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Evaluation of Housing Project Business Feasibility Calculations from a Financial Perspective

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Abstract: This study evaluates the limitations of Return on Investment (ROI) as PT XYZ's primary project assessment tool and contrasts it with the Discounted Cash Flow (DCF) and Net Present Value (NPV) approaches. Analysis of three projects reveals that ROI fails to account for the time value of money and tends to produce overly optimistic evaluations. Major deviations stem from cost overruns in operational, legal, and construction components, as well as oversimplified cash-flow assumptions. Qualitative findings confirm that reliance on ROI is driven by time pressure and limited expertise in DCF modelling. The simulation of Project D demonstrates that a conservative DCF framework provides a more accurate assessment and exposes hidden risks. This study recommends using ROI only as an initial screening tool, with final investment decisions based on NPV supplemented by scenario analysis.

Keywords: ROI, NPV, DCF, Project Feasibility, Cost Deviation, Cash Flow, Property Development.

INTRODUCTION

The residential property sector is one of the fundamental pillars of the national economy, serving not only as a provider of basic housing needs but also as an investment instrument and a catalyst for various related industries (Kusilp et al., 2023). However, this sector possesses unique characteristics, most notably, its high sensitivity to fluctuations in macroeconomic conditions, making it an investment arena with significant volatility and risk.

The performance of the property sector cannot be analyzed in isolation; it directly reflects broader economic health and dynamics. Numerous academic studies consistently demonstrate strong causal relationships between macroeconomic variables and residential property prices and demand. Gross Domestic Product (GDP) growth is one of the primary determinants. An increase in GDP positively correlates with rising property prices, as it reflects higher per capita income and purchasing power, which subsequently stimulates demand for housing (Okunevičiūtė Neverauskienė et al., 2025). Recent analyses confirm that economic growth is one of the key indicators driving increases in the housing price index (Ding, 2022).

Another crucial variable is interest rates, particularly mortgage or home loan (KPR) rates. Interest rates have an inverse relationship with property demand. Lower interest rates reduce mortgage instalment costs, thereby improving affordability and encouraging more consumers to enter the market (Ding, 2022). Conversely, rising interest rates increase instalment burdens, suppress demand, and potentially cool down the overall property market (Ding, 2022).

Inflation also plays a dual role. On one hand, high inflation can raise construction costs, such as building materials and labour wages, which later translate into higher selling prices. On the other hand, property is often seen as a hedge against inflation, attracting investor interest (Ronan, 2022). Demographic factors, including population growth and urbanisation, also serve as long-term fundamental drivers of demand. Population increases, especially in urban centres, inherently create the need for new housing units (Ding, 2022).

The combination of these factors GDP, interest rates, inflation, and demographics, creates a complex and dynamic environment. Volatility in these variables directly affects risks faced by property developers. Uncertainty in sales revenue projections, escalating construction costs, and changes in capital costs are direct manifestations of macroeconomic risks. Therefore, the ability to conduct a careful and methodologically sound feasibility evaluation is not merely a best practice but a strategic necessity for ensuring project sustainability and profitability in this sector.

Given the uncertainty of the external environment described above, feasibility studies hold a strategic role as the primary instrument in investment decision-making within property development. A feasibility study is a systematic analysis designed to assess the practicality and potential success of a proposed project before committing significant resources, particularly capital and time (Cogito Corp, 2024). Its purpose is to proactively identify various risks, barriers, and opportunities inherent in the project, enabling decision-makers to make informed, data-driven choices (Moorhead et al., 2022).

A comprehensive feasibility study extends beyond financial analysis. It involves a multidimensional evaluation consisting of several major pillars: market feasibility, technical feasibility, legal feasibility, and financial feasibility (August Brown, 2024). Market feasibility analyzes demand–supply dynamics, target consumer profiles, and pricing trends. Technical feasibility evaluates site conditions, design, and construction challenges. Legal feasibility ensures regulatory compliance, permits, and land ownership status. Among these pillars, financial feasibility serves as the quantitative core that integrates findings from the other aspects to determine the project's economic viability, including cost projections, potential revenue, and expected profitability (August Brown, 2024).

Thus, a feasibility study functions not merely as an administrative document but as a proactive risk-management framework. This process forces organizations to systematically translate abstract macroeconomic threats into measurable and modelable risk variables. For example, the threat of rising interest rates is analyzed in terms of its impact on market absorption assumptions and financing costs. The potential for high inflation is translated into contingency allocations within construction budgets. Through this approach, a feasibility study transforms decision-making from speculative judgment into a measured risk calculation. It provides an objective basis for determining whether a project should proceed, be modified, or be terminated—thereby preventing costly capital misallocation and future project failures (Moorhead et al., 2022). For property developers such as PT XYZ, mastery of a reliable feasibility study process is foundational for achieving competitive advantage and sustainable growth.

Despite the widely recognized importance of feasibility studies, their effectiveness depends heavily on the validity and sophistication of the methodologies applied—particularly in financial analysis. The quality of resulting investment decisions is directly proportional to the quality of the analytical tools used. In this context, PT XYZ faces a fundamental challenge that lies at the heart of this research: a critical gap between the company's current feasibility evaluation practices and the well-established theoretical framework of corporate finance.

