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Business Design of Public Electric Vehicle Charging Stations for Trans Java Cikampek – Surabaya Toll With The Dynamic System Approach

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ABSTRACT

Government support through Presidential Regulation No. 55 of 2019 concerning the Acceleration of the Battery-Based Electric Motor Vehicle Program for Road Transportation and the Ministry of Energy and Mineral Resources which has issued Ministerial Regulation No. 13 of 2020 concerning the Provision of Electric Charging Infrastructure for Battery-Based Electric Motorized Vehicles. The Ministerial Regulation explains that the government aims to accelerate the battery-based Electric Motorized Vehicle (KBL) program. This regulates the electric charging facility for KBL.The Public Electric Vehicle Charging Station (SPKLU) is a business opportunity that can provide benefits for producers and national business entrepreneurs. This study reviews the business opportunities for public electric vehicle charging stations, especially on the Trans Java Cikampek Surabaya Toll Road, using a dynamic system approach. Several reviews were also discussed which included emission conversions, business schemes, financial analysis, and investment values. In this paper, there isan option for placing the SPKLU on the Trans Java Cikampek – Surabaya 54 rest area as a business opportunity for business actors to invest in SPKLU.Financial analysis regarding the feasibility of SPKLU investment, can provide investment certainty regarding the business model of providing SPKLU with the Ultra Fast Charging Out Door type.

***Keywords:**. SPKLU, system, dynamic, vehicle, electricity*

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ABSTRACT

Dukungan Pemerintah melalui Peraturan Presiden No. 55 Tahun 2019 tentang Percepatan Program Kendaraan Bermotor Listrik Berbasis Baterai Untuk Angkutan Jalan dan Kementerian ESDM yang telah menerbitkan Peraturan Menteri No. 13 Tahun 2020 tentang Penyediaan Infrastruktur Pengisian Tenaga Listrik untuk Kendaraan Bermotor Listrik Berbasis Baterai. Peraturan Menteri tersebut menjelaskan bahwa pemerintah bertujuan untuk mempercepat program Kendaraan Bermotor Listrik (KBL) berbasis baterai. Hal ini mengatur fasilitas pengisian listrik untuk KBL. Stasiun Pengisian Kendaraan Listrik Umum (SPKLU) merupakan peluang bisnis yang dapat memberikan keuntungan bagi produsen dan pelaku usaha nasional. Kajian ini mengkaji peluang bisnis stasiun pengisian kendaraan listrik umum khususnya di Tol Trans Jawa Cikampek Surabaya dengan menggunakan pendekatan sistem dinamis. Beberapa kajian juga dibahas yang meliputi konversi emisi, skema bisnis, analisis keuangan, dan nilai investasi. Dalam tulisan ini terdapat opsi penempatan SPKLU pada rest area Trans Jawa Cikampek – Surabaya 54 sebagai peluang usaha bagi pelaku usaha untuk berinvestasi pada SPKLU. Analisis keuangan mengenai kelayakan investasi SPKLU, dapat memberikan kepastian investasi terkait model bisnis penyediaan SPKLU dengan tipe Ultra Fast Charging Out Door.

