

# How Inflation Changes the Pattern of Production Costs? An Investigation of Raw Materials, Labor, and Overhead

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## Abstract

Manufacturing companies face significant challenges in managing production costs amid economic volatility, particularly during inflationary periods. This study investigates how raw material costs, direct labor costs, and factory overhead costs influence the cost of goods manufactured (COGM), with inflation serving as a moderating variable. The research examines 594 manufacturing companies listed on the Indonesia Stock Exchange during 2021-2023, utilizing purposive sampling methodology. Secondary data was collected from annual financial statements and Bank Indonesia's inflation database. The analytical approach employed descriptive statistics, classical assumption tests, multiple linear regression, and moderated regression analysis (MRA). Results demonstrate that raw material costs ( $t=273.886$ ,  $p<0.001$ ), direct labor costs ( $t=26.885$ ,  $p<0.001$ ), and factory overhead costs ( $t=96.285$ ,  $p<0.001$ ) exhibit significant positive effects on COGM. Inflation significantly moderates the relationship between raw material costs and COGM ( $t=2.531$ ,  $p=0.012$ ), but does not moderate direct labor costs ( $t=0.700$ ,  $p=0.484$ ) or factory overhead costs ( $t=-1.668$ ,  $p=0.096$ ) relationships. The model explains 97% of COGM variance, indicating robust explanatory power. These findings provide crucial insights for manufacturing cost management strategies, particularly emphasizing the need for adaptive raw material procurement policies during inflationary periods. The study contributes to contingency theory application in cost accounting and offers practical implications for manufacturing efficiency optimization.

**Keywords:** Contingency Theory, Cost Management Strategies, Economic Volatility, Manufacturing Efficiency, Production Optimization.

## 1. Introduction

Manufacturing companies remain a critical pillar of Indonesia's economy, contributing approximately 18.67% to the national Gross Domestic Product (GDP) and employing millions of workers across industries such as metals, automotive, and electronics (BPS, 2023). However, over the past three years, the manufacturers have faced rising production cost pressures due to global supply chain disruptions, energy price volatility, and economic uncertainty triggered by the COVID-19 pandemic and its aftermath. The structural and operational inefficiencies in Indonesian manufacturing were exacerbated by external shocks, affecting cost management efforts (Permana et al., 2023).

This pressure was further compounded by unstable macroeconomic conditions, particularly inflation. According to Bank Indonesia (2025) Indonesia's inflation rate experienced significant fluctuations: 1.86% in 2021, rising sharply to 5.51% in 2022, and dropping to 2.61% in 2023. Inflation not only erodes consumer purchasing power but also directly raises input prices, thereby undermining efficiency and competitiveness (Amri, 2022).



Inflation has also been shown to significantly disrupt production input structures and company cost efficiency (Salim & Fadilla, 2021). Empirical studies highlight the importance of cost control in maintaining profitability amid inflationary pressures. Rising production costs have been shown to significantly reduce profit margins in food and beverage companies (Nurkholifah & Abdullah, 2010).

This study is grounded in Contingency Theory, which asserts that organizational effectiveness depends on aligning internal strategies with external environmental conditions. In this context, cost management practices must adapt to inflationary pressures in order to sustain competitiveness. Therefore, it is crucial to understand how production cost components interact with inflation in shaping the cost of goods manufactured (COGM). COGM, as an aggregate measure of total production costs, provides a comprehensive view of cost efficiency and is directly influenced by raw material costs, direct labor costs, and factory overhead (Firmandani et al., 2024). In addition, labor costs play a significant role in determining the magnitude of COGM. Increases in minimum wages or declines in worker productivity can substantially add to the company's cost burden. Therefore, strategies for managing labor costs through improved efficiency and productivity are critical to maintaining cost stability (Rohma & Sholihah, 2022). Another crucial component is factory overhead. This includes indirect expenses such as electricity, water, maintenance, and asset depreciation, all of which contribute significantly to COGM. A company's inability to effectively control overhead costs may lead to undesirable increases in total production costs (Abbas & Napitupulu, 2022). The importance of controlling factory overhead particularly energy and depreciation costs to maintain operational efficiency and profitability in manufacturing companies (Nasution et al., 2024). The total production cost is calculated by summing raw material costs, direct labor costs, and factory overhead (Mulyadi, 2019:14)

