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Key Determinants of Net Profitability: Evidence from Pharmaceutical Manufacturing Companies

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Abstract

This research analyzes the effect of sales volume, operating costs, and production costs on the net profit of pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The population of this study consists of pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange. The study applies a quantitative approach using secondary data collected from the companies' annual financial statements. The research sample was determined through purposive sampling based on predetermined criteria. Panel data regression analysis was performed using EViews 12, supported by descriptive statistics, panel model selection tests, hypothesis testing, and the coefficient of determination (R^2). The empirical findings reveal that sales volume has a positive and statistically significant effect on net profit. In contrast, both operating costs and production costs demonstrate a significant negative relationship with net profit. Simultaneously, the three independent variables significantly explain variations in corporate profitability.These findings suggest that increasing sales volume and effectively controlling operating and production costs are essential strategies for improving corporate profitability.

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INTRODUCTION

The pharmaceutical industry in Indonesia faced significant challenges during the COVID-19 pandemic, as companies were required to increase production capacity while managing supply chain disruptions and rising operational costs. Although the growing demand for healthcare products created opportunities for higher revenue, several pharmaceutical companies

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experienced fluctuations in profitability due to changing market conditions and increasing cost pressures. These conditions indicate that strong sales performance alone does not always result in higher net profit, highlighting the importance of effective cost management. Therefore, understanding the roles of sales volume, operating costs, and production costs is essential in explaining variations in the financial performance of pharmaceutical companies

Net profit is widely recognized as an important indicator of a company's financial performance because it reflects the firm's ability to generate earnings from its operating activities. Theoretically, higher sales volume contributes to increased revenue and, consequently, higher net profit. In contrast, inefficient operating and production cost management can reduce profitability. Therefore, balancing sales growth with efficient cost control is essential for maximizing net profit.

Previous studies have examined the relationship between sales volume, production costs, operating costs, and net profit in pharmaceutical companies. Risniangsih et al. (2023) found that production costs had a negative effect, while sales volume had a positive effect on net profit. Meanwhile, Vellia & Kasir (2024) and Chairunisa et al. (2023) showed that sales volume, operating costs, and production costs significantly influenced net profit. However, previous studies have not specifically examined these factors during the 2020–2024 period, which represents a critical transition phase for the pharmaceutical industry due to the COVID-19 pandemic and changing business conditions

Based on the identified phenomena and research gap, this study aims to examine the effect of sales volume, operating costs, and production costs on net profit in pharmaceutical companies listed on the Indonesia Stock Exchange during the 2020–2024 period. This study contributes to providing empirical evidence regarding the factors that influence pharmaceutical companies' profitability during a period of industry transformation. The findings of this study are expected to provide valuable insights for company management in developing strategies related to sales optimization and cost efficiency to improve financial performance.

LITERATURE REVIEW

Net Profit

Net profit is defined in PSAK 1 as the difference between total revenue and total expenses during a reporting period, excluding other comprehensive income and changes in owners' equity. Net profit serves as a key indicator of a company's financial performance, reflecting management's ability to utilize resources efficiently and sustain business growth. Furthermore, profitability is one of the primary considerations for investors when evaluating a company's performance, as higher profitability indicates a stronger ability to generate returns and enhances the company's attractiveness to investors (Oktasari, 2023). Therefore, net profit is used as the dependent variable in this study to assess the financial performance of pharmaceutical manufacturing companies

According to Wicaksono et al. (2022), net profit is influenced by several factors, including costs, selling price, and sales and production volume. Costs represent all resources sacrificed in the production process, including raw materials, direct labor, and manufacturing overhead. The selling price refers to the monetary value set by the company for its products or services, while sales and production volume determine the level of revenue generated and the production costs incurred. Therefore, effective management of these factors is essential for improving a company's net profit.

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Sales Volume

Sales volume refers to the quantity of goods sold within a specific period, measured in units or monetary value, and reflects the effectiveness of a company's marketing and sales strategies (Pratama & Sari, 2022). An increase in sales volume is expected to generate higher revenue, which contributes to greater net profit, particularly when accompanied by efficient distribution and operational cost management. Conversely, a decline in sales volume may reduce a company's revenue and profitability.