***Kata kunci*:. SPKLU, sistem, dinamis, kendaraan, kelistrikan**

INTRODUCTION

Electric vehicles are starting to be in great demand and are being discussed by the public, besides that the Government also supports it based on Presidential Regulation Number 55 of 2019 concerning Reducing the Use of Electric-Based Vehicles for Transportation. The Ministry of Energy and Mineral Resources has issued Permen No. 13 of 2020 concerning the availability of Electric Battery-Based Electric Motorized Vehicle Infrastructure. Ber candythe purpose of testing the performance of the KBL (Electric Motor Vehicles) program. This discussion covers the facilities for the special KBL register building, the business model for the special KBL register building, the electricity tariff for the special KBL register building, and the infrastructure standards for the special KBL register building. Charging the energy needed for an electric car is 4-5 hours until the battery is full, but it also takes 17 hours to charge energy from 0% -100%. In Indonesia, there are now 122 stations for charging electric cars spread across 83 locations such as DKI Jakarta, Tangerang, West Java, Bali, Central Java, DI Yogyakarta and Surabaya. The Public Electric Vehicle Charging Station (SPKLU) is one of the business opportunities that can provide benefits for manufacturers and national business entrepreneurs. According to Ministerial Regulation No. 13/2020, "Entrepreneurs or Business Entities engaged in the provision of SPKLUs are required to invest or have SPKLUs whose business locations are in more than one province so that they can carry out the battery-based KBL program properly". For integrated IUPTL holders, the SPKLU business scheme can be POSO (Provider, Owner, Self Operated), POPO (Provider, Owner, Privately Operated), PPOO (Provider, Privately Owned, & Operated), PLSO (Provider, Lease, Self Operated) , PLPO (Provider, Lease, Privately Operated). In contrast, SPBKLU is a Public Electric Vehicle Battery Exchange Station, where the business license is in accordance with existing regulations or laws, where a permit from the agency does not require an IUPTL. The SPBKLU operational structure can be either a BPCO (Battery Provider, Cabinet Owner) or a BPCL (Battery Provider, Cabinet Lease). Related to tariff setting electricity for providers of SPBKLU, SPKLU, and facilities for making private lists that are used for list maker prices with the minimum tariff for PLN in the bulk tariff category using the Q multiplier formula, where the amount used is a minimum of 0.8 and a maximum of 2. Application of the multiplier factor or formula Q is required for IUPTL holders who are integrated with their business. In addition to the standard fare for public transport, owners of private electrical installations will be charged according to the applicable tariff schedule. SectionThe Cikampek - Surabaya Toll Road is 615 km long, consists of 12 sections, and has 54 Rest Areas. Trans Java Cikampek - Surabaya Toll Road has the potential to invest in the availability of SPKLU infrastructure. In this regard, a business plan is needed regarding the provision of battery-based electric vehicle charging infrastructure such as SPKLU which uses the Trans Java Cikampek-Surabaya Toll Road. The economic side of the provision of SPKLU will be discussed in general based on Minister of Energy and Mineral Resources Decree No. 55 of 2019.

METHOD

This research was conducted in several stages, namely in the pre-research stage data collection was carried out on literature studies taken from books, websites and academic journals. This literature study can be used as a basis for determining the basic SPKLU design on the Trans Java Toll Road Section Cikampek – Surabaya. Subsequent data collection was carried out by field surveys to determine the location and obtain radiation values for determining the development of the SPKLU and its placement point. In this research used Stella 9.13 software to calculate the feasibility simulation of SPKLU on the Trans Java Cikampek - Surabaya toll road with the BOO and BOT schemes.

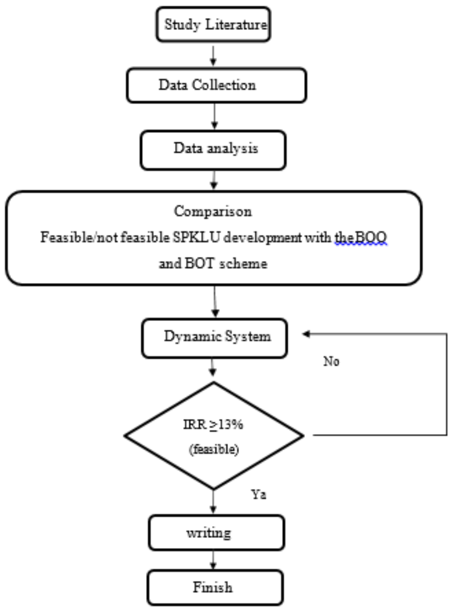

Figure 1. Research Flowchart

RESULTS AND DISCUSSION

Map of the Cikampek-Surabaya Trans Java Toll Road

There are 10 toll roads on the Cikampek-Surabaya toll road, such as the Cikampek-Palimanan toll road with an area of 892 Ha, the Kanci-Pejagan toll road with an area of 279 Ha, the Pejagan Pemalang toll road with an area of 380 Ha, the Pejagan-Pemalang toll road with an area of 380 Ha , the Pemalang-Batang toll road section with an area of 134 Ha, the Batang-Semarang toll road section 476 Ha, the Semarang-Solo toll road section with an area of 804 Ha, the Solo-Ngawi - Kertosono toll road section with an area of 1,018 Ha, the Kertosono-Mojokerto toll road section with an area of 294 Ha and the Mojokerto-Surabaya toll road with an area of 356 Ha.

