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Study on the Implementation of the Hybrid Annuity Model Financing Scheme in Water Supply Systems (SPAM) in Indonesia

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Abstract: *This study examines the implementation of the Hybrid Annuity Model (HAM) financing scheme in the Public-Private Partnership (PPP) project of the Lombok Regional Water Supply System (SPAM) in West Nusa Tenggara. The project service area covers Mataram, West Lombok Regency, and North Lombok Regency with a 20-year concession period. This research employed a quantitative approach using descriptive analysis and discounted cash flow-based financial modelling to evaluate the financial feasibility and sensitivity of the HAM scheme. The study utilized secondary data obtained from pre-feasibility study documents, SPAM technical and operational data, macroeconomic data, and infrastructure financing regulations. Financial feasibility assessed by Net Present Value (NPV), Internal Rate of Return (IRR), Debt Service Coverage Ratio (DSCR), and Payback Period (PBP). The results point out that both the unsupported PPP scheme and the HAM scheme are financially feasible. The PPP scheme generated a higher NPV of IDR 132.673 billion and a faster payback period compared to the HAM scheme, which produced an NPV of IDR 55.527 billion. However, the HAM scheme demonstrated a stronger DSCR value of 1.5. Sensitivity analysis revealed that the project is highly sensitive to revenue reductions and increases in investment and operational costs.*

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INTRODUCTION

The National Medium-Term Development Plan (RPJMN) 2025–2029 estimates to achieve the vision of Golden Indonesia 2045 in the drinking water, the investment in IDR 157.2 trillion should be done. The government has allocated approximately 14% or IDR 22.2 trillion of the total budget, while the largest portion, amounting to 86% or IDR 135.2 trillion, is planned to be financed through innovative financing schemes. Furthermore, funding requirements for the sanitation sector are estimated at IDR 74.9 trillion, with government funding allocation amounting to IDR 16.9 trillion or 23%. The remaining funding gap of IDR 58 trillion or 77% in the sanitation sector is expected to be fulfilled through innovative financing mechanisms (RPJMN 2025–2029). Innovative financing schemes inevitably involve private sector participation, making the private sector increasingly strategic in supporting the achievement of infrastructure development targets.

Nevertheless, the government's fiscal capacity to support infrastructure development financing remains limited. The RPJMN has identified the role of business entities as one of the financing sources to bridge the existing funding gap (Miolo et al., 2020). Therefore, the government has developed collaborative arrangements along with the private sector through the Public-Private Partnership (PPP) scheme, known in Indonesia as Kerja Sama Pemerintah dengan Badan Usaha (KPBU) (Istinganah & Akhmadi, 2025). The KPBU scheme is regarded as an alternative financing mechanism capable of

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distributing project risks while enhancing financial feasibility through partnerships between the government and private entities (Ariana L., 2023).

The Hybrid Annuity Model (HAM) is a variant of the KPBU model that adopts a more balanced financing risk-sharing approach with the private sector, emphasizing high project readiness, providing incentives for early completion, and addressing several issues faced by the construction industry (Massora & Zevi, 2024). HAM has proven successful in improving project bankability and attracting private sector interest (Shiwakoti & Dey, 2022).

The study entitled "The Lombok Regional SPAM PPP Project Using the Hybrid Annuity Model (HAM) Financing Scheme" represents a novel study within the Drinking Water Supply System (SPAM) sector. Previous studies on the Hybrid Annuity Model (HAM) have predominantly focused on the toll road sector; therefore, this research constitutes a new study in Indonesia that specifically examines the Drinking Water Supply System (SPAM) sector. This study discusses the Lombok Regional SPAM project, which is planned to utilize the PPP financing scheme, where the Hybrid Annuity Model (HAM) is considered one of the alternative financing mechanisms within the KPBU framework. This research is expected to provide updated insights regarding alternative financing mechanisms applicable to the Drinking Water Supply System (SPAM) sector.

