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## **FEASIBILITY STUDY OF KALIANDA COAST RING ROAD IN SOUTH LAMPUNG REGENCY**

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### **Abstract**

South Lampung Regency is a regency of Lampung, Sumatra, Indonesia. It has an area of 2,109.74 km<sup>2</sup> and a population of 909,989 people at the 2010 Cene sus. The capital lies at Kalianda. Administratively it is divided into 17 districts (kecamatan), 3 kelurahan and 248 desa. South Lampung has a function as a gateway for the transportation between the islands of Sumatra and Java that are served by the national road. The purpose of this study was to analyze the development of the road network in South Lampung regency, especially in the Coastal Ring Road Kalianda reviewed from various aspects and interests. The purpose of this study was to examine the possibility of building a road to connect the existing road network with facilities available / to be created. Comparison of costs and benefit is a basis in determining the economic and financial feasibility of the development and operation of transportation facilities. Results obtained from the analysis that is needed cost Rp 180,888,775,414 to build a new road. Benefits of new roads is calculated from vehicle operating cost savings is Rp. 583 079 000 000, - up to the year 2030. If used consumer surplus method, some economic indicators such as NPV is positive and interest rate level EIRR 14.9%. Considering alternative segment currently has a potential movement, as well as the potential for tourism, and the government plan to Sunda Strait bridge construction program, the development of road is feasible to be followed.

**Key Words:** traffic count, economic analysis, consumer surplus

## **INTRODUCTION**

South Lampung District is the only district in Lampung province is geographically has a function as a gateway to the movement of ground transportation between the islands of Sumatra and Java. The movement has been serviced by a national road through South Lampung, namely Sumatra's Cross Road. Bakauheni Port as the last point of these roads, have primary function connecting Java and Sumatera. In recent years, the service of Sumatera's Cross Roads, especially South Lampung was interrupted due to the landslide at some point. As a result of this incident, the flow of traffic from Bandar Lampung to Bakauheni nor otherwise be disconnected. Traffic flow diverted to alternative roads through Ketapang (the left side of the Sumatra's Cross Road) which have a travel time 4 hours longer than normal road, cause of the road condition is not capable to supporting the load of traffic. A partial segment of Kalianda Coast Ring Road is a part of alternative road. The purpose of this study was to determine the feasibility of Kalianda Coast Ring Road related to these function.

## **METHODOLOGY**



### The Mindset of This Study

The mindset of this study is related to actual implementation of activity, there is input component (as a basis of conducting job analysis in the implementation phase), process implemented (technical analysis, transport analysis and economic analysis) and the expected output. Feasibility study is one part of overall planning activity which is start from Problem Identification, General Planning, Feasibility and Design or Technical Planning.

### The Stage of Study

In an outline, the approach method of study is without project and with projec, based on public policy approach or economic analysis.