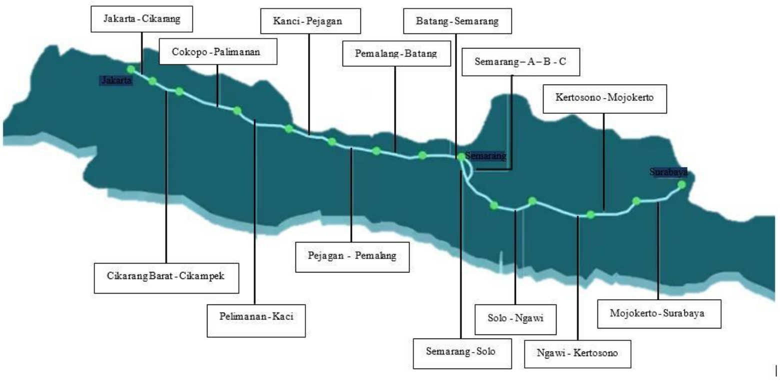

Figure 2 Map of the Trans Java Toll Road

Along the Trans Java toll road, 12 entrances were built with facilities in the form of dozens of rest areas utilizing three types, such as Rest and Service Areas (TIP). The following is information about rest areas or TIPs along the Trans Java Cikampek-Surabaya toll road:

No	Pintu Tol		Rest Area (KM)	Type Rest Area
1	Jakarta	Cikampek	6 19 42 40 57 62 33 52	B A B A A B A B
2	Cikopo	Palimanan	101 102 164 166 86 130	B A B A A B A B
3	Palimanan	Kanci	207 208+400	A B
4	Kanci	Pejagan	228 A-229	B
5	Pejagan	Pemalang	260 282 287 252 275 294	B B A A B B
6	Pemalang	Batang	388	A

No	Pintu Tol		Rest Area (KM)	Type Rest Area
7	Batang	Semarang	360 379 389 391+400	B A B A
8	Semarang	Solo	424 429+300 456 487	B A A B A B
9	Solo	Ngawi	519 575 538	A B A B A B
10	Ngawi	Kertosono	626+200 597+800 KM 640	A B A B A B
11	Kertosono	Mojokerto	KM 678 KM 695	A B A B
12	Mojokerto	Surabaya	KM 725 KM 726	A B

Figure 3. Cikampek and Surabaya Trans Java Tollgates and Availability of Rest Area Types

Source: PT. Jasa Marga Man Pul Toll Division

Emissions Conversion

The Trans Java road is one of the toll road sections that has a fairly high level of density, as evidenced by data from the Central Statistics Agency for DKI Jakarta Province, which has data on how many vehicles will cross certain roads in 2020. Where in the data it is stated that the number of vehicles through the Cikampek toll road are as follows:

Table 2. Number of Vehicles Using the Jakarta-Cikampek Toll Gate

Ruas Tol	**Jumlah Kendaraan Pengguna Tol Tahun 2022 Ribuan**												
	Januari	**Februari**	**Maret**	**April**	**Mei**	**Juni**	**Juli**	**Agustus**	**September**	**Oktober**	**Nopember**	**Desember**	**Jumlah**
Jakarta - Cikampek	**12.991**	**12.597**	**11.732**	**7.532**	**7.060**	**10.436**	**12.453**	**12.682**	**11.815**	**12.677**	**13.141**	**13.250**	**138.366**

Source: PT. Jasa Marga Man Pul Toll Division

No	Car Type	Fuel Consumption (Liter/100km)	Fuel Consumption (Liter/km)
1	Passenger car and sedan	11,79	0,1179
2	Minibus, City Transport, Suburbs, Combi,	11,6	0,116
3	Open tub, Small vehicle, and mobile crane	10,64	0,1064
4	Minibus	16,5	0,165
5	2 axle medium truck	18,5	0,185