RESEARCH METHOD

The research was conducted in West Nusa Tenggara, specifically on Lombok Island, utilizing raw water sourced from the Segara Watershed (DAS Segara). The service coverage area includes Mataram, West Lombok Regency, and North Lombok Regency. The Lombok Regional SPAM PPP project is planned with a concession period of 20 years. This study employed a quantitative approach based on positivist principles, using descriptive and financial analyses through financial modeling and discounted cash flow methods to evaluate the feasibility and sensitivity of the Hybrid Annuity Model (HAM) financing scheme. The research relied primarily on secondary data, including the pre-feasibility study documents of the Lombok Regional SPAM PPP project, macroeconomic data from Bank Indonesia, technical and operational SPAM data, as well as relevant regulations and policies concerning PPP and infrastructure financing. The financial analysis incorporated key variables such as CAPEX, OPEX, water tariffs, water demand, discount rates, and inflation. Project feasibility was assessed using several financial indicators, namely Net Present Value (NPV), Internal Rate of Return (IRR), Debt Service Coverage Ratio (DSCR), and Payback Period (PBP). In addition, sensitivity analysis was conducted by simulating changes in revenue, CAPEX, and OPEX by ±10% and ±20% to evaluate the project's financial resilience and the sustainability of implementing the HAM financing scheme in the Lombok Regional SPAM PPP project.

RESULTS AND DISCUSSION

Assumptions of Operational Costs for the Lombok Regional SPAM

Water Demand Projection:

The water demand projection was developed based on an analysis of water requirements within the service coverage area of the SPAM system. This projection is influenced by several factors, including population growth, industrialization, and economic expansion.

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Bulk Water Tariff:

The tariff assumption applied to beneficiaries is determined based on Capital Expenditure (CAPEX), Operational Expenditure (OPEX), and the beneficiaries' capacity to absorb bulk water supply. In summary, the CAPEX, OPEX, and beneficiary absorption projections are presented in Tables 1 and 2 below.

Table 1. Projection of Beneficiary Water Absorption for the Lombok Regional SPAM

Regency/City	L/D	2029	2030	2031	2032
Mataram	160	40	40	40	40
West Lombok Regency	110	25	25	25	35
North Lombok Regency	130	40	30	30	30
TOTAL L/D		105	95	95	105
Cumulative Total (L/D)		105	200	295	400

Tabel 2. Capex SPAM Regional Lombok

Description	Upstream–Downstream Investment		
	Unit	Constant Price	Current Price
Upstream CAPEX	IDR Million	745,589	798,816
Downstream CAPEX	IDR Million	171,120	188,020
Total Upstream + Downstream Physical CAPEX	IDR Million	916,709	986,836
Non-Physical CAPEX	IDR Million	27,501	29,605
Total Physical and Non-Physical Upstream + Downstream CAPEX	IDR Million	944,211	1,016,442
Contingency	IDR Million	47,211	50,822
VAT	IDR Million	118,971	128,072
Total CAPEX	IDR Million	1,110,392	1,195,335

Table 3. OPEX of the Lombok Regional SPAM

Operation and Maintenance Components	(IDR/m^3)	2,652
Operation and Maintenance Cost	(Rp/m^3)	250
Raw Water Cost	(Rp/m^3)	394
Personnel Cost	(Rp/m^3)	937
Electricity/Power Generation Cost	(Rp/m^3)	54
Fuel Cost	(Rp/m^3)	370
Chemical Cost	(Rp/m^3)	386
Asset Maintenance Cost	(Rp/m^3)	59
Administrative & General Cost	(Rp/m^3)	20
Sludge Handling Cost	(Rp/m^3)	181

The tariff is projected to increase annually by 5% based on several considerations. The SPAM system capacity to be utilized is 400 liters per second and will be operated gradually depending on the level of demand, with a Non-Revenue Water (NRW) assumption of 5%. The project duration is assumed to span 20 years, from 2025 to 2045. Operation and maintenance costs represent the estimated annual expenses required to maintain and operate the SPAM facilities. In addition, the KBA is calculated using an assumed interest rate of 12% with a repayment period of 10 years under the

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effective interest method. The KBA installment amount is subsequently converted into IDR/m³ based on the bulk waterdistribution allocated to each beneficiary.