This theoretical argument is supported by the findings of Risniangsih et al. (2023), Indrayani et al., 2022), and Chairunisa et al. (2023) who consistently reported that sales volume has a positive and significant effect on net profit. Based on the theoretical framework and empirical evidence, the following hypothesis is proposed.

Operating Costs

Operating costs refer to all expenses incurred in supporting a company's daily business activities, excluding production-related costs. According to Wicaksono et al. (2022), operating costs include marketing expenses, such as promotion, advertising, and distribution, as well as general and administrative expenses, including employee salaries, office utilities, depreciation, and other operating expenditures. Purnama et al. (2023) stated that operating costs have a direct relationship with a company's net profit. Higher operating costs tend to reduce net profit, whereas efficient cost management can improve profitability.

This theoretical argument is supported by the findings of Janurini et al. (2024) and Purnama et al. (2023), who consistently reported that operating costs have a negative and significant effect on net profit. Based on the theoretical framework and empirical evidence, the following hypothesis is proposed.

Production Costs

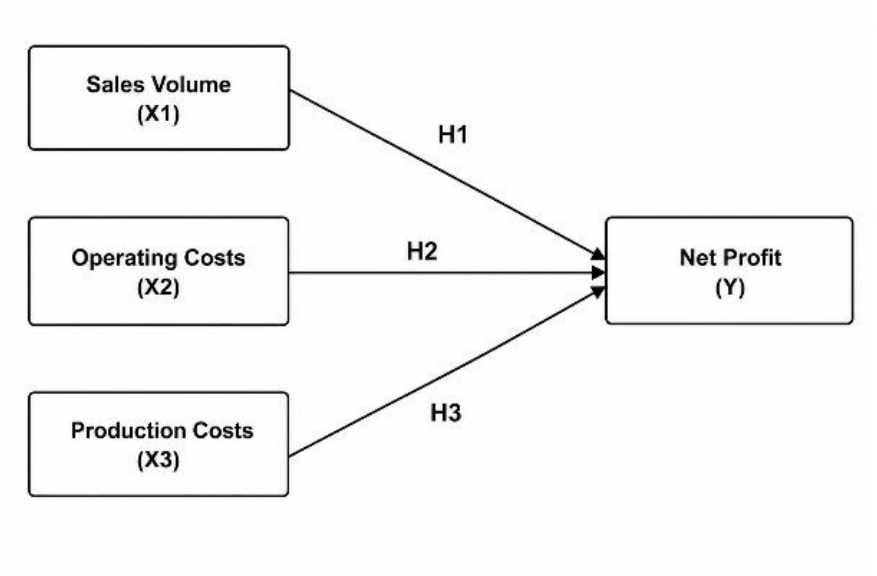
According to PSAK 14 on Inventories, production costs (conversion costs) include direct labor costs and manufacturing overhead incurred in converting raw materials into finished goods. These costs are recognized as part of the cost of inventories and subsequently become part of the cost of goods sold when the products are sold. Anindya et al. (2024) explained that production costs consist of three main components: raw material costs, direct labor costs, and manufacturing overhead. These components represent the primary resources required in the production process and play an important role in determining the total cost of manufacturing.

An increase in production costs may reflect higher production capacity to meet growing market demand. When the resulting increase in sales revenue exceeds the additional production costs incurred, the company's net profit is expected to increase. Therefore, production costs can be viewed as a productive investment that supports higher output, sales growth, and profitability.

This theoretical argument is supported by the findings of Manurung et al. (2024), *Hindi & Yasa (2023)* and Alisa et al. (2024) who consistently reported that production costs have a positive and significant effect on net profit. Based on the theoretical framework and empirical evidence, the following hypothesis is proposed.

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Figure 1. Framework



Source: Author's Processed Results (2026)

METHOD

This study employed a quantitative research approach using secondary data obtained from the annual financial reports of pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The financial reports were collected from the official IDX website (https://www.idx.co.id). A causal research design was adopted to examine the effect of sales volume, operating costs, and production costs on net profit.

