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Solvent Machine Investment for Increasing Digital Printing Profit

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ABSTRACT:
This study evaluates the financial viability of investing in solvent printing machine units for producing two products—flexible material and sticker material—targeted at the MSME sector. The research uses capital budgeting techniques to determine project profitability, focusing on net present value (NPV), internal rate of return (IRR), payback period (PP), and profitability index (PI). The analysis finds that the project is financially viable, with an initial investment of IDR 281 million yielding an NPV of IDR 288.4 million and an IRR of 69.84%. The investment is projected to be recouped in under two years, with a profitability index of 5.13. Based on these findings, the research recommends increasing marketing efforts for flexible materials, supporting community initiatives, and offering free design services as strategies to enhance profitability and community engagement. These recommendations align with the financial analysis, suggesting ways to maximize returns and build customer loyalty.
Keywords: Digital Printing, Capital Budgeting Techniques, Investment, MSMEs.

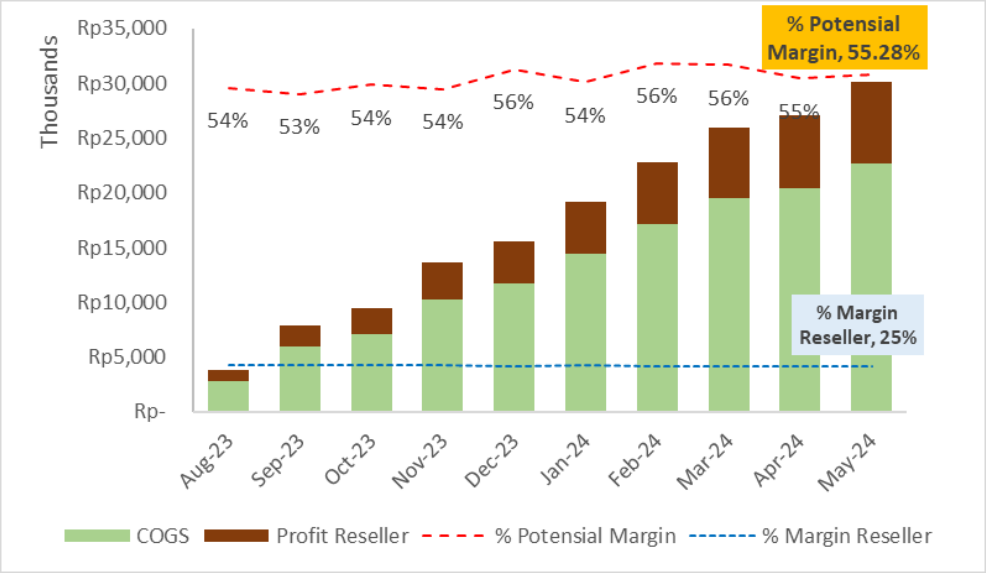
INTRODUCTION

MSMEs play a crucial role in the Indonesian economy, contributing over 61% of the country's GDP annually and absorbing 97% of the workforce (Asikin et al., 2024; Salsabillah et al., 2023). The creative industry, which includes research and development, advertising, architecture, and design, is expected to weather the global financial crisis better than many other sectors. The printing industry is also growing at an encouraging rate, with the ICI (Industrial Confidence Index) value rising significantly to 52.35 in January 2024. The printing industry locations are distributed throughout Indonesia, with Sumatra, Java, Kalimantan, Bali, and Eastern Indonesia being the main locations (Rothenberg et al., 2017).

The digital printing industry is gaining popularity for company promotion and is expected to grow at a 5% rate. This growth can influence the demand for promotional media such as banners, brochures, and flag promotions in printing businesses (Brito & Pratas, 2015). Digital printing products can also support information media for community, institutional, or agency

activities by installing print media in targeted areas. The research was conducted at PT. Yudhis Digiprint, a company located in Sukabumi City, West Java, is one of the companies engaged in the printing sector. With a large number of MSMEs in West Java, the largest in Indonesia, the need for printing products is increasing. The increasing number of community activities and organizations in Sukabumi City require promotional props in the form of printed banners (Syahira et al., 2024). This has prompted printing businesses to continue developing their businesses. This company's digital printing business started as an MSME in 2023 and has since grown to become a leading digital printing and apparel company with production experience ranging from hundreds to thousands of prints and apparel per month (Ruvoletto, 2023).

