

Housing Project Investment Feasibility Analysis (Case Study Hasanah City Housing)

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Abstract— With an ever-increasing population resulting in rising housing demands, one solution is to create more housing. Parung Panjang in Bogor is one of the developing areas in the real estate industry. PT Hasanah Karya Abadi, a developer located in Jl. Arsitek F Silaban No.9 Bogor, West Java is planning to build a commercial residential area called Hasanah City. Hasanah City will occupy around 6,892 sqm of land in Parung Panjang, Bogor. This housing project is targeted at the lower-middle to upper-middle class. Given the size of the required finances in the long run, it is critical to thoroughly and accurately analyze the investment's viability. This is done to reduce the risk of future loss as well as serve as a guide in decision-making that will decide whether or not the project can proceed as planned. As the project will occupy a strategic area, the feasibility analysis is assessed from the technical and financial aspects. With a land area of 6,892 sqm, the result of the technical aspect feasibility analysis defines the planned number of houses that can be built as many as 30 units; 7 units of type 36/72, 16 units of type 36/48, and 7 units of type 45/90. Meanwhile, using the Net Present Value (NPV) approach to analyze the financial aspects, a value of IDR 15,798,426,042,18 (NPV>0) was found. The Hasanah City housing project is feasible to run with an interest rate of 15% each year, using the Internal Rate of Return (IRR) technique, with an interest rate of 10-20%, a 58% IRR is yielded with a Minimum Attractive Rate of Return (MARR) value of 15%. With an IRR of 58% > 15%, this project is feasible to run as the interest rate is larger than MARR.

Keywords— Financial aspects, financial investment feasibility, technical aspects.

I. INTRODUCTION

Real estate is a general investment for both the public and investors. Investing in the real estate industry is a long-term investment that may serve as a multipurpose asset. One of the many types of property is a plot of land. The land is a multipurpose development asset, as housing development has a higher added value than an empty one.

Investment is needed to start a business or run a project. Therefore, before the project even started, it is necessary to carry out a thorough investment feasibility analysis by analyzing numerous aspects including the financial aspect. The financial aspect of a project feasibility study can help figure out whether the project is profitable or not (Manopo, et al., 2013).

PT Hasanah Karya Abadi, a developer based in Jl. Arsitek F Silaban No.9, Bogor, West Java, will construct a commercial residential area called Hasanah City, located in Parung Panjang, Bogor with a land of 6,892 sqm. The Hasanah City housing project is aimed at the lower-middle to upper-middle class. Considering the number of funds needed for the long term, an investment feasibility study is necessary to be done thoroughly and carefully to avoid the loss risk in the future and as a guide for the decision-making process that will

determine whether the project will run as planned or not. This study is conducted to analyze the feasibility of the Hasanah City project by looking at the technical and financial aspects, using the investment feasibility analysis.

Technical Aspects

The technical aspect is one of the aspects that relate to the technical process of project construction and after it ended. Technical aspects are matters related to the project location, raw material source, manpower, transportation, and the existing market (Ibrahim, 2009). Technical aspect analysis serves a purpose to:

- Analyze the location's suitability to run a business;
- Analyze the production scale to achieve the economical scale;
- Analyze the criteria for tools and technologies selected to run the production process; and
- Analyze the layout of the land, buildings, and other facilities.

Financial Aspects

Investing in a business needs some expertise, particularly capital investments. Capital is used to finance a business, from the pre-investment costs through the fixed assets and working capital. The initial capital is utilized to cover the costs of permits and

business research. Next is to obtain fixed assets such as land, building, machine, et cetera.

When the business is running, capital is also used to cover operational costs, such as raw materials, wages, and other operational costs. The amount of capital required to invest is determined by the type of business. Investment needs should be calculated before doing an investment (Kasmir and Jakfar, 2003).