Based on preliminary findings, PT XYZ currently relies on Return on Investment (ROI) as its primary metric for decision-making in assessing project feasibility. ROI, calculated by dividing net profit by total investment, indeed offers advantages in simplicity and interpretability (Loan & Tella, 2022). However, beneath its simplicity lies a fundamental theoretical limitation, especially when applied to long-term investment projects with complex cash-flow patterns, such as property development.

The most significant weakness of ROI is its failure to account for the time value of money (de Souza et al., 2022). This metric treats profit earned in the fifth year as equally valuable as profit earned in the first year, a theoretically indefensible assumption. In multi-year property projects, this oversight can seriously distort real profitability assessments and lead to misguided decisions. A project with a high ROI but generating most of its profits in later years may be substantially less valuable than a project with slightly lower ROI but producing earlier cash inflows (de Souza et al., 2022). Furthermore, ROI is typically based on accounting profit rather than actual cash flows and does not explicitly incorporate investment scale or project risk profiles, making it inadequate and potentially misleading for complex capital-budgeting decisions.

To address the weaknesses of conventional methodologies like ROI, modern finance theory has introduced a more advanced and widely accepted framework, Discounted Cash Flow (DCF) analysis (Luo, 2023). Methods under the DCF umbrella, particularly Net Present Value (NPV), are considered the "gold standard" in investment feasibility evaluation (Li et al., 2022).

The core advantage of NPV lies in its theoretical foundation, which explicitly recognizes and incorporates the time value of money (Luo, 2023). NPV is defined as the difference between the present value of all projected future cash inflows and the present value of cash outflows (initial investment). By discounting each future cash flow using a discount rate that reflects the project's cost of capital and risk profile, NPV provides an absolute monetary measure of the value a project creates for the firm. The decision rule is clear: projects with positive NPV (NPV > 0) are accepted because they increase shareholder wealth, while those with negative NPV are rejected (Luo, 2023).

However, transitioning to advanced DCF methods is useless if the input data is inaccurate. The validity of NPV results depends entirely on the quality of projected cash flows, consistent with the principle of "Garbage In, Garbage Out" (Teker, 2020; Pacific Appraisers, n.d.). The relevant cash flows in this context are incremental cash flows (AnalystPrep, n.d.), which are often the most critical yet most error-prone element in analysis (Teker, 2020; Pacific Appraisers, n.d.).

This represents the second practical problem faced by PT XYZ. Beyond reliance on ROI, the company's process for developing assumptions used to forecast cash flows relies on outdated data and does not systematically incorporate realized outcomes from previously completed projects. This practice creates a significant risk of producing unrealistic projections.

Therefore, the research problem lies not only in choosing between "inferior" (ROI) and "superior" (NPV/IRR) evaluation methodologies but in bridging the gap between theoretical knowledge and practical application. This study proposes an innovative and practical solution: adopting superior DCF methodologies must be accompanied by a fundamental reform in the assumption-building process, namely, utilizing historical data from completed projects to calibrate and enhance the accuracy of future incremental cash-flow projections. This approach serves as a unique contribution that bridges theory and practice within PT XYZ.

METHOD

This study employs a case study research strategy. This approach is selected because it is well-suited to answering "how" and "why" questions related to contemporary events that cannot be manipulated by the researcher (Yin, 2018). In this context, the case study method enables an in-depth investigation of the business feasibility calculation processes within the real-world environment of PT XYZ.

This research utilizes both primary and secondary data to obtain a comprehensive understanding of the phenomenon. Primary data were collected through an analysis of PT XYZ's internal documents, including feasibility study reports for residential projects, realized revenue and cost data, historical financial statements, and project planning and budgeting documents. In addition, semi-structured interviews were conducted with key personnel involved in feasibility study preparation and investment decision-making. These interviews were intended to explore the process of formulating financial assumptions, the rationale behind the use of the ROI method, and the challenges associated with projecting cash flows. Meanwhile, secondary data were used to build the theoretical foundation and to compare the company's practices with industry standards. These data were obtained from academic journals, corporate finance textbooks, and property industry reports in Indonesia.

Data analysis in this research adopts a qualitative comparative analysis approach. The analytical process follows systematic stages as proposed by Miles and Huberman (1994), including data reduction, data display, and conclusion drawing. This process is designed to critically evaluate the business feasibility methodology currently used by PT XYZ and compare it with the theoretically superior framework, namely Discounted Cash Flow (DCF). The analytical steps undertaken are as follows:

Determining the discount rate is a key step in DCF analysis, as it must reflect the project's cost of capital and risk profile. The discount rate used in this study is the Weighted Average Cost of Capital (WACC), which represents the combined cost of debt and equity. WACC is calculated using the following formula:

$$WACC = \left(\frac{E}{V} \times K_e\right) + \left(\frac{D}{V} \times K_d \times (1 - T)\right)$$

Explanation:
1. **E/V** represents the proportion of equity in the capital structure.
2. **Ke** refers to the Cost of Equity.
3. **D/V** represents the proportion of debt in the capital structure.
4. **Kd** refers to the Cost of Debt.
5. **T** is the corporate tax rate.

The WACC components—equity proportion (E/V), cost of equity (Ke), debt proportion (D/V), cost of debt (Kd), and tax rate (T)—will be estimated systematically. The cost of equity is calculated using the Capital Asset Pricing Model (CAPM), where the risk-free rate is proxied by the yield on Indonesian government bonds with a 10-year tenor, beta is derived from the average beta of comparable publicly listed property companies as a proxy for PT XYZ (a privately held firm), and the market risk premium (ERP) is estimated using the Implied Equity Risk Premium for Indonesia. This approach ensures that the WACC estimation is accurate and aligned with the characteristics of the property development project under analysis.

