Timur District. Meanwhile, the total area of Aceh Utara District is 3,296.86 km2, or 329,686 ha.

With the coastline length of 51 km, and the district authority is up to 4 nautical miles, the total area of the sea of this authority is 37,744 Ha or 3,774.4

km2. The administrative area of Aceh Utara District consists of 27 subdistricts. In addition there are 70 (seventy) Settlements, and 852 (eight hundred and fifty two) vilages. Meanwhile, the total area of Aceh Utara District is 3,296.86 km2, or 329,686 ha.

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METHODS This study begins with evaluation on decision of KEK Lhoksemawe in term of availability of multimodal transportation, and multimodal infrastructure. Study of KEK Lhokseumawe refer to Government Regulation No.5 Year 2017 which has been signed by the President of the Republic of Indonesia, viewed from the aspect of transportation of goods based on connectivity.

The availability of multimodal transport is assessed by looking at the types of available modes and serving the routes of origin from Lhokseumawe to Jakarta, North Sumatra and surrounding areas of Aceh, including Ro-Ro ship, train and trucks. The readiness of the multimodal infrastructure is assessed by analyzing the availability of ports in the KEK Lhokseumawe and road structures linking North Sumatra and other cities in Aceh, in particular the eastern and central coast of Aceh. Location of KEK Lhokseumawe administratively involves 2 sub-districts, i.e.

Muara Satu subdistrict in Lhokseumawe City with area of 2128 ha and Dewantara subdistrict in Aceh Utara District with 513 ha. The total area of KEK Lhokseumawe is an accumulation of the area of various companies including PT. ARUN (1370 ha), PT.PIM (277 ha) PT. AAF (236 ha) and PT. Pelindo 148 ha. The total area is 2,031 ha as shown in Fig. 1. _ FIGURE 1.

Masterplan KEK Lhokseumawe [1] The major industrial activity in Lhokseumawe City is oil and gas processing industry (Arun LNG). This area is located in Blang Lancang, Muara Satu subdistrict. This area is part of Lhokseumawe Industrial Estate (KIL) which covers Lhokseumawe and part of Aceh Utara District.

Other large industrial areas that are part of Lhokseumawe Industrial Estate (KIL) located in Aceh Utara District are Iskandar Muda (PIM), Aceh Asean Fertilizer (AAF), and Kertas Kraft Aceh (KKA) industries. The existence of KIL supports Lhokseumawe City and part of Aceh Utara District as PKN. The area of land designated for large industrial estates is the extent of plant installation, excluding large industrial settlement land and other facilities.

Some of the existing activities in the vicinity of KEK Lhokseumawe, among others are Gas Engine Power Plant (PLTMG) operated by PT. Pembangkitan Jawa Bali with capacity of 200 MW. In this estate there is also PLTMG belongs to PT. Perta Arun Gas with capacity 8 x 20 MW. On the west side, there is PT. AAF, a closed-down fertilizer factory due to the lack of raw material supply. PT. AAF has been out of operation since December 2003.

The strategic area located in the city of Lhokseumawe comprises the National Strategic Area, the Provincial Strategic Area and the City Strategic Area. For large industrial estates, including Lhokseumawe Industrial Estate, located in Blang Lancang, Muara Satu District, covering an area of approximately 915 Ha. This area is designated as a national strategic area with the point of view of economic interests.

Lhokseumawe industrial area is the oil and gas processing industry (LNG Arun), which is the terminal of regasification. Fig. 2 shows the bird-view of Lhokseumawe's existing industrial estate.

_ FIGURE 2. Existing area of Lhokseumawe industrial estate Optimization of economic potency of the KEK Lhokseumawe requires adequate support in transportation system.

An adequate transportation system can be found from the Connectivity Index. The higher the index value means the more road networks connecting the city or region. This certainly affects the potential movement of people, goods and services because the road infrastructure is facilitating inter-regional mobility. To calculate the connectivity index used equation: ß = e / v (1) Where: ß = connectivity index e = number of road network v = number of city Multimodal Transport Implementation of on-time freight transport with low cost requires a multimodal transport system. Multimodal transport within Government Regulation No.

8 Year 2011 concerning Multimodal Transport is defined as the transport of goods by using at least 2 (two) different modes of transportation from one place of receipt of goods by a multimodal transport agency to a designated place for the delivery of goods to the recipient of the freight Multimodal. KEK Lhokseumawe which is facing the world's busiest shipping lanes should optimize the use of marine, land and railway modes.

However, the movement of goods in Aceh is still largely based on inefficient road transport. Fig. 3 illustrates the role of multimodal transport in a unity ranging from local terminals to national terminals. _ FIGURE 3. Concept of multimodal transportation networking

Transshipment The most important process in the operation of freight transport is the movement that needs to be done at the points of the nodes, either between modes of transportation, or with similar modes from small vessels to large vessels or vice versa from large ships to small vessels. Therefore the equipment for loading and unloading is needed.