The outcome of calculating the investment criterion is an indicator of capital invested, meaning a comparison of the total benefits obtained and total expenditures spent in current value during the project's economic life. If the calculated result shows a feasible result, the implementation will rarely fail. Failure will only happen

due to uncontrollable factors such as floods, earthquakes, regulation changes, and irrelevant data being used (Ibrahim, 2009).

Basic Concept of Housing

Wicaksono (2007) defines a house as a final destination for humans. A house functions as a shelter from the weather and surrounding environment, a place to unify a family, increase growth and development, and as part of a lifestyle.

There are several types of housing, Sastra and Marlina (2006) has classified houses into:

- a. Simple house
- b. Middle house
- c. Luxury house

II. METHODOLOGY

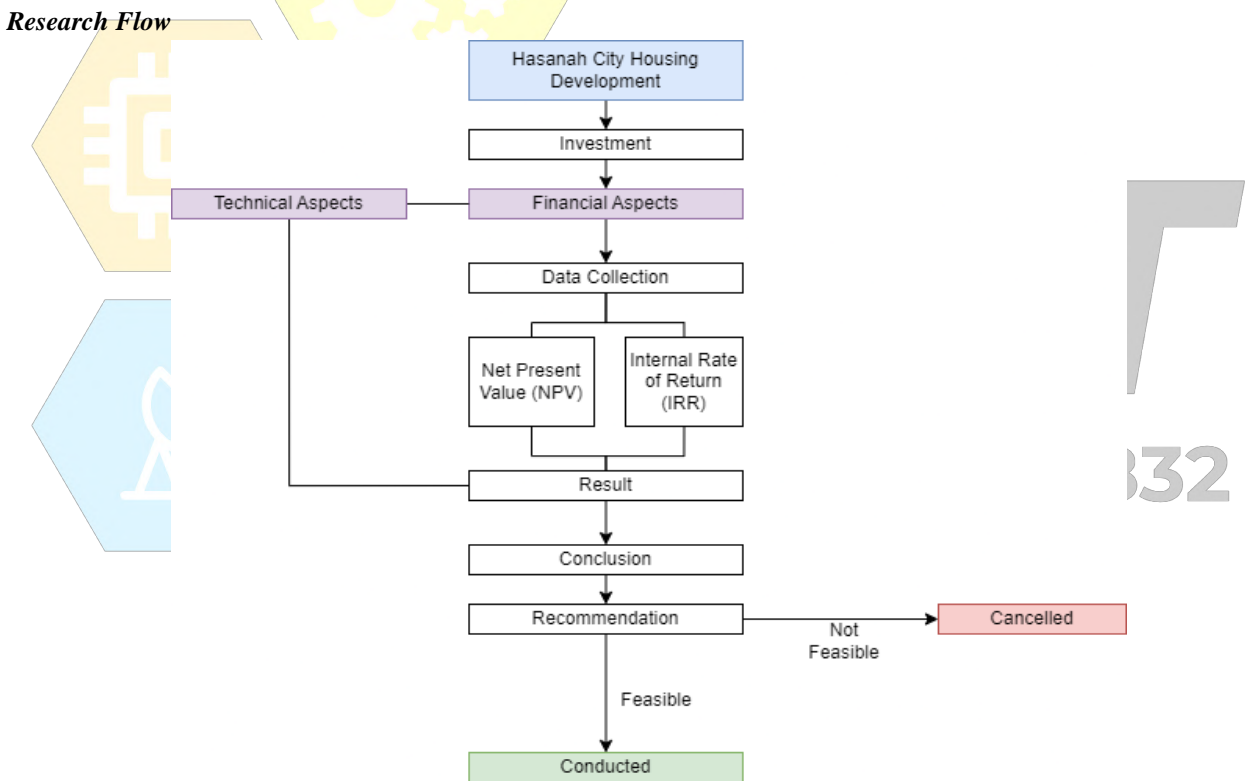


Fig. 1: Research Flow

Fig. 1 explains that the study is based on the construction plan of the Hasanah City Housing area in Bogor, West Java. A housing development needs investment, the larger the investment made, the bigger the risk in the future. Hence the need to conduct a feasibility study.

