

Sensitivity Analysis of Investment

(Case Study Grand Permata Ajung Residential)

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Abstract— Growth of population residential causes need for new residential to increase from year to year. Meanwhile, in terms of the provision of services residential construction, the number of residential has not been able to meet the growth of population. This condition was compounded by the existence of 3.4 million housing units with uninhabitable conditions in 2014 that still needs to be taken seriously. This study uses qualitative research methods using investment criteria value of development and also using sensitivity analysis. The research method is a calculation method, including data processing of financial feasibility, Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PBP), Break Even Point (BEP). The NPV results is IDR 3,375,311,611, its means the NPV > 0 (zero), the housing development plan is feasible to be implemented and also the value of IRR is 19.99%, Net B/C is 1.24, PBP of the Grand Permata Ajung residential development project in Jember Regency occurs in the 3rd year of more than 5 months, BEP value of the project is IDR 10,853,675,000. Based on the calculation results, the Grand Permata Ajung residential development project in Jember Regency can run according to investment criteria.

Keywords— Housing, Investment, Sensitivity.

I. INTRODUCTION

The population of Indonesia is 241 million people with a population growth rate 1,3% per year. The average number of people each Kepala Keluarga (KK) is 4,3 million people. With the calculation of the number of residential needs: 241 million x ,3% = 4,3 million. So that each year it takes 728,604 housing units per year or if rounded up to 729 thousand housing units per year. In addition, Statistics Indonesia data also claim that the number of residential in Indonesia has reached 49,3 million units. Of that amount, 3% needs to be repaired because it is damaged so that the number of residential that must be rehabilitated reaches 1.479.000 units, derived from the calculation of 49,3 million x 3%.

The number of residential needs in Indonesia, as happened in the world community, especially in urban communities, with a large population density, thus requiring the government's efforts to address residential problems in the various constraints such as limited land for housing. Rising house prices every year is not due to high budget for houses building, but higher price of land. There are also problems with land conversion permits, environmental management efforts, environmental legal measures, construction financing, financial loan and land sharing with public facilities for housing which makes the calculation of the residential investment value very important, to see investment is profitable or not expressed in financial terms.

This is background research of residential needs in Indonesia on the financial, which object at the Grand Permata Ajung Residential Development by PT. Kharisma Karya Raya Sentosa. Based on this background, research on analysis of investment criteria for the Grand Permata Ajung residential investment is important to obtain investment value that can benefit developer.

II. LITERATURE REVIEW

Cash flow

Cash flow is an increase or decrease in the amount of money raised. In finance, this term is used to describe the

amount of cash that is generated or consumed in a certain period of time. Cash flow can be divided: (Hernawan, 2011).

1. Initial Cash Flow
Pattern of cash flow related to capital expenditures.
2. Operational Cash Flow
Determining operational cash flow will be a year is the starting point for assessing the profitability of the investment proposal.
3. Terminal Cash Flow.
Terminal cash flow cash flow is generally comprised of the residual value of the investment and return on working capital.

Investment Assessment Criteria

Assessments can be used in assessing a proposed investment or project: (Halim, 2005).

1. Concept of Time Value of Money
a Compound interest Compound interest, also referred as interest, shows the interest on principal of the loan.
b Present value shows how the value of money at moment to a certain value in the future.
2. Net Present Value (NPV)
Investment criteria used in assessing whether a project is feasible or not. The Net Present Value is the net benefit has been discounted using social opportunity cost of capital (SOCC) as the discount factor.
$$NPV = \sum_{i=1}^n \frac{NB_i}{(1+i)^n}$$

If calculated NPV is greater than 0 (zero), this means project is feasible to be implemented and if NPV less than 0 (zero) this means not feasible to be implemented. The result of the calculation of the NPV is equal to 0 (zero), this means the project is in a Break Event Point (BEP).
3. Internal Rate of Return (IRR)
The discount rate which NPV is equal to 0 (zero). Therefore, if the IRR calculation result is greater than Social Opportunity Cost of Capital (SOCC) this means

project feasible, if same as the SOCC, this means the return of principal and under SOCC project is not feasible.