Multimodal Infrastructure Encouraging the use of multimodal transport for freight transport needs support of appropriate infrastructure tools. The most important infrastructure to encourage the movement of multimodal transport is the loading and unloading facility adjusted for the amount of cargo transported. Loading and unloading facilities must be provided at the beginning of the trip until arrive.

The main considerations in the selection of transportation modes are freight and speed of transport service. RESULTS AND DISCUSSION KEK Lhokseumawe The city of Lhokseumawe is recognized as National Activity Centre (NAC) in Aceh province that serves domestically the flow of people, goods and services from outside into the area of Lhokseumawe City or vice versa.

In addition, as National Activity Centre, Lhokseumawe is allowed to serve the flow of goods for international freight. NAC is cantered in Lhokseumawe City and part of Aceh Utara District (Muara Batu sub-district, Dewantara sub- district) serving as international, national and regional service centre supported by Lhokseumawe Industrial Estate, Lhokseumawe Port and Malikussaleh Airport (located in Aceh Utara Which is a support area of NAC Lhokseumawe).

The strategic area located in Lhokseumawe City, comprising the National Strategic. Based on the results of data analysis of the population of each district and city, the number of road network and the distance between cities and regencies is obtained the highest road connectivity index is located in Lhokseumawe City of 1.25 connecting Lhokseumawe - Bireuen - Pidie Jaya - Aceh Utara - Bener Meriah - Aceh Tengah Districts.

Multimodal Transportation To success of KEK Lhokseumawe especially in terms of multimode transport. It is necessary to see the readiness of multimodal transport which already has the route from and to Lhokseumawe. The following is existing multimodal transportation from and to Lhokseumawe.

x Ro-Ro ship x Railway x Container Trucks x Trucks Multimodal Infrastructure Development of transportation network system in Aceh involves land transportation network system, water transportation network system, and air transportation network

system. Land transport network system includes road network system and rail network system. The city of Lhokseumawe has arranged traffic service network and road network of Inter-city Inter-Provincial City route network, covering: Banda Aceh - Sigli - Meureudu - Bireuen - Lhokseumawe - Lhoksukon - Panton Labu - Idi Rayeuk - Langsa - Kuala Simpang - Medan.

Development and revitalization of the railway network on the east coast connecting Banda Aceh-Lhokseumawe, to North Sumatra Province, is part of the eastern railway network of Sumatra Island Development plan of the Lhokseumawe City transport network system consists of a land transport network system, a sea transport network system, and an air transport network system, and a railway network system.

The development plan of the transportation network system aims to develop interconnection between centers of activity and strengthen

the inter-regional movement system internally and externally. The road network development plan in Lhokseumawe City consists of arterial road, collector road and local road. Arterial roads planned in Lhokseumawe City include: x Banda Aceh - Medan road area located in Lhokseumawe city area.

This artery road connects NAC existing in Aceh Province (Lhokseumawe City and its surroundings) and NAC in Sumatera Utara Province. This road is also known as Sumatera east coast lane that connects between Banda Aceh - Lhokseumawe – Medan. This lane becomes one of the economic pulses of the island of Sumatra on the east coast.

The status of this road is a National Road that has been established in PP No.26 year 2008. x Highway which connects Banda Aceh boundary to Sumatera Utara Province. The length of the road is planned that is 390 km across the city of Lhokseumawe. This road is complementary to the East Cross Road. This Highway is a National Road that has been established in PP No.26 year 2008. It is proposed to place the entrance around Blang Mangat subdistrict.

The development of road network needs to be supported by the existence of goods terminal infrastructure. located at Kandang, Muara Dua sub-district. This terminal serves the transportation of goods from and to the city of Lhokseumawe. Supporting Infrastructure Development Plan Planning for development of supporting infrastructure for KEK Lhokseumawe can be explained follows: x Port of Krueng Geukuh has been designated as a limited import export port based on Regulation of the Minister of Trade No.

61 / M-DAG / PER / 9/2013 on Amendment to Regulation of the Minister of Trade No. 83 / M- DAG / PER / 12/2012 on provisions on the import of certain products at the Krueng Geukueh Port. To support of the development of the Lhokseumawe KEK, various port supporting facilities will be stepped up gradually, such as warehouse expansion and packing (logistics), improvement of road quality to ports, supporting facilities for loading and unloading, and other facilities. x Special Port of PT. PAG and PT.

