Preliminary Technical Feasibility Analysis, Operational, Economic Of Radin Inten II International Airports Trains, South Lampung

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Abstract. Lampung Province is the second largest province on the island of Sumatra. Given the function of Bandar Lampung as the capital city, its effect is very significant in increasing the need for comprehensive and optimal transportation. One of the problems with transportation in the city of Bandar Lampung is the effort to increase the mode of transportation, such as transportation to the International Raden Inten II International Airport. This research, conducted an analysis of the technical feasibility, operational feasibility, economic and financial feasibility of the Radin Inten II International Airport Train, South Lampung. This study uses 3 scenarios for the number of airport train fill in which the scenario is an optimistic scenario, a moderate scenario and a pessimistic scenario. Technical feasibility can be said to be feasible to operate if several indicators are met. Based on the results of the analysis, the airport train is not feasible to operate if it uses the existing line. A project is declared economically and financially feasible by comparing the feasibility parameters such as NPV, BCR, IRR, and Payback Period. Meanwhile, based on the results obtained, the feasibility parameters used indicate the economic feasibility analysis of the highest NPV value: Rp. 32,490,236,361,014 > 0, BCR: 0.269, <0, and IRR: 21.04%. While the financial feasibility analysis of the highest value is obtained in the optimistic scenario where the NPV value: Rp. 467,181,556,733 > 0, payback period of 20 years, and IRR: 6.36%. It can be concluded that only the optimistic scenario shows that all investment parameters are feasible to use. The results of the sensitivity analysis show that the project is more sensitive to the age of the concession.

Keywords : technical feasibility, operational feasibility, economic and financial feasibility

1. Introduction

Lampung Province is the second largest province on the island of Sumatra with an area of 34.6 thousand km\textsuperscript{2} (1.84 percent of Indonesia's territory). The population growth rate of Lampung Province, the increasing population growth, has an impact on the increase in the economic, social, cultural and business sectors in the city of Bandar Lampung. Given the function of Bandar Lampung City as the capital of Lampung Province, its effect is very significant in increasing the need for comprehensive and optimal transportation.\textsuperscript{[4]}

One of the problems with transportation in the city of Bandar Lampung is the effort to increase transportation modes, such as transportation to the International Raden Inten II International Airport, which is a place for current modes of air transportation to be more effective in traveling long distances, with the development of airports. Raden Inten II and seeing the opportunities for the high quantity and needs of passengers with an interest in Raden Inten II International Airport, are needed supporting facilities that not only make travel easier but the most important thing is punctuality\textsuperscript{[7]}
There are 3 things that hope for an airport train, including:
1. The airport train system moves the airport door to a city called a city station.
2. Move the door downtown symbolically to the airport.
3. Provide convenient and safe transportation between the two points.

Various analyses need to be carried out regarding the plan to build this train operating system to determine whether or not the airport train operation system development is actually carried out, including, among others, an analysis of technical, economic and financial operational aspects. Analysis of the economic and financial aspects and the impact of the existence of airport train transportation needs to be done so that it can be seen whether the airport train operational planning will generate economic and financial benefits or on the contrary it will only harm and the activities in it.

1.1. Formulation Of The Problem
Based on the background description above, the problems in this Final Project are formulated as follows:
1. What is the feasibility of the Radin Inten II International Airport Train operating system?
2. What are the costs and benefits of the Radin Inten II International Airport Train?

1.2. Purpose
The purpose of writing this Final Project is as follows:
1. Knowing the feasibility of the Radin Inten II International Airport Train operating system.
2. Conduct a cost benefit analysis resulting from the operation of the Radin Inten II International Airport Train

2. General Description
We already know that the timeliness of the community in carrying out their daily activities is hampered by various factors. One of the factors is congestion. The congestion that occurs in the city of Bandar Lampung usually occurs in areas that serve public transportation, one of which is the Raden Inten II International Airport. The choice of transportation mode to reduce congestion from various modes of transportation is the train because the train is one of the modes of mass transportation which has several advantages over other modes of transportation.[14]