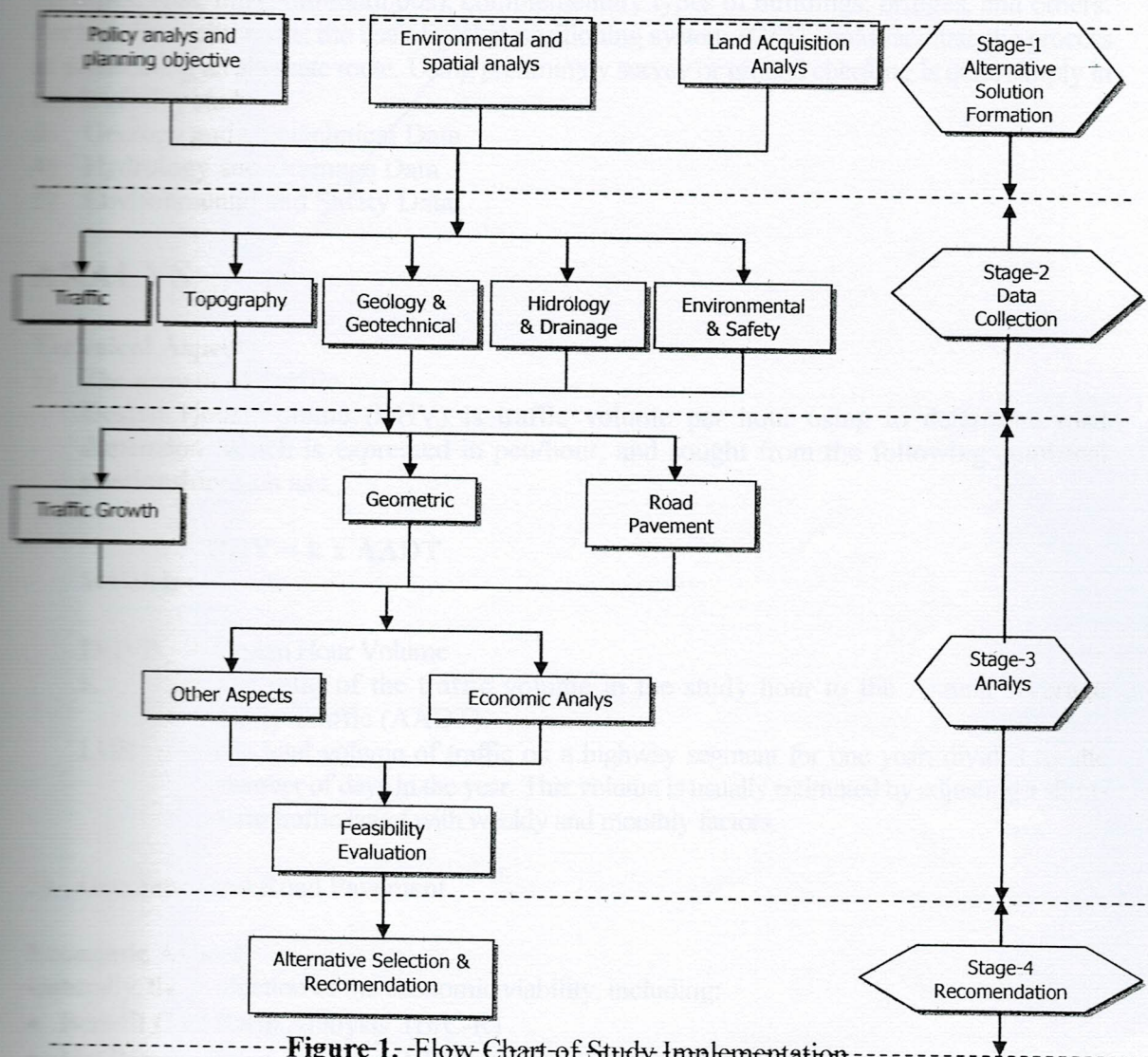


Figure 1: Flow Chart of Study Implementation



### **Formulation of Solution Alternative**

#### **Study of Policy and Planning Objective**

- a. Study of Environmental and Spatial
- b. Study of Land Acquisition

### **Data Collection**

#### **1) Traffic Flow Data**

Traffic Data is needed to establish the dimension of road geometric to design road construction and calculate total vehicle operating cost.

#### **2) Topograph**

Topograph map is required in determining the road and estimating project cost related to existing condition, possibility of land acquisition, reallocation of population, topography condition (flat, hilly, mountainous), complementary types of buildings, bridges, and others. For new inter-city route, the use of global positioning system (GPS) could facilitate the process of determining an alternate route. Using preliminary survey or ground checking is quite simply in this feasibility study.

#### **3) Geology and Geotechnical Data**

#### **4) Hydrology and Drainage Data**

#### **5) Environmental and Safety Data**

## **ANALYS**

### **Technical Aspect**

#### **1) The growth of Traffic**

Design Hour Volume (DHV) is traffic volume per hour using to determine road dimension, which is expressed in pcu/hour, and sought from the following empirical relationship such as :

$$\text{DHV} = k \times \text{AADT}$$

Which is :

DHVP = Design Hour Volume

K = The ratio of the traffic volume in the study hour to the Annual Average Daily Traffic (AADT).

LHR = The total volume of traffic on a highway segment for one year, divided by the number of days in the year. This volume is usually estimated by adjusting a short-term traffic count with weekly and monthly factors.

#### **2) Geometric and Road Pavement**

### **Economic Aspect**

Generally, the evaluation of the economic viability, including:

- Benefit Cost Ratio Analysis (B/C-R)
- Net Present Value Analysis (NPV)
- Economic Internal Rate of Return Analysis (EIRR)
- First Year Rate of Return Analysis (FYRR)



### Recommendation

The feasibility of the project depends not only on economic feasibility to account the non-economic aspects. There are several methods that can be used, such as multi criteria analysis, Delphi method, Analytical Hierarchy Process and others.

## SOUTH LAMPUNG IN ECONOMICAL CORRIDOR OF LAMPUNG

### The Improvement of Economic Region through Economic Corridor

Overall, the centers of economic growth and connectivity creates Indonesian economic corridor. Increased economic potential of the region through economic corridor has become one of the three main strategies.