PIM Seaport managed by PT. PAG and seaport owned by PT PIM will be optimized to support economic activities and business of KEK Lhokseumawe. The various port supporting facilities will be upgraded. x Land transportation and road infrastructure within the framework of Aceh Utara have adequate space as corridor connectivity to support KEK Lhokseumawe.

The condition of the primary arterial road network that passes through this area is generally quite good with the pavement stability reaching 94.62%. The road network

connects various districts including Pidie Jaya, Bener Meriah, Aceh Tengah, Bireuen, Aceh Utara, and Lhokseumawe. This road network will continue to be developed and improved especially on the road network to connect the central of agriculture production to palm oil mills and Krueng Geukuh port.

Krueng Geukueh Port The port of Krueng Geukeuh Lhokseumawe or Lhokseumawe port has been designated as a port of certain imports through the Regulation of the Minister of Trade (Permendag) RI number 61 / M-DAG / PER / 9/2013 on the amendment of the Regulation of RI nomo 83 / M-DAF / 12/2012. Krueng Geukueh Port Lhokseumawe has a depth of 10 meters, can be disandari ship with the size of 20,000 Dead Weight Ton / DWT (dead weight of the ship) x 100 meters long. The harbor also has a 267 x 25 meter dock that allows two boats to lean at the same time.

Also supported by two permanent warehouses each measuring 2,000 and 600 square meters, as well as five tarpaulins size 32 x 10 and 24 x 10 meters. For supporting equipment, this Port has two crane units with 45 and 25 tons each. To transport goods from ship to warehouse, it has six forklift units (forks) with weights of 7.5 tons, 5 tons, and 3 tons respectively.

Until the first quarter of 2014 export activities through the port in Aceh Utara was recorded only as much as 384,473 tons.

TABLE 2. Information of Krueng Geukueh Port Type of Jetty _ Length _Depth (MLWS) _ Capacity (Ton) _ _Multipurpose berth _267.50 m _10 _20.000 _ _Liquid bulk _80 m _6 _5.000 _ _Ro-ro _165 m _6 _5.000 _ _Item _Length _Width (M) _Depth (MLWS) _ _Cruise channel _2,5 Mil _250 _10 _ _Item _Area (M2) _Depth (MLWS) _ _Reservoir _1.100.000 _6 - 10 _ _Warehouse _2.600 _- _ _Bulking station _20.158 _- _ _ The low port activity is due to the transports of commodities produced from Aceh and the logistics needs of the people of Aceh still utilize the Belawan harbor facilities in North Sumatra. For that purpose revitalization efforts need to be done to increase port activity.

This revitalization effort is not only related to the improvement of the completeness and capacity of infrastructure but also the improvement of the type of services provided. PT. Pelindo I Operational Analysis as port manager and owner of 148 hectare land in Krueng Geukueh port area will be the leading revitalization and port development.

Pelindo I will be responsible for the development and completion of port infrastructure. In the implementation of PT. Pelindo I will partner with state-owned companies and related private companies. As mentioned above so far transportation of logistical needs for Aceh and commodities of crops and industries from Aceh is largely transported to North Sumatra for shipping via Belawan harbor. On the other hand the government should be able to support this effort by building a more adequate land transportation infrastructure.

The railway lines connecting cities on the east and north coasts of Aceh should be immediately realized. The passage between the East-North coast of Aceh and the South West coast of Aceh must also be built. Thus the production and commodity goods produced in Aceh can be mobilized to the port of Krueng Geukuh.

In contrast, consumer goods, raw materials and industrial capital goods transported from outside Aceh via the Krueng Geukuh port can be easily distributed in Aceh CONCLUSIONS AND RECCOMENDATIONS Based on the results of research, discussion, and theories there are a number of conclusions can be summarized as follows: x The determination of the Lhokseumawe KEK is expected to drive new economic growth, especially the east coast of Aceh; x The readiness of Multimodal Transportation and Multimodal Infrastructure in Lhokseumawe and Aceh Utara has been able to support Lhokseumawe KEK; x The availability of road network with stability of the structure of poverty reached 94.62% able to support the increase of Krueng Geukueh port operation for the distribution of goods.

Based on the results of research are given the following recommendations: x The Government of Aceh, the Government of Lhokseumawe City, the Government of Aceh

Utara District and all components of the Acehnese community, should support the realization of the Lhokseumawe KEK within 3 (three) years after the signing of Government Regulation No.5 of 2017; x Development of Krueng Geukueh Port, Port of PT. Perta Arun Gas and Port of PT.

PIM must be done seriously to support the success of the Lhokseumawe KEK; x There needs to be a regulation to cultivate an agriculture-based and fisheries-based industry in the central and eastern part of Aceh; x Accelerated settlement of collector roads as connecting coastal areas of North-East with Central and West- South Aceh region.

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