This investment feasibility study will be conducted based on financial aspects. Data for the financial aspects

included Net Present Value (NPV) and Internal Rate of Returns (IRR). After all of the data have been calculated and analyzed, they will be rated based on each aspect's criteria.

A conclusion is then drawn based on the feasibility study to then give a recommendation on whether the development of Hasanah City housing is feasible or not.

Study Area

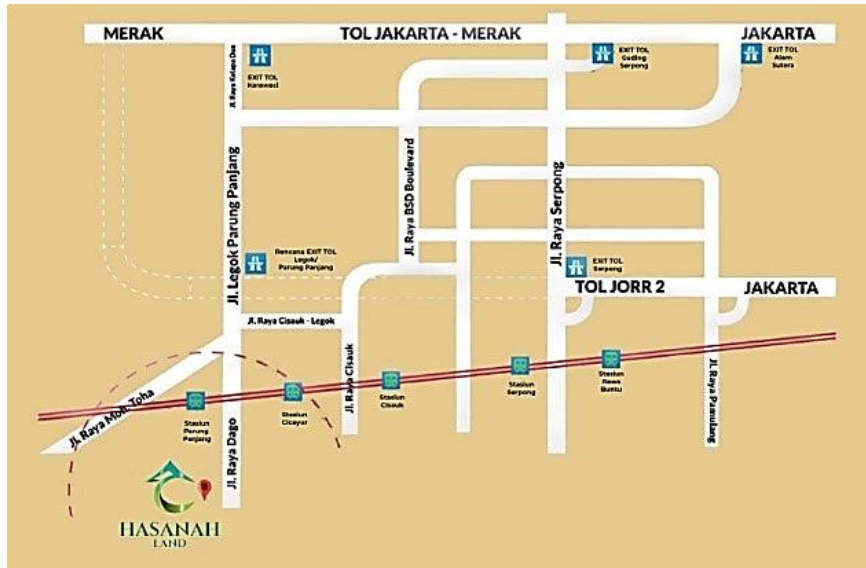


Fig. 2: Map of study area

The study is conducted in the Hasanah City housing location, in Jl. Raya Dago, Parung Panjang. It is close to Parung Panjang station, next to a planned strategic road that connected Pamulang Province, Setu (Parung Panjang), and the Maja area, and will be a highly competitive housing area. Moreover, Parung Panjang is relatively close to other independent cities such as BSD, Alam Sutera, and Gading Serpong.

Data Collection

All of the data used in this study is obtained from the developer and field survey. There are primary data and secondary data in this study:

- a. **Primary Data.**
Primary data are data collected by conducting interviews and observations on the field;
- b. **Secondary Data.**
Secondary data are historical data on Hasanah City Housing such as site plan and layout for each type of housing, budget plan for each type of housing, and project plan that includes construction and marketing schedule.

Data Analysis

To evaluate and rate the capital and investment budgeting, several methods are used:

a. Net Present Value (NPV)

The NPV method is a method to calculate the difference between investment value and the present value of net cash receipts in the future. To calculate the present value, a relevant interest rate needs to be determined first. If the present value of

net cash receipt in the future is larger than the investment value, a project is deemed profitable, and if the NPV has a lower net cash receipt than the investment value, the project is deemed as not accepted. Formula 1 is the formula used to calculate the NPV, where NPV is Net Present Value, C_t is cash flow for year- t , C_0 is the initial expenditure, r is the interest rate or discount rate, and t can be replaced with 1,2,3,4, and so on, based on the calculation needs.

$$NPV = \sum_{t=1}^t \frac{C_t}{(1+r)^t} - C_0 \quad \text{Equation 1}$$

The NPV criteria used to rate the project's feasibility are:

- 1. $NPV < 0$, not feasible to conduct
- 2. $NPV = 0$, the project's break-even point
- 3. $NPV > 0$, feasible to conduct

b. Internal Rate of Return (IRR)