### Sumatera Economic Corridor

Although Sumatera has very large reserves of coal, but coal production in Sumatera is still very low at around 20 million tons per year, or about 10 percent of the total coal production in Indonesia. One reason is because of the ten largest coal producing companies on Indonesia, only one company that has a large processing area in Sumatera.

### South Lampung in Sumatera Economic Corridor

#### Strategic Profile of South Lampung

As the district which is connecting Java and Sumatera through Bakauheni Port, the existence of South Lampung is very crucial. Everyday thousands of vehicles across the area of Sumatera Cross Road that split Kalianda, the capital of South Lampung become two.

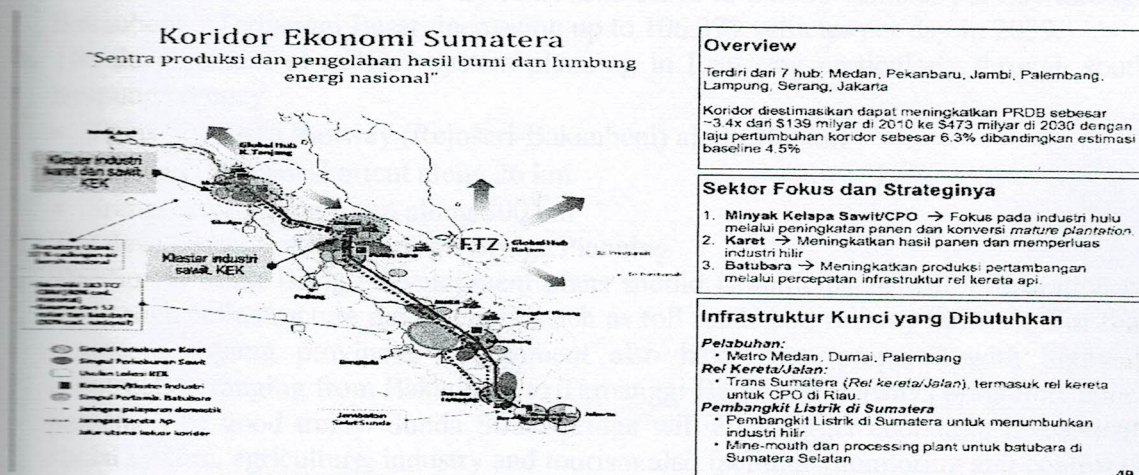


Figure 2. The Map of Sumatera Economic Corridor

The existence of South Lampung is become more important after the government have plans to build a Terminal Agribusiness at Panengahan. Great potential of South Lampung to be developed among others are major commodity sectors such as coconut plantation, hybrid coconut, oil palm, rubber, tobacco, cloves, cocoa, pepper and patchouli.



### **Strategic Plan of Government related to South Lampung**

The strategic plan of government related to south Lampung are:

- Sunda Strait region at Panengahan District and Bakauheni District is busy line connecting Java and Sumatera. Supporting infrastructure is a primary arterial road, toll highways and railways planning.
- Penengahan Agropolitan.
- Ketapang industrial area to supporting fisheries activity centre, minapolitan, industry and tourism by collector road infrastructure connecting Bakauheni and Sragi, and railway network plan.
- Katibung industrial area as industrial activity, Kegiatan Industri, Cane molasses harbor plan, supporting by arterial road which connects Bakauheni with Bandar Lampung
- Coal tracking region planning and coal designated port development in Merbau Mataram supporting by highway and railway network plan.
- Sidomulyo Agropolitan and Terminal Agribusiness at Panengahan supporting by arterial road which connects Bakauheni with Bandar Lampung.
- Coast tourism at Sibesi and Sebuk island in Rajabasa district with cruise line infrastructure.
- Bakauheni port, Karakatau's nature reserve, Farms seed shrimp and seaweed, Beach and coastal zone, Lampung industrial zone, Kalianda Resort adventure zone, agriculture zone, Siger's tower, Rajabasa mountains, Wartawan coach and hot water resources
- Development of sunda strait strategic area

### **Infrastructure Development Plan**

#### **a. Bakauheni - Bd. Lampung – Terbanggi Besar Highway Plan**

This highway will be connected with the province of south Sumatera, until North Sumatera and Aceh as a part of Trans Asean Highway.

The result of traffic volume survey in 2006 is 8.245 to 24.666 vehicles per day through Bakauheni – Terbanggi Besar, increasing up to 106.379 vehicles per day in 2039.