After determining cash flows and the discount rate, quantitative analysis is conducted using the Net Present Value (NPV) metric, calculated as the difference between the total discounted future free cash flows and the initial investment. The calculation components include $\mathbf{CF_t}$, representing monthly net cash flows based on historical project cash-in and cash-out records; **WACC**, the validated monthly discount rate used to maintain consistency in the model; and **t**, the time period in months until the end of the project cycle. The investment decision is determined based on the NPV result: the project is accepted if **NPV > 0** and rejected if **NPV < 0**, in line with the objective of maximizing shareholder value.

In line with the case study strategy, this research utilizes primary data sourced from PT XYZ's internal documents, enabling an in-depth and authentic analysis without relying on hypothetical models. The main data include the initial feasibility study report containing financial projections and assumptions on revenue, costs, and project schedules, as well as actual project realization data covering realized revenue, detailed material costs, labor expenses, overhead, and other cash flows. Comparing projected and actual figures allows the identification of deviations and the evaluation of the accuracy and performance of ROI and NPV methods in real practice.

The analysis focuses on incremental cash flow components, including initial investment, capital expenditures, project duration, sales schedule, and projected versus realized revenue and costs. This primary-data approach ensures a consistent and relevant evaluation for PT XYZ. Furthermore, in-depth interviews were analyzed using Thematic Analysis to address the underlying "why" behind the company's quantitative practices, and the findings were validated through data triangulation by comparing qualitative insights with document analysis results. This process provides a more comprehensive understanding of the rationale behind the company's use of ROI and its perceived relevance compared to NPV in practice.

RESULT AND DISCUSSION

The discount rate is the most critical component in NPV analysis as it represents the opportunity cost of invested capital. The appropriate discount rate for project evaluation is the company's WACC, which reflects the minimum return a project must generate to cover the cost of equity and debt financing. The WACC calculation for PT XYZ is conducted through three main steps.

The cost of equity (Ke) is calculated using the Capital Asset Pricing Model (CAPM), which consists of three main components. The risk-free rate (Rf) is proxied by the yield on 10-year Indonesian government bonds, corresponding to the investment horizon of the real estate project; as of October 2025, this yield is 6.409%. The equity risk premium (ERP) is based on the Implied Equity Risk Premium (IMRP), which is forward-looking and better reflects current market expectations; as of August 2025, Indonesia's IMRP is 4.5%. The sector beta is calculated using comparable companies (BSDE, CTRA, PWON, APLN, ASRI). To reflect pure business risk, each company's levered beta is first "unlevered" to remove the effect of capital structure, then averaged. This unlevered beta is subsequently "relevered" using PT XYZ's target capital structure, resulting in a beta relevant for equity cost calculation. This approach ensures that the Ke estimate accurately reflects the industry's risk characteristics. Selected comparable companies include PT Bumi Serpong Damai Tbk (BSDE), PT Ciputra Development Tbk (CTRA), PT Pakuwon Jati Tbk (PWON), PT Agung Podomoro Land Tbk (APLN), and PT Alam Sutera Realty Tbk (ASRI).

Table 1. Unlevered Beta Calculation for the Property Sector

Company	Levered Beta (βL)	D/E Ratio	Unlevered Beta (βU)
BSDE	0.43	0.25	0.36
CTRA	0.47	0.31	0.38
PWON	0.56	0.21	0.48
APLN	0.64	0.40	0.49
ASRI	0.81	0.58	0.56
Average			**0.45**

The average unlevered beta for the property sector is 0.45. This beta is then adjusted to PT XYZ's target capital structure, proxied by the average D/E ratio of the peer group at 0.35.

Beta Levered PT XYZ = 0,45 x [1 + (1 – 0,22) /0,35] = 0,45 x 1,273 = **0,57**

Table 2. Components and Calculation of Cost of Equity (Ke)

Component	Symbol	Value	Source / Justification
Risk-Free Rate	Rf	6.409%	10-Year Indonesian Government Bond Yield (October 2025)
Property Sector Beta	β	0.57	Result of Unlevered & Relevered Beta Calculation
Market Risk Premium	ERP	4.5%	Implied Equity Risk Premium Indonesia (August 2025)
Cost of Equity	Ke	8.97%	CAPM Calculation Resu

The cost of debt (Kd) is estimated using corporate borrowing rates rather than mortgage rates, as it is more relevant to the company's financing profile. Based on data as of June 2025, the corporate loan interest rate in Indonesia stood at 8.38%. With a corporate tax rate of 22%, the after-tax cost of debt is 6.54%.

PT XYZ's capital structure is determined from internal company data, showing a total enterprise value of IDR 27.54 billion, with debt of IDR 21.54 billion and equity of IDR 6 billion. Therefore, the debt weight (D/V) is 78.21%, while the equity weight (E/V) is 21.79%. This structure forms the basis for calculating the WACC as the project's discount rate.

With all components estimated, PT XYZ's WACC is calculated by combining the costs of each capital source according to their respective weights:

$WACC = (E/V \times Ke) + (D/V \times Kd \times (1-T))$

$WACC = (21{,}79\% \times 8{,}97\%) + (78{,}21\% \times 6{,}54\%)$

$WACC = 1{,}97\% + 5{,}11\% =$ **$7{,}08\%$**

This discount rate of 7.08% represents PT XYZ's blended cost of capital and will be used as the hurdle rate or discount rate in NPV analysis. Any project yielding returns below this rate effectively destroys shareholder value.