Projection of Water Sales Volume and Bulk Water Tariff

Revenue for the Lombok Regional SPAM is generated from bulk water sales to each beneficiary, namely the off-takers PT Giri Menang, Perumdam of West Lombok Regency, and Perumdam of North Lombok Regency. Revenue is calculated based on the volume of bulk water supplied to each beneficiary multiplied by the applicable tariff (IDR/m³) for each respective beneficiary. The projected bulk water sales for the Lombok Regional SPAM are presented in Table 4.

Table 4. Projected Sales of Bulk Water from Lombok Regional SPAM

Tariff Projection	2029	2030	2031	2032	2033	2034	2035	2040	2045
Absorption Year	1	2	3	4	5	6	7	12	17
Scenario 1 – PPP Without Support									
Sold Volume (000 m³)	1.261	2.523	3.784	5.046	5.046	5.046	5.046	5.046	5.046
Planned Tariff Adjustment	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bulk Water Tariff (IDR/m³) – Iteration 1	15.923	16.719	17.555	18.433	19.355	20.322	21.339	27.234	34.758
West Lombok Regency									
Sold Volume (000 m³)	788	1.577	2.365	3.469	3.469	3.469	3.469	3.469	3.469
Planned Tariff Adjustment	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bulk Water Tariff (IDR/m³) – Iteration 1	15.923	16,719	17,555	18,433	19,355	20,322	21,339	27,234	34,758
North Lombok Regency									
Sold Volume (000 m³)	1.261	2.208	3.154	4.100	4.100	4.100	4.100	4.100	4.100
Planned Tariff Adjustment	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bulk Water Tariff (IDR/m³) – Iteration 1	15.286	16,050	16,853	17,696	18,580	19,509	20,485	26,144	31,779
Scenario 2 – HAM Scheme									
Mataram City									
Sold Volume (000 m³)	1.261	2.523	3.784	5.046	5.046	5.046	5.046	5.046	5.046
Planned Tariff Adjustment	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bulk Water Tariff (IDR/m³) – Iteration 1	9.238	9,700	10,185	10,694	11,229	11,790	12,380	15,800	20,165

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West Lombok Regency									
Sold Volume (000 m^3)	788	1.577	2.365	3.469	3.469	3.469	3.469	3.469	3.469
Planned Tariff Adjustment	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bulk Water Tariff (IDR/m^3) – Iteration 1	9.238	9.700	10.185	10.694	11.229	11.790	12.380	15.800	20.165
North Lombok Regency									
Sold Volume (000 m^3)	1.261	2.208	3.154	4.100	4.100	4.100	4.100	4.100	4.100
Planned Tariff Adjustment	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bulk Water Tariff (IDR/m^3) – Iteration 1	8.868	9.312	9.777	10.266	10.780	11.319	11.884	15.168	19.359

Annual Revenue Calculation

Annual Revenue is calculated using the following formula:

$$\text{Annual Revenue} = \text{Volume of Water Sold} \times \text{Bulk Water Tariff}$$

The volume of water sold, expressed in cubic meters (m^3), is calculated based on the assumed or projected annual water absorption capacity of each beneficiary. This volume is then multiplied by the applicable bulk water tariff for each beneficiary to generate the projected revenue of the Business Entity (BUP).

This revenue projection is calculated annually throughout the cooperation period and serves as the basis for the financial feasibility analysis using Financial Internal Rate of Return (FIRR) and Net Present Value (NPV) parameters. The revenue projection under the unsupported PPP scheme illustrates the projected business returns obtained during the planning period, as presented in Tables 5 and 6.

Table 5. Revenue Projection of the Lombok Regional SPAM – Unsupported PPP Scheme

PROJECT TARIFF	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**16**	**21**
	2029	2030	2031	2032	2033	2034	2035	2040	2045
Absorption Year	1	2	3	4	5	6	7	12	17
A. Mataram City									
Revenue – Mataram City									
Revenue – Mataram City	20.086	42.181	66.435	93.009	97.659	102.542	107.669	137.416	175.382
B. West Lombok Regency									
Revenue – West Lombok Regency									
Revenue – West Lombok Regency (Iteration 1)	12.554	26.363	41.522	63.943	67.141	70.498	74.023	94.474	120.575