#### **b. The development of railway system planning in Lampung particularly through south Lampung regency**

- Trans Sumatera Railway (Rejosari-Bakauheni) along 100 km
- Rejosari-Tarahan shortcut along 26 km
- Srengsem-Tanjung Enim along 300 km

#### **c. The development of Sunda Strait Bridge Planning**

The Sunda Strait Bridge development plans should be anticipated with preparation of supporting infrastructure development such as toll roads and railway network. For that reason, Lampung provincial government also have been prepared with highway construction ranging from Bakauheni to Terbanggi Besar and railways programs, either passenger or good trains. Sunda Strait Bridge will also trigger economic investment, social culture, agriculture, industry and tourism also facilitate monitoring and control of nature conservation.





Figure 3. Highway Development Planning

## DATA PRESENTATION

### Road Corridor Survey

#### a. Segment-1 (STA 0+000 – 1+643)

This segment starts from Kalianda's intersection which connect to Trans Sumatera National Road and ended up in the Kalianda,s traditional market. The length of this segment is 1,643 km. The type of pavement in this segment is asphalt hotmix. Pavement condition relatively good with permanent drainage on both street's sides.

#### b. Segment-2 (STA 1+643 – 25+700)

Land use at the beginning of this segment is Kalianda,s market, so both sides of the road is shopping and residential areas. This segment of the road is starting from the end of segment-1 and ends at Totoharjo's intersection along 24,057 km. Because this road along the coast, so the potential of nature tourism such as beach is very high.

#### c. Segment-3 (STA 25+700 – 33+800)

Segment-3 start from Totoharjo's intersection (STA 25+700) and ends at Klawi's intersection (STA 33+800) which is a merge point between this road and Trans Sumatera national road in Bakauheni along  $\pm 8,100$  km, including district road.

### Qualified Traffic Volume

Traffic volume on the Kalianda coastal ring road generally divided into two groups, namely goods and others.

Table 1. Vehicle's Volume on the Kalianda Coastal Ring Road (vehicle/day)

Segment	Direction	Pick Up	Medium Truck	Big Truck	Private	Motor cycle	Micro bus	Medium Bus
I	in	29	18	2	244	462	36	5
	out	35	22	3	229	527	24	9
II	in	43	35	3	137	275	28	12
	out	29	41	5	181	204	31	14
III	in	4	6	0	41	73	0	0
	out	7	4	0	24	85	0	0



### **Basic Soil Testing Condition**

Soil testing on roads in the area of study was conducted using Conducted Dynamic Cone Penetrometer (DCP) method. Based on field test along Kalianda coastal road, CBR values obtained is 4.3 – 6.5 %. These values provide the basic information that soil's conditions are generally quite good.

## **SOCIO-ECONOMIC AND TERRITORIAL**

### **South Lampung's Profile**

South Lampung Regency located between 105°14' until 105°45' East Longitude and 5°15' until 6° South Latitude. Having a port located at Bakauheni. South Lampung regency consists of 17 districts. The northern region bordering central Lampung and East Lampung, southern region bordering Sunda's strait, western region bordering Bandar Lampung and Pesawaran, east region bordering the Java sea.

### **Population and Customs**

In 2010 the population of south lampung regency was 985,075 persons. The population density in south lampung is still concentrated in the northern region near the centre of Bandar Lampung, which is called Natar. Generally, population of South Lampung can be classified into two parts, namely indigenous lampung and settlers. Indigenous people in south lampung composed of indigenous groups peminggir and pepadun, typically are patrilineal kinship system and genealogis.

### **Natural Resource Potential of South Lampung**

Potential of the South Lampung Selatan related to natural resources, including agriculture, plantation, animal husbandry, fisheries, forestry, mining, and tourism.

### **Transportation Network Profile**

Road network in south lampung consist of national road network, provincial road network, and district road network. In addition, south lampung regency have 5 local sea ports, that is only to serve people and fishermen, such as Kalianda, Canti, Sebesi, Ketapang and Padang Cermin. Port management is handled directly by Ministry of Transportation.

## **AREA DEVELOPMENT PLAN**

### **Activity Center Development**

Development activity centers is coordinated with settlement systems, infrastructure and facilities network, allocation land use in cultivation area existing or planning, so that development can enhance the utilization of existing space.

### **The Plan of Growing Region Pattern**

Referral pattern of space for cultivation activities include directives utilization of forest, agriculture areas, as well as non- agriculture areas. This directive is based on the suitability of the land, the potential for development and , management of protected area in small



islands and coast through the marine tourism activity, fisheries industry, organic agriculture and livestock.

