Investment Analysis for Replacement Premium Economy Trains into Executive Trains of Argo Parahyangan A Case Study of PT Kereta Api Indonesia (Persero)

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Abstract. This research will explore the financial feasibility of the investment plan for replacing the premium economy train into an executive train. Financial feasibility analysis is carried out by several methods such as incremental cash flow projection, financial feasibility based on the free cash flow to the project, financial feasibility based on free cash flow to equity and sensitivity analysis. Based on free cash flow to the project, the NPV is IDR 225 Billion the IRR is 45.27% (greater than WACC = 17.32%), and the payback period is 3.13 years. On the other hand, based on free cash flow to equity, the NPV is IDR 66 Billion the IRR is 85.15% (higher than the cost of equity = 36.72%), and the payback period is 1.94 years. So that from the results of the analysis, it can be obtained that the premium economy train replacement project becomes an executive train for Argo Parahyangan financially feasible.

Keyword: investment analysis, replacement project, financial feasibility, incremental cash flow

1. Introduction

PT Kereta Api Indonesia (Persero), well known as KAI, is the biggest state-owned company that provides railway transportation services. KAI's railway transportation services are in high demand by passengers. KAI can provide safe, effective, on time and comfortable mass transportation services, as well as to meet basic human needs to facilitate and accommodate the social and economic activities. The role of KAI in providing railway transportation services to transport passengers and goods from one place to another can have a significant impact on economic development and can encourage the occurrence of multiplier effects for users and surrounding communities. During the last seven years, the total passengers of railway services have increased steadily, shown in Figure 1.1. In 2017, there are more than 393 billion people use railway services in Indonesia. This number is rising by more than 10% from the previous year. This condition is quite promising for KAI to continue developing its business, especially in the passenger transportation segment.

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The passengers have some reasons in determining the transportation mode that will be chosen, among them, are safety, services, comfort, the condition of transportation facilities, cost, distance, flexibility, speed, pollution and so on. Compared to other modes of transportation, railway has several advantages including being able to transport a large number of passengers, using specific track so that the safety and compliance of time can be guaranteed, not too affected by weather conditions, more energy-efficient and environmentally friendly [1].

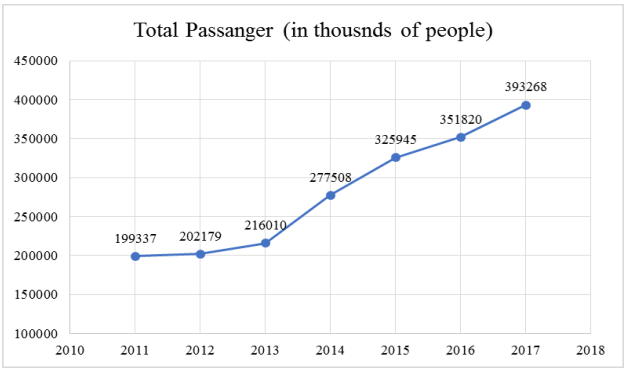

Figure 1. Total Passenger of Railway Transportation in Indonesia

Among all passenger transport services, Argo Parahyangan has the highest frequency for Bandung – Gambir and Gambir – Bandung route. At this time, Argo Parahyanagan can be operated with a maximum of 34 frequencies and with an average occupancy rate of 82.50% per day. The revenue gained by KAI from Argo Parahyangan also continues to increase every year. From 2014 to 2017 the average growth rate of Argo Parahyangan's revenue per year is 47.76%. At the end of November 2018, Argo Parahyangan's revenue reached 435.21 billion rupiahs. It grows 77.34% of the total revenue in 2017 [2]. The increase of Argo Prahyangan's performance in terms of frequency, occupancy and income are affected by the declining interest of passengers to use modes of transportation that pass Jakarta-Cikampek Toll Road, due to congestion that often occurs on the toll road.