The printing industry, especially solvent products, is a product that is always needed for product promotion, business, and organizational and community activities (Cseri et al., 2018). Along with the development of online advertising, this solvent product (flexi and stickers) is no less competitive than offline advertising needs, according to research at PT. Yudhis Digiprint Company was still taking finished products from partners to be resold to customers through resellers. From 2023 to May 2024, solvent product sales data increased by an average of 18.7% per month. The company has a potential margin of 55.28%, compared to reseller sales of 25%. Here is the sales data for solvent products in the graph below:



(Source: Company sales report 2023 – 2024)

Figure 1. Revenue from sales of solvent products

This study aims to analyze investment, price, benefit value, and risk in order to provide investment recommendations for adding solvent machine units for the development of the printing business (Chang et al., 2018).

RESEARCH METHODS

This study uses quantitative methods to answer the research questions and research objectives as follows:

1. Is the investment in solvent machines profitable, according to the parameters used in capital budgeting techniques?
2. What are the sensitive variables that can affect the NPV?
3. What are the best and worst-case scenarios for the project?
4. What is the probability of a positive NPV using Monte Carlo simulation?

The research objective of this study is to assess the financial feasibility of the project using capital budgeting techniques, including:

1. Analyzing investment by calculating the NPV value, internal rate of return (IRR), payback period, and probability index can be accepted and profitable.
2. Evaluating which variables are sensitive to NPV when there is a positive and negative change in variables of 20%.
3. Analyzing and calculating the best and worst scenarios of changes in variables that affect NPV.
4. Calculating and analyzing values that affect positive NPV with Monte Carlo simulation

Statistical analysis allows researchers to identify patterns, trends, and relationships between different variables." in the book by Hen, Manion, & Morrison (2022). The research design is implemented through a comprehensive strategy that provides guidance for the entire research process, encompassing planning and data analysis (Poedjiastutie, 2021). Several research methodologies commence with the data collection methodology, followed by internal data analysis methods and capital budgeting analysis.

RESULTS AND DISCUSSION

In managing the business issue presented in the introduction, to analyze results by processing financial variables, several financial analyses are needed, as follows:

General Assumptions

The basic general assumptions developed to support the analysis of the project is detailed below:

Table 1. General Assumption and Indonesia Inflation Rate

Variable	Value	Remarks
Number of days in years	365	
Number of months in a year	12	
Inflation rate	2.95 %	inflation rate in Indonesia from 2018 to 2024

(Source: Author's Analysis, 2023)

The sales projections assume a monthly indoor and outdoor product sales price of IDR 20,000 per meter based on market and competitor surveys. The banner production projection uses an average total print per month of 13.387 m2 per year, based on the Indonesian printing sector growth.

Operating expenses include employee salaries, wages, office supplies, and capital expenditures, excluding goods sold and significant assets (Lee & Lin, 2019). They exclude rental, general, administrative, salary, and depreciation costs.

Table 2. Assumption for Operating Expenses

Variable	Value	
Building Rental Cost	25,000,000	per year
Number of Worker	5	Persons
Wage/Salary	2,500,000	IDR
G&A Expenses	16.9%	of Total Sales
Marketing	1.0%	

(Source: Author's Analysis, 2023)

Capital expenditures, including solvent printing machines, are the total cost of establishing a business or investing, including work preparation, mobilization, and electrical installation equipment, adjusted for inflation (Field, 2022).

Table 3. CAPEX of Solvent Printer Purchase

Description	Qty	Unit	Unit Price	Total	Remark
Mobilization and de-mobilization	1	ls	2,500,000	2,500,000	
Additional electrical power	1	ls	5,600,000	5,600,000	Power Upgrade from 5,500 V to 7,500
Electrical Installation Equipment	1	ls	1,500,000	1,500,000	Installation of electrical cables and slots
Rent lifting equipment	1	ls	2,200,000	2,200,000	Rent a crane truck to unload the engine from the truck
machine operator's computer	1	unit	7,500,000	7,500,000	
designer's computer	1	unit	10,500,000	10,500,000	
Stabilizer	1	unit	5,800,000	5,800,000	
Pressing, glue and sew machine	1	unit	2,100,000	2,100,000	

Solvent Printer Purchase	1	unit	230,000,000	230,000,000	D1300-2 (four head Epson I 6200)
			Total	**267,700,000**	
			Grand Total with contigencies 5%	**281,085,000**	

(Source: Author's Analysis, 2023)

The Solvent printer machine's residual value is projected to depreciate at 1.7% per month, reflecting the investment in the project's fixed assets.