The analysis of the feasibility study is a fairly important initial stage of activities for airport railway development planning. The results of the feasibility study are recommendations regarding whether or not the project under study should be continued to the next stage.[8]

2.1. Transportation
The notion of transportation put forward by Nasution (1996: 50) is defined as the transfer of goods and people from their place of origin to their destination. So that with these activities, there are three things, namely the existence of cargo being transported, the availability of vehicles as means of transportation, and the presence of roads that can be traversed. The process of moving from the movement of the place of origin, where the transportation activity starts and to the destination where the activity ends. For this reason, with the transfer of goods and people, transportation is one of the sectors that can support economic activity (the promoting sector) and the service sector for economic development.[10]

2.2. Train.
A train is a means of transportation in the form of a vehicle with the power of movement, either on its own or in combination with other vehicles moving on the rails. Trains generally consist of locomotives[11]

Who is driven by a human being called a machinist with the help of a machine and a series of trains or carriages as a place for transporting goods and / or passengers. The train or carriage series is relatively large so that it is able to load passengers or goods on a large scale. Due to its nature as effective mass transportation, several countries have tried to make maximum use of it as the main means of land transportation both within cities, between cities, or between countries. According to Salim (2004) rail transportation is the provision of transportation services on rails to carry goods and passengers. Trains provide safety, comfortable and safe services for passengers.[16]
2.3. Airport Train
The operation of a rail transportation system for access to the airport originated from the construction of an airport that is far outside the city due to flight operational problems. This causes aircraft passenger service travel time to be even longer on the ground than air travel itself. Therefore, a transportation mode that connects the city center with an airport is needed that is fast, safe, comfortable, and provides various accessibility, namely the Airport Train (Airport rail link). Airport rail link is a passenger train that connects the airport with other city centers in an area that is still within the range of airport services. The aims and objectives of airport railway development include reducing the burden on parking areas in the airport area, encouraging the use of public transportation facilities, increasing accessibility from the airport to the city center and vice versa, and as an attraction for visiting tourists. [7]

2.4. Radin Inten II International Airport
The airport is located on Jalan Alamsyah Ratu Prawiranegara in Branti Raya Village, Natar District, South Lampung Regency, in the northwest of Bandar Lampung City. On March 8, 2019, this airport was inaugurated by the President of the Republic of Indonesia Joko Widodo to become an international airport. Decree of the Minister of Transportation of the Republic of Indonesia Number KP 2044 of 2018 concerning the Designation of Radin Inten II Airport in South Lampung Regency, Lampung Province as an International Airport. This airport is also targeted to become an international airport that accompanies Kualanamu International Airport, Medan.[10]

2.5. Feasibility Analysis
Project feasibility analysis is a study to assess projects that will be undertaken in order to assess future projects. The assessment here is nothing but giving a recommendation whether the project in question should be feasible if viewed from all kinds of related aspects or whether the project should be postponed first. Given that the future conditions are full of uncertain possibilities, the analysis carried out certainly covers various aspects and requires certain considerations in making a decision.[12]

2.6. Previous Research
In this study, the authors used previous research as a reference in knowing the financial feasibility of the Radin Intan II Airport train in South Lampung. In reviewing the previous research, the writer found research with the same title which became a reference was a thesis by Clara Virena Gustiana with the title Economic and Financial Feasibility Analysis of the Tanjung Karang-Radin Inten II Airport Train 2017. In this study it was calculated by planning the Radin Intan Airport Train II year 2017 where financially and economically this airport train is not feasible. Therefore an update in the calculations that the author will do to calculate

Financial feasibility is the renewal of airport train planning in 2021. To add references to the author for conducting research, there are several journals that the author refers to which can be selected in the table below.

3. Research methods
The analysis carried out in this study used several values that are commonly used as references in determining whether or not a project is feasible or not. The evaluation criteria in the financial analysis in this study are to estimate project costs, sensitivity analysis and analysis of technical, operational, economic and financial feasibility.

The values are Net Present Value (NPV), Internal Rate of Return, Profitability Index, Rolling Stock Cost (RSC), and Payback Period (PP).[1]

4. Results and Discussion
Data and assumptions are used to support the calculations and analysis in this study, along with the data used.

