Investment Feasibility Analysis on Villa Construction Project

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Abstract
This study discusses the feasibility of investing in a villa construction project in Gianyar Regency, Bali. the purpose of this study is to determine the financial feasibility and payback cost time of the villa construction project. In 2023 there was an increase in the number of tourist visits to Bali along with the revival of the post-pandemic tourism sector. this has an impact on increasing interest in exclusive housing. This project was developed by PT Manunggal Graha Persada with a plan time of three years. The development includes two villa clusters. Using a quantitative descriptive approach and secondary data from the developer, the analysis was carried out using five methods in engineering economics The results indicate that the net present value is positive, the internal rate of return exceeds the minimum attractive rate of return, the benefit cost ratio is greater than one, the payback period is shorter than the project duration, and the break-even point is achieved after the sale of twelve villa units. Based on these findings, the villa construction project is financially feasible and expected to recover investment costs within two years and one month, or when twelve units are sold.
Keywords: Analysis, Engineering Economics, Investment, Villa.

1. INTRODUCTION

Gianyar Regency in Bali is known as a center of art and culture that attracts many domestic and foreign tourists. In Gianyar Regency is one of the regions in Bali Province known as a center for art, culture, and spirituality. With an area of approximately 368 km² and a population of over 500,000 people, Gianyar has become a major attraction for tourists, particularly in the globally renowned Ubud area. Tourist visitation data for 2023 shows a significant increase, with Gianyar recording over 5.2 million international tourists, a sharp rise compared to the previous year.

This situation presents highly promising investment opportunities, particularly in the property and tourism sectors. One potential form of investment is the development of exclusive residential villas. Demand for accommodations that blend traditional Balinese ambiance with modern amenities is on the rise. Therefore, the construction of villas that combine local cultural values with modern comfort presents an extremely attractive option, whether for short-term or long-term rentals.

In this context, plans are underway for the development of a villa project located in the heart of Gianyar Regency. This project consists of several clusters developed by PT Manunggal Graha Persada, with initial plans for construction to begin in 2019 and continue until 2023. However, due to the COVID-19 pandemic, construction activities were delayed and could only resume between 2021 and 2024. This delay caused significant financial impacts for both investors and contractors. One of the factors contributing to these losses was the lack of a comprehensive investment feasibility analysis prior to the project's implementation.

Investment feasibility analysis is crucial to ensure that the funds invested will yield the expected returns. Investing in a property project not only requires construction funds but also includes operational costs, maintenance, and other ongoing expenses. Therefore, accurate analysis is needed to assess the potential financial benefits of the project and to reduce the risk of future losses.

This study uses five main methods to assess the financial feasibility of the project, namely Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), Payback Period (PP), and Break Even Point (BEP). Each method has its own advantages and provides a different perspective in evaluating investment returns. For example, NPV provides the present value of the net benefits to be obtained, IRR indicates the rate of return on investment, BCR assesses the ratio of benefits to costs, PP indicates how long it takes for the capital to be recovered, and BEP indicates the break-even point quantitatively. The combination of these five methods provides a comprehensive and in-depth overview of the financial aspects of the project.

The primary focus of this study is to answer two key questions: whether this villa development project is viable from an investment perspective, and how long it will take for the invested capital to be recovered. The results of

this study are expected to provide accurate data and information for investors to make decisions, as well as assist property developers in developing more effective business strategies and financial management.

2. METHOD

2.1. Research Method

This study uses a quantitative descriptive method, which is used to understand phenomena in the form of numbers or quantitative data that are then analyzed statistically to identify existing relationships and patterns. (Sugiyono, 2017) This method involves collecting relevant data and analyzing it numerically to obtain objective results. The analysis focuses on financial aspects, where the data obtained is processed into cash flow calculations, which are then analyzed using relevant investment methods.

2.2. Data Analysis Techniques

In this study, data analysis was conducted by calculating the costs required to evaluate investment in the research object. This analysis used several methods, as follows:

1. Net Present Value (NPV) to determine the net value of future cash flows discounted to their present value.
2. Internal Rate of Return (IRR) to determine the discount rate at which the NPV of the project's cash flows is zero.
3. Benefit Cost Ratio (BCR) to compare the present value of the benefits generated with the present value of the costs incurred
4. Payback Period (PP) to determine the time required to recover investment expenditures with profits or net cash flow.
5. Break Even Point (BEP) to determine the point at which the total project revenue is equal to the total costs incurred.