Income Statement Projection

The Income Statement Projection estimates revenues and costs based on sales volume changes, often considering multiple main variables:

The business operations are projected to generate revenue from digital printing, including apparel, sublime, and solvent machines, with a growth rate of 2.81%, based on a quantitative projection of 16,245 m2 and solvent machines projection for the next five years:

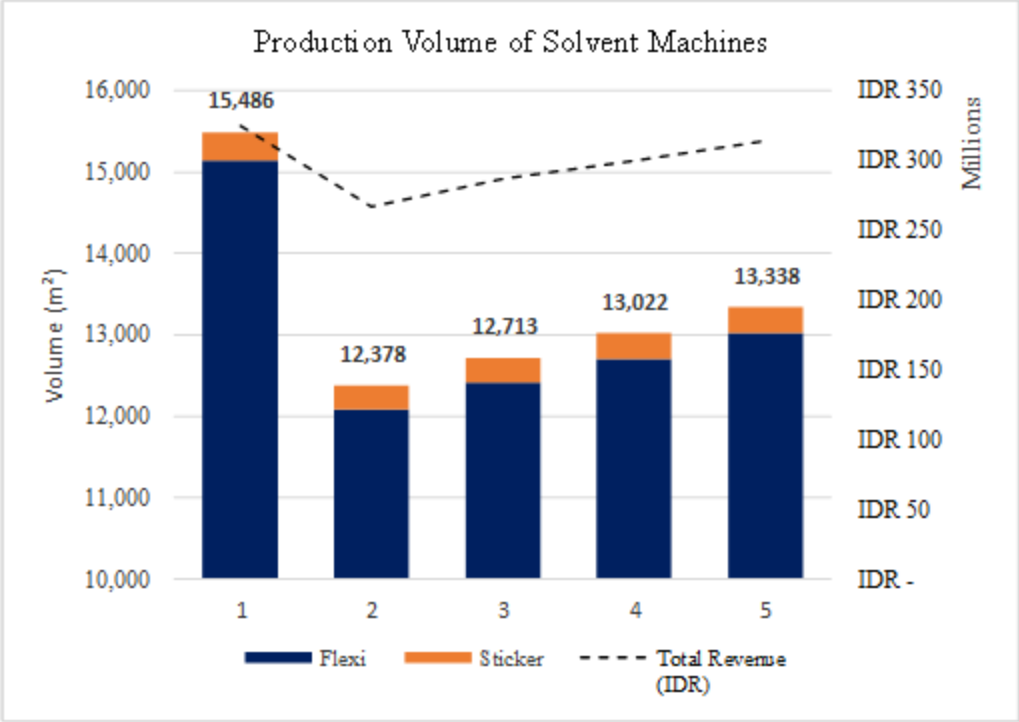


Figure 2. Solvent's Machine Production

(Source: Author's Analysis, 2023-2024)

The company calculates revenue for solvent machine production using average sales prices per square meter, ranging from IDR 20,000 for flexi to IDR 65,000 for stickers, which increases with inflation each year; the formula below:

Total Revenue=Total Volume Production x price

The table presents the revenue calculation results for the company's ten years of operation:

Table 4. Revenue Projection

Year	Flexi	Sticker	Total
1	302,966,298	21,937,129	324,903,428
2	247,671,170	19,281,765	266,952,935
3	266,789,444	19,804,112	286,593,555
4	279,618,255	20,284,674	299,902,929
5	292,912,575	20,776,897	313,689,472

(Source: Author's Analysis)

Operating profit margin indicates the "pure benefit" received for every rupiah earned, as it only accounts for operating profits and excludes interest, taxes, and dividends on preferred stock.

As shown in the table above, the net profit margin calculated from the initial year of business operations increases to a 34% to 41% annual margin over a five-year period. The average net profit margin over a five-year period is 39%.