Table 1. Five Toll Roads with the Highest Traffic Volume in 2017

No.	Toll Road	Traffic Volume (Vehicle)
1	Jakarta –Cikampek	205,111,304
2	Jakarta - Bogor - Ciawi	188,758,759
3	Jakarta – Tangerang	133,042,272
4	Cawang - Tomang - Pluit	117,861,778
5	Surabaya - Gempol	102,390,959

Jakarta-Cikampek Toll Road is one of the toll roads with the highest traffic volume in Indonesia. In 2017, Jakarta-Cikampek occupied the first position among the four toll roads with the highest traffic volume in Indonesia such as Jakarta-Bogor-Ciawi Toll Road, Jakarta-Tangerang Toll Road, Cawang-Tomang-Pluit Toll Road and Surabaya-Gempol Toll Road[3]. Based on Figure 1.4, the traffic volume of Jakarta - Cikampek Toll Road continues to increase from 2013 to 2016 with an average growth of 3.38 % per year. However, in 2017, the traffic volume of Jakarta – Cikampek Toll Road has decreased significantly. The decreasing in traffic

volume of Jakarta – Cikampek from 2016 to 2017 reached 6.99% with a decrease in the number of vehicles up to 15,457,267 vehicles [4].

Figure 2. Total Traffic Volume of Jakarta-Cikampek Toll Road in 2013-2017

To overcome the high traffic volume on the Jakarta-Cikampek Toll Road and to improve connectivity between the DKI Jakarta and West Java province, the government has launched the project of Jakarta-Cikampek II Elevated Toll Road. This project is included in one of the national strategic projects in the category of toll road infrastructure development projects. At this time the project is still under construction. The construction is using the concept of overpass toll road which spans from Cikunir to Karawang Barat along 36.84 km. This project is planned to be built for 24 months, and it is estimated to be completed in April 2019 [5]. The maps of Jakarta – Cikampek II Elevated toll road plan can be seen in Figure 1.3.

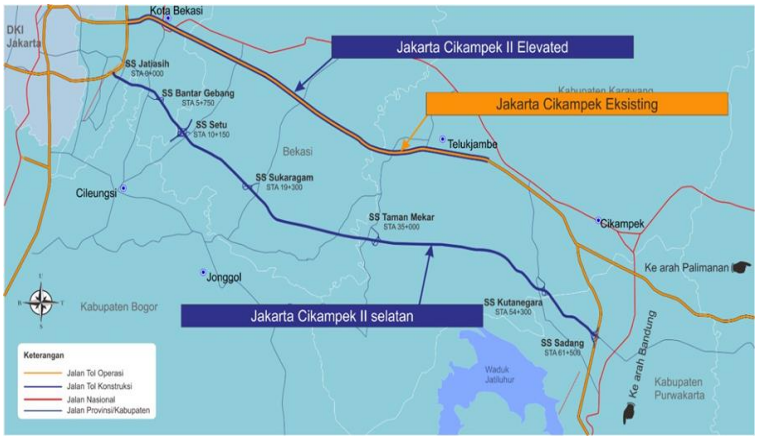

Figure 3. Maps of Jakarta-Cikampek II Elevated Toll Road Development Plan

The operation of Jakarta-Cikampek II Elevated toll road is not only expected to reduce the congestion in the existing Jakarta-Cikampek toll road, but it is also feared that it will impact the continuity of the KAI business in Argo Parahyangan services. To anticipate the decline in the Argo Parahyangan train occupancy rate as a result of the operation of Jakarta-Cikampek II Elevated toll road, management is preparing strategies for improving services provided to passengers through Argo Parahyangan. So by increasing service to passengers during the trip,

passengers are expected to remain loyal to choose Argo Parahyangan as a transportation mode for Jakarta-Bandung and Bandung-Jakarta routes.

2. Business Issue Exploration

2.1 Conceptual Framework

This research was conducted by referring to the conceptual framework in Figure 4. The research is started with the identification of business issues, that is financial feasibility for replacing premium economy trains into executive trains of Argo Parahyangan. Furthermore, the business situation analysis is carried out by using SWOT Analysis to identify the internal and external condition which affects the business of Argo Parahyangan based on strengths, weaknesses, opportunities, and threats. After analyzed the business situation, then the business solution analysis is conducted to get the conclusion, by analyzing the proposed replacement project, incremental cash flow projection, and financial feasibility assessment.

Figure 4. Conceptual Framework

2.2 Business Situation Analysis

In conducting a business situation analysis will be identified based on strengths, weaknesses, opportunities and threats, especially those relating to the business of Argo Parahyangan. Strength, Weakness, Opportunity, Threat (SWOT) analysis is a method commonly used for strategic planning [6]. This method can be used to derive strategies for comparing the internal (strength and weakness) and external (opportunities and threats) forces of the organization [7]. The SWOT analysis can help the organization to get the insight of internal and external business environment that can be used to formulate the strategic plans or decisions by analyzing the organization's resources, capabilities and business environment in four regions namely strengths, weakness, and threats [8]. A resume of the SWOT analysis results can be seen in Table 2.6.