The IRR method is a method to measure the rate of return. IRR is an interest rate between the desired cash outflow and cash inflow. It calculates the time value of money so cash flows are discounted at the interest rate. The formula (Equation 2) used is similar to NPV, the only difference is that the value of i (interest) is unknown and must be found by trial and error.

$$IRR = NPV = \sum_{t=1}^N \frac{C_t}{(1+r)^t} - C_0 \quad \text{Equation 2}$$

The IRR can be estimated using Formula 3 where:

- IRR: Internal Rate of Return
- NPV₁: Net Present Value discount rate i_1
- NPV₂: Net Present Value discount rate i_2
- i_1 : First trial for discount rate
- i_2 : Second trial for discount rate

Based on the IRR method, the criteria to rate the investment's feasibility are related to the Minimum Attractive Rate of Return (MARR):

1. $IRR \geq MARR$, project investment accepted
2. $IRR < MARR$, project investment denied

If the project's investment is carried out by selecting one or several alternative projects, then the project that has the highest IRR is chosen.

III. RESULTS AND DISCUSSION

Technical Aspect



Fig. 3: Site plan of Hasanah City Housing

With the total land occupied of 6,892 sqm, the total housing unit that can be plotted and constructed are 30 units, consisting of 7 units of type 36/72, 16 units of type 36/84, and 7 units of type 45/90.

Financial Aspect

a. Budget Plan

Based on Table 1, the calculated total budget plan is IDR 13,146,423,000.

b. Cost of Goods Sold (COGS) Plan

Based on the calculation, the COGS of house type 36/72 is IDR 869,467,729 (Table 2), the COGS of house type 36/84 is IDR 1,084,368,804 (Table 3), and the COGS of house type 45/90 is IDR 1,211,691,181 (Table 4).

c. Unit Price

Based on the calculation in Table 5, the unit price for house type 36/72 is around IDR 1,065,097,968.03, type 36/48 is around IDR 1,328,351,784.90, and type 45/90 is around IDR 1,484,321,696.73.

Table 1: Budget Plan

No.	Job Description	Unit	Volume	Unit Price (IDR)	Total Price (IDR)
A	LAND CLEARANCE				
1	Land Purchase	sqm	6,892	725,478.82	5,000,000,000.00
2	Topographical Measurement	sqm	6,892	3,000.00	20,676,000.00
	Sub Total				5,020,676,000.00
B	PREPARATION				
1	Keet Direction	l/s	1	4,500,000.00	4,500,000.00
2	Water & Electrical for Construction	l/s	1	4,254,000.00	4,254,000.00
3	Cleaning	l/s	1	500,000.00	500,000.00
4	Project Documentation	l/s	1	210,000.00	210,000.00
	Sub Total				9,464,000.00
C	ADMINISTRATION				
1	Permits and Legality	sqm	6,892	100,000.00	689,200,000.00
2	Operational	months	12	3,500,000.00	42,000,000.00
3	Marketing	unit	30	1,000,000.00	30,000,000.00
4	Documents	unit	30	2,500,000.00	75,000,000.00
	Sub Total				836,200,000.00
D	INFRASTRUCTURE				
1	Striping and Land Clearance	sqm	6,892	5,250.00	36,183,000.00
2	Entrance Gate Sculpture (landmark)	sqm	200	500,000.00	100,000,000.00
3	Entrance and Main Road	sqm	1,934	250,000.00	483,500,000.00
4	Design Plan	months	3	2,500,000.00	7,500,000.00
5	Perimeter Fence	sqm	6,892	75,000.00	516,900,000.00
6	Sewage	sqm	1,934	250,000.00	483,500,000.00
7	Driveways	sqm	1,934	250,000.00	483,500,000.00
8	Street Lights	unit	30	5,000,000.00	150,000,000.00
	Sub Total				2,261,083,000.00
E	BUILDING CONSTRUCTION				
	House Type 36/72	unit	7	157,500,000.00	1,102,500,000.00
	House Type 36/84	unit	16	157,500,000.00	2,520,000,000.00
	House Type 45/90	unit	7	199,500,000.00	1,396,500,000.00
	Sub Total				5,019,000,000.00
	TOTAL				13,146,423,000.00