Table 3. PT XYZ Weighted Average Cost of Capital (WACC) Calculation

Component	Symbol	Weight	Cost	WACC Contribution
Equity	E	21.79%	9.02%	1.97%
Debt	D	78.21%	6.54%	5.11%
Total Capital	V	100.00%		7.08%

The initial simulation of Project A in Cilangkap–Cimanggis represents PT XYZ's standard development project with a duration of 24 months. Total revenue is projected at IDR 20.82 billion, calculated based on an effective selling price of IDR 4.3 million/m², derived from market analysis of competing projects, resulting in an average price of IDR 462.7 million for 45 units of Type 36/84 houses. This revenue comes from land sales of IDR 16.46 billion and building sales of IDR 4.86 billion, after considering hard cash discounts.

Total planned expenditures amount to IDR 16.10 billion, consisting of land acquisition costs of IDR 3.75 billion, construction costs of IDR 4.27 billion, infrastructure costs of IDR 3.83 billion, project legal fees of IDR 805 million, operational and marketing costs of IDR 1.65 billion, and taxes of IDR 1.8 billion. The cost composition shows a relatively balanced distribution, with construction (26.5%), infrastructure (23.8%), and land acquisition (23.3%) as the largest components, reflecting a standard project risk profile without a single dominant cost driver.

Financially, the project generates a profit of IDR 4.72 billion with an initial investment requirement of IDR 2.3 billion, equivalent to 14.3% of total expenditures. This capital structure represents a conventional financing pattern, where most capital is invested upfront, and shortfalls are expected to be covered by sales cash flows. This configuration provides a crucial comparison benchmark for funding strategies in subsequent projects, particularly Project C.

Project B, located in Cimanggis–Bojong Gede, has a comparable scale and development duration of 24 months to Project A but shows a significantly different cost structure. Total projected revenue reaches IDR 22.812 billion, with an effective selling price of IDR 4.65

million/m², determined through comparative analysis with competitor projects such as Green Hills (IDR 5.1 million/m²) and Pondoq Rajeg (IDR 5.2 million/m²). Revenue is generated from the sale of 44 units of Type 36 and Type 55 houses, with an average selling price of approximately IDR 518.4 million per unit.

Planned total expenditures amount to IDR 20.436 billion. Land acquisition costs of IDR 5.859 billion cover land purchases, price increases, taxes, and related legal fees. Construction costs are IDR 6.598 billion, covering the construction of Type 36 and Type 55 units and guarantees for wells, gardens, and electricity. Infrastructure requires IDR 2.11 billion for preparatory work, roads, drainage, fences, and residential electricity facilities. Legal project costs amount to IDR 706 million for certificate separation and consolidation, site plan and building permit (IMB) management, and administration of property taxes and environmental permits. Operational and marketing expenses of IDR 1.711 billion include overhead, marketing, and sales commissions. Taxes and financing costs total IDR 3.452 billion, including interest costs, final income tax, VAT, and property tax (PBB).

The project yields a profit of IDR 5.828 billion with an initial investment of IDR 2 billion. Project B's cost structure shows a higher capital intensity in the land component. Land acquisition accounts for 34.5% of total operational expenditures, much higher than Project A's 23.3%, concentrating the main risk in the early phase when most project capital is locked into illiquid assets. This requires precise land valuation and careful pricing strategies to cover substantial fixed costs from the outset.

From a simple ROI perspective, Project B appears more attractive than Project A due to higher profit with slightly lower initial investment. However, this interpretation can be misleading, as it does not consider the additional risk from the large upfront land cost. A DCF (Discounted Cash Flow) analysis, which accounts for the timing and magnitude of cash outflows, provides a more accurate view of the project's financial feasibility and risk profile.

Project C in Cibinong is the largest and most ambitious project among the three, with a much longer development duration of 36 months. Total revenue is projected at IDR 31.858 billion, based on an effective selling price of IDR 4.3 million/m², after considering competitor projects such as Pondok Rajeg Residence (IDR 4.3 million/m²) and De Rivera Green Hill (IDR 5.3 million/m²). Revenue comes from the sale of 83 units, likely Type 36/72, with an average selling price of IDR 383.8 million per unit. Sales are planned in two waves: 10 units in hard cash totaling IDR 3.03 billion and 73 units in regular sales totaling IDR 28.83 billion.

Total planned expenditures reach IDR 26.317 billion, with the largest portion from land acquisition of IDR 9.256 billion, including main and additional land payments, taxes, fees, and transaction costs. Construction costs amount to IDR 7.852 billion, covering house construction, bore wells and jet pumps, and electricity installation. Infrastructure requires IDR 2.532 billion for preparatory work, roads, drainage, walls, and supporting facilities. Legal costs are IDR 839.5 million, covering certificate splitting, site plan and building permit (IMB) management, and related administration. Operational and marketing costs reach IDR 2.230 billion, while taxes and interest amount to IDR 3.608 billion, including final income tax, VAT, and property tax.