From several analyzes that have been carried out in the previous section, it can be identified that KAI has the main strengths in running the Argo Parahyangan service business. The first is that KAI can provide Jakarta-Bandung and Bandung-Jakarta routes that guarantee safety, punctuality, service, and comfort to passengers.The second is Argo Parahyangan operated with the latest rolling stock conditions that are reliable and can provide passenger comfort during the trip. Whereas the weaknesses possessed by KAI for the first is KAI being unable to increase the frequency of Argo Parahyangan due to infrastructure conditions such as

single track conditions in several segments of the Purwakarta-Bandung railroads, limited platform capacity in some stations and the limitations of the stabling line at Bandung station. For the second weakness is that the average travel time for Argo Parahyangan train is more than three hours.

STRENGTHS	WEAKNESSES
▪ Kai has the capability to provide railway transportation services for the Jakarta-Bandung and Bandung-Jakarta routes that guarantee safety, punctuality, service, and comfort to passengers. ▪ Argo Parahyangan is operated with the latest reliable rolling stocks.	▪ KAI cannot increase the frequency of Argo Parahyangan due to the limitations of the KAI infrastructure conditions. ▪ The average travel time for Argo Parahyangan train is more than three hours.
OPPORTUNITIES	**THREATS**
▪ The number of passengers of Argo Parahyangan has continued to increase in the past five years. ▪ Manggarai-Cikarang's double-double track project is expected to have an impact on the smooth operation of Argo Parahyangan so that travel time can be accelerated.	▪ The operation of the Jakarta-Cikampek II Elevated Toll. ▪ The shifting of interest in Argo Parahyangan passengers to other modes of transportation such as shuttle travel.

Figure 5. SWOT Analysis of Argo Parahyangan

Furthermore in terms of external KAI, has been identified opportunities and threats related to the business continuity of Argo Parahyangan. For the opportunities, there are two main factors. The first is the number of passengers of Argo Parahyangan which has continued to increase over the past five years shows that the demand for rail transport passengers in Jakarta-Bandung and Bandung-Jakarta is very high. The second is Manggarai-Cikarang's Double-Double Track project is expected to have an impact on the fluency operation of Argo Parahyangan so that the travel time of Argo Parahyangan can be accelerated. On the other hand, in terms of threats, some threats can negatively affect the continuity of the Argo Parahyangan business. The first is the operation of the Jakarta-Cikampek II Elevated Toll which can have an impact on the passenger volume of Argo Parahyangan. The second threat is the shifting in the interest of Argo Parahyangan passengers to other modes of transportation such as shuttle travel.

2.3 Literature Review

2.3.1 Replacement Project

The replacement project is an investment strategy that can be applied by a company to replace the old asset with the new one for some purpose such as continuing the operations of an existing business or supporting an existing business to maintain the current profit that has been obtained [9]. Replacement strategy can also be applied when the company faces uncertainty, implicitly or explicitly [10].

2.3.2 Incremental Cash Flow

In term of capital budgeting, there is a difference in conducting a cash flow assessment between the replacement project and the expansion project. Assessing cash flow for a replacement project is more complicated compared with assessing cash flow for the expansion

project. Incremental cash flow approach (new versus old) is commonly used in the analysis of replacement projects [11]. For replacement project, incremental cash outflows and inflows must be identified which will be generated from the replacement of assets that have been proposed. Incremental operating cash flow can be calculated by determining the difference between the operating cash flow from the proposed project and the operating cash flow from the present project [12].