2.3. Research Stages

The research stages conducted in the Feasibility Analysis of the Villa Development Project are as follows:

1. Preparation Stage
   In this stage, the author classified the data obtained based on the clusters found in the villa development project.
2. Implementation Stage
   After the data was classified based on the types of villas in the four clusters, the author was able to process the data.
   - Calculating the costs of land acquisition and permit processing for each cluster.
   - Calculating the costs of land development for each cluster.
   - Summing up the total construction costs for all villa units in each cluster.
   - Calculating the costs of road and drainage infrastructure for each cluster.
   - Calculating the costs of supporting infrastructure construction for each cluster.
   - Calculate the real estate and marketing costs for each cluster.
   - Create a cash flow for each cluster.
   - Conduct an investment analysis based on the data obtained using the NPV, IRR, BCR, PP, and BEP methods.

3. Results and Discussion

3.1. Overview

This villa development project is a cultural and sustainable residential area located in Banjar Tengkulak, Kemenuh Village, Gianyar Regency, Bali. Developed by PT Manunggal Graha Persada, the project features an eco-luxury concept that combines traditional Balinese architecture with modern facilities such as a retreat center, jogging track, and nature-themed café. Spanning approximately 1.7 hectares and divided into four clusters, the villa units are offered with freehold ownership status backed by a Certificate of Ownership (SHM). The project targets domestic and international investors as well as tourists seeking exclusive residences with an authentic living experience in Bali. With land prices still competitive in the eastern Bali region, the project offers potential for capital gains and passive income through short-term or long-term rental schemes. Scheduled to take place over three years (2026–2028), the project is expected to not only provide financial benefits but also contribute to the well-being of the local community through the implementation of ESG (Environmental, Social, and Governance) principles, making it a form of investment oriented toward sustainability.

3.2. Investment Costs for the Construction of Villa

Investment costs are all costs incurred to carry out activities ranging from land acquisition, construction, to the sale of units in clusters (Kasmir & Jakfar, 2012).

3.2.1. Construction Conditions for the Construction of Villas

In the initial stage of the villa construction project, land preparation work was carried out in the form of cutting and filling to level the elevation according to the design, as well as wall and soil reinforcement work in the cave and riverbank areas. The following is the budget plan for the land preparation work

Table 1. budget plan for the land preparation work

NO	URAIAN PEKERJAAN	KONTRAK				MC-100	
		VOLUME	SAT.	HARGA SATUAN (Rp)	JUMLAH HARGA (Rp)	VOLUME	JUMLAH HARGA (Rp)
A	**PEKERJAAN GRAIDING TANAH**						
1	Greiding Lahan Site Untuk Galian (CUT)		M3	98.250,00		6.353,03	624.185.394,00
2	Greiding Lahan Site Untuk Urugan (FILL)		M3	79.750,00		2.536,94	202.320.965,00
	JUMLAH A						**826.506.359,00**
B	**PEKERJAAN RETENNING WALL**						
I	**PEKERJAAN PERSIAPAN**						
1	Pekerjaan Uitzet	150,00	M'	12.000,00	1.800.000,00	215,50	2.586.000,00
2	Pekerjaan Bowplank	150,00	M'	25.000,00	3.750.000,00	215,50	5.387.500,00
3	Pekerjaan Gudang Bahan & Alat	1,00	Ls	2.000.000,00	2.000.000,00	1,00	2.000.000,00
	JUMLAH I				**7.550.000,00**		**9.973.500,00**
II	**PEKERJAAN TANAH & PONDASI**						
1	Pekerjaan Galian Tanah Pondasi	150,00	M3	68.000,00	10.200.000,00	524,44	35.681.920,00
2	Pekerjaan Beton Pondasi Plat Kaki	8,79	M3	3.306.280,00	28.929.950,00	3,68	12.167.110,40
3	Pekerjaan Beton Struktur Kolom	42,55	M3	3.306.280,00	140.682.214,00	15,66	51.776.344,80
4	Pekerjaan Beton Sloof Struktur	28,85	M3	3.306.280,00	95.386.178,00	10,48	34.649.814,40
5	Pekerjaan Bronjong Tanggul Penahan Tanah	175,00	M3	1.400.000,00	245.000.000,00	506,70	709.380.000,00
6	Pekerjaan Pasangan Batu Kali Penahan Tanah	650,00	M3	714.000,00	464.100.000,00	347,98	248.454.864,00
7	Urugan Pasir Bawah Pondasi Tebal 15 Cm		M3	515.600,00		6,15	3.170.940,00
8	Lantai Kerja Bawah Pondasi Tebal 20 Cm		M3	835.300,00		8,20	6.849.460,00
	JUMLAH II				**984.298.342,00**		**1.102.110.453,60**
III	**PEKERJAAN BETON PERKUATAN DINDING & LANGIT - LANGIT GOA SUNGAI**						
1	Pekerjaan Bore Pile	150,00	M'	80.000,00	12.000.000,00	16,00	1.280.000,00
	JUMLAH III				**12.000.000,00**		**1.280.000,00**
IV	**PEKERJAAN LAIN - LAIN / TAMBAHAN**						
1	Pembersihan Lapangan		Ls	35.000.000,00		1,00	35.000.000,00
2	Mobilisasi Dan Demobilisasi Peralatan		Ls	8.000.000,00		1,00	8.000.000,00
3	Sewa Alat Berat Excavator 60-120 HP		Jam	537.500,00		192,00	103.200.000,00
4	Sewa Alat Berat Excavator 80-140 HP		Jam	762.500,00		299,00	227.987.500,00
5	PasangTrucuk Bambu ø 10 cm P = 2,50 M		Btg	225.000,00		45,00	10.125.000,00
6	Pasang Pipa PVC ø 1 1/4"		M'	148.150,00		120,00	17.778.000,00
7	Pasang Sumur Bor Kedalaman 50,00 m Lengkap		Unit	10.500.000,00		1,00	10.500.000,00
	JUMLAH IV						**412.590.500,00**
	JUMLAH				**1.003.848.342,00**		**2.352.460.812,60**
	DIBULATKAN				**1.003.000.000,00**		**2.352.000.000,00**