Based on this revenue and cost structure, Project C is projected to yield a profit of IDR 5.540 billion with an initial investment of only IDR 1 billion. The 36-month project duration is the most distinguishing factor, as it extends the project's exposure to various macroeconomic uncertainties, such as interest rate fluctuations, material cost inflation, and changes in market demand. In this context, ROI calculations are highly misleading, as they treat profits in the third year as equally valuable as profits in the first year, ignoring the time value of money and additional risks from the extended timeline.

The most critical implication lies in the project's capital structure. The initial investment of only 3.8% of total expenditures reflects a highly aggressive financing strategy. Project C heavily relies on operational cash flows from pre-sales (off-plan), creating a vulnerable liquidity condition. Project continuity depends on achieving sales targets from the first month of marketing. Delays or slower market absorption than estimated will cause cash deficits, hinder construction, and potentially trigger a series of delays and cost escalations. Therefore, despite an attractive ROI, the main risk originates from extreme dependence on market sales, which is not reflected in conventional ROI metrics.

For ease of comparison of the financial profiles of the three projects, key simulation data are consolidated in **Table 4**, summarizing complex worksheets into a concise, structured format to quickly visualize differences in scale, cost structure, profitability, and capital requirements between Projects A, B, and C.

Table 4. Summary of Initial Project Simulation Data (in IDR)

Description	Project A	Project B	Project C
Revenue	20,822,980,000	22,812,200,000	31,857,793,157
Land Acquisition	3,752,218,500	5,859,683,500	9,256,021,900
Construction	4,270,500,000	6,597,800,000	7,851,800,000
Infrastructure	3,828,600,000	2,110,011,557	2,532,078,994
Project Legal Fees	805,000,000	706,244,000	839,500,000
Operational Costs	1,646,298,000	1,140,610,000	2,230,045,521
Taxes	1,800,042,506	570,305,000	3,607,895,075
Profit	4,720,320,994	5,827,545,943	5,540,451,667
Initial Investment	2,300,000,000	2,000,000,000	1,000,000,000
Duration (Months)	24	24	36

Source: Processed data from Project A, B, and C simulations

Overall, the initial simulation presents three distinct investment profiles. Project A serves as a standard benchmark. Project B appears attractive due to its high profit and low initial investment but carries significant risk because of its high land acquisition costs. Project C, although the largest and most profitable on paper, exhibits the highest level of unquantifiable risk due to its long duration and highly aggressive financing strategy, which relies heavily on cash flow. This comparative review indicates that single-metric evaluation is insufficient to capture the nuanced risk-return profiles of these heterogeneous projects, laying the groundwork for more rigorous analysis in subsequent sections.

PT XYZ currently evaluates project feasibility using Return on Investment (ROI), calculated as the ratio of total profit to initial investment. The results indicate very high ROI across all projects: Project A at 205.23%, Project B at 291.38%, and Project C at 554.05%. When normalized for project duration, the annualized ROI remains above 100%—102.62% for Project A, 145.69% for Project B, and 184.68% for Project C. Based on ROI alone, Project C appears the most favorable, followed by Project B and Project A. However, a single-metric evaluation using ROI has fundamental limitations because it ignores project duration, risk profiles, and the time value of money. Thus, relying solely on ROI may bias decisions toward projects with low initial investment or long durations, failing to reflect comprehensive project feasibility.

The NPV methodology addresses the limitations of ROI by incorporating the time value of money. For the initial simulation calculation, PT XYZ did not produce detailed monthly cash flow simulations. Therefore, for applying NPV to the initial simulation data, a simple assumption is made: the initial investment occurs at the present time (t=0) and the total cash flow is received as a single sum at the end of the project duration. The discount rate used is the annual WACC of 7.08%. NPV is calculated by discounting the total profit to present value and subtracting the initial investment.

Table 5. Net Present Value (NPV) Calculation Based on Initial Simulation (in IDR)

Description	Project A	Project B	Project C
Future Cash Flow	4,720,320,994	5,827,545,943	5,540,451,667
Duration (Years)	2	2	3
Discount Factor	0.8721	0.8721	0.8145
NPV	4,116,684,062	5,082,192,233	4,512,877,327

Source: Processed data from Project A, B, and C simulations

Table 6. ROI vs NPV Analysis of Initial Simulation and Actual Project Results

Project	Metric	Initial Simulation Result	Detailed Actual Result
Project A	ROI	205.23%	-
	NPV	4,116,684,062	2,561,308,789
Project B	ROI	291.38%	-
	NPV	5,082,192,233	3,215,786,432
Project C	ROI	554.05%	-
	NPV	4,512,877,327	3,688,045,688

This comparative analysis reveals highly significant findings. First, for all projects, the NPV calculated from the initial simulation model is much more optimistic than the NPV calculated from detailed actual data. Project A's simulated NPV (IDR 4.12 billion) is 44% higher than its actual NPV (IDR 2.56 billion), Project B's simulated NPV (IDR 5.08 billion) is 58% higher than its actual NPV (IDR 3.21 billion), and Project C's simulated NPV (IDR 4.52 billion) is 22% higher than its actual NPV (IDR 3.68 billion). This consistent pattern indicates that the very simple initial simulation model—which assumes all profit is received at the end—systematically overestimates project value. The model fails to capture the negative impact of large early cash outflows, which significantly reduce the present value of the projects. This provides empirical evidence that not only the choice of metric (NPV vs ROI) matters, but also the quality and level of detail of cash flow projections used as inputs.

Using Project A as an example, a comparison between initial simulation data and actual data shows significant differences in various cost and revenue components.