4.1. Number of Passengers
Data on the number of passengers on Radin Inten II International Airport can be seen in Table 4.1. The trend of increasing passenger numbers from 2014 to 2019 can be predicted using Microsoft Excel and used as a polynomial regression to obtain a projection of the number of passengers in the following year. From the analysis results in 2020 the increase in the number of passengers is predicted to be 2,662,931 people / year.
4.2. Passenger Transport Scenarios and Train Demand Projection

Furthermore, to find out how many passengers will use the special airport train simulated in three (3) scenarios, namely as follows:

- Optimistic scenario: airport train passengers are 70% of the total number of airplane passengers.
- Moderate scenario: airport train passengers 50% of the number of aircraft passengers.
- Pessimistic scenario: airport train passengers are 30% of the total number of airplane passengers.

4.3. Train Fares

The scenario for determining the tariff for the Radin Inten II International Airport Train - Tanjung Karang from the results of previous research will be a maximum rate of Rp. 30,000 - Rp. 60,000 with an analysis of Ability To Pay 90% and Willingness To Pay 60%. In this study, the train fare for Radin Inten II - Tanjung Karang Airport is Rp. 36,000.

4.4. Estimated Economic and Financial Costs

The following are the costs of procurement, operation, infrastructure maintenance, and airport train maintenance. Estimated total investment the construction of the Radin Inten II International Airport Train is Rp. 341,470,083,125.

4.5. Annual Fee

Annual costs are costs that must be incurred during the life of the project which are the total of operational and maintenance costs, investment loan costs and depreciation or depreciation costs.

4.6. Operational and Maintenance Costs

Operational and maintenance costs are calculated based on office operating costs, station heads, ticketing, controllers, train travel controllers, Head Office, allowances, train cleaning crew, use of diesel fuel (BBD), use of lubricating oil (oil) is estimated at Rp. 1,927,341,000 and maintenance costs Rp. 3,371,975,032 per year.
4.7 Depreciation
The depreciation calculation in this study uses the straight depreciation method by assuming that the contribution of fixed assets will contribute evenly throughout their useful life, so that fixed assets will experience the same decline in function from one period to another until the assets are not reused in annual operational activities. 

Airport Station Building: Rp. 50,627,713,571
Economical age: 45 years
Depreciation Rate: 2.22%
Depreciation: Depreciation Rate x Cost: Rp. 1,125,615,857

4.8 Investment Loan Interest Costs
The bank interest installments paid in the first year are Rp. 10,244,102,494. For the following year, the bank loan will be reduced and multiplied by an interest rate of 10% for the following year until the end of the predetermined loan year.

4.9 Estimation of Economic Benefits
The following is a calculation of the economic benefits:

4.9.1 Annual Time Cost Saved. In this calculation using Gross Regional Domestic Income in 6 regions, namely Tanjung Karang, Labuhan Ratu, Gedung Ratu, The trend of increasing GRDP from 2015 to 2019 can be predicted using Microsoft Excel. From the analysis results in 2020 the increase in GDP is predicted to be Rp. 70,466,334 per year.[2] The population of Bandar Lampung City based on data obtained from the Central Bureau of Statistics of Bandar Lampung City can be projected in the following year using Microsoft Excel. From the analysis results in 2021 the population increase is predicted to be 1,086,755 people. The total Time Value Savings yield for the first year is the first year.

4.9.2 (Savings BOK). From the calculation, it was found that the profit generated from the savings in BOK was IDR 2,571,295,607 / year.

4.9.3 Emission Saving Cost Saved. According to the HKSAR Transportation Bureau (2000), HSR can reduce air pollution by as much as 600 tons of NOx and 160,000 tons of CO2 for a 26 km long rail in Hong Kong. The average value of pollution storage in CO2 emissions and USD $ 7,741.10 per tonne of NOx (Maibach et al, 2007). Then the Emission Reduction Cost Savings is Rp. 744,529,401,000 first year [5]

4.9.4 Estimated Financial Benefit. In this financial feasibility analysis, the benefit aspect itself comes from how much return will be obtained through ticket sales (farebox) during the operational life of the Train.