3.2.2. Total Investment Costs to be Absorbed in the Villa Construction Project.

The total cost that will be absorbed by several parties to carry out the villa construction project is Rp 117,200,000,000. These costs will be used for land acquisition payments, construction financing, public facility construction financing, and payments to other parties involved in this project. The following is the investment cost plan:

Table 2. investment cost plan

RENCANGAN BIAYA INVESTASI			
Biaya Investasi Lahan			
Cluster	Luas (m²)	Harga Satuan (/m²)	Jumlah Harga
1	4200	Rp 6.000.000,00	Rp 25.200.000.000,00
2	5000	Rp 5.000.000,00	Rp 25.000.000.000,00
Total Biaya			Rp 50.200.000.000,00
Biaya Investasi Pelaksanaan Konstruksi			
Cluster	Unit	Harga Satuan	Jumlah Harga
1	9	Rp 2.250.000.000,00	Rp 20.250.000.000,00
2	11	Rp 2.250.000.000,00	Rp 24.750.000.000,00
Total Biaya			Rp 45.000.000.000,00
Biaya Investasi Fasilitas Umum			
Cluster	Jumlah Harga		
1	Rp		4.500.000.000,00
2	Rp		5.000.000.000,00
Total Biaya			Rp 9.500.000.000,00
Biaya Investasi Pihak Lain			
Cluster	Notaris & Biaya Balik Nama	Fee Jasa Marketing	Fee Jasa Konsultan & MK
1	Rp 4.000.000.000,00	Rp 1.250.000.000,00	Rp 1.000.000.000,00
2	Rp 4.000.000.000,00	Rp 1.250.000.000,00	Rp 1.000.000.000,00
Total Biaya	Rp 8.000.000.000,00	Rp 2.500.000.000,00	Rp 2.000.000.000,00
Total biaya			Rp 12.500.000.000,00
Total Biaya Investasi Keseluruhan			Rp 117.200.000.000,00

3.2.3. Revenue from villa sales

Sales made by the marketing department will cover the entire investment costs. To meet these requirements, sales targets are necessary. Sales results are reported to the owner every quarter or every three months. The selling price for each villa unit is IDR 8,000,000,000.00. The following are the sales targets for the villa cluster units:

Table 3. sales targets

Time	Sales Target
Q1	5%
Q2	5%
Q3	5%
Q4	5%
Q5	10%
Q6	10%
Q7	10%
Q8	10%
Q9	10%
Q10	10%
Q11	10%
Q12	10%
Total Sales	100%

3.3. Cash Flow

Cash flow is data on receipts and expenditures recorded in various financial reports, such as journals, ledgers, and cash flow statements, which are then calculated over a certain period of time (Giatman, 2006). The following is the cash flow from a villa construction project:

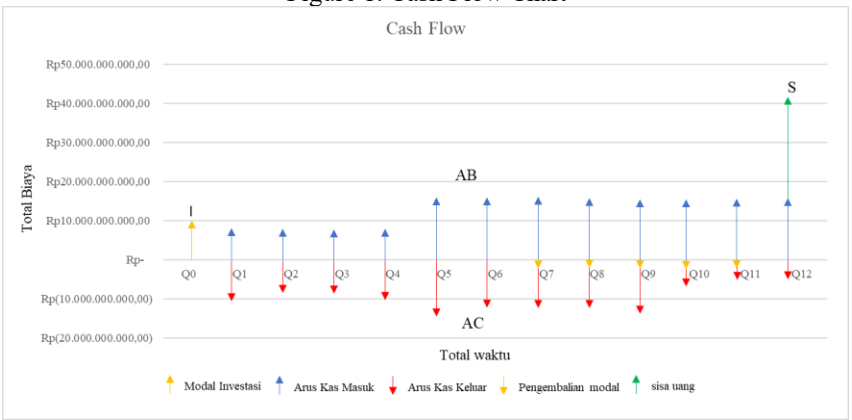
Table 4. Cash Flow Year 1

DESCRIPTION	initial investment	Year 1							
	Q0	Q1		Q2		Q3		Q4	
Cash In		Rp	8.000.000.000,00	Rp	8.000.000.000,00	Rp	8.000.000.000,00	Rp	8.000.000.000,00
Total Cash In		Rp	8.000.000.000,00	Rp	16.000.000.000,00	Rp	24.000.000.000,00	Rp	32.000.000.000,00
Cash Out		-Rp	10.575.000.000,00	-Rp	8.175.000.000,00	-Rp	8.175.000.000,00	-Rp	10.175.000.000,00
Total Cash Out	Rp 10.000.000.000,00	-Rp	10.575.000.000,00	-Rp	18.750.000.000,00	-Rp	26.925.000.000,00	-Rp	37.100.000.000,00
investment									
Available Cash		Rp	7.425.000.000,00	Rp	7.250.000.000,00	Rp	7.075.000.000,00	Rp	4.900.000.000,00
Net cash flow		-Rp	2.575.000.000,00	-Rp	175.000.000,00	-Rp	175.000.000,00	-Rp	2.175.000.000,00

Table 5 Cash Flow Year 1 and 2

DESCRIPTION	Year 2							
	Q1		Q2		Q3		Q4	
Cash In	Rp	16.000.000.000,00	Rp	16.000.000.000,00	Rp	16.000.000.000,00	Rp	16.000.000.000,00
Total Cash In	Rp	48.000.000.000,00	Rp	64.000.000.000,00	Rp	80.000.000.000,00	Rp	96.000.000.000,00
Cash Out	-Rp	14.500.000.000,00	-Rp	12.000.000.000,00	-Rp	12.000.000.000,00	-Rp	12.000.000.000,00
Total Cash Out	-Rp	51.600.000.000,00	-Rp	63.600.000.000,00	-Rp	75.600.000.000,00	-Rp	87.600.000.000,00
investment					-Rp	2.000.000.000,00	-Rp	2.000.000.000,00
Available Cash	Rp	6.400.000.000,00	Rp	10.400.000.000,00	Rp	12.400.000.000,00	Rp	14.400.000.000,00
Net cash flow	Rp	1.500.000.000,00	Rp	4.000.000.000,00	Rp	2.000.000.000,00	Rp	2.000.000.000,00
	Year 3							
Cash In	Rp	16.000.000.000,00	Rp	16.000.000.000,00	Rp	16.000.000.000,00	Rp	16.000.000.000,00
Total Cash In	Rp	112.000.000.000,00	Rp	128.000.000.000,00	Rp	144.000.000.000,00	Rp	160.000.000.000,00
Cash Out	-Rp	13.300.000.000,00	-Rp	6.300.000.000,00	-Rp	5.000.000.000,00	-Rp	5.000.000.000,00
Total Cash Out	-Rp	100.900.000.000,00	-Rp	107.200.000.000,00	-Rp	112.200.000.000,00	-Rp	117.200.000.000,00
investment	-Rp	2.000.000.000,00	-Rp	2.000.000.000,00	-Rp	2.000.000.000,00		
Available Cash	Rp	15.100.000.000,00	Rp	22.800.000.000,00	Rp	31.800.000.000,00	Rp	42.800.000.000,00
Net cash flow	Rp	700.000.000,00	Rp	7.700.000.000,00	Rp	9.000.000.000,00	Rp	11.000.000.000,00

Figure 1. Cash Flow Chart



3.4. Minimum Attractive Rate of Return

Minimum Attractive Rate of Return (MARR) is the minimum rate of return or interest that is acceptable to investors (Giatman, 2006). The Bank Indonesia benchmark interest rate (BI-7Day Reverse Repo Rate) is used as the basis.