$$IRR = i_1 + NPV_1 (NPV_1 - NPV_2) \times (i_2 - i_1)$$

4. Net Benefit Cost Ratio (B/C Ratio)

If the amount of all income minus all expenses (specific economic comparisons) is obtained a positive number then activity is profitable, 0 (zero) number indicates a BEP and a negative number indicates that activity is detrimental. (Kodoatie, 2005; (Pujawan, 2008; Budikusuma, 2011).

$$B/C = PV (\text{Benefit}) \times PV (\text{Cost})$$

* If $B/C > 1$ the project was feasible; if the $B/C < 1$ the project was not feasible.

5. Pay Back Period (PBP)

A certain time period, shows the flow of the reception (cash flows) cumulative cash flows is same as amount of investment in form of present value.

$$PBP = T_{p-1} + \sum I_i - \sum B_{i \times p-1} \quad n \quad i=1 \quad n \quad i=1 \quad B_p$$

6. Break Even Point (BEP)

Breakeven point is a technical analysis conducted to study relationship between fixed costs, variable costs, expected profits and volume of sales/leasing. This analysis also gives an overview to company's management or foundation to find out what the sale or lease at least first accounting period, so that operations do not suffer losses.

III. METHOD

This study uses qualitative research methods using investment criteria on the value of development and using sensitivity analysis to variables that affect investment of Grand Permata Ajung Residential, in Jember Regency.

Primary data derived from surveys, planning and cash flow development company based on data with field and approved PT Kharisma Karya Raya. Collection of secondary data derived from the residential ± 2 km radius of residential locations Grand Permata Ajung to determine price and also number of sold.

Processing data using analysis criteria in residential investment, with a case study on PT. Kharisma Karya Raya Sentosa using sensitivity analysis to find limits for the acceptance of development constraints on certain variables.

The residential that was built was divided into 5 (five) clusters (types) and to be sold well for 5 (five) years. The initial step for investing in Grand Permata Ajung is to determine work, calculate material requirements and calculate budget plan required as development investment costs.

IV. RESULTS AND DISCUSSION

Cost of Investment Project

The residential that was built was divided into 5 (five) clusters (types): Type 30/60 as 171 units; Type 36/72 as 15 units; Type 43/78 as 18 units; Type 63/105 with 6 units and Type 100/120 with 12 units. Grand Permata Ajung Residential is projected to be sold well for 5 (five) years.

The initial step for investing in Grand Permata Ajung is to determine work, calculate material requirements and calculate

budget plan required as development investment costs is IDR 38,417,058,100,-.

Cost of Investment Development

Total investment cost is IDR. 38,417,058,100 which investment cost for developer from the beginning until next 5 years (2025). Cost needed until developer gets to carry out the development can run itself is IDR 30,165,841,034. Investors approves the application for loan funds 70%, so from this can loan IDR 21,166,088,724 with an interest of 15% a year. To minimize a loan of IDR. 9,334,906,952, obtained from the first year development and also loan interest.

For development in 2021, the developer can loan IDR. 6,745,167,783, so the total loan plus loan interest is IDR. 18,917,734,982, which loan interest from the first and second loans. In the years 2022 and 2023 can be seen in table 1 as follows.