2.3.3 Investment Decision Criteria

The financial feasibility of the project will be assessed based on three decision criteria namely Net Present value (NPV), Internal Rate of Return (IRR) and Payback Period (PP). These three criteria are generally used to determine the financial performance of an investment project [13].

a) Net Present Value

Net Present Value (NPV) is the cumulative present value of all incremental cash flows, discounted to the present and less with the initial investment value. If NPV is positive, it means that the project is profitable. Otherwise, it is unprofitable [14]. NPV can be calculated using the following equation[15].

$$\mathrm{NPV} = -\mathrm{C}_0 + \frac{\mathrm{C}_1}{(1+\mathrm{r})^1} + \cdots + \frac{\mathrm{C}_\mathrm{T}}{(1+\mathrm{r})^\mathrm{T}}$$

Where:
NPV = net present value (IDR)
C_0 = initial investments (IDR)
r = discount rate (%)
C_t = periodic cash flows in periods t = 1, ..., T.

b) Internal Rate of Return

Internal Rate of Return (IRR) is the rate of return on a project that results in NPV of all cash flows equal to zero [16]. The project is feasible if the IRR value is more than the required rate of return. Otherwise, if the IRR value is less than the required rate of return, the project is not feasible. IRR can be calculated using the following equation [17].

$$\mathrm{NPV} = -\mathrm{C}_0 + \frac{\mathrm{C}_1}{(1+\mathrm{IRR})^1} + \cdots + \frac{\mathrm{C}_\mathrm{T}}{(1+\mathrm{IRR})^\mathrm{T}} = 0$$

Where:
NPV = net present value (IDR)
C_0 = initial investments (IDR)
IRR = internal rate of return (%)
C_t = periodic cash flows in periods t = 1, ..., T.

c) Payback Period

Payback Period (PP) shows the number of years in which the project costs have reached break-even [18]. PP can also be interpreted as a time needed to recover the initial investment of a project from future incremental cash flow. For assessing the feasibility of an investment

project, the PP rule states that a project should be accepted if its PP is less than some specified cutoff period [17].

2.3.4 WACC

Weighted Average Cost of Capital (WACC) is the discount rate used for investment projects that are funded by debt and equity [19]. WACC describes the company expected rate of return derived from a combination of weighted average cost of debt and the weighted average cost of equity. The after-tax WACC can be formulated as follows [17]:

$$\text{WACC} = W_d \text{ x } K_d \text{ x } (1 - \text{Tax rate}) + W_e \text{ x } K_e$$

Where:
WACC = weighted average cost of capital (%)
W_d = weight of debt (%)
K_d = cost of debt (%)
W_e = weight of equity (%)
K_e = cost of equity (%)

In this research, the value of the bank interest rate is used as the cost of debt, while the value of the cost of equity will be calculated using the following formula:

$$K_e = R_f + \beta \text{ x } (R_m - R_f)$$

Where:
K_e = cost of equity (%)
R_f = risk-free rate (%)
β = beta coefficient
$(R_m\text{-}R_f)$ = market risk premium (%)

In this research, the risk-free rate will be using Indonesian Government Bond Yield value of 10 years.For the equity risk premium will be using country risk premium of Indonesia.Furthermore, beta coefficient values will be calculated using the beta leverage formula as follows:

$$\beta_{\text{leverage}} = \beta_{\text{unleverage}} \text{ x } \left[1 + (1 - \text{tax rate}) \text{ x } \frac{\text{debt}}{\text{equity}}\right]$$

3. Business Solution

3.1 Proposed Project Investment

To analyze the replacement plan must be reviewed the existing trainset operated for the Argo Parahyangan. From the ten trainsets used for Argo Parahyangan operations, there are six trainsets which are used specifically for the Argo Parahyangan which can be seen in Table 3.3.

Table 2. Original Trainset of Argo Parahyangan

Trainset Number	Trainset Formation	Number of Frequency	Number of Economy Train
1	5K1 + 4K3 + 1MP	5	4
2	5K1 + 4K3 + 1MP	5	4

3	**8K3 + 1MP**	**4**	**8**
4	8K1 + 1M + 1P	4	-
5	**5K1 + 4K3 + 1MP**	**4**	**4**
6	8K1 + 1M + 1P	4	-

From six trainsets contained in Table 2, two trainsets have been operated with all executive classes, while the other four trainsets are still operated with premium economy class. Trainset number three is the only Argo Parahyangan trainset that is operated with all premium economy classes consisting of eight trains. To review the sales policy of Argo Parahyangan with all executive classes, incremental cash flow analysis of investment between the proposed project and the existing project is needed to know whether replacing premium economy class with executive class is a right decision for KAI to give the additional value for the business continuity of Argo Parahyangan.

3.2 Incremental Analysis

Incremental analysis is used to determine the incremental cash flow between the proposed project and the existing project. Before calculating incremental cash flow, an incremental net income calculation is required. Incremental net income is calculated based on the difference between net income value of the proposed project and net income value of the existing project. Table 3 shows the results of incremental net income calculations from 2020 to 2014.