Table 6. Deposit Interest Rate

NO	Date	BI-7Day-RR
1	23 April 2025	5,75%
2	19 Maret 2025	5,75%
3	19 Februari 2025	5,75%
4	15 Januari 2025	5,75%
Average		5,75%

Table 7. Bank Credit Interest Rates

NO	Bank Name	Bank Credit Interest Rates
1	BRI	8,50%
2	Bank Mandiri	8,50%
3	BNI	8,56%
4	Bank Danamon	9,00%
5	Bank permata	8,00%
6	BCA	8,32%
7	Bank Maybank	9,72%
8	Bank Cimb Niaga	9,00%
9	Bank UOB	9,00%
Average		8,73%

In the villa construction project, all funding came from investors without using bank loans. The following is the WACC calculation:

$$WACC = (\frac{E}{E+D} \times r_e) + (\frac{D}{E+D} \times r_d) \quad (1)$$

$$WACC = (\frac{\text{Rp. } 10.000.000.000}{\text{Rp. } 10.000.000.000 + 0} \times 5{,}75\%) + (\frac{0}{\text{Rp. } 10.000.000.000 + 0} \times 8{,}73\ \%)$$

$$WACC = 5{,}75\%$$

The cash flow unit of time used is quarterly, so it needs to be converted using compound interest calculations. The following are the compound interest calculations:

$$i_{quarter} = (1 + i_{Year})^{1/4} - 1 \quad (2)$$

$$i_{quarter} = (1 + 5{,}75\%)^{1/4} - 1$$

$$i_{quarter} = 1{,}41\%$$

3.5. Financial Feasibility Analysis

3.5.1. Net Present Value

Net Present Value (NPV) is a method used to evaluate the feasibility of an investment by calculating the net value of future cash flows discounted to their present value. NPV measures the difference between the present value of cash inflows and the present value of cash outflows. If the NPV value is positive, then the project is feasible to implement because it is expected to generate a net profit after taking into account the cost of capital (Brealey, Myers, & Allen, 2017).

$$PWB = \sum_{t=0}^{n} Cb_t(FBP) \quad (3)$$

$$PWC = \sum_{t=0}^{n} Cc_t(FBP) \quad (4)$$

$$PWF = \sum_{t=0}^{n} Cf_t(FBP) \quad (5)$$

$$NPV = PWB - PWC \quad (6)$$

Explanation :
NPV = Net Present Value
Cb = *Cash flow benefit*
Cc = *Cash flow cost*
Cf = *Cash flow* (*benefit* + *cost*)
t = time period

n = Investment period
FPB = present interest rate factor

Table 8. NPV Calculation

Q	Net cash flow	(P/F,I,N)	Present Value
1	-Rp 2.575.000.000,00	1,000	-Rp 2.575.000.000,00
2	-Rp 175.000.000,00	0,986	-Rp 172.571.055,21
3	-Rp 175.000.000,00	0,972	-Rp 170.175.823,41
4	-Rp 2.175.000.000,00	0,959	-Rp 2.085.686.255,84
5	Rp 1.500.000.000,00	0,946	Rp 1.418.439.716,31
6	Rp 4.000.000.000,00	0,933	Rp 3.730.005.921,53
7	Rp 2.000.000.000,00	0,920	Rp 1.839.117.308,09
8	Rp 2.000.000.000,00	0,907	Rp 1.813.590.940,11
9	Rp 700.000.000,00	0,894	Rp 625.946.604,52
10	Rp 7.700.000.000,00	0,882	Rp 6.789.845.294,52
11	Rp 9.000.000.000,00	0,870	Rp 7.826.031.098,26
12	Rp 11.000.000.000,00	0,857	Rp 9.432.387.868,16
Net Present Value			Rp 28.471.931.617,03

Example calculation for NPV Q1 year 1:

$$NPV\ Q1\ tahun\ 1 = \frac{C_t}{(1+r)^t} = \frac{-\text{Rp } 2.575.000.000,00}{(1+1{,}41\%)^0} = -\text{Rp } 2.575.000.000,00$$

Calculation NPV :

∑ NPV = NPV Q1 tahun 1 + NPV Q2 tahun 1 + NPV Q3 tahun 1 + NPV Q4 tahun 1 + NPV Q1 tahun 2 + NPV Q2 tahun 2 + NPV Q3 tahun 2 + NPV Q4 tahun 2 + NPV Q1 tahun 3 + NPV Q2 tahun 3 + NPV Q3 tahun 3 + NPV Q4 tahun 3

∑ NPV = (-Rp2,575,000,000.00) + -Rp172,571,055.21) + (-Rp170,175,823.41) + -Rp2,085,686,255.84) + Rp1,418,439,716.31 + Rp3,730,005,921.53 + Rp1,839,117,308.09 + Rp1,813,590. 940.11 + Rp625,946,604.52 + Rp6,789,845,294.52 + Rp7,826,031,098.26 + Rp9,432,387,868.16

∑ NPV = Rp 28,471,931,617.03

NPV = Rp 28,471,931,617.03> 0, Therefore, the investment is considered feasible.