Table 7. Projection vs. Actual Comparison for Project A (in IDR)

Description	Initial Simulation	Actual Realization	Deviation (%)
Revenue	20,822,980,000	23,777,484,303	14.19%
Land Acquisition	3,752,218,500	4,903,963,600	30.70%
Construction	4,270,500,000	5,570,613,516	30.44%
Infrastructure	3,828,600,000	3,409,720,164	-10.94%
Legal Costs	805,000,000	774,887,661	-3.74%
Operating Costs	1,646,298,000	3,633,705,499	120.72%
Tax	1,800,042,506	1,785,293,370	-0.82%
Profit	4,720,320,994	3,699,300,494	-21.63%
NPV	4,116,684,062	3,215,786,432	-21.88%

This deviation analysis shows that although actual revenue was 14.19% higher than projected, it was insufficient to offset significant cost overruns, particularly in "Operating Costs" (120.72%), "Land Acquisition" (30.70%), and "Construction" (30.44%). As a result, actual profit was 21.63% lower than expected. Moreover, the impact on real project value (NPV) was even greater, with a negative deviation of 21.88%. This confirms that inaccuracies in cost assumptions and ignoring the timing of cash flows are the main sources of deviation in value assessment, addressing the second research question.

A similar analysis was conducted for Project B, which also shows significant deviations between projections and actual results.

Table 8. Projection vs. Actual Comparison for Project B (in IDR)

Description	Initial Simulation	Actual Realization	Deviation (%)
Revenue	22,812,200,000	24,936,371,035	9.31%
Land Acquisition	5,859,683,500	5,884,347,617	0.42%
Construction	6,597,800,000	7,813,769,327	18.43%
Infrastructure	2,110,011,557	2,740,160,624	29.86%
Legal Costs	706,244,000	853,912,110	20.91%
Operating Costs	1,140,610,000	4,644,045,515	307.15%
Tax	570,305,000	692,143,929	21.36%
Profit	5,827,545,943	2,307,991,913	-60.40%
NPV	5,082,192,233	3,215,786,432	-36.72%

For Project B, although actual revenue was 9.31% higher than projected, there was an extreme surge in "Operating Costs" of 307.15%. This caused actual profit to drop by 60.40% below expectations. Consequently, the real value created (Actual NPV) was also 36.72% lower than the initial simulated NPV. These findings further reinforce the conclusion that inaccuracies in cost assumptions—especially operating costs—are the main source of value deviation.

The deviation analysis for Project C shows a slightly different pattern, where increased revenue compensated for most of the cost increases.

Table 9. Projection vs. Actual Comparison for Project C (in IDR)

Description	Initial Simulation	Actual Realization	Deviation (%)
Revenue	31,857,793,157	38,268,429,111	20.12%
Land Acquisition	9,256,021,900	9,310,776,037	0.59%
Construction	7,851,800,000	8,552,664,572	8.93%
Infrastructure	2,532,078,994	2,185,128,772	-13.70%
Legal Costs	839,500,000	1,900,283,454	126.36%
Operating Costs	2,230,045,521	6,619,762,462	196.84%
Tax	3,607,895,075	3,630,365,656	0.62%
Profit	5,540,451,667	6,069,448,158	9.55%
NPV	4,512,877,327	3,688,045,688	-18.27%

For Project C, actual revenue exceeded projections significantly (+20.12%). This increase was strong enough to cover surges in "Legal Costs" (+126.36%) and "Operating Costs" (+196.84%), resulting in actual profit that was 9.55% higher than the simulation. However, interestingly, despite the higher profit, the actual NPV was 18.27% lower than the simulated NPV. This again demonstrates that the overly simplistic initial simulation model—which assumes profit is received at the end—fundamentally misjudges the real value creation of a project.

The interview findings strongly clarify and reinforce the quantitative results. Respondents indicated that time pressure in land acquisition made ROI the preferred metric because it was simple and quick to use for immediate decisions. They also acknowledged that the use of NPV was constrained by limited technical knowledge in building a full DCF model, as the company focused more on total profitability rather than time-based value creation. Nonetheless, there is awareness that more in-depth analysis, such as NPV, is increasingly necessary—particularly when dealing with external investors—and that historical project data is key to improving projection accuracy. This triangulation shows that the deviations identified quantitatively stem from the use of a simplified approach due to speed requirements and a lack of internal analytical capacity.

Initial assumptions projected a sales rate, or market absorption, of 5 units per month. The revised scenario reduces this figure significantly by 30% to 3.5 units per month. This downward adjustment is a proactive measure to anticipate potential macroeconomic pressures.

For example, an increase in the central bank's benchmark interest rate directly impacts mortgage rates, which can reduce consumer purchasing power and slow property demand. Additionally, the emergence of competing projects near Project D or general market sentiment slowdown provides strong justification for adopting a more conservative sales rate. Consequently, this revision shifts projections from a "best-case" scenario to a more defendable "base-case" or even "conservative-case" scenario.

The most significant revision occurs in the construction cost component. Whereas the previous model used an average cost of IDR 3 million per square meter for all unit types, the revised scenario not only raises this figure but also introduces a more realistic tiered cost structure. Single-story house costs were increased by 30% to IDR 3.9 million per square meter, while two-story houses rose 50% to IDR 4.5 million per square meter. This increase reflects external pressures such as post-pandemic supply chain disruptions, inflation in key material prices, and rising labor wages. The tiered cost structure also improves model accuracy by recognizing the higher technical complexity and material requirements of two-story buildings, making the cost differential fully rational.