Net profit served as the dependent variable, while sales volume, operating costs, and production costs were treated as the independent variables. The population consisted of all pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange during the 2020–2024 period. The sample was selected using a purposive sampling technique based on the following criteria: (1) companies that were consistently listed on the Indonesia Stock Exchange throughout the 2020–2024 period, and (2) companies that published complete annual financial reports during the observation period.

The data were analyzed using panel data regression, supported by descriptive statistics, panel data model selection tests (Chow, Hausman, and Lagrange Multiplier), classical assumption tests, goodness-of-fit tests (F-test and coefficient of determination/R^2), and partial hypothesis testing (t-test). All statistical analyses were performed using EViews 12.

RESULTS AND DISCUSSION

Results

This section presents the findings of the data analysis conducted to investigate the effects of sales volume, operating costs, and production costs on the net profit of pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The analysis is based on secondary data obtained from the annual financial reports available on the official IDX website (https://www.idx.co.id) and the respective companies' official websites. The study population comprised 15 pharmaceutical manufacturing companies listed on the IDX. Using a purposive sampling technique, 9 companies that met the predetermined criteria were selected, resulting in a total of 45 firm-year observations over the

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five-year study period. The following section presents the sample companies and the results of the statistical analysis.

Table 1. Sample of Pharmaceutical Manufacturing Companies 2020-2024

No	Stock Ticker	Company
1	KLBF	PT. Kalbe Farma Tbk
2	SIDO	PT. Industri Jamu Dan Farmasi Sido Muncul Tbk
3	SOHO	PT. Soho Global Health Tbk
4	PYFA	PT. Pyridam Farma Tbk
5	DVLA	PT. Darya-Varia Laboratoria Tbk
6	MERK	PT. Merck Tbk
7	INAF	PT. Indofarma Tbk
8	SCPI	PT. Organon Pharma Indonesia Tbk
9	TSPC	PT. Tempo Scan Pacific Tbk

Source: Author's Processed Results (2026)

Descriptive Statistics

Table 2. Descriptive Statistics Test Results

	X1 SV	X2 OC	X3 PC	Y NP
Mean	6.630.112	1.543.583	4.204.277	650.756
Median	2.893.298	727.979	1.618.095	187.702
Maximum	32.627.776	8.315.849	19.670.736	3.450.083
Minimum	210.380	43.669	113.508	-721.000
Std. Dev.	8.641.520	2.277.121	5.219.653	1.000.504
Observations	45	45	45	45

Source: Data processed using EViews 12 (2026)

Sales Volume ranges from a minimum value of 210,380 to a maximum value of 32,627,776. The mean value is 6,630,112, with a standard deviation of 8,641,520, indicating substantial variability in sales volume among pharmaceutical manufacturing companies. The high standard deviation suggests considerable differences in sales performance across the observed companies during the 2020–2024 period.

Operating Costs range from a minimum value of 43,669 to a maximum value of 8,315,849. The mean operating cost is 1,543,583, with a standard deviation of 2,277,121, indicating considerable variation in operating expenses among the sampled companies. This finding reflects differences in the scale of business operations and cost management practices.

Production Costs range from a minimum value of 113,508 to a maximum value of 19,670,736. The mean value is 4,204,277, while the standard deviation is 5,219,653, indicating a relatively high level of variability in production costs across companies. The variation reflects differences in production capacity and manufacturing activities among pharmaceutical companies.

Net Profit ranges from a minimum value of −721,000 to a maximum value of 3,450,083. The mean net profit is 650,756, with a standard deviation of 1,000,504, indicating considerable variability in profitability among the sampled companies. The negative minimum value indicates that some companies experienced net losses during the observation period, whereas the maximum value reflects strong financial performance achieved by other companies. The relatively high standard deviation suggests substantial differences in net profit across pharmaceutical manufacturing companies during the 2020–2024 period.

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Panel Data Model Selection

Table 3. Chow Test

Effect Test	Statistic	d.f	Prob.
Cross-section F	5.416638	(8,33)	0.0002
Cross-section Chi-square	37.736960	8	0.0000

Source: Data processed using EViews 12 (2026)

Based on the Chow test results in Table 3, the Cross-Section F probability value is 0.0002. This value is lower than the 5% significance level (0.0002 < 0.05), leading to the rejection of H_0 and acceptance of Ha. Therefore, the most appropriate model to be used in this study is the Fixed Effect Model (FEM).