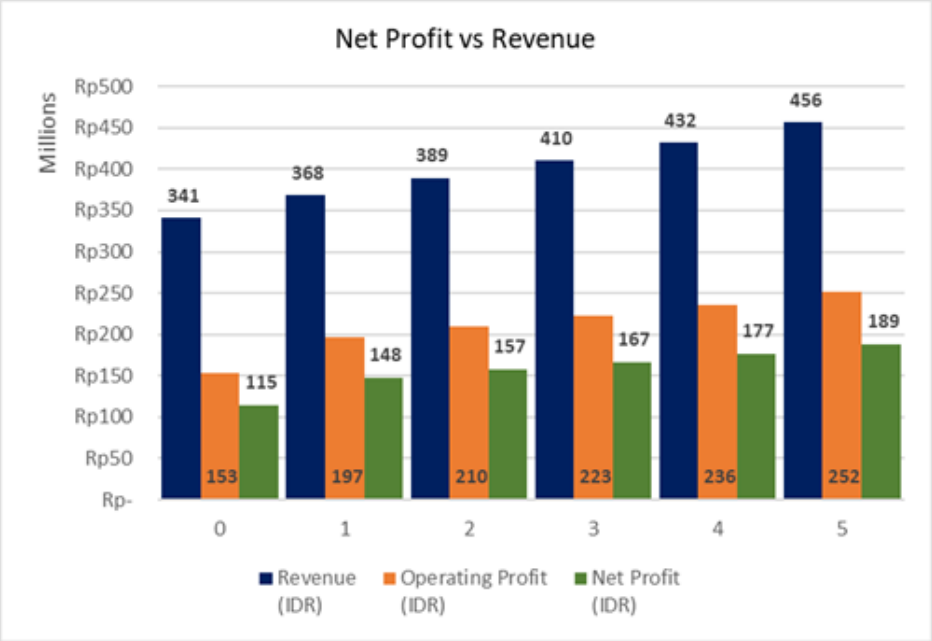


Figure 3. Solvent's Machine Production

(Source: Author's Analysis)

The projection of operating expenses for general, administrative, and salary expenses, with a baseline of 16.9% of the COGS value, reveals building rent cost as the largest contributor at 44%, above are as follows in the graph below:

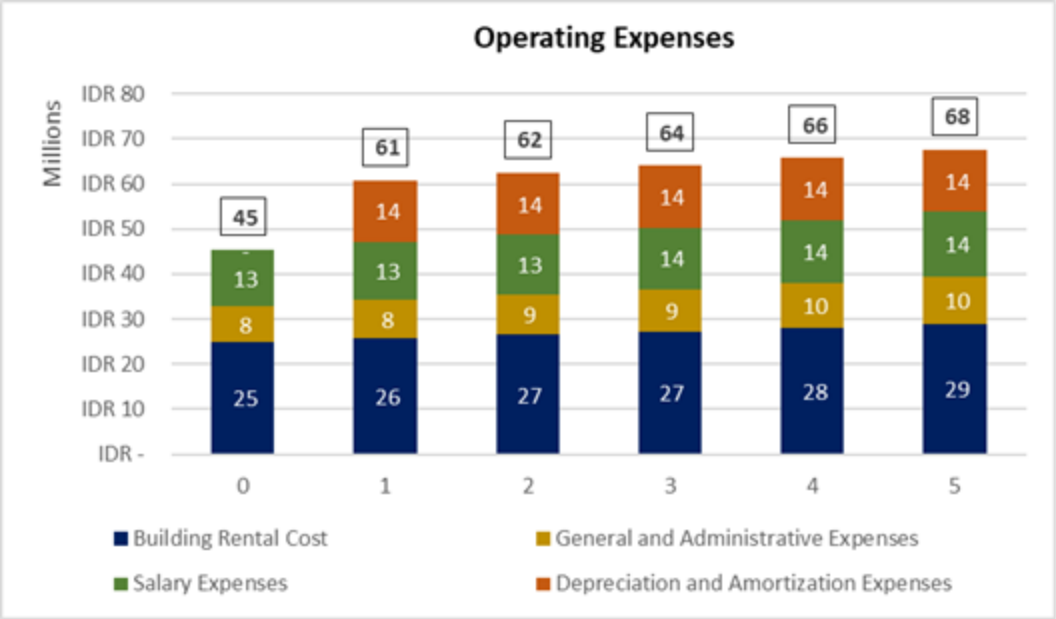


Figure 4. Operating Expenses and Depreciation Projection

(Source: Author's Analysis)