TABLE 1. Allocation of Loan

Uraian	2020	2021	2022	2023	2024	2025
Dana dari Kreditur 70%	7.934.870.909	6.745.167.783	3.383.721.042	3.042.528.990	2.853.607.750	2.882.244.195
Dana dari Pemembelian 30%	3.400.573.247	2.890.795.751	1.454.451.875	1.303.840.961	1.226.631.693	1.239.533.227
Bunga Pinjaman	1.400.236.043	2.837.690.247	1.977.018.710	835.893.304	-	-
Pinjaman investasi investor	9.334.906.952	18.917.734.982	13.180.134.734	5.572.622.028	(3.246.587.721)	(12.776.498.976)
Pengembalian Dana	11.108.350.000	11.485.925.000	11.485.925.000	11.702.817.500	12.422.156.450	13.864.372.095
Pinjaman sisa investor	9.334.906.952	7.899.384.982	1.894.199.734	(6.130.195.472)	(15.668.744.171)	(26.440.872.071)
Bunga pinjaman 15%	1.400.236.043	2.837.690.247	1.977.018.710	835.893.304	-	-

Source: Calculation Result, 2020

In table 1 for loan funds of 70% and funds from developers of 30% of funds in 2023 there is a remaining IDR. 6,130,195,472 and that can be used as capital in 2024, and in 2025 a return on developer capital can be made and also profit calculations.

Net Present Value (NPV)

Calculation of NPV analysis by using interest rate of 15%, its level of interest rates on loans, and the results are as follows.

TABLE 2. Net Present Value (NPV)

Th	Benefit	Cost	Net Cash Flow	DF 15%	NPV
0	0	12.735.480.199	-12.735.480.199	1	-12.735.480.199
1	11.108.350.000	12.473.614.222	-1.365.264.222	0,87	-1.187.186.280
2	11.485.925.000	6.825.191.628	4.660.733.372	0,76	3.524.184.024
3	11.702.817.500	5.182.363.290	6.520.454.210	0,66	4.287.304.486
4	12.422.156.450	4.119.439.644	8.302.716.806	0,57	4.747.105.281
5	13.664.372.095	4.131.777.422	9.532.594.673	0,50	4.739.384.299
TOTAL					3.375.311.611

Source: Calculation Result, 2020

Based on the results of the calculation of table 2, with a factor discount 15%, it can be seen NPV = IDR 3,375,311,611, its means NPV > 0 (zero), then the decision can be accepted and the project is feasible to run.

Can also be calculated with the benefit cost ratio (B/C Ratio).

$$B/C \text{ ratio} = \sum NPV \text{ Positif} / \sum NPV \text{ Negatif} \\ = Rp17.297.978.090 / Rp13.922.666.479 \\ = 1.24$$

As long as the B/C ratio is ≥ 1 , the project development can be accepted.

Payback Back Period (PBP)

Based on the results of the NPV calculation in table 2, the

Pay back Period can be calculation.

TABLE 3. Pay back Period (PBP)

Tahun Ke-	Tahun	Benefit	Cost	Net Benefit	Net Benefit Kumulatif
0	2020	Rp -	Rp 12.735.480.199	Rp (12.735.480.199)	Rp (12.735.480.199)
1	2021	Rp 11.108.350.000	Rp 12.473.614.222	Rp (1.365.264.222)	Rp (14.100.744.421)
2	2022	Rp 11.485.925.000	Rp 6.825.191.628	Rp 4.660.733.372	Rp (9.440.011.049)
3	2023	Rp 11.702.817.500	Rp 5.182.363.290	Rp 6.520.454.210	Rp (2.919.556.839)
4	2024	Rp 12.422.156.450	Rp 4.119.439.644	Rp 8.302.716.806	Rp 5.383.159.968
5	2025	Rp 13.664.372.095	Rp 4.131.777.422	Rp 9.532.594.673	Rp 14.915.754.641
Jumlah		Rp 60.383.621.045	Rp 45.467.866.404	Rp 14.915.754.641	

Source: Calculation Result, 2020

Based on the calculation, the amount of Pay Back Period can be calculated using the Net Benefit Cumulative Method, with the formula:

$$PBP = TP - 1 + \frac{\text{Sisa Hutang}}{\text{Net Benefit Setelah Sisa Hutang}} \times 12 \text{ bulan}$$

$$PBP = 4 - 1 + \frac{(2.919.556.839)}{8.302.716.806} \times 12 \text{ bulan}$$

$$PBP = 3 + 4.2$$

$$PBP = 3 \text{ tahun } 4.2 \text{ bulan}$$

Internal Rate of Return (IRR)

IRR calculation is to calculate interest rate on the condition NPV = 0. The project is feasible if the IRR > level results. Calculation using interpolation method, where the yield level is increased every 4% until the NPV approaches 0.