Figure 4. Consumption of Fuel Type Group 1

Source: Nunuj Nurdjanah, 2017

No	Transportation Type	Fuel Type	Persentase (%)	Totally(unit)
1	Passenger car and sedan	Premium/Pertalite/Pertamax	21	29.056.857
2	Minibus, City Transport, Suburbs, Combi,	Premium/Pertalite/Pertamax	25	34.591.497
3	Open tub, Small vehicle, and mobile crane	Premium/Pertalite/Pertamax	23	31.824.177
4	Minibus	Diesel/Solar	20	27.673.197
5	2 axle medium truck	Diesel/Solar	21	29.056.857
Totally			100	152.202.585

Figure 5. Percentage of the number of types of vehicles

Source: PT. Jasa Marga Man Pul Toll Division

No	Fuel Type	Emisssion Level (g/liter)	Local Emisssion Level (g/liter)
1	Pertalite/Pertamax	2.597,86	2.003,40
2	Dexlite/Pertamina Dex	2.924,90	2.220,40

Figure 6. CO2 Emissions

Source: IPCC 2021

No	Toll Road		Route Length (KM)
1	Jakarta	Cikampek	83,00
2	Cikopo	Pemalang	116,75
3	Palimanan	Kanci	26,30
4	Kanci	Pejagan	35,00
5	Pajagan	Pemalang	57,00
6	Pemalang	Batang	39,20
7	Batang	Semarang	75,00
8	Semarang	Solo	72,64
9	Solo	Ngawi	90,43
10	Ngawi	Kertosono	87,02
11	Kertosono	Mojokerto	40,50
12	Mojokerto	Surabaya	36,27
Total			756,11

Figure 7. Distance between Cikampek - Surabaya toll gates

Source: PT. Jasa Marga Man Pul Toll Division

Exhaust Gas Calculation with Emission Factors

To understand the relationship between CO2 emissions and emission factors (FE), see food and beverage consumption (IPCC 1996)by multiplying the number of vehicles, distance, energy consumption, emission factor values.

No	Transportation Type	Fuel Type	Persentase (%)	Number of Vehicles (unit) /year	Route Length Cikampek - Surabaya	Energy Consumption (Liter/km)	Total fuel/ year (thousand)	Local CO_2 Emission factor(g/liter)	Karbon emission Value for years thousand)
a	b	c	d	e	f	g	h = (e x f x g) /1000	i	j = h x i
1	Passenger Car (station wagon dan sedan)	Premium/ Pertalite/ Pertamax	21	29.056.857	756,11	0,1179	2.600.561,65	2.003,40	5.209.965.209
2	Opelet, suburban, combi, and Minibus	Premium/ Pertalite/ Pertamax	25	34.591.497	756,11	0,116	3.046.015,15	2.003,40	6.102.386.750
3	Pick-up, micro truck, and Delivery car	Premium/ Pertalite/ Pertamax	23	31.824.177	756,11	0,1064	2.570.416,63	2.003,40	5.149.572.670
4	Bus kecil	Diesel/Solar	20	27.673.197	756,11	0,165	3.466.155,09	2.220,40	7.696.250.773
5	Truk sedang 2 sumbu	Diesel/Solar	21	29.056.857	756,11	0,185	4.080.609,88	2.220,40	9.060.586.184

Figure 8. Recap of Emission Material Calculation Values

Source: IPCC, 2021

Conventional and Electric Vehicle Population

According to the Central Statistics Agency (BPS), there will be 136.13 million motorized households in 2020 with the following breakdown:

No	Transportation Type /Island	Family / Passenger	Bus	Goods / Expedition	Two Wheeler	Special	Amount	%
1	Java	10.996.367	121.072	2.524.373	64.007.271	35.640	77.684.723	58,48%
2	Sumatera	2.570.862	65.257	1.391.217	24.135.168	35.640	28.198.144	21,23%
3	Kalimantan	736.405	12.226	488.209	8.649.656	4.886	9.891.382	7,45%
4	Sulawesi	946.907	6.941	373.039	6.720.593	13.920	8.061.400	6,07%
5	Bali	459.717	8.118	155.661	3.821.682	806	4.445.984	3,35%
6	Nusa Tenggara	157.498	6.264	121.639	2.481.542	1.180	2.768.123	2,08%
7	Papua	131.010	1.884	66.968	993.410	2.766	1.196.038	0,90%
8	Maluku and North Maluku	42.967	573	24.803	518.923	177	587.443	0,44%
	Amount	**16.041.733**	**222.335**	**5.145.909**	**111.328.245**	**95.015**	**132.833.237**	**100%**