Table 4. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.348701	3	0.5033

Source: Data processed using EViews 12 (2026)

Based on the Hausman test results in Table 4, the Cross-Section Random probability value is 0.5033. This value is higher than the 5% significance level (0.5033 > 0.05), indicating that the Random Effect Model (REM) is more appropriate than the Fixed Effect Model (FEM). Therefore, the Random Effect Model (REM) was selected as the appropriate model for this study.

Table 5. Lagrange Multiplier Test

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	14.48043 (0.0001)	0.313515 (0.5755)	14.79395 (0.0001)
Honda	3.805316 (0.0001)	-0.559924 (0.7122)	2.294839 (0.0109)
King-Wu	3.805316 (0.0001)	-0.559924 (0.7122)	1.739824 (0.0409)
Standardized Honda	5.500357 (0.0000)	-0.344386 (0.6347)	0.189512 (0.4248)
Standardized King-Wu	5.500357 (0.0000)	-0.344386 (0.6347)	-0.405155 (0.6573)
Gourieroux, et al.	--	--	14.48043 (0.0003)

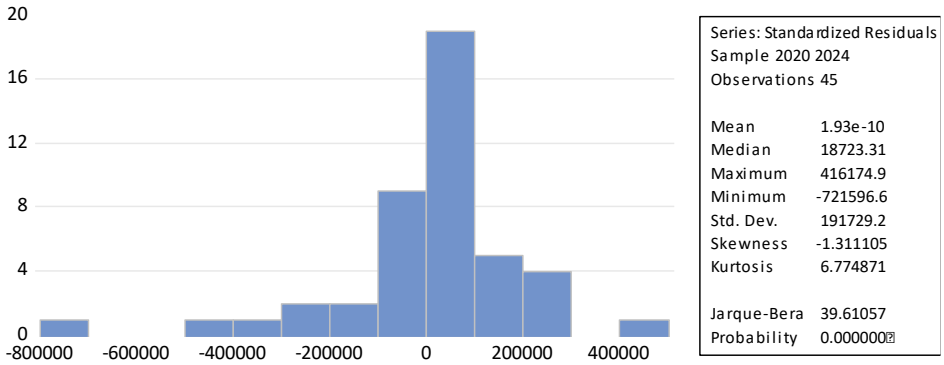
Source: Data processed using EViews 12 (2026)

Based on the Lagrange Multiplier (LM) test results in Table 5, the Breusch–Pagan probability value is 0.0001. This value is lower than the 5% significance level (0.0001 < 0.05), leading to the rejection of H_0 and the acceptance of Ha. Therefore, the Random Effect Model (REM) is considered the most appropriate model for this study.

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Classical Assumption Tests

Figure 2. Normality Test Result



Source: Data processed using EViews 12 (2026)

The normality test was conducted using the Jarque–Bera (JB) test. The results indicate that the Jarque–Bera probability value after logarithmic transformation is 0.0000, which is lower than the 5% significance level (0.05), indicating that the residuals are not normally distributed. However, because this study uses 45 firm-year observations, the normality assumption is considered acceptable based on the Central Limit Theorem (Basuki & Prawoto, 2015).

Table 6. Multicollinearity Test Result

	LOG_OC	LOG_PC	LOG_SV
LOG_OC	1	0.71802063	0.58733096
LOG_PC	0.71802063	1	0.59094870
LOG_SV	0.58733096	0.59094870	1

Source: Data processed using EViews 12 (2026)

The multicollinearity test was performed using a correlation matrix. As presented in Table 6, all correlation coefficients among the independent variables are below the threshold of 0.90. These results indicate that the regression model is free from multicollinearity, suggesting that no strong correlation exists among the independent variables.

The heteroscedasticity test was initially conducted using the Glejser test under the Ordinary Least Squares (OLS) model. The results indicated no evidence of heteroscedasticity before the logarithmic transformation. However, after the transformation, heteroscedasticity was detected. According to *Gujarat & Porter (2009)*), heteroscedasticity may lead to inefficient parameter estimates and biased standard errors, thereby affecting statistical inference. Therefore, the regression model was estimated using the Robust Least Squares (M-estimation) method, which provides robust standard errors and reliable parameter estimates in the presence of heteroscedasticity.