Based on that context, empirical evidence on how inflation moderates the relationship between production cost components and cost of goods sold (COGS) is still very limited. Until now, there has been little research examining this issue. One of them was conducted by Saputri & Suswandoyo (2023) on manufacturing companies in the cosmetic subsector during the period 2016–2021. However, this research is sectoral in nature and has not utilized the Contingency Theory framework which emphasizes the importance of alignment between internal strategies and external conditions. This leaves a significant gap in understanding how inflation shapes cost structures more broadly in the manufacturing industry. Therefore, this study aims to analyze the influence of raw material costs, direct labor costs, and factory overhead costs on COGM, as well as to examine the role of inflation as a moderating variable within the framework of Contingency Theory. By focusing on manufacturing companies listed on the Indonesia Stock Exchange during the 2021–2023 period, this study not only captures the dynamics of a highly volatile post-pandemic era but also offers a novel contribution by explicitly integrating inflation as a moderating variable. This approach is expected to provide a more comprehensive theoretical and empirical understanding of how external shocks affect the cost structures of manufacturing companies in Indonesia.

## 2. Literature Review

### 2.1. Theory Contingency

Contingency theory, developed by Fiedler (1970), states that organizational effectiveness depends on the fit between leadership style and environmental conditions. In managerial accounting, this theory supports the idea that companies must adapt their cost systems and strategies in response to changing environmental factors, such as inflation. In

this study, contingency theory explains that cost management strategies that are responsive to inflationary conditions can minimize the negative impact on the cost of goods manufactured (COGM). Therefore, cost control strategies should be aligned with external environmental factors to maintain organizational efficiency. as contingency theory further asserts that there is no single optimal cost accounting system for all conditions rather (Ariyani et al., 2024), the system must be designed flexibly and adapted to the environmental pressures faced (Siagian et al., 2025).

## 2.2. Production Cost and Components

Production cost refers to the total expenses incurred by a company to process raw materials into finished goods that are ready for sale. According to Mulyadi (2019), production costs consist of three major components: raw material costs, direct labor costs, and factory overhead costs. These three components directly influence the determination of the cost of goods manufactured (COGM), and any fluctuation in one component can significantly affect the total cost of production.

Raw material costs are considered the primary element in production cost composition. These include the purchase price of raw materials used directly in the manufacturing process. Raw materials are typically sensitive to market fluctuations and inflationary pressures Julia & Fithri (2023) emphasize that managing raw material efficiency is critical, as increases in raw material prices without corresponding control mechanisms may lead to higher COGM and reduced profit margins. The influence of raw material costs on production volume is very significant, indicating that efficient management of raw materials directly increases factory output (Laia et al., 2025)

Direct labor costs are expenses related to the compensation of employees who are directly involved in the production process. This component includes wages, benefits, and incentives. According to Rohma & Sholihah (2022), increases in minimum wages or decreases in worker productivity can lead to higher production costs. Therefore, managing labor efficiency is essential to ensure stable and competitive COGM levels (Febrianti & Rasmawati, 2024).

Factory overhead costs represent all indirect costs associated with the manufacturing process. These include utilities (electricity and water), equipment maintenance, depreciation, and indirect materials. Anggorowati & Suryana (2019) argue that overhead costs must be allocated accurately to avoid distortion in product costing. Effective management of these cost components is essential to ensure that the company remains efficient and competitive in volatile economic conditions.