Figure 9. Population of Conventional Vehicles in Indonesia in 2020

Source: Gaikindo 2021

In 2030, the use of SPKLU and KLBB will be introduced with a ratio of 1:10. Mentioned, 1 SPKLU will provide 10 electric vehicles. The target is the availability of 60 billion SPKLUs to pay for 600 billion electric vehicles in 2030. On 1 April 2019, Indonesia started selling on the open market. The last digit represents 787 units. Sales of the first battery-powered electric vehicles (BEV) started in 2020 with a total of around 125 units. Previously, in the same year, 8 units of PHEV and 1,191 units of HEV were sold. BEV sales will increase to 687 units in 2021, PHEV to 46 units, and HEV to 2,472 units. Sales of BEVs were recorded at 64 units, PHEV 10 units, and HEV 646 units as of March 2022. Despite mentioning sales growth, electric car coverage is much more expensive when compared to oil cars. The percentage of listed vehicles sold each year must not exceed 5%.

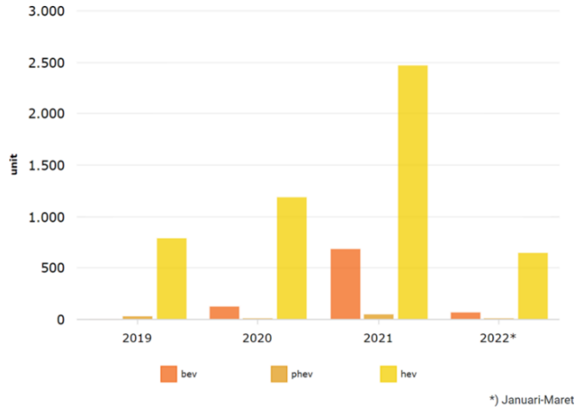

Figure 10. Electric Car Sales in Indonesia (2019-March 2022)

Source: Gaikindo 2022

Business Scheme And Financial Analysis

Business scheme

Several business schemes in SPKLU development include:

1. The first model is cooperation between PLN and Partners where PLN must ensure the availability of electricity for partners, provide information technology for electricity sales schemes and partners must provide equipment, operate, utilize the facilities provided by PLN in terms of information technology for recharging batteries and distribution of equipment products latest
2. The second model is cooperation between PLN and partners where PLN must ensure the availability of electricity for partners, provide information technology for electricity sales schemes and borrow equipment or new products and partners must provide equipment, operate, utilize the facilities provided by PLN in terms of technology. information for battery charging.
3. The third model is a cooperation arrangement between PLN and partners where PLN must ensure the availability of electricity for partners, provide information technology for sales schemes, and partners carry out operations, information technology for electricity sales schemes on land owned by PLN.

Financial analysis

Financial analysis will be carried out on the SPKLU Ultra Fast Charging Out Door type > 100kW. Financial analysis calculations are carried out in the following way:

1. Calculation of capacity usageSPKLU Ultra Fast Charging Out Door at 100% with a useful life of 10 years in accordance with the accounting treatment or PSAK 105 paragraph 13b-i.
2. Calculation of capacity usageSPKLU Ultra Fast Charging Out Door is 100% with a useful life of 15 years according to KPS either BOO or BOT.