After calculating net profit, the author also use the formula below to calculate the net profit margin of the business:

$$Net\ Profit\ Margin = \frac{Net\ Profit}{Revenue}$$

The net profit margin from the initial year of business operations increases from 34% to 41% annually over a five-year period, with an average of 39%; using that formula, the author's calculation for operating profits is shown in the table below:

Table 5. Net Profit Margin

Year	Revenue	Tax Expenses	Net Profit	Net Profit Margin
0	340,906,496	22,112,273	66,336,820	19%
1	368,268,910	17,946,476	53,839,428	15%
2	389,283,731	19,645,917	58,937,750	15%
3	410,036,195	21,274,128	63,822,384	16%
4	431,610,391	22,935,023	68,805,070	16%
5	456,188,484	25,093,645	75,280,934	17%

(Source: Author's Analysis)

Cost of Capital (Cost of Equity) Calculation

Solvent printing machines are funded through owner's equity, with no long-term debt used in projections (Brunnermeier & Krishnamurthy, 2020). To be acceptable to the firm's owners, the project must generate returns enough to compensate the capital supplier. Companies can raise funds from debt and equity, with the project assumed to be fully financed with company equity. The cost of equity measures the rate of return a company must earn on equity investment. Capital costs are the actual costs a company incurs to obtain funds from various sources (Phalippou et al., 2018). Preferred stock, common stock, debt, or profits can provide funds for accumulated investments or operational projects. An initial investment of the project is fully financed by equity.

Table 6. Assumption and Weight for Cost of Capital

Variable	Value	Source
Risk free rate	6.99%	IBPA 10 Years Government Bond Yield
Risk Premium	6.58%	Damodoran
Cost of Debt	0%	company
Cost of Equity	100%	company

(Source: Author and Internet Research)

Therefore, in this calculation, the weighted average cost of capital (WACC) is represented as the cost of equity; the cost of equity (based on (Paramartha et al., 2021) can be obtained from the formula below:

$$r_s = R_f + \beta(r_m - R_f)$$

Where:

rs = cost of equity Rm = market rate of return β = beta

Rf = risk free rate Rm – Rf = risk Premium

The cost of equity is calculated using a bottom-up approach, which is shown in the table below:

Table 7. Cost of Equity Calculation

Variable	Weight
RF = Risk Free Rate	6.85%
ERP (Equity Risk Premium)	7.62%
β = Beta of the security	1.37
monthly market return	0.36%
rm = Market Rate of Return	4.43%
Cost of Equity, We	17.29%
WACC = 100% Cost of Equity	17.29%

(Source: Author's Analysis)

Financial Analysis

The author uses an operating cash flow (OCF) projection to calculate the cash flow of all investments, as the owner's equity fully finances them. The results of the operating cash flow (OCF) calculation are shown in the table below:

Table 8. Cash Flow Projection

Year	EBIT	Tax of EBIT	NOPAT	Depreciation	OCF
0	88,449,093	22,112,273	66,336,820	-	66,336,820
1	71,785,904	17,946,476	53,839,428	29,540,000	83,379,428
2	78,583,666	19,645,917	58,937,750	29,540,000	88,477,750
3	85,096,512	21,274,128	63,822,384	29,540,000	93,362,384
4	91,740,093	22,935,023	68,805,070	29,540,000	98,345,070
5	100,374,578	25,093,645	75,280,934	29,540,000	104,820,934

(Source: Author's Analysis)

Profitability analysis uses four parameters: net present value (NPV), internal rate of return (IRR), payback period (PP), and profitability index (PI) to assess business profitability. Each parameter has different criteria and produces certain results after calculation, as illustrated in the table below:

Table 9. Capital Budgeting Analysis

Parameter	Criteria	Value	Decision
Net Present Value (NPV)	>0	288,404,195	Accepted
Internal Rate of Return (IRR)	>Cost of Capital	69.84%	Accepted
Payback Period (PP)	<3 Years	1.552	Accepted
Profitability Index (PI)	>1	5.134	Accepted

(Source: Author's Analysis)

Sensitivity Analysis

The sensitivity analysis of this project is displayed in the tornado chart, serving as a guide for making adjustments to assess the risks associated with different variables (Borgonovo & Plischke, 2016). The tornado chart is a valuable tool for assessing deterministic sensitivity and comparing the relative significance of variables (Gal & Ghahramani, 2016). The author employs a +20 percent swing and -20 percent swing to evaluate changes in NPV by modifying variables.

Based on the tornado diagram given, the variables that have the greatest impact on the change in NPV are the price of product A (Flexi) and the Volume of sales of product A (Flexi) (El-Temtamy & Gendy, 2014). This variable produces a significant change in NPV of 63.20%. In terms of its impact on changes in net present value (NPV), the price of product B (Sticker) and the Volume

of sales of Product B (sticker) have the smallest variability, with a fluctuation of 0.76% in the change in NPV. The following are the comprehensive results of the sensitivity analysis:

Table 10. Sensitivity Analysis

Base	Current Assumption	+20% SWING	-20% SWING	+20% SWING NPV	-20% SWING NPV
Investment	281,085,000	(337,302,000)	(224,868,000)	-19.5%	3.9%
Inflation Rate	2.95%	3.54%	2.83%	3.7%	0.1%
Salary Expenses	12,500,000	15,000,000	12,000,000	-2.9%	0.6%
G & A Expense	54,908,184	65,889,821	52,711,856	-2.9%	0.6%
Quantity Sold A	15,889	19,067	12,711	-22.9%	22.9%
Quantity Sold B	356	427	285	-0.8%	0.8%
Price A	20,000	24,000	19,200	63.2%	-12.0%
Price B	65,000	78,000	62,400	4.6%	-0.9%
NPV	**288,404,195.4**	**(28,122,303.8)**	**481,098,237.2**		

(Source: Author's Analysis)

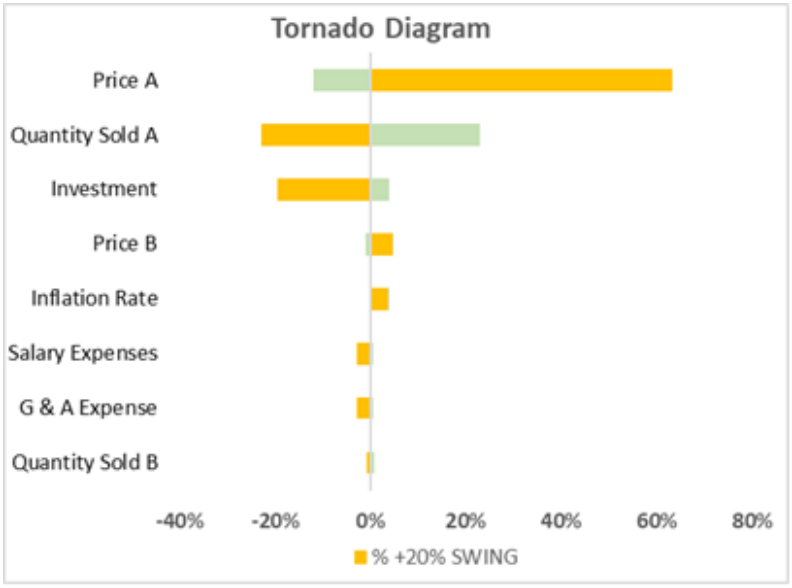


Figure 5. Revenue, Operating Profit, and Net Profit Comparison

(Source: Author's Analysis)

Scenario Analysis

The authors conducted a scenario analysis using 20% most responsive variables from sensitivity analysis to determine the optimal, most favorable, and least favorable outcomes of various potential events (Song et al., 2015).