TABLE 4. Internal Rate of Return (IRR)

Th	Benefit	Cost	Net Cash Flow	NPV		NPV		NPV	
				DF 15%	DF 19%	DF 19%	DF 23%	DF 23%	
0	0	12.735.480.199	-12.735.480.199	1	-12.735.480.199	1	-12.735.480.199	1	-12.735.480.199
1	11.108.350.000	12.473.614.222	-1.365.264.222	0,87	-1.187.186.280	0,84	-1.147.280.859	0,81	-1.109.970.913
2	11.485.925.000	6.825.191.628	4.660.733.372	0,76	3.524.184.024	0,71	3.291.245.938	0,66	3.080.661.889
3	11.702.817.500	5.182.363.290	6.520.454.210	0,66	4.287.304.486	0,59	3.869.340.644	0,54	3.503.987.233
4	12.422.156.450	4.119.439.644	8.302.716.806	0,57	4.747.105.281	0,50	4.140.305.423	0,44	3.627.436.171
5	13.664.372.095	4.131.777.422	9.532.594.673	0,50	4.739.384.299	0,42	3.994.627.801	0,36	3.385.989.211
TOTAL					3.375.311.611		1.412.758.748		-247.376.607

Source: Calculation Result, 2020

Based on the calculation, can be seen a positive NPV closest to 0 (zero) and the level of interest rates and negative NPV closest to 0 (zero). This means amount of IRR is between interest rates. Thus it can be seen that the amount of IRR is between the interest rates.

$$IRR = I_1 \left(\frac{NPV \text{ Positif}}{NPV \text{ Positif} - NPV \text{ Negatif}} \right) (I_2 - I_1)$$

$$IRR = 19\% \times (0.85099^4 4\%)$$

$$IRR = 19.99\%$$

Based on calculations, IRR and interest rate is 15%. This means IRR > interest rate, so that residential developer plan shows a very good condition.

Break Even Point (BEP)

To calculate BEP, will require several variables fixed cost, variable costs and income.

TABLE 5. Break Even Point (BEP)

KETERANGAN	PRODUK					TOTAL
	30	36	43	63	100	
PENJUALAN	Rp 33.955.749.520	Rp 4.502.816.505	Rp 7.326.651.640	Rp 3.579.549.380	Rp 11.018.854.000	Rp 60.383.621.045
FIXED OPERATING COST						Rp 3.268.237.471
VARIABLE OPERATING COST+ TAX						Rp 42.201.022.416

Source: Calculation Result, 2020

Calculate Break Even Point (BEP):

$$BEP = \left(1 - \frac{F}{S} \right)$$

$$BEP = \left(1 - \frac{Rp. 3268.237.471}{Rp. 42.201.022.416} \right) \frac{Rp. 60.383.621.045}{Rp. 60.383.621.045}$$

$$BEP = \frac{Rp. 3.268.237.471}{0.30111}$$

$$BEP = Rp.10.853.675.000$$

V. CONCLUSIONS

Based on results and discussion from this research, the following conclusions can be follows:

1. Net Present Value (NPV) can be found to be IDR 3,375,311,611 which means the NPV > 0 (zero), so residential developer plan is feasible to be implemented and also the value of IRR is 19.99%, Net B/C is 1.24,
2. Payback Period of the Grand Permata Ajung residential developer project in Jember Regency occurs in the 3rd year of more than 5 months, BEP value of the project is IDR 10,853,675,000.
3. Based on the calculation results, Grand Permata Ajung residential developer project in Jember Regency can be carried out according to investment criteria.

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