Investment Value

The investment value in SPKLU is used for a number of other things, including the following:

NO	Facility Nama	Amount				Unit price	TOTAL Cost (IDR)
		Units	Unit	Units	Unit		
Preparation							
1	Preparatory Work	1	Ls			5.000.000	5.000.000
2	Planning Work	1	Ls			15.000.000	15.000.000
3	Permit Work	1	Ls			25.000.000	25.000.000
						Preparation Amount	**45.000.000**
Utility							
1	Office	3	m	4	m	3.500.000	42.000.000
2	Parking Area	20	m	20	m	1.000.000	400.000.000
3	Utility	10	m	4	m	4.500.000	180.000.000
4	Equipment						-
	a. Office Equipmen	1	Ls	1	Ls	5.000.000	5.000.000
	b. Charging	1	Ls	5	Unit	50.000.000	250.000.000
	c. Fire extinguisher	2	Unt			1.500.000	3.000.000
	d. Communication System	1	Unt			5.000.000	5.000.000
	e. Substation	1	Unt			150.000.000	150.000.000
						Utility Amount	**1.035.000.000**
						Total	**1.080.000.000**

Figure 11. Investment Cost of SPKLU Ultra Fast Charging Out Door> 100 kW

Source: Secondary Data

In Table 8 it is known that the partnership package offered by PT PLN (Persero) for SPKLU Ultra Fast Charging Out Door is IDR 1,083,500,000, but after calculations it is found that the investment value for the package is IDR 1,080,000,000

Depreciation (Depreciation)

The investment in SPKLU Ultra Fast Charging Out Door is planned to have a life of 10 years and 15 years, so that the depreciation value of the asset is obtained as follows:

Period	Year	Depreciation /year
1	2023	108.000.000
2	2024	108.000.000
3	2025	108.000.000
4	2026	108.000.000
5	2027	108.000.000
6	2028	108.000.000
7	2029	108.000.000
8	2030	108.000.000
9	2031	108.000.000
10	2032	108.000.000

Figure 12. Depreciation of SPKLU Assets

Source: Secondary Data

From the table above, it is found that SPKLU Ultra Fast Charging assets have been depreciated with useful lives of 10 years and 15 years.

Operational Financing

Operational financing can be in the form of labor costs and other operational costs. Funding for labor is IDR 3,500,000/person/month, with a total of 4 operators with details of 3 shifts with 1 person guarding each shift. Then the operational costs of IDR 14,000,000.

Maintenance cost

Planning and calculation of maintenance costs for SPKLU Ultra Fast Charging Out Door for 10 years and 15 years are as follows:

Period	Year	Maintenance cost
1	2023	1.080.000
2	2024	1.090.800
3	2025	1.101.708
4	2026	1.112.725
5	2027	1.123.852
6	2028	1.135.091
7	2029	1.146.442
8	2030	1.157.906
9	2031	1.169.485
10	2032	1.181.180
Totally		**11.299.190**

Figure 13. Calculation of SPKLU Maintenance Costs

Source: Secondary Data

It is assumed that maintenance costs are 0.1% of the asset value and increments in the second year and so on are 0.1%. From the figures above, it can be obtained that maintenance costs for SPKLU Ultra Fast Charging assets in 10 years amount to IDR 11,299,190 and in 15 years IDR 17,384,647.

Sale

It is assumed that sales are made by calculating the number of kWh of electricity sold with a SPKLU Ultra Fast Charging Out Door capacity of 100% and 45% for 10 years and 45% for 15 years with a Cost of Capital of 10%, the calculation results are as follows:

Period	Year	Capacity (%)	Sale	Capacity (%)	Sale
1	2023	100	243.600.000	45	109.620.000
2	2024	100	267.960.000	45	120.582.000
3	2025	100	294.756.000	45	132.640.200
4	2026	100	324.231.600	45	145.904.220
5	2027	100	356.654.760	45	160.494.642
6	2028	100	392.320.236	45	176.544.106
7	2029	100	431.552.260	45	194.198.517
8	2030	100	474.707.486	45	213.618.369
9	2031	100	522.178.234	45	234.980.205
10	2032	100	574.396.058	45	258.478.226
Totally			**3.882.356.633**		**1.747.060.485**

Figure 14. Sales of SPKLU

Source: Secondary Data

Period	Year	Capacity (%)	Sale
1	2023	45	109.620.000
2	2024	45	120.582.000
3	2025	45	132.640.200
4	2026	45	145.904.220
5	2027	45	160.494.642
6	2028	45	176.544.106
7	2029	45	194.198.517
8	2030	45	213.618.369
9	2031	45	234.980.205
10	2032	45	258.478.226
11	2033	45	284.326.048
12	2034	45	312.758.653
13	2035	45	344.034.519
14	2036	45	378.437.971
15	2037	45	416.281.768
Totally			**3.482.899.443**