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C. North Lombok Regency									
Revenue – North Lombok Regency									
Revenue – North Lombok Regency (Iteration 1)	19.282	35.432	53.147	72.546	76.173	79.982	83.981	107.184	139.282
TOTAL REVENUE									
Total Revenue (Iteration 1)	51.922	103.975	161.103	229.497	240.972	253.020	265.671	339.071	412.143

Table 6. Lombok Regional SPAM Revenue Projection – Hybrid Annuity Model Scheme

PROJECT TARIFF	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**16**	**21**
	2029	2030	2031	2032	2033	2034	2035	2040	2045
Absorption Year	1	2	3	4	5	6	7	12	17
A. Mataram City									
Revenue – Mataram City									
Revenue – Mataram City	11.653	24.471	38.542	53.959	56.657	59.490	62.465	79.722	101.748
B. West Lombok Regency									
Revenue – West Lombok Regency									
Revenue – West Lombok Regency (Iteration 1)	7.283	15.295	24.089	37.097	38.952	40.899	42.944	54.809	69.952
C. North Lombok Regency									
Revenue – North Lombok Regency									
Revenue – North Lombok Regency (Iteration 1)	11.187	20.556	30.834	42.088	44.193	46.402	48.722	62.184	79.364
TOTAL REVENUE									
Total Revenue (Iteration 1)	30.123	60.322	93.465	133.145	139.802	146.792	154.131	196.715	251.064

Macroeconomic Information

A. Inflation

The inflation rate is used to adjust projections of future operational costs and revenues. Inflation affects the prices of raw materials, labor, and other operational expenses. Developments in inflation rates and the benchmark interest rates set by Bank Indonesia have a significant influence on investment and operational activities in the drinking water sector. During the 2019–2023 period, the average actual inflation rate experienced fluctuations, both above and below the inflation targets established by the Government, as presented in Table 7.

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Table 7. Inflation Targets and Actual Inflation Rates

Year	Inflation Target	Actual Inflation (YoY)	Average BI Rate
2019	3.5 ± 1%*	2.72%	5.63%
2020	3±1%*	1.68%	4.25%
2021	3±1%*	1.87%	3.52%
2022	3±1%**	5.51%	4.00%
2023	3±1%**	2.61%	5.81%
2024	2.5±1%**	2.62%	6.16%
2025	2.5±1%***		
2026	2.5±1%***		
2027	2.5±1%***		
	Average	2.84%	4.90%

* Minister of Finance Regulation (PMK) No.124/PMK.010/2017
** Minister of Finance Regulation (PMK) No.101/PMK.010/2021
*** Minister of Finance Regulation (PMK) No.31 of 2024

Based on Minister of Finance Regulation (PMK) No. 31 of 2024, dated May 16, 2024, regarding the inflation targets for 2025, 2026, and 2027, the inflation targets established by the Government for the 2025–2027 period are 2.5%, 2.5%, and 2.5%, respectively, with a deviation of ±1% for each year. The macroeconomic assumption related to inflation used in this financial projection adopts the average inflation rate over the last five years, namely from 2019 to 2023, which was 2.84% and subsequently rounded to 3.00%.

B. Economic Growth Rate (GDP Growth)

Indonesia's economic growth during the 2017–2023 period averaged 3.89%. In 2024, the Government projected that economy would grow by 5.2%, whilst the current economic growth stands at 5.1% year-on-year (YoY). According to Bank Indonesia, the projected economic growth over the coming five years is predicted to range between 4.8% and 5.8%.

C. Interest Rate

The benchmark interest rate (such as the BI Rate in Indonesia) during the 2019–2023 period averaged 4.9%, while as of August 2024, the benchmark interest rate stood at 6.25%.

D. Exchange Rate

The exchange rate value based on JISDOR (USD-IDR) as of September 10, 2024, was IDR 15,447 per USD. If the project includes imported components, such as technology or raw materials, fluctuations in the Rupiah exchange rate against foreign currencies (particularly the USD) will affect overall project costs.

Financial Assumptions

A. Loan Interest Rate

One of the important factors in investment activities financed through loans is the loan interest rate. The interest rate applied in this study refers to data published by the Government through Bank Indonesia, particularly the Prime Lending Rate (Suku Bunga Dasar Kredit/SBDK). Based on the Press Release of the Board of Governors Meeting regarding the Assessment of Policy

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Rate Transmission to Banking Prime Lending Rates in June 2024, the data used in this analysis are presented in Table 8.