3.5.2. Internal Rate of Return

Internal Rate of Return (IRR) is the discount rate at which the NPV of a project's cash flow is zero. IRR provides information about the internal rate of return of a project and allows investors to compare various investment alternatives by looking at the expected rate of return (Giatman, 2006). investment plan is considered feasible/profitable if the IRR value is greater than or equal to the MARR.

$$IRR = i_1 + (i_2 - i_1)\frac{NPV_1}{NPV_1 + NPV_2} \quad \text{.....(7)}$$

Explanation :

IRR = Tingkat pengembalian
i_1 = Discount rate that produces the smallest negative NPV
i_2 = Discount rate that produces the smallest positive NPV
NPV1 = Present value using i_1
NPV2 = Present value using i_2

IRR values can also be obtained using another method, namely Excel software. Excel software has a Goal Seek feature that can find the input values needed to achieve a specific result in a formula.

Table 9. IRR Calculation Using the Goalseek Method

Q	Net cash flow	(P/F,I,N)	Present Value
1	-Rp 2.575.000.000,00	1,000	-Rp 2.575.000.000,00
2	-Rp 175.000.000,00	0,752	-Rp 131.559.064,61
3	-Rp 175.000.000,00	0,565	-Rp 98.901.642,75
4	-Rp 2.175.000.000,00	0,425	-Rp 924.075.479,09
5	Rp 1.500.000.000,00	0,319	Rp 479.095.588,79
6	Rp 4.000.000.000,00	0,240	Rp 960.447.505,06
7	Rp 2.000.000.000,00	0,181	Rp 361.015.929,63
8	Rp 2.000.000.000,00	0,136	Rp 271.399.531,49
9	Rp 700.000.000,00	0,102	Rp 71.410.137,00
10	Rp 7.700.000.000,00	0,077	Rp 590.520.909,11
11	Rp 9.000.000.000,00	0,058	Rp 518.883.418,11
12	Rp 11.000.000.000,00	0,043	Rp 476.763.167,24
Net Present Value			Rp 0,00

i = 33.0201% (GoalSeek)

Example calculation for NPV Q1 year 1:

$$NPV\ Q1\ tahun\ 1 = \frac{C_t}{(1+r)^t} = \frac{-\text{Rp } 2.575.000.000,00}{(1+33.0201\%)^0} = -\text{Rp } 2.575.000.000,00$$

Calculation NPV :

∑ NPV = NPV Q1 Year 1 + NPV Q2 Year 1 + NPV Q3 Year 1 + NPV Q4 Year 1 + NPV Q1 Year 2 + NPV Q2 Year 2 + NPV Q3 Year 2 + NPV Q4 Year 2 + NPV Q1 Year 3 + NPV Q2 Year 3 + NPV Q3 Year 3 + NPV Q4 Year 3

NPV = (-Rp2,575,000,000.00) + (-Rp131,559,064.61) + (-Rp98,901,642.75) + (-Rp924,075,479.09) + Rp479,095,588.79 + Rp960,447,505.06 + Rp361,015,929.63 + Rp271,399,531.49 + Rp71,410. 137.00 + Rp590,520,909.11 + Rp518,883,418.11 + Rp476,763,167.24

NPV = Rp 0

IRR = 33.0201% > MARR = 1,41%, therefore the investment is considered feasible.

3.5.3. Benefit Cost Ratio

Benefit Cost Ratio (BCR) is one of the analysis methods used to evaluate the economic feasibility of a project by comparing the present value of the benefits generated with the present value of the costs incurred. A project is considered economically feasible if the BCR value obtained is greater than one (Giatman, 2006).

$$BCR = \frac{Present\ Value\ Benefit}{Present\ Value\ Cost} \quad (8)$$

Table 10. Present Worth of Benefit Calculation

Q	Benefit	(P/F,I,N)	Present Worth of Benefit
1	Rp 8.000.000.000,00	1,000	Rp 8.000.000.000,00
2	Rp 8.000.000.000,00	0,986	Rp 7.888.962.524,04
3	Rp 8.000.000.000,00	0,972	Rp 7.779.466.213,22
4	Rp 8.000.000.000,00	0,959	Rp 7.671.489.676,65
5	Rp 16.000.000.000,00	0,946	Rp 15.130.023.640,66
6	Rp 16.000.000.000,00	0,933	Rp 14.920.023.686,13
7	Rp 16.000.000.000,00	0,920	Rp 14.712.938.464,72
8	Rp 16.000.000.000,00	0,907	Rp 14.508.727.520,84
9	Rp 16.000.000.000,00	0,894	Rp 14.307.350.960,44
10	Rp 16.000.000.000,00	0,882	Rp 14.108.769.443,15
11	Rp 16.000.000.000,00	0,870	Rp 13.912.944.174,68
12	Rp 16.000.000.000,00	0,857	Rp 13.719.836.899,14
TOTAL			Rp 146.660.533.203,68