Table 2: COGS of House Type 36/72

No	COGS of House Type 36/72	Volume	Unit Price (IDR)	Total Price (IDR)	Amount
a	Built Area	36.00			7
b	Land Area	72.00			
1	Land COGS				
a	Land Cost	9.10%		455,000,000.00	
b	Infrastructure	9.10%		205,758,553.00	
c	Permits and Legality	9.10%		62,717,200.00	
d	Documents	9.10%		6,825,000.00	
e	Marketing	9.10%		2,730,000.00	
f	Operational	9.10%		3,822,000.00	
g	Topographical Measurement	9.10%		1,881,516.00	
	Total Land COGS/Unit				
1	Land COGS	72.00	10,260,198.18	738,734,269.00	
2	Built COGS	36.00	3,631,485.00	130,733,460.00	
	TOTAL COGS/UNIT			869,467,729.00	6,086,274,103.00

Table 3: COGS of House Type 36/84

No	COGS of House Type 36/84	Volume	Unit Price (IDR)	Total Price (IDR)	Amount
a	Built Area	36.00			16
b	Land Area	84.00			
1	Land COGS				
a	Land Cost	9.60%		480,000,000.00	
b	Infrastructure	9.60%		217,063,968.00	
c	Permits and Legality	9.60%		66,163,200.00	
d	Documents	9.60%		7,200,000.00	
e	Marketing	9.60%		2,880,000.00	
f	Operational	9.60%		4,032,000.00	
g	Topographical Measurement	9.60%		1,984,896.00	
	Total Land COGS/Unit				
	Land COGS	72.00	10,823,945.33	779,324,064.00	
2	Built COGS	84.00	3,631,485.00	305,044,740.00	
	TOTAL COGS/UNIT			1,084,368,804.00	17,349,900,864.00

Table 4: COGS of House Type 45/90

No	COGS of House Type 45/90	Volume	Unit Price (IDR)	Total Price (IDR)	Amount
a	Built Area	45.00			7
b	Land Area	90.00			
1	Land COGS				
a	Land Cost	10.90%		545,000,000.00	
b	Infrastructure	10.90%		246,458,047.00	
c	Permits and Legality	10.90%		75,122,800.00	
d	Documents	10.90%		8,175,000.00	
e	Marketing	10.90%		3,270,000.00	
f	Operational	10.90%		4,578,000.00	
g	Topographical Measurement	10.90%		2,253,684.00	
	Total Land COGS/Unit				
	Land COGS	45.00	19,663,500.69	884,857,531.00	
2	Built COGS	90.00	3,631,485.00	326,833,650.00	
	TOTAL COGS/UNIT			1,211,691,181.00	8,481,838,267.00

d. Projected Revenue

In Table 6, it can be seen the projected sales; 3 units sold in 2022, 8 units sold in 2023, 6 units sold in 2024, and 13 units sold in 2025. With 30 units

needing to be sold, based on the targeted sales, in Table 7, it can be seen that the total cumulated sales are IDR 39,099,566,211.65 so that the projected revenue can work according to plan in 2025.

Table 5: Retail Unit Price

Retail Price (IDR)								
No	Type	Amount	COGS	VAT (10%)	BPHTB* (5%)	Income Tax (2,5%)	Mortgage (5%)	Total
1	36/72	7	869,467,729.00	86,946,772.90	43,473,386.45	21,736,693.23	43,473,386.45	1,065,097,968.03
2	36/84	16	1,084,368,804.00	108,436,880.40	54,218,440.20	27,109,220.10	54,218,440.20	1,328,351,784.90
3	45/90	7	1,211,691,181.00	121,169,118.10	60,584,559.05	30,292,279.53	60,584,559.05	1,484,321,696.73