The project timeline from land acquisition to ready-to-sell stage was extended from 6 to 11 months, a more than 83% increase, as an adjustment to the reality of a more complex pre-construction process. This revision considers uncertainties in permitting, potential land clearance and maturation obstacles, and additional time required for detailed design and contractor tendering. As a consequence, cash inflows from sales are delayed by 5 months, increasing capital requirements and pressuring profitability.

The three main assumption revisions in the model reinforce each other's negative impact. First, the extended pre-sales period ties up capital longer without revenue, increasing capital costs and holding costs. Second, the longer non-productive period coincides with rising construction costs, raising the total investment required before the first sale occurs. Third, when sales begin in month 12, cash inflows proceed slowly (3.5 units/month), prolonging the time to reach the breakeven point. The combination of higher capital needs, a longer investment horizon, and slower returns significantly worsens liquidity pressure and increases project risk.

Cash flow analysis becomes a key element in evaluating the impact of revisions, as it captures the timing of cash outflows and inflows. In the new monthly cash flow model, the emerging pattern is significantly different from the previous optimistic scenario. During the first 11 months, net cash flows are deeply negative due to land acquisition, permitting, design, and initial infrastructure work. Cash inflows only begin in month 12 from unit sales, but at the same time, large construction expenditures also commence. As a result, the early months of sales still produce negative net cash flows until sales volumes reach a critical point sufficient to cover construction and operational costs.

From the cumulative cash flow curve, Peak Funding Requirement becomes a vital metric because it indicates the maximum capital required to survive the deepest investment phase. In the revised scenario, both the amount and timing of this peak increase significantly, heightening funding risk. Moreover, the 5-month schedule extension triggers a surge in time-dependent costs such as project team salaries, security, marketing office rent, promotional expenses, and particularly interest expenses on loans. If the initial scenario bore these costs for 6 months, the revised scenario must sustain them for 11 months. This additional "capital burn" directly erodes profitability before the impacts of increased construction costs and slower sales are even considered.

Thus, the extended timeline amplifies pressure on fixed costs (operating leverage), making profitability more fragile, and demonstrates that schedule risk is as critical—if not more—than cost or sales risk in the revised scenario.

Table 10. Monthly Cash Flow Projection for Project D (Revised Scenario) – Conceptual Summary

Project Period	Cash Flow Description	Key Impact
Month 0–11 (Pre-Construction & Permitting Phase)	Cash inflow: 0. Cash outflow: Land acquisition, permits, design, initial infrastructure, overhead.	Cumulative cash flow is deeply negative, forming the basis for capital requirements.
Month 12–24 (Construction & Early Sales Phase)	Cash inflow: Starts from sales of 3.5 units/month. Cash outflow: Massive construction costs, marketing, overhead.	Monthly net cash flows may still be negative early on; cumulative cash flow reaches its lowest point (Peak Funding Requirement).
Month 25–End of Project (Mature Sales & Completion Phase)	Cash inflow: Stabilizes from ongoing sales. Cash outflow: Declines as construction completes, residual overhead.	Monthly net cash flow becomes positive; cumulative cash flow rises, passes breakeven, and builds profit.

The conceptual table above illustrates how the project's cash flow structure changes dramatically. The cumulative cash flow curve becomes deeper, wider, and takes longer to return to positive territory, providing a financial visualisation of the overall increased project risk.

CONCLUSION

Based on quantitative and qualitative analyses, this study produces three main conclusions. First, the Net Present Value (NPV) method is fundamentally superior to Return on Investment (ROI) because it is able to capture the time value of money, indicating that the timing of cash inflows is more decisive than the mere amount of aggregate profit, something that ROI overlooks. Second, the deviation analysis for Projects A, B, and C shows that the inaccuracy of projections mainly stems from cost overruns, particularly in "Operational Costs," "Project Legal Costs," and "Construction." The initial simulation model, which placed all profit at the end of the period, also proved to produce an overly optimistic NPV. These findings are consistent with interviews, which indicate that reliance on ROI encourages overly simplified assumptions. Third, the simulation of Project D demonstrates that applying DCF with better-calibrated assumptions can provide a more realistic feasibility assessment and serves as a financial stress test that can prevent investment decisions in high-risk projects and protect long-term profitability. Future research could involve multiple property developers to examine whether the reliance on ROI and the observed cost deviation patterns are industry-wide phenomena. The NPV model can also be strengthened with quantitative risk analyses such as Sensitivity Analysis or Monte Carlo Simulation. Additionally, a Real Options Analysis (ROA) approach can be explored to assess the value of managerial flexibility, such as options to delay, modify designs, or sell land strategic values not captured in conventional NPV.

REFERENCES

August Brown. (2024). Feasibility study for real estate: A guide to informed development in 2024. https://augustbrown.com/news-item/feasibility-study-for-real-estate/

Chatra, A., et al. (2023). Metodologi Penelitian Kualitatif dalam Ilmu Sosial.

Cogito Corp. (2024). Feasibility study.