Table 8. Average Prime Lending Rate (SBDK) Based on Non-KCBA Bank Groups

No.	Bank Group	SBDK
1	Regional Development Banks (BPD)	**8.41%**
2	State-Owned Commercial Banks (BUMN)	**8.04%**
3	National Private Commercial Banks (BUSN)	**8.37%**
Average		**8.45%**

Source: Banking Data (ojk.go.id) – Processed June 2024

B. Weighted Average Cost of Capital (WACC)

The Capital Asset Pricing Model (CAPM) approach is used to calculate the cost of equity capital. This approach estimates the cost of equity financing through a mathematical formulation that considers market risk and expected returns. The WACC calculation used as the basis for project feasibility assessment is as follows:

Risk-Free Rate (Rf)

The risk-free interest rate applied in this cooperation scheme, which has a project period ranging from 5 to 10 years, is based on Indonesian Government Bonds (ORI). The coupon rates of government bonds issued between 2006 and 2023 varied significantly, with the highest coupon rate recorded at 12.05% (ORI 001/2006) and the lowest at 4.90% (ORI 021/2022).

In this SPAM project, the projected risk-free rate was calculated using the average coupon rates of government bonds issued in 2021 and 2022, namely ORI 019/2021 (5.57%), ORI 020/2021 (4.95%), ORI 021/2022 (4.90%), ORI 022/2022 (5.95%), ORI 023/2023-T6 (6.10%), ORI 025-T3 (6.25%), and ORI 025-T6 (6.40%). Based on these figures, the risk-free rate used in the analysis was determined to be 6.4%.

Beta (β)

Beta is a measure of systematic risk, representing the level of fluctuation in an equity investment relative to the overall market. Beta is generally estimated by referring to the beta values of comparable companies. Since only a limited number of water utility companies or SPAM projects in Indonesia are listed on the Indonesia Stock Exchange, the beta estimation in this study utilized comparable foreign companies listed on the Philippine and Hong Kong Stock Exchanges, as presented in Table 9.

Table 9. Average Beta of Water Utility Companies Listed on Stock Exchanges

No	Company Code	Comparable Company	Beta
1	MWC	Manila Water Company Inc	0.98
2	MPI.PS	Metro Pacific Investments Corp	1.06
3	BEL.PS	Belle Corp (BEL)	0.53
4	0855.HK	China Water Affairs Group Ltd	0.55
5	601158.SS	Chongqing Water Group Co Ltd	0.31
6	0840.HK	Xinjiang Tianye Water Saving Irrigation System Co Ltd	0.31
7	0270.HK	Guangdong Investment Ltd	1.05
Average Beta			**0.68**

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To estimate the project beta, the latest beta update from Betas (nyu.edu) in January 2024 for water utility companies in the United States was also considered, which reported a beta value of 0.71. Although these companies are not directly comparable to the project due to differences in size, infrastructure, regulatory environment, and other factors, their beta values provide a general indication of project risk. Accordingly, the beta used in the WACC calculation for this study was set at 0.71.

Equity Risk Premium (ERP)

The Equity Risk Premium (ERP) is representing the additional return above the risk-free rate required by investors to invest in equities instead of risk-free government bonds. For the Lombok Regional SPAM project, the ERP assumption was derived from data published by NYU Stern School of Business and was set at 7.8%.

- **Loan Interest Rate / Pre-Tax Cost of Debt**
  The loan interest rate assumed for this project was 9.5% per annum.
- **Tax Rate**
  The applicable corporate income tax rate has been set at 22% since 2022.
- **Project Financing Structure**
  Based on long-term financial projections, the project financing structure was assumed to consist of 30% equity financing and 70% debt financing.