The autocorrelation test was performed using the Durbin–Watson test. The initial OLS model showed no evidence of autocorrelation. However, after the logarithmic transformation, the results indicated the presence of autocorrelation. According to *Gujarat & Porter (2009)*), autocorrelation may result in inefficient estimators and unreliable hypothesis testing. Therefore, the Robust Least Squares (M-estimation) approach was employed to obtain consistent parameter estimates and robust standard errors, ensuring the validity of the regression results despite the presence of autocorrelation.

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Table 7. Panel Data Regression Analysis

Variabel	Coefficient	Std. error	t-Statistic	Prob
C	8198.385	7279.494	1.126230	0.2601
SV	0.801810	0.011552	69.41162	0.0000
OC	-0.832205	0.019402	-42.89255	0.0000
PC	-0.801234	0.012112	-66.15283	0.0000

Source: Data processed using EViews 12 (2026)

Based on the results shown in Table 7, the following regression equation model is derived:

$$\mathbf{NP = 8.198{,}385 + 0{,}801810\ SV - 0{,}832205\ OC - 0{,}801234\ PC}$$

The panel data regression equation can be interpreted as follows:

1. The constant coefficient is 8,198.385, indicating that if sales volume, operating costs, and production costs are held constant, net profit is estimated to be 8,198.385. However, the constant is not statistically significant (p = 0.2601).
2. The sales volume coefficient is 0.801810, indicating that a one-unit increase in sales volume will increase net profit by 0.801810 units, while holding the other independent variables constant (ceteris paribus).
3. The operating costs coefficient is −0.832205, indicating that a one-unit increase in operating costs will decrease net profit by 0.832205 units, while holding the other independent variables constant (ceteris paribus).
4. The production costs coefficient is −0.801234, indicating that a one-unit increase in production costs will decrease net profit by 0.801234 units, while holding the other independent variables constant (ceteris paribus).

Goodness of Fit

Table 8. F Test Result

Rn-squared statistic	32335.29
Prob(Rn-squared statistic)	0.000000

Source: Data processed using EViews 12 (2026)

Based on Table 8, the Prob. (F-statistic) is 0.000000 (< 0.05), and the calculated F-value exceeds the critical F-value (32335.29 > 2.83274713), indicating that the regression model is statistically significant and suitable for explaining the effect of Sales Volume (SV), Operating Costs (OC), and Production Costs (PC) on Net Profit (NP).

Table 9. Coefficient of Determination (R^2)

R-squared	0.628034
Adjusted R-squared	0.600816

Source: Data processed using EViews 12 (2026)

Based on Table 4.13, the Adjusted R^2 value is 0.600816, indicating that Sales Volume (SV), Operating Costs (OC), and Production Costs (PC) explain 60.01% of the variation in Net Profit (NP), while the remaining 39.99% is explained by other factors outside the model.

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Hypothesis Testing

Table 10. t Test Result

Variabel	Coefficient	Std. error	t-Statistic	Prob
C	8198.385	7279.494	1.126230	0.2601
SV	0.801810	0.011552	69.41162	0.0000
OC	-0.832205	0.019402	-42.89255	0.0000
PC	-0.801234	0.012112	-66.15283	0.0000

Source: Data processed using EViews 12 (2026)

Based on the t-test results presented in Table 10, the effect of each independent variable on net profit can be explained as follows:

Sales volume has a t-statistic of 69.41162, which is greater than the t-table value of 2.01669. The regression coefficient is 0.801810 with a probability value of 0.0000, which is lower than the 5% significance level (0.05). Therefore, H1 is accepted, indicating that sales volume has a positive and significant effect on net profit.

Operating costs have a t-statistic of −42.89255 (|t| = 42.89255), which exceeds the t-table value of 2.01669. The regression coefficient is −0.832205 with a probability value of 0.0000 (< 0.05). Therefore, H2 is accepted, indicating that operating costs have a negative and significant effect on net profit.