## 2.3. Inflation

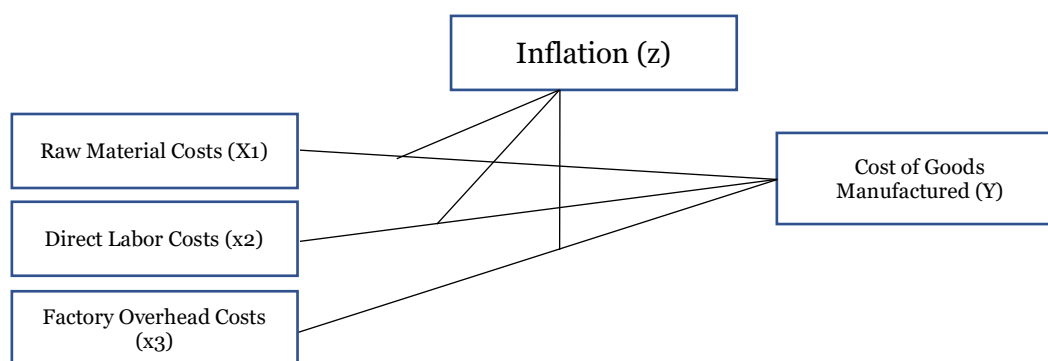
Inflation is an economic measure that shows the overall and ongoing rise in the prices of products and services. There are two primary reasons for inflation: demand-pull inflation, caused by an excess of demand over supply, and cost-push inflation, which stems from increasing production costs (Feranika & Haryati, 2020). For manufacturing firms, inflation presents a critical external factor that affects not only input prices but also profit planning, production budgets, and strategic decisions. a high level of inflation can directly increase production input costs such as raw materials, labor, and energy," thereby putting added pressure on manufacturing efficiency (Nurlailatin et al., 2024). Dini & Nana (2025) also highlights that high inflation can significantly increase raw material costs, forcing companies to adjust their pricing and production strategies to maintain profitability.

Increased inflation can result in rising prices of raw materials, higher wages due to cost-of-living adjustments, and increased utility costs. This phenomenon introduces uncertainty

and complexity into production cost planning. According to Salim & Fadilla (2021), prolonged and unstable inflation can disrupt financial forecasts and reduce purchasing power, thereby lowering overall economic activity.

From a contingency theory perspective, companies must adapt their cost management strategies to respond to these external pressures. When inflation is high, the relationship between each cost component including raw materials, labor, and overhead, and the cost of goods manufactured may shift, making it necessary to monitor and revise internal costing systems more frequently. This study considers inflation as a moderating variable that may strengthen or weaken the effect of each cost component on COGM depending on its magnitude and volatility (Ilham et al., 2025).

## 2.4. Hypothesis Development



**Figure 1. Research Framework**

### 2.4.1. Effect of Raw Material Costs on Cost of Goods Manufactured (COGM)

Raw material costs represent the largest and most critical component in the production cost structure. These costs involve the procurement of primary materials that are directly processed into finished goods. Since raw materials are at the core of manufacturing, any increase in their cost will have a direct and immediate impact on the cost of goods manufactured (COGM). The price of raw materials is highly sensitive to market conditions, currency fluctuations, and inflationary pressures.

For example, when essential commodities such as red chili and shallots rise in price, small-scale businesses like food vendors or traditional restaurants experience a direct cost burden. When raw material volatility led to reduced profits and even closure of businesses. In larger manufacturing companies, inefficient use of raw materials, wastage, or poor purchasing strategies can exacerbate these costs further. Hence, effective inventory control and procurement policies are essential to reduce COGM volatility (Irhamni et al., 2023).

Saputri (2023) found that raw material costs have a significant positive effect on COGM in manufacturing firms listed on the Indonesia Stock Exchange. This conclusion aligns with the findings of Dewi et al. (2024), Banamakani et al. (2023), Rahmawati (2019), Maulana (2019), Mulyana (2018), and Lubis D.S (2018) as well as Arni (2018) who also highlighted the strong influence of raw material input on overall production cost.

**H1:** Raw material costs significantly affect the cost of goods manufactured.

### 2.4.2. Effect of Direct Labor Costs on Cost of Goods Manufactured (COGM)

Direct labor refers to the compensation given to employees who are directly involved in the production process, such as machine operators, assembly workers, and line supervisors.

These labor costs include not only salaries but also overtime pay, performance incentives, and statutory benefits. In labor-intensive industries, direct labor constitutes a substantial portion of the production cost structure. Increases in minimum wage regulations, labor shortages, or declining productivity can significantly elevate direct labor costs. If not managed properly, these increases lead to inefficiencies in production and eventually cause a rise in the cost of goods manufactured. Technology plays an important role in improving the efficiency and effectiveness of the workforce in Indonesia (Ningsih, 2024).

Conversely, improvements in worker productivity through training, process automation, or performance-based systems can help contain labor cost escalation (Ariani et al., 2025