Table 3. Incremental Net Income (in Million)

INCOME STATEMENT	2020	2021	2022	2023	2024
Proposed Project					
Revenue	232,062	239,410	247,668	256,210	265,772
(-) Expenses	(113,059)	(116,694)	(120,719)	(124,883)	(129,482)
EBITDA	119,004	122,716	126,948	131,327	136,290
(-) Depreciation and amortization	(4,366)	(4,366)	(4,366)	(4,366)	(4,366)
EBIT	114,638	118,350	122,583	126,961	131,925
(-) Interest Expense	(9,060)	(7,447)	(5,637)	(3,608)	(1,333)
EBT	105,578	110,904	116,946	123,353	130,591
(-) Tax (@25%) 25%	(26,394)	(27,726)	(29,236)	(30,838)	(32,648)
Net Profit	**79,183**	**83,178**	**87,709**	**92,515**	**97,944**
INCOME STATEMENT	**2020**	**2021**	**2022**	**2023**	**2024**
Existing Project					
Revenue	197,544	203,798	210,827	218,099	226,239
(-) Expenses	(109,903)	(113,430)	(117,342)	(121,389)	(125,868)
EBITDA	87,641	90,369	93,485	96,710	100,371
(-) Depreciation and amortization	(551)	(551)	(551)	(551)	(551)
EBT	87,090	89,818	92,935	96,159	99,821
(-) Tax (@25%) 25%	(21,772)	(22,454)	(23,234)	(24,040)	(24,955)
Net Profit	**65,317**	**67,363**	**69,701**	**72,119**	**74,865**
INCREMENTAL NET INCOME	**13,866**	**15,814**	**18,008**	**20,396**	**23,078**

3.3 WACC Calculation

WACC will be used to calculate discounted free cash flow to the project used to assess project feasibility parameters.In this part, the calculation of WACC is started with the calculation of beta leverage. To calculate the beta leverage is required the value of beta

unleveraged, tax rate, the portion of debt and portion of equity for the proposed investment project. The value of beta leverage for the railroad transportation industry is 1.24 [20], tax rate at 25%, the debt portion of the project is 69.06%, and the equity portion is 30.94%.

$$\beta_{\text{leverage}} = \beta_{\text{unleverage}} \text{ x } \left[1 + (1 - \text{tax rate}) \text{ x } \frac{\text{Debt}}{\text{Equity}}\right]$$
$$\beta_{\text{leverage}} = 1.24 \text{ x } \left[1 + (1 - 25\%) \text{ x } \frac{69.06\%}{30.94\%}\right]$$
$$\beta_{\text{leverage}} = 3.32$$

From the calculation above, the value of Beta leverage is 3.32. Then, we need to calculate the cost of equity. To calculate the cost of equity is required the value of risk-free rate and market risk premium. For the risk-free rate, the author uses the Indonesian Government Bond Yield value of 10 years, that is 8.19% [21] while the market risk premium is equal to 8.6% [22].

$$\text{Ke} = \text{Rf} + (\text{Rm} - \text{Rf}) \text{ x } \beta$$
$$\text{Ke} = 8.19\% + (8.6\%) \text{ x } 3.32$$
$$\text{Ke} = 36.72\%$$

From the calculation above, the cost of equity for the project is 36.72%. After obtaining the cost of equity value continued with the calculation of WACC by using the value of the cost of debt at 11.5%.

$$\text{WACC} = [\text{Wd x Kd x } (1 - \text{tax rate})] \text{ x } [\text{We x Ke}]$$
$$\text{WACC} = [69.06\% \text{ x } 11.50\% \text{ x } (1 - 25\%)] \text{ x } [30.94\% \text{ x } 36.72\%]$$
$$\text{WACC} = 17.32\%$$

Based on the results of the calculations, the WACC value is 17.32%. This value will be used for the discount rate for the calculation of free cash flow to the project in the next section.

3.3 Investment Decision Criteria

The financial feasibility will be assessed based on free cash flow to the project and free cash flow to equity. Free cash flow to the project is used to analyze the financial feasibility based on investment funds that come from companies and bank that provide loans for project funding. Whereas free cash flow to equity is only used to analyze the financial feasibility based on investment funds that have been issued by the company towards the proposed investment project.