Table 11. Scenario Analysis

Variable	Worst Case	Base Case	Best Case	Monte Carlo Simulation

Investment	(337,302,000)	(281,085,000)	(224,868,000)	(673,078,414)
Revenue	72,725,197	40,906,496	409,087,795	296,969,633
Inflation Rate	5.95%	2.95%	1.32%	5.61%
Salary Expenses	12,444,003	12,500,000	12,752,411	12,598,590
G & A Expense	54,662,208	54,908,184	56,016,940	55,051,148
Quantity Sold A	11,917	15,889	18,273	14,811
Quantity Sold B	285	356	427	341
Price A	15,000	20,000	23,000	20,950
Price B	52,000	65,000	78,000	74,859
NPV	**(28,122,303.77)**	**329,411,031**	**481,098,237.16**	
Range		509,220,541		

Table 11 shows that the most unfavorable outcome results in a negative net present value (NPV) of IDR (28,122.303.8), while the most favorable outcome yields a NPV of IDR 481,098.237.2, more than twice the base scenario's projected value.

The Monte Carlo simulation method is used to analyze investment decisions and assess risks, ensuring the right decisions under uncertainty (Pereira et al., 2014). Each variable is assigned a random number based on its range, and the model is calculated thousands of times. Upon completion, several model results are obtained, each based on a randomized input number (Hu et al., 2019). The results describe the trend or chance of variations in the model's results, including statistics like max, min, mean, standard deviation, median, kurtosis, skewness, and probability NPV<0. The simulation output is displayed in a histogram chart.

Table 12. Monte Carlo Simulation Result

Descritive Statistic	
Min:	(885,174,718.82)
Max:	1,220,435,653.40
Mean:	243,262,054.13
Standard Deviation:	295,441,772.78
Median:	255,419,624.23
Kurtosis:	0.18
Skewness:	0.01
Prob NPV<0:	18.9%

(Source: based on author calculation-summary of Monte Carlo simulation)

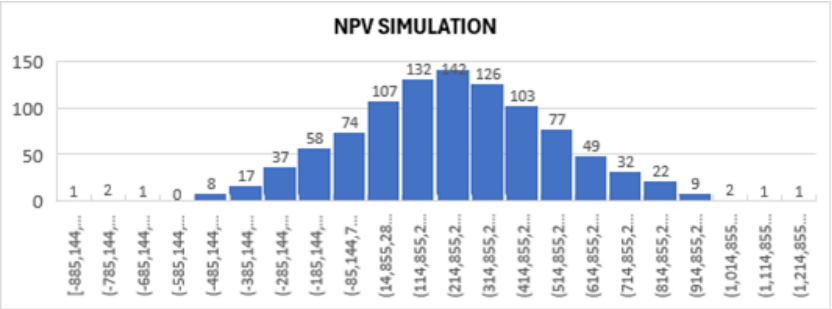


Figure 6. Monte Carlo Simulation

(Source: based on author calculation- NPV distribution profile)

The mean of NPV across simulation is IDR 260,023,181.24 with a minimum value of negative IDR 885,144,718.82 and a maximum value of IDR 1,225,435,653.40, or it can be explained that the average NPV is IDR 260,023,181.24 this is the added value that this project can provide to PT. Yudhis Digiprint, where the company's revenue will increase through an efficiency cost amount of IDR 260,023,181.24 in present value Judging from the distribution, this value falls within the standard deviation range. The best possibility is that this project will generate revenue of IDR 1,225,435,653.40, and the worst possibility is if all variables do not meet expectations. This project will still generate revenue of IDR 885,144,718.82, which is negative for PT. Yudhis Digiprint. The probability of failing this project (NPV<0) is 18.9%

CONCLUSION

PT Yudhis Digiprint is a digital printing company that offers a range of advertising solutions, including merchandise and clothing for promotional or event purposes. The company utilizes advanced technology, sophisticated machines, and accounting software, offering free custom design services and unlimited revisions to ensure customer satisfaction. With the increasing number of micro, small, and medium enterprises (MSMEs) in West Java and the popularity of ordering through marketplaces and smartphones, the digital printing industry has increasing profit potential. The company requires a capital expenditure of IDR 281 million for solvent machines for flexi and stickers, funded through owner equity. The business generates revenue from sublimation machine production, clothing, and solvent products. A feasibility study is currently underway to procure machines for solvent product production. The solvent machine production's net present value (NPV) is IDR 288,404,195, with an internal rate of return of 69,84%. The business has the potential to return its initial investment within one year and eight months of operation.

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