Based on the above assumptions, the WACC calculation is as follows:

- Market value of Cost of Debt:
  11.0% × (1 − 22%) = 8.58%
- Cost of Equity:

$$Cost\ of\ Equity = 6.4\% + (7.8\% \times 0.71) = 11.9\%$$

Accordingly, the estimated Weighted Average Cost of Capital (WACC) is:

WACC = (8,58%*70%) + (11,94%*30%) = 9,6%

Financial Feasibility Analysis Using IRR, NPV, and DSCR Parameters

Financial feasibility assessment through the parameters of Internal Rate of Return (IRR), Net Present Value (NPV), and Debt Service Coverage Ratio (DSCR) is an important tool for evaluating whether a project such as the Lombok Regional SPAM is financially profitable and feasible to finance and operate. By using NPV, IRR, and DSCR indicators, project management and investors can determine whether the Lombok Regional SPAM project will generate sufficient returns to cover costs and risks, as well as whether the project can remain financially sustainable throughout the evaluation period. If these three indicators demonstrate favourable results, the project can be considered feasible for implementation.

Financial Feasibility Analysis of the Unsupported PPP Scheme

Based on the cash flow modelling calculations, the Lombok Regional SPAM PPP Project is considered financially feasible without government support. The results of the financial feasibility evaluation are as follows (detailed calculations are presented in the Appendix):

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a. Net Present Value (NPV): IDR 132,673,000,000. Therefore, the project is financially feasible because the NPV value is greater than zero.
b. Debt Service Coverage Ratio (DSCR): 1.4. Therefore, the project is financially feasible because the DSCR value is greater than 1.
c. Internal Rate of Return (IRR): 12.1%. Therefore, the project is financially feasible because the IRR exceeds the Weighted Average Cost of Capital (WACC).

Financial Feasibility Analysis of the Proposed Scheme

This analysis assumes that the investment cost for the Lombok Regional SPAM PPP project borne by the Project Implementing Entity (BUP) amounts to 60% of the total project cost, in accordance with the Hybrid Annuity Model (HAM) financing scheme. The annual annuity received by the BUP from the Government is estimated at IDR 136 billion per year, calculated using the following formula:

$$\text{Annual Annuity} = \frac{\text{Total Cost} \times i \times (1+i)^n}{(1+i)^n - 1}$$

Where the total expenditure borne by the BUP is IDR 1.19 trillion, the discount rate (i)is 9.6%, and the concession period (n)is 20 years. Therefore:

$$\text{Annual Annuity} = \frac{(Rp\ 1.19\ T \times 9.6\% \times (1+9.6\%)^{20}}{(1+9.6\%)^{20} - 1}$$
$$= \text{IDR } 136 \text{ billion per year}$$

Based on the cash flow modeling calculations, the Lombok Regional SPAM PPP project under the Hybrid Annuity Model financing scheme is considered financially feasible according to the financial evaluation results received by the BUP, as follows (detailed calculations are presented in the Appendix):

a. Net Present Value (NPV): IDR 55,527,000,000. Therefore, the project is financially feasible because the NPV value is greater than zero.
b. Debt Service Coverage Ratio (DSCR): 1.5. Therefore, the project is financially feasible because the DSCR value is greater than 1.
c. Internal Rate of Return (IRR): 12%. Therefore, the project is financially feasible because the IRR exceeds the Weighted Average Cost of Capital (WACC).

Recapitulation of Financial Feasibility Analysis

A comparison of the financial feasibility between the existing PPP scheme and the proposed HAM scheme is presented in Table 10.

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Table 10. Recapitulation of Financial Feasibility Analysis

PPP Scheme		**HAM Scheme**	
Implementing Business Entity		Implementing Business Entity	
WACC	9.6%	WACC	9.6%
NPV	IDR 132,673,000,000	NPV	IDR 55,527,000,000
DSCR	1.4	DSCR	1.5
IRR	12.1%	IRR	12%
PBP	12 years 3 months	Payback Period	12 years 7 months

Based on Table 10, which summarizes the financial feasibility analysis, it can be concluded that both the Public-Private Partnership (PPP/KPBU) scheme and the Hybrid Annuity Model (HAM) scheme are financially feasible for implementation. This is indicated by the positive NPV values under both schemes, IRR values that exceed the Weighted Average Cost of Capital (WACC) of 9.6%, and DSCR values greater than 1, demonstrating that the project is capable of fulfilling its debt repayment obligations.