Figure 15. Sales of SPKLU

Source: Secondary Data

Feasibility study

From the calculation results, it can be obtained that the calculation value of NPV, Payback Period and Benefit Cost of Ratio is as follows:

Measurement	Value	Remark	Value	Remark
	Kapasitas 100%		*Kapasitas 45%*	
Net Present Value (NPV) {in IDR}	828.831.540	Feasible since it is ≥ 0	(157.382.950)	Feasible since it is ≥ 0
Internal Rate of Return (IRR) {in %}	27%	Feasible since it is ≥ 12% (MARR)	8,42%	Feasible since it is ≥ 12% (MARR)
Payback Period {in years}	5,99	Feasible since it is ≤ 10 years	6,09	Feasible since it is ≤ 10 years
Benefit Cost ratio	1,77	Feasible since it is ≥ 1	0,85	Feasible since it is ≥ 1

*) 10 tahun

Figure 16. Financial Analysis of SPKLU Ultra Fast Charging OD

Source: Secondary Data

Measurement	Value	Remark
Net Present Value (NPV) {in IDR}	194.712.731	Feasible since it is ≥ 0
Internal Rate of Return (IRR) {in %}	14,81%	Feasible since it is ≥ 12% (MARR)
Payback Period {in years}	11,08	Feasible since it is ≤ 15 years
Benefit Cost ratio	1,18	Feasible since it is ≥ 1

Figure 17. Financial Analysis of SPKLU Ultra Fast Charging OD

Source: Secondary Data

Analysis of Build Own Operate (BOO) and Build Operate Transfer (BOT)

Build Own Operate analysis

Investments made under the Build Own Operate (BOO) scheme with a useful life of 10 years (100% and 45% capacity) and 15 years (45% capacity) according to table 12, the following analysis is obtained:

1. Investments made with a 100% operating pattern in accordance with SPKLU capacity for 10 years are acceptable based on the calculation table above, namely:
   a. *Net Present Value*: IDR 828,831,540
   b. *Internal Rate of Return on investment*: 27%
   c. *Payback Period*< 6 years
   d. *Benefit Cost of ratio*: 1.77
2. Investationthose carried out with an operating pattern of 45% in accordance with the SPKLU capacity for 10 years are not acceptable based on the calculation table above, namely:
   a. *Net Present Value*: - Rp. 157,382,950
   b. *Internal Rate of Return on investment*: 8.42%
   c. *Payback Period*> 6 years
   d. *Benefit Cost of ratio*: 0.85
3. Investationwhich is carried out with an operating pattern of 45% in accordance with the SPKLU capacity for 15 years is acceptable based on the calculation table above, namely:
   a. *Net Present Value*: IDR 194,712,731
   b. *Internal Rate of Return on investment*: 14.8%
   c. *Payback Period*< 15 years
   d. *Benefit Cost of ratio*: 1.18

Build Operate Transfer analysis

In the case of a Cooperation Agreement (PKS) where the assets will transfer ownership or Build Operate Transfer, the business actor/investor will hand over the assets that have been built in accordance with the agreed age/useful life of the assets, which is 5 years. The following is the calculation result if the investment is made using the Build Operate Transfer scheme.

Measurement	Value	Remark
		(5 Tahun)
Net Present Value (NPV) {in IDR}	-Rp 27.367.766	Feasible since it is >= 0
Internal Rate of Return (IRR)	11%	Feasible since it is >= 12% (MARR)
Payback Period {in years}	5,95	Feasible since it is <= 10 years
Benefit Cost ratio	103%	Feasible since it is >= 1

Figure 18. SPKLU Financial Analysis with the BOT Scheme

Source: Secondary Data

From Table 13 above, the investment calculation results are carried out using the Build Operate Transfer scheme, an analysis of the calculations can be taken as follows:

1. *Net Present Value*: - Rp. 27,367,766
2. *Internal Rate of Return on investment*: 11%
3. *Payback Period*in year 6
4. *Benefit Cost of ratio*: 103%

Based on the results of the Financial Analysis above, if it is carried out for up to 5 years with the Build Operate Transfer (BOT) system it is not acceptable, this is because some Financial Analysis instruments do not meet the minimum requirements required. However, if the Build Operate Transfer (BOT) scheme is carried out with a 10-15 year agreement in accordance with the Build Own Operate scheme, then the SPKLU investment can be said to be acceptable.