*BPHTB = Acquisition Cost of Land and Building Rights

Table 6: Annual Unit Sales

Annual Sales	Amount	Unit Price (IDR)	Total (IDR)			
			2022	2023	2024	2025
36/72	7	1,065,097,968.03	2,130,195,936.05	1,065,097,968.03	2,130,195,936.05	2,130,195,936.05
36/84	16	1,328,351,784.90	1,328,351,784.90	6,641,758,924.50	3,985,055,354.70	9,298,462,494.30
45/90	7	1,484,321,696.73	0.00	2,968,643,393.45	1,484,321,696.73	5,937,286,786.90
Total	30		3,458,547,720.95	10,675,500,285.98	7,599,572,987.48	17,365,945,217.25
Cumulative Sum						39,099,566,211.65

Table 7: Annual Sales

Annual Sales	Amount	Unit Price (IDR)	Total (IDR)			
			2022	2023	2024	2025
36/72	7	1,065,097,968.03	2,130,195,936.05	1,065,097,968.03	2,130,195,936.05	2,130,195,936.05
36/84	16	1,328,351,784.90	1,328,351,784.90	6,641,758,924.50	3,985,055,354.70	9,298,462,494.30
45/90	7	1,484,321,696.73	0.00	2,968,643,393.45	1,484,321,696.73	5,937,286,786.90
Total	30		3,458,547,720.95	10,675,500,285.98	7,599,572,987.48	17,365,945,217.25
Cumulative Sum						39,099,566,211.65

e. *Cash Flow Projection*

Based on the calculation shown in Table 8, 2022 is the start of the Hasanah City housing development

plan, where the largest amount of funds is dedicated to the purchase of land.

Table 8: Cash Flow

No	Detail	Total (IDR)			
		2022	2023	2024	2025
A	Cash In				
1	Starting Balance	0	-4,347,839,939.05	3,483,035,886.93	9,274,591,084.40
2	House Type 36/72	2,130,195,936.05	1,065,097,968.03	2,130,195,936.05	2,130,195,936.05
3	House Type 36/84	1,328,351,784.90	6,641,758,924.50	3,985,055,354.70	9,298,462,494.30
4	House Type 45/90	0.00	2,968,643,393.45	1,484,321,696.73	5,937,286,786.90
	Total Income	3,458,547,720.95	10,675,500,285.98	7,599,572,987.48	17,365,945,217.25
B	Cash Out				
1	Land Purchase	5,000,000,000.00	0.00	0.00	0.00
2	Topographical Measurement	20,676,000.00	0.00	0.00	0.00
3	Infrastructure	1,500,000,000.00	500,000,000.00	261,083,000.00	0.00
4	Permits and Legality	689,200,000.00	0.00	0.00	0.00
5	House Type 36/72	261,466,920.00	130,733,460.00	261,466,920.00	261,466,920.00
6	House Type 36/84	305,044,740.00	1,525,223,700.00	915,134,220.00	2,135,313,180.00
7	House Type 45/90	0.00	653,667,300.00	326,833,650.00	1,307,334,600.00
8	Marketing	5,000,000.00	5,000,000.00	10,000,000.00	10,000,000.00
9	Operational	10,000,000.00	15,000,000.00	8,500,000.00	8,500,000.00
10	Documents	15,000,000.00	15,000,000.00	25,000,000.00	20,000,000.00
	Total Expenditure	7,806,387,660.00	2,844,624,460.00	1,808,017,790.00	3,742,614,700.00
	Net Flow	-4,347,839,939.05	7,830,875,825.98	5,791,555,197.48	13,623,330,517.25
	End Balance	-4,347,839,939.05	3,483,035,886.93	9,274,591,084.40	22,897,921,601.65

which cost IDR 5 billion for 6,892 sqm of land. There are also some infrastructure works needed to be done that cost around IDR 1.5 billion, as the land was previously a rice field. Around IDR 689,200,000 was used for building permits and other legal documents. The total expenses in 2022 sum up to IDR 7 billion. In 2022 there is a small amount of income from the sales of 3 units for IDR 3,458,547,720.95.