However, when compared in terms of investment profitability, the PPP scheme demonstrates better performance, as reflected by its higher NPV value, slightly higher IRR, and faster Payback Period compared to the HAM scheme. On the other hand, the HAM scheme has a slightly higher DSCR value, indicating relatively stronger debt repayment capability.

Therefore, although both schemes are considered feasible for implementation, the PPP scheme is more attractive in terms of financial returns and investment payback efficiency.

Financial Feasibility Analysis of the Proposed Scheme

Sensitivity analysis in the Lombok Regional SPAM project can be conducted to evaluate how changes in key factors influence the overall success of the project. The sensitivity analysis is used to test each financial feasibility parameter against changes in variables such as increases in investment costs, increases in operation and maintenance (O&M) costs, revenues not reaching 100% of the target, and combinations of these variables. This analysis aims to examine how such changes affect the Net Present Value (NPV), Internal Rate of Return (IRR), and Debt Service Coverage Ratio (DSCR).

By utilizing NPV, IRR, and DSCR indicators, project management and investors can determine whether the Lombok Regional SPAM project will generate sufficient returns to cover costs and risks, as well as whether the project can remain financially sustainable throughout the evaluation period. If all three indicators demonstrate favorable results, the project may be considered financially feasible for implementation, as presented in Table 11.

Table 11. Sensitivity Analysis of the Hybrid Annuity Model Scheme

Scenario	Various Factors	Equity IRR	NPV (Million IDR)	DSCR
Base Case		**12%**	**55,527**	**1.5**
Case 1	O&M Costs Increase by 10%	**11%**	**33,682**	**1.3**
Case 2	Investment Costs Increase by 10%	**11%**	**44,017**	**1.2**
Case 3	Revenue Decreases by 10%	**9%**	**-23,664**	**1.1**
Case 4	Investment and O&M Costs Increase by 10%	**9%**	**-23,736**	**1.2**

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1. Under the base case condition, the project demonstrates strong financial performance, with an IRR of 12%, a positive NPV, and a DSCR of 1.5, indicating that the project is financially feasible.
2. A 10% increase in operation and maintenance (O&M) costs reduces the project's performance, as reflected in the decline of IRR, NPV, and DSCR values; however, the project remains financially feasible.
3. A 10% increase in investment costs also decreases the financial indicators, although the impact is not as significant as that caused by a decline in revenue.
4. A 10% decrease in revenue produces the most significant impact, resulting in a negative NPV, which indicates that the project becomes financially unfeasible.
5. The combination of a 10% increase in investment costs and O&M costs further worsens the project condition, with the NPV remaining negative and the IRR declining substantially, thereby rendering the project financially unfeasible.

Overall, the project is more sensitive to changes in revenue than to increases in costs. The feasibility of the project under the Hybrid Annuity Model (HAM) scheme is highly dependent on revenue stability, and a decline in revenue represents the greatest risk that could cause the project to become financially unfeasible.

CONCLUSION

In conclusion, the project has the potential to be implemented, as most of the feasibility indicators satisfy the investment criteria. A comparison between the Public-Private Partnership (PPP/KPBU) scheme without government support and the Hybrid Annuity Model (HAM) scheme indicates that both schemes are financially feasible for implementation. However, the PPP scheme generates a higher NPV value and a faster investment payback period compared to the HAM scheme, with the following comparison: PPP Scheme Without Government Support: NPV of IDR 132,673,000,000, DSCR of 1.4, IRR of 12.1%, and payback period occurring in the third month of the 12th operational year, namely in 2037. Hybrid Annuity Model Scheme: NPV of IDR 55,527,000,000, DSCR of 1.5, IRR of 12%, and payback period occurring in the seventh month of the 12th operational year, namely in 2037. In the Lombok Regional SPAM Project, the Hybrid Annuity Model scheme was found to be sensitive to changes under scenarios 3 and 4, which showed a decline in IRR and DSCR values as well as a negative NPV. These conditions indicate that the project becomes financially unfeasible. Therefore, SPAM management must maintain financial stability to avoid situations similar to scenarios 3 and 4, namely a decrease in revenue of up to 10% and an increase in investment and operation & maintenance (O&M) costs of up to 10%.

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