Two-Sample F-Test Analysis for Variances

In terms of investing in SPKLU Ultra Fast Charging Outdoor, the authors try to test the hypothesis for the Build Own Operate scheme when revenue is received with an operational pattern of 100% and 45% with an operating period of 10 years.

Uraian	Kapasitas 100%	Kapasitas 45%
Mean	404.306.293	181.937.832
Variance	10.992.607.754.909.400	2.226.003.070.369.180
Observations	9	9
Pooled Variance	6.609.305.412.639.310	
Hypothesized Mean Diffe	-	
df	16	
t Stat	5,80	
P(T<=t) one-tail	0,000013	
t Critical one-tail	1,75	
P(T<=t) two-tail	0,000027	
t Critical two-tail	2,12	

Figure 19. Two Sample T-Test Calculation for Variance

Source: Secondary Data

The results of the analysis of the table are as follows:

1. *Means*can be referred to as the average value of Sales:
   a. SPKLU capacity 100% = IDR 404,306,293
   b. SPKLU capacity 45% = Rp. 181,937,832.
2. *Variances*is the result of the value of the variation in Sales
   a. 100% SPKLU capacity of 10,992,607,754,909,400
   b. SPKLU capacity 45% of 2,226,003,070,369,180
3. *Observations*can be interpreted as the number of observations of Sales trends with an operational pattern of 100% and 45% with an operating period of 10 years, each of which

has a total of nine observations.

4. *Pooled Variance*referred to as a variation of the Sales trend with an operational pattern of 100% and 45% with a 10 year operating period of 6,609,305,412,639,310.
5. *Hypothesized Mean Difference*is the meaning of the average difference from the Sales and Operational Pole of 100% and 45%. In this case, it is assumed that there is no difference and the result is "0".
6. *Degree of Freedom*determined by the permutation n1+n2- 2, which results in 10+10-2=1.
7. t-stat 5.80.
8. The p-value for P(T=t) with one tail is about 0.000013.
9. t critical one tail which is the value of t in the table, namely 2.12.

The results of the hypothesis testing are one way, where when µ1 > µ2 (greater in value, only the values in -p and in the t-table (t crucial) of ONE TAIL are visible. However, it is not recommended to look at the results marked with TWO TAIL for In this case, the author can use the criteria for rejecting p-values or t-values using only one of them.

From the results of testing the t-test, it is concluded that t count 1.809 > t table 1.734, so it can be concluded that we reject H0 and accept H1. In other words, p-value 0.04) < alpha 0.05, this means we can reject H0 and accept H1. That way, the authors can conclude that revenue receipts with an operational pattern of 100% with an operating period of 10 years are better than revenue receipts with an operational pattern of 45% with an operating period of 10 years.

CONCLUSION

Based on the results of writing this research, the authors provide advice for PT PLN (Persero) and business actors/investors in investing in SPKLU Ultra Fast Chaging Out Door as follows:

1. PT PLN (Persero) in implementing the SPKLU partnership program, should provide convenience in fulfilling the requirements of the SPKLU sharing partner program at the nearest PLN office to the location of the rest area, business actors/investors can be served by the most advanced service office, namely the Customer Service Unit.
2. Business Actors/Investors should not hesitate in investing in Electric Motorized Vehicle infrastructure, this is due to various support from the Government, Ministries and SOEs appointed to cooperate in providing Electric Motorized Vehicle infrastructure such as SPKLU.
3. Business actors, in this case investors/rest area managers, have opportunities in 54 rest areas on the Trans Java Cikampek-Surabaya Toll Road in providing SPKLUs. Trans Java Cikampek-Surabaya Toll Road.

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