Table 2 Scenario The Radin Inten II International Airport.

| No. | Scenario     | Number of Seats | Rates     | Return       |
|-----|--------------|-----------------|-----------|--------------|
| 1.  | Scenario 1   | 421             | Rp.36,000., | Rp. 15,156,000 |
| 2.  | Scenario 2   | 301             | Rp. 36,000., | Rp. 10,836,000 |
| 3.  | Scenario 3   | 181             | Rp. 36,000., | Rp. 5,516,000  |

4.9.5 Facility and Rental Fees. The assumptions used for the financial and economic analysis of this project are that there are several additional benefit costs, namely from advertising rental, space rental, fast lane service and other facilities.
### Table 3
The assumptions used for the financial and economic

| No | Facilities          | Total Revenue / Year |
|----|---------------------|----------------------|
| 1. | Room rental         | Rp. 995,230,677      |
| 2. | Advertisement       | Rp. 497,615,339      |
| 3. | Fast Lane Service   | Rp. 99,523,068       |
| 4. | Other Facilities    | Rp. 497,615,339      |

4.9.6 *Cash Flow*. Based on the calculations that have been done, 3 (three) scenarios were made based on the seat fill assumption. With the scenario assumptions carried out in this study can be seen in:

### Table 4. Scenarios were made based on the seat fill assumption.

| Scenario | KTD  | Bank Interest | Explanation         |
|----------|------|---------------|---------------------|
| Optimistic | 70%  | 5%            | *Share/Capital* (Investor) Loan |
| Modareta  | 50%  | 5%            | *Share/Capital* Loan |
| Pessimist | 30%  | 5%            | *Share/Capital* Loan |

4.10 *Technical Feasibility Analysis*

In this technical analysis discusses several technical aspects of the construction of the Radin Inten II International Airport Train project. Technical aspects discussed included land use plans, construction of new stations, placement of schedules given to airport train schedules, and drafting of drafts on existing rail lines.

4.10.1 *Land Use Plan*. The plan to build an airport train station will be built right in front of the airport and a sky bridge will be built for the crossing between the station to the airport, because in front of the airport there is an existing line, which already exists, which often passes by babaranjang and passenger trains. If land acquisition in the area around station construction can be carried out, the airport train operating system can be feasible to operate. However, until now, land acquisition is still being reviewed with PT KAI because the area belongs to residents.[14]

4.10.2 *Placement of Airport Train Schedule*. From Figure 1. It can be seen that the existing (existing) railroad crossing capacity is no longer possible for airport trains to cross. This is due to the already busy movement of freight and passenger trains on the existing (existing) line. If the airport train is still forced to operate using the existing line, there will be a change in the schedule for all train movements, which results in not maximizing the freight and passenger train services. In order for freight and passenger train services to remain maximum, airport train travel requires a special route that only serves aircraft passengers traveling at Radin Inten II Airport, South Lampung.
4.10.3. Addition Of Money Orders. From previous research, Bekri emplacement on the Tanjung Karang - Kotabumi route is the route that the airport train will pass in the form of making long siding to support the crossing safely and the train travel time is fulfilled and on time. The Bekri emplacement construction has a planned track with an axle pressure of 18 tons, a design speed of 100 km / hour, and a track width of 1067 mm.

| No | Technical Indicators | Explanation |
|----|----------------------|-------------|
| 1  | There is Land Acquisition for Sky Bridge Development | ✓ |
| 2  | There is a new station construction | ✓ |
| 3  | Placement of the Schedule Given for Airport Train Schedules | - |
| 4  | The existence of making money orders on the existing line | ✓ |

Airport trains will be built if the four indicators in Table 5 are available. If seen from the existing condition, the airport train is not technically feasible to operate because from the scheduling indicator if using the existing existing line it will interfere with the train schedules that are already operating.

4.11 Operational Feasibility Analysis
Operational feasibility is seen from the supply of trains that will be used for airport train operations. In this analysis an airport train is available to carry out airport train operations.