On the projected revenue, after 2022 there will be an increase to 8 units in 2023, 6 units in 2024, and 13 units in 2025, when the cash flow projection will end.

f. *NPV projection*

This study will use a 15% interest rate, an average of Bank Indonesia's interest rate based on investment or cost of invested capital.

NPV is calculated using Equation 1, where C_0 is -4,347,839,939.05.

In 2023 as the first period, C_1 is 7,830,875,825.98 with r of 15% and t of 1, hence the NPV for the first period is calculated as below:

$$C_1 = \frac{7,830,875,825.98}{(1+15\%)^1} = 6,809,457,239.98$$

For the second period in 2024, C_2 is 5,791,555,197.48 with r of 15% and t of 2, the calculated NPV for the second period is:

$$C_2 = \frac{5,791,555,197.48}{(2+15\%)^2} = 4,379,247,786.37$$

For the third and last period in 2025, C_3 is 13,623,330,517.25 with r of 15% and t of 3, the calculated NPV for the second period is:

$$C_3 = \frac{13,623,330,517.25}{(3+15\%)^3} = 8,957,560,954.88$$

The projected NPV is calculated as:

$$NPV = (\text{Total sum of } C) - C_0 \quad \text{Equation 3}$$

$$NPV = 20,146,265,981.23 - 4,347,839,939.05$$

$$NPV = 15,798,426,042.18$$

As mentioned before, the criteria for an accepted project is when the NPV is bigger than 0, hence this project is feasible to conduct.

g. IRR Projection

The IRR calculates the interest rate that equates the present value with the net cash receipt in the future. If the IRR value is higher than the MARR value, the investment can be categorized as profitable, and if the IRR value is lower than the MARR value, the investment can be categorized as nonprofitable. The MARR value used in this study is 15%.

To calculate the IRR where the NPV is 0, a trial and error method is used because the value of i is unknown. To do this, this study used a 'total C approach by calculating NPV (Equation 3) with two trials, with the first trial using the discount rate (i_1) of 10% and the second trial using the discount rate (i_2) of 20%, by using:

The calculation of the first trial (NPV_1) where i is 10% can be found below:

$$NPV_1 = 22,140,797,132.91 - 4,347,839,939.05$$

$$NPV_1 = 17,792,957,193.86$$

While the calculation of the second trial (NPV_2) where i is 20% can be found below:

$$NPV_2 = 18,431,515,013.67 - 4,347,839,939.05$$

$$NPV_2 = 14,083,675,074.62$$

Using the calculation of NPV_1 and NPV_2 , we can then calculate the IRR using Equation 4 as shown below:

$$IRR = i_1 + \frac{NPV_1}{(NPV_1 - NPV_2)} (i_2 - i_1) \quad \text{Equation 4}$$

So, the calculated IRR is:

$$IRR = 10\% + \frac{17,792,957,193.86}{(3,709,282,119.24)} (10\%)$$

$$IRR = 0.5797 = 57.97\% = 58\%$$

With an IRR value of 58%, higher than MARR value of 15%, the Hasanah City housing project is deemed feasible to conduct.

IV. CONCLUSION

From this study, it can be concluded that:

- With total land of 6,892 sqm and the strategic surrounding neighborhood where people with lower-middle to upper-middle class wants to live, 30 units of houses are planned to fill this land that can be classified into 3 house types; unit type 36/72 with the total of 7 units, unit type 36/84 with the total of 16 units, and unit type 45/90 with the total of 7 units.
- After analyzing the financial aspects and calculating the NPV and IRR thoroughly for the investment feasibility study, this project and investment is deemed fit to conduct and profitable. The value of the NPV with the interest rate of 15% is 15,798,426.18 which fits the criteria of acceptable ($NPV > 0$). Meanwhile the IRR value is 58% which is higher than the MARR value of 15%, and fits the criteria of acceptable ($IRR > MARR$).

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