Calculation of free cash flow to the project is obtained from incremental EBITDA proposed projects and existing projects reduced by incremental taxes proposed projects and existing projects. Based on the results of free cash flow to project calculation shown in Table 3.14, the NPV of the project is IDR 225,803,694,115. IRR of the project is 45.27% (higher than the WACC) and the payback period of the project is 3.13 years. So based on the investment feasibility parameters that are reviewed from free cash flow to the project, the investment of the proposed project is feasible. The complete calculation of free cash flow to the project will be shown in Appendix 7.

Table 4. Free Cash Flow to Project

No	DESCRIPTION	2019	2020	2021	2022	2023
1	Component Free Cash Flow					
a	EBITDA		31,363,079,061	32,347,224,975	33,462,880,764	34,617,015,522
b	Taxes		(4,621,986,167)	(5,271,471,504)	(6,002,756,248)	(6,798,514,912)
c	Operating Cash Flow (a+b)		26,741,092,894	27,075,753,470	27,460,124,516	27,818,500,610
d	Investment Cost and CAPEX	(122,732,595,000)	-	-	-	-
2	Free Cash Flow to Project	(122,732,595,000)	53,482,185,787	54,151,506,941	54,920,249,033	55,637,001,219
3	Discounted Free Cash Flow to Project	(122,732,595,000)	45,587,392,768	39,344,294,271	34,012,559,707	29,370,148,315
4	Accumulated Free Cash Flow to Project	(122,732,595,000)	(69,250,409,213)	(15,098,902,272)	39,821,346,761	95,458,347,980
5	Cumulative Discounted Cash Flow to Proje	(122,732,595,000)	(77,145,202,232)	(37,800,907,961)	(3,788,348,254)	25,581,800,061
6	**IRR**	**45.27%**				
7	**WACC**	**17.32%**				
8	**NPV**	**225,803,694,115**				
9	**Payback Period**	**3.13**				

Table 5. Free Cash Flow to Equity

Free Cash Flow to Equity			1	2	3	4
No	DESCRIPTION	2019	2020	2021	2022	2023
1	Component Free Cash Flow					
a	Free Cash Flow to Project	(122,732,595,000)	53,482,185,787	54,151,506,941	54,920,249,033	55,637,001,219
b	Bank Loan	84,759,500,000				
c	Repayment of Bank Loan Principal		(13,308,629,194)	(14,922,424,628)	(16,731,907,813)	(18,760,807,713)
d	Payment of Bank Loan Interest		(9,060,359,664)	(7,446,564,229)	(5,637,081,044)	(3,608,181,145)
e	Payment of Provision	(847,595,000)				
2	Free Cash Flow to Equity	(38,820,690,000)	31,113,196,930	31,782,518,083	32,551,260,175	33,268,012,362
3	Discounted Free Cash Flow to Equity	(38,820,690,000)	22,756,645,976	17,002,607,666	12,736,750,825	9,520,972,612
4	Accumulated Free Cash Flow to Equity	(38,820,690,000)	(7,707,493,070)	24,075,025,013	56,626,285,188	89,894,297,550
5	Cumulative Discounted Cash Flow to Equit	(38,820,690,000)	(16,064,044,024)	938,563,642	13,675,314,467	23,196,287,079
6	**IRR**	**85.15%**				
7	**Cost of Equity**	**36.72%**				
8	**NPV**	**66,242,274,202**				
9	**Payback Period**	**1.94**				

Furthermore, based on the calculation results of free cash flow to equity shown in Table 3.15, NPV is IDR 66,242,272,202. The IRR is 85.15% (higher than the cost of equity) and the payback period of the project is 1,94 years. Based on the results of the feasibility decision criteria for the free cash flow to equity the project is feasible.

4. Conclusion

Based on the analysis of the business situation as well as the business solution, the conclusions can be taken the project of replacement premium economy trains to executive trains of Argo Parahyangan is financially feasible both based on free cash flow to the project and free cash flow to equity. Based on free cash flow to the project, the NPV is IDR 225,803,694,115, the IRR is 45.27% (higher than WACC = 17.32%), and the payback period is 3.13 years. On the other hand, based on free cash flow to equity, the NPV is 66,242,272,202, the IRR is 85.15% (higher than the cost of equity = 36.72%), and the payback period is 1,94 years. So that replacing premium economy trains into executive trains of Argo Parahyangan is financially feasible.

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