Example of PVB calculation:

$$Benefit\ Q1\ Year\ 1 = \frac{C_t}{(1+r)^t} = \frac{\text{Rp } 8.000.000.000,00}{(1+1,41\%)^0} = \text{Rp } 8.000.000.000,00$$

Calculation PVB :

∑ PVB = Benefit Q1 year 1 + Benefit Q2 year 1 + Benefit Q3 year 1 + Benefit Q4 year 1 + Benefit Q1 year 2 + Benefit Q2 year 2 + Benefit Q3 year 2 + Benefit Q4 year 2 + Benefit Q1 year 3 + Benefit Q2 year 3 + Benefit Q3 year 3 + Benefit Q4 year 3

∑ PVB = Rp 146,660,533,203.68

Table 11. Present Worth of Cost Calculation

Q	Cost	(P/F,I,N)	Present Worth of Cost
1	Rp 10.575.000.000,00	1,000	Rp 10.575.000.000,00
2	Rp 8.175.000.000,00	0,986	Rp 8.061.533.579,26
3	Rp 8.175.000.000,00	0,972	Rp 7.949.642.036,64
4	Rp 10.175.000.000,00	0,959	Rp 9.757.175.932,48
5	Rp 14.500.000.000,00	0,946	Rp 13.711.583.924,35
6	Rp 12.000.000.000,00	0,933	Rp 11.190.017.764,60
7	Rp 12.000.000.000,00	0,920	Rp 11.034.703.848,54
8	Rp 12.000.000.000,00	0,907	Rp 10.881.545.640,63
9	Rp 13.300.000.000,00	0,894	Rp 11.892.985.485,86
10	Rp 6.300.000.000,00	0,882	Rp 5.555.327.968,24
11	Rp 5.000.000.000,00	0,870	Rp 4.347.795.054,59
12	Rp 5.000.000.000,00	0,857	Rp 4.287.449.030,98
TOTAL			Rp 109.244.760.266,17

Example of PVC calculation:

$$Cost\ Q1\ Year\ 1 = \frac{C_t}{(1+r)^t} = \frac{\text{Rp } 10.575.000.000{,}00}{(1+1{,}41\%)^0} = \text{Rp } 10.575.000.000{,}00$$

Calculation PVC :

∑ PVC = Cost Q1 year 1 + Cost Q2 year 1 + Cost Q3 year 1 + Cost Q4 year 1 + Cost Q1 year 2 + Cost Q2 year 2 + Cost Q3 year 2 + Cost Q4 year 2 + Cost Q1 year 3 + Cost Q2 year 3 + Cost Q3 year 3 + Cost Q4 year 3

∑ PVC = Rp 109,244,760,266.17

Calculation BCR :

$$BCR = \frac{\sum Present\ Value\ Benefit}{\sum Present\ Value\ Cost}$$

$$BCR = \frac{\text{Rp } 146{,}660{,}533{,}203.68}{\text{Rp } 109{,}244{,}760{,}266.17}$$

$$BCR = 1.342494897$$

BCR = 1.342494897 > 1, therefore the investment is considered feasible.

3.5.4. Payback Period

Payback Period (PP) is the time required to recover investment expenses by utilizing net cash flows. The Payback Period of an investment aims to determine how long (the period) it will take for the investment to be recovered when the break-even point is reached (Giatman, 2006).

$$K_{(PBP)} = \frac{Investasi}{Annual\ Benefit}\ x\ time\ period \quad \text{..... (8)}$$

Table 12. Payback Period Calculation

Kuartal	Investasi	Benefit	Cost	∑ Benefit	Keputusan
1	Rp 10.000.000.000,00	Rp 8.000.000.000,00	Rp 10.575.000.000,00	-Rp 2.575.000.000,00	I > ∑benefit
2		Rp 8.000.000.000,00	Rp 8.175.000.000,00	-Rp 2.750.000.000,00	I > ∑benefit
3		Rp 8.000.000.000,00	Rp 8.175.000.000,00	-Rp 2.925.000.000,00	I > ∑benefit
4		Rp 8.000.000.000,00	Rp 10.175.000.000,00	-Rp 5.100.000.000,00	I > ∑benefit
5		Rp 16.000.000.000,00	Rp 14.500.000.000,00	-Rp 3.600.000.000,00	I > ∑benefit
6		Rp 16.000.000.000,00	Rp 12.000.000.000,00	Rp 400.000.000,00	I > ∑benefit
7		Rp 16.000.000.000,00	Rp 12.000.000.000,00	Rp 4.400.000.000,00	I > ∑benefit
8		Rp 16.000.000.000,00	Rp 12.000.000.000,00	Rp 8.400.000.000,00	I > ∑benefit
9		Rp 16.000.000.000,00	Rp 13.300.000.000,00	Rp 11.100.000.000,00	I < ∑benefit (layak)
10		Rp 16.000.000.000,00	Rp 6.300.000.000,00	Rp 20.800.000.000,00	I < ∑benefit (layak)
11		Rp 16.000.000.000,00	Rp 5.000.000.000,00	Rp 31.800.000.000,00	I < ∑benefit (layak)
12		Rp 16.000.000.000,00	Rp 5.000.000.000,00	Rp 42.800.000.000,00	I < ∑benefit (layak)