Cogito Corp. (2024, October 29). The importance of feasibility studies in real estate development. https://www.cogitorp.com/the-importance-of-feasibility-studies-in-real-estate-development/

Corporate Finance Institute. (2024). Incremental cash flow. https://corporatefinanceinstitute.com/resources/accounting/incremental-cash-flow/

de Souza, J., Davis, L., & Hernandez, G. (2022). Time value of money and its implications. Journal of Finance, 77(4), 1–45.

de Souza, R. F., de Oliveira, M. A., de Andrade, J. C. S., & de Oliveira, L. R. (2022). Methods for economic evaluation of investments in renewable energy sources: A systematic literature review. Processes, 10(2), 184. https://doi.org/10.3390/pr10020184

DebtBook. (2024). A guide to incremental cash flow. https://www.debtbook.com/learn/blog/guide-to-incremental-cash-flow

Ding, L. (2022). Macroeconomic factors and the housing market. Real Estate Economics, 50(2), 213–245.

Ding, X. (2022). Macroeconomic factors affecting housing prices: Take the United States as an example. In Proceedings of the 2022 7th International Conference on Financial Innovation and Economic Development (ICFIED 2022) (pp. 2335–2339). Atlantis Press.

Guma, T. (2021). The role of real options in enhancing the value of real estate projects. International Journal for Multidisciplinary Research, 7(3), 25–30.

Kim, T., Shim, H., & Kim, S. (2025). A study on bid decision factors for non-performing real estate project financing and the valuation basis. Sustainability, 17(3), 915. https://doi.org/10.3390/su17030915

Kusilp, N., et al. (2023). The role of the real estate sector in the national economy. Journal of Economic Structures, 12(1), 1–20.

Kusilp, T., et al. (2023). The impact of housing policies on the real estate market: A systematic literature review. Buildings, 13(11), 2735.

Li, Y., Wang, Y., & Zhang, Y. (2022). Application and comparison of NPV and IRR methods in the company investment decision. BCP Business & Management, 33, 1–6. https://doi.org/10.54691/bcpbm.v33i.2023

Li, Y., Wang, Z., & Chen, X. (2022). A comparison of investment appraisal techniques: NPV and IRR. Journal of Corporate Finance, 72, 102–118.

Loan, A., & Tella, S. (2022). Understanding Return on Investment (ROI). Financial Management Review, 15(3), 45–60.

Loan, N. T., & Tella, A. (2022). A theoretical framework on return on investment (ROI) in academic libraries. Library Hi Tech News, 39(2), 13–16. https://doi.org/10.1108/LHTN-11-2021-0077

Luo, D. (2023). Discounted Cash Flow: Theoretical and practical aspects of its use. Advances in Scientific and Applied Accounting, 16(3), 1–15.

Luo, Y. (2023). Comparison between NPV and IRR: Evaluation of investment. BCP Business & Management, 40, 149–154. https://doi.org/10.54691/bcpbm.v40i.4439

Miles, M. B., & Huberman, A. M. (1994). Qualitative data analysis: An expanded sourcebook (2nd ed.). Sage Publications.

Moorhead, A., et al. (2022). The role of feasibility studies in data-driven decision making. Project Management Journal, 53(5), 459–472.

Moorhead, M., Armitage, L., & Skitmore, M. (2022). Risk management processes used in determining project feasibility in the property development process early stages by Australia/New Zealand property developers. Journal of Property Investment and Finance, 40(6), 628–642. https://doi.org/10.1108/JPIF-08-2021-0071

Okunevičiūtė Neverauskienė, L., et al. (2025). The impact of GDP growth on residential property prices. International Journal of Housing Markets and Analysis, 18(1), 88–105.

Okunevičiūtė Neverauskienė, L., Linkevičius, D., & Andriušaitienė, D. (2025). How macroeconomic factors impact residential real estate prices in Eastern Europe. Business, Management and Economics Engineering, 23(1), 30–43.

Pacific Appraisers. (n.d.). Challenges and pitfalls in implementing discounted cash flow analysis for California commercial real estate: Key considerations.

https://pacificappraisers.com/challenges-in-implementing-discounted-cash-flow-analysis/
Pacific Appraisers. (n.d.). Discounted cash flow analysis.
Park, J. K., Lee, J. B., Ahn, Y. M., & Yoo, G. Y. (2025). A case study on multi-real-option-integrated STO-PF models for strengthening capital structures in real estate development. Buildings, 15(2), 216. https://doi.org/10.3390/buildings15020216
Ronan, P. (2022). Real estate as an inflation hedge. Journal of Portfolio Management, 48(6), 110–125.
Ronan, S. G. (2022). Macroeconomic factors that affect the price of housing in the United States: Evidence from a state-level panel data analysis. SUNY Oneonta.
Schoch, K. (2020). Case study research. In P. Atkinson, S. Delamont, A. Cernat, J. W. Sakshaug, & R. A. Williams (Eds.), SAGE research methods foundations. Sage Publications.
Teker, D. (2020). Challenges in cash flow estimation for capital budgeting. Journal of Applied Finance, 30(1), 75–89.
Teker, S. (2020). Questioning the critical factors of discounted cash flows (DCF) model. PressAcademia Procedia, 12, 60–63. https://doi.org/10.17261/Pressacademia.2020.1349
Yin, R. K. (2018). Case study research and applications: Design and methods (6th ed.). Sage Publications.
Zhang, C. (2024). A comparative study of the application of NPV and IRR to real estate investment decision-making. Highlights in Business, Economics and Management, 41, 376–380. https://doi.org/10.54097/rsmybq28