The results of the analysis show that based on the comparison of the total cash flow value, it will be feasible to operate if the situation occurs in the Optimistic Scenario because the positive NPV is Rp. 1,137,915,241,121 and an IRR of 11.78% and the Moderate Scenario because the positive NPV is Rp. 529,684,187,811 and an IRR of 9.553%.

4.12 Economic and Financial Feasibility Analysis
Based on the table above, it can be seen that the economic indicator for the rate of return on the Internal Rate of Return (IRR) for the optimistic scenario is 20.97%, the moderate scenario is 21.04%, and the pessimistic scenario is 21.03%. This proves the description that the construction of an airport train operating system has contributed quite well to the performance of transportation in the city of Bandar Lampung. The calculation results of the economic feasibility analysis of the Tanjung Karang Airport - Airport train can be seen in the attachment.
Of the three scenarios in Table 4.12, it shows that the optimistic scenario and the moderate scenario meet the eligibility requirements for investment, the worst condition is shown in the pessimistic scenario with 30% KTD, the BI Rate used 5% per year, the resulting internal rate of return is 0.744%. and negative NPV of Rp. 26,249,288,761. For the calculation of the Payback Period in this scenario the time to get back is less than the economic age of the building. From the results obtained, it is clear that the feasibility study on the construction of an airport train is feasible when viewed from a financial aspect in an optimistic scenario. Meanwhile, if it occurs in a moderate and pessimistic scenario, Airport Train is not financially feasible. For further studies related to the calculation of benefits other than the main income from tickets, the main income from tickets is calculated, the income from cooperation is calculated for the ships, sponsors and others.

In this study, the economic benefits are only calculated from the savings in vehicle operating costs (BOK) of private vehicles that switch to fireworks and generate substantial profits. It is hoped that there will be further research on the effect of other economic benefits such as savings in road repairs, benefits from reduced accident rates, benefits from reduced air pollution generated by motorized vehicles and many other social benefits that also have a considerable effect.

4.13 Sensitivity Analysis

Sensitivity analysis is carried out by changing the value of a variable to see how it affects investment. The variables that are changed in this final project are ticket price and concession period.

Based on Table 4:13, it can be seen how it affects the rate of return of the Internal Rate of Return (IRR) interest for the ticket price of Rp. 25,000 is 5.60% in the optimistic scenario with a concession age of 75 years, for a ticket price of Rp. 36,000 is 8.15% in the optimistic scenario, the concession age is 75 years, while the ticket price is Rp. 50,000 is 9.14% in the optimistic scenario, the concession age is 75 years. This proves that the airport train operating system development project is more sensitive to the concession period than the ticket price. The following Table 4.13. the results of the sensitivity analysis of tickets and concession periods.

5. Conclusion

After analyzing the technical aspects, operational aspects, and economic and financial aspects described in chapter 4, conclusions can be drawn:

1. From a technical point of view, planning for the development of the Radin Inten II International Airport Train in South Lampung is feasible when viewed from the land use planning, station construction and drafting of money orders. Meanwhile, when viewed from the aspect of scheduling placement using the existing train route it is not feasible because it will disrupt the movement of existing freight and passenger trains. Meanwhile, from the operational planning of the Radin Inten II International Airport Train, South Lampung, it is feasible to operate in the credit payment period. Of the three scenarios that have been analyzed, only two are feasible scenarios, namely the Optimistic Scenario and the Moderate Scenario.

2. Based on the calculation and analysis of economic feasibility, the project is declared to be economically feasible because it meets the eligibility requirements for NPV> 0 and the IRR value is greater than the current interest rate. While the financial

6. Recommendation

Referring to the results and discussion of this analysis, suggestions that can be given are as follows:

1. There needs to be a further study related to a feasibility study regarding the Radin Inten II International Airport Train - Tanjung Karang.

2. To maximize the operation of the Radin Inten II South Lampung International Airport Train, the participation of the government is needed to help develop other supporting facilities so that the Radin Inten II International Airport Train can be carried out properly.
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