Interpolasi :

$$K_{(PBP)} = n + \frac{a-b}{c-b} \times 1\ kuartal$$

$$K_{(PBP)} = 5 + \frac{Rp\ 10.000.000.000 - (-Rp\ 3.600.000.000)}{Rp\ 400.000.000 - (-Rp\ 3.600.000.000)} \times 1\ kuartal$$

$$K_{(PBP)} = 8{,}4 \times 1\ quarter$$

$$K_{(PBP)} = 2\ year, 1{,}2\ month$$

$K_{(PBP)} \approx 2\ year, 1\ month$
PP = 2 year,1 month > 3 Year, therefore the investment is considered feasible.

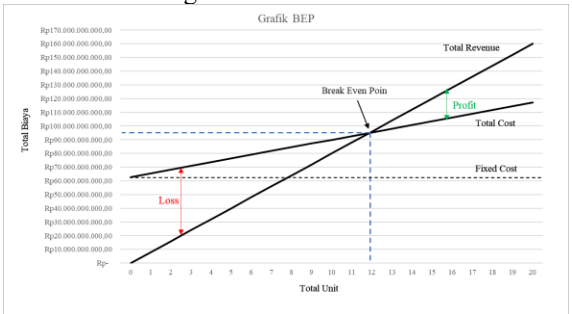
3.5.5. Break-Even Point

Break-even point (BEP) is an important concept in investment feasibility analysis that refers to the point at which the total revenue of a project equals the total costs incurred, so that the project neither makes a profit nor incurs a loss (Riyanto, 2022).

$$BEP = \frac{fixed\ cost}{Selling\ price\ per\ unit - Variable\ costs} \quad \text{.....(8)}$$

The BEP calculation can be done by dividing the total fixed costs by the difference between the selling price per unit and the variable cost per unit. In this study, fixed costs are costs incurred for land purchase and costs paid to other parties. Meanwhile, variable costs are costs incurred for the construction of villa units and the construction of public facilities.

Figure 2. BEP Chart



Fixed cost calculation:
Land purchase cost = Rp 50,200,000,000.
Other costs = Rp 12,500,000,000.
Fixed cost calculation:
Fixed cost = Land purchase cost + Other costs
Fixed Costs = IDR 50,200,000,000 + IDR 12,500,000,000
Fixed Costs = IDR 62,700,000,000
Variable cost calculation per unit:
Unit construction cost = IDR 2,250,000,000.
Common facility costs = IDR 500,000,000.
Variable costs = Unit construction costs + Common facility costs
Variable costs = IDR 2,250,000,000 + IDR 500,000,000
Variable costs = IDR 2,750,000,000
Selling price per unit = IDR 8,000,000,000
Break-Even Point (BEP) Calculation:

$$BEP = \frac{fixed\ cost}{Selling\ price\ per\ unit - Variable\ costs}$$

$$BEP = \frac{\text{IDR } 62{,}700{,}000{,}000}{\text{IDR } 8{,}000{,}000{,}000 - \text{IDR } 2{,}750{,}000{,}000}$$

$BEP = 11{,}89\ units$
$BEP \approx 12\ units$
BEP = 12 units villa > 20 units villa, therefore the investment is considered feasible.

4. Conclusions

Based on the results of the analysis and discussion obtained by the researcher, the following conclusions can be drawn:

1. This villa development project is financially feasible. This is because all analyses using several methods show feasible results. The positive NPV value is IDR 28,471,931,617.03 (NPV > 0). The IRR rate is 33.02%, which significantly exceeds the MARR of 1.44% per quarter (IRR > MARR). The BCR ratio is 1.34 (BCR > 1). The payback period (PP) is 8.4 quarters or 2 years and 1 month (PP < project lifespan). The break-even point (BEP) is achieved with the sale of the 12th villa unit (BEP < number of villa units).

2. The time required for cost recovery in this villa development project is 8.4 quarters or 2 years and 1 month. The BEP is 12 units. Villa unit sales can already cover fixed and variable costs when the villa sales percentage reaches 60%. The shorter payback period compared to the project's lifespan indicates that the project has good liquidity and lower investment risk.

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