Production costs have a t-statistic of −66.15283 (|t| = 66.15283), which is greater than the t-table value of 2.01669. The regression coefficient is −0.801234 with a probability value of 0.0000 (< 0.05). Therefore, H3 is rejected, indicating that production costs have a negative and significant effect on net profit. This finding is inconsistent with the proposed hypothesis, which predicted a positive effect of production costs on net profit.

Discussion

The Effect of Sales Volume on Net Profit

The findings demonstrate that sales volume positively and significantly influences the net profit of pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange during the 2020–2024 period. This result indicates that higher sales volume contributes to greater profitability by increasing company revenue. Accordingly, firms that consistently achieve stronger sales performance are more likely to generate higher net profit.

This finding is consistent with the theoretical perspective that sales volume is one of the main determinants of net profit. Higher sales enable companies to increase revenue while optimizing the utilization of fixed costs, thereby improving profitability. In the pharmaceutical industry, increased sales also reflect the company's ability to meet market demand and maintain its competitive advantage.

Furthermore, this finding is consistent with the studies of Risniangsih et al. (2023), Indrayani et al. (2022) and Chairunisa et al. (2023), which reported that sales volume has a positive and significant effect on net profit. These findings reinforce the empirical evidence that sales volume is an important determinant of profitability in pharmaceutical manufacturing companies.

The Effect of Operating Costs on Net Profit

The results of this study indicate that operating costs have a negative and significant effect on net profit in pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange during the 2020–2024 period. This finding suggests that an increase in operating costs tends to reduce net profit, particularly when the increase is not accompanied by higher

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revenue. Therefore, effective management of operating costs is essential to improve a company's financial performance and profitability.

This finding is consistent with the theoretical perspective that operating costs represent expenditures incurred to support the company's daily business activities. Inefficient management of these costs may reduce the company's ability to generate profits. Consequently, companies that effectively control their operating costs are more likely to achieve higher net profit and maintain better financial performance.

Furthermore, this finding is consistent with the studies of Janurini et al. (2024) and Purnama et al. (2023)both of which reported that operating costs have a negative and significant effect on net profit. These findings strengthen the empirical evidence that efficient operating cost management is an important factor in improving the profitability of pharmaceutical manufacturing companies.

The Effect of Production Costs on Net Profit

The results of this study indicate that production costs have a negative and significant effect on net profit in pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange during the 2020–2024 period. This finding suggests that an increase in production costs tends to reduce net profit, particularly when the increase is not accompanied by a proportional rise in output or sales revenue. Therefore, efficient management of production costs is essential to improve the company's profitability and overall financial performance.

This finding is in line with the theoretical perspective that production costs represent expenditures directly associated with the manufacturing process, including raw materials, labor, and factory overhead. Inefficient utilization of production resources or rising costs that do not contribute to higher productivity may weaken the company's profit-generating capacity. As a result, firms with less efficient production cost management tend to experience lower net profit levels.

Furthermore, this finding is consistent with the studies conducted by Purnama et al. (2023), which reported that production costs have a negative and significant effect on net profit. In addition, Janurini et al. (2024) also found that operational-related costs have a negative and significant impact on corporate profitability. These findings strengthen the empirical evidence that effective cost control, particularly in production activities, plays a crucial role in enhancing profitability in pharmaceutical manufacturing companies.

CONCLUSION

Based on the results of the research and discussion regarding the effect of sales volume, operating costs, and production costs on net profit in pharmaceutical manufacturing companies listed on the Indonesia Stock Exchange during the 2020–2024 period, it can be concluded that sales volume has a positive and significant effect on net profit. This indicates that an increase in sales volume leads to higher revenue, which in turn contributes to an increase in net profit. Meanwhile, operating costs have a negative and significant effect on net profit, meaning that higher operating costs tend to reduce net profit, especially when they are not accompanied by an increase in revenue. In addition, production costs also have a negative and significant effect on net profit, indicating that rising production costs can decrease profitability if they are not balanced with higher sales volume or improved production efficiency. Overall, these findings highlight that efficient cost management and efforts to increase sales volume are important factors in improving the financial performance and profitability of companies.

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