## **LAMPUNG STRATEGIC AREA**

From the review of Lampung Province spatial plan, it is known there are four strategic areas of Lampung Province located in south Lampung regency. The four strategic areas are:

- a. Metropolitan area of Bandar Lampung
- b. Bakauheni area
- c. Lampung Industri Area
- d. The central government of Lampung Province at Jati Agung

### **Strategic Area from Economic Interests Point of View**

PKLp South Lampung, Natar Strategic Area, Merbau Mataram Area, Sidomulyo Agropolitan Area and Panengahan Agribusiness Terminal, Ketibung, Kalianda, Ketapang, Bakauheni, Sibesi and Sebuk.

**Strategic Area from Environment Interests Point of View**, there is Krakatau Nature Reserve.

**Strategic Area from Environment Interests Point of View**, there is Rajabasa Mountain Area

### **Infrastructure System Network Planning**

Road System Network Planning

Terminal Development Planning

Railway Station Development

River, Lake and Crossing Transportation Network Development Planning

Sea Transportation (Port Development)

Air Transportation

### **Strategic Issues of Regional Development Planning**

Strategic issues related to environmental and building work plan implementation of south Lampung are as follows:

- a) Sunda Strait Development Planning;
- b) Jati Agung New City Development Planning;
- c) Rejosari – Bandar Lampung Short Cut Railway Development Planning;
- d) Tarahan – Bakauheni Railway Development Planning;
- e) Radin Inten II International Airport Development Planning;
- f) Sebalang People Harbor Cruise Development Planning;
- g) Terbanggi Besar – Tegineneng – Babatan – Bakauheni Highway Development Planning;
- h) PT. BA/PT. Transpacific Railway (Tanjung Enim – Srengsem Double Track).

## **FEASIBILITY ANALYSIS**

**General Framework Analysis**



Road planned should be reviewed in terms of their feasibility, financial feasibility, and its benefits to the community or better known as the economic feasibility.

The comparison of cost and benefit/revenue is a basis in determining the economic and financial feasibility of the development and operation of transportation facilities, including Kalianda coastal ring road. This comparison made between the two condition, namely for the scenario without the construction and operation (base case or without project) and with the construction and operation (with project).

**Table 2.** Differences Components on Financial and Economic Approach

No.	Aspect	Economic Analys	Financial Analys
1.	View of point	Public	Private
2.	Objective	Economic efficiency (transportation cost reduction)	Refund and return on investment
3.	criteria	NPV, BCR, EIRR	Pay Back Period, IRR
4.	application	The project for the community, by the government	Private projects that are profit oriented
5.	Cost-Benefit Component	Direct and indirect	Directly to projects (return)
6.	Price fixing	shadow prices transfer prices interest level	Market mecanism tax subsidy interest level

### **Transportation Benefit Determination Approach**

As is usual in assessing the feasibility of the transportation infrastructure investment needs 2 primary input, ie, the estimated component cost and the estimated components of returns/benefits/revenue. To get a measure of the level of producer surplus feasibility analysis for each selected segment

### **Road Condition Analysis**

- **Alternative-1** is the development of coastal ring road network is the focus of this study.
- **Alternative-2** existing road network is now there. Is a national road and cross the middle of a road with most prone to landslides
- **Alternative-3** an alternative path that has been frequently used by users of the road when traffic is experiencing disorders such as no congestion, or landslides on the road along the 7 km. The alternative path III is now mostly in poor condition.

### **Feasibility Analysis**

On road with a high volume in developed area, the calculation of the benefits of road and bridge construction is done by calculating directly from road user namely a vehicle operating cost reduction, value of time and accident cost from the difference with the project and without the project based on existing traffic volumes (JICA, 1986).

This road construction feasibility analysis will try to take into account the benefit using consumer surplus approach. Calculation of benefits (saving vehicle operating cost and time value), conducted since the road was built.



## **CONCLUSION**

- 1) Study area especially near road network system of south Lampung have potential to develop.
- 2) Road network that is focused in this study is the road connecting Bakauheni and Bandar Lampung, or Bakauheni to Kalianda. There are three alternatives routes connected two points.
- 3) The result if using consumer surplus method, this is feasible project with some economic indicators such as Net Present Value is positives, internal rate 14,9% or EIRR 14,9%,. Using national bank interest up to 9 until 12% per year, this project is feasible to be continued.

## **RECOMMENDATION**

1. Related to potential traffic flow in this road, beside others such as tourism, strategic issues about Sunda Strait, which is Lampung is one of foot bridge, so the development of the road should be immediately implemented.
2. It is necessary to be carried out a further study such as Engineering Detail Design for the road, as well as the Environmental Impact Assessment (EIA)
3. The next stage, Detail Engineering Design (DED), should be done in 2012. The next phase of land acquisition carried out in 2013. At the end of 2013 should be commenced construction on both sides of this. So the beginning of the year 2014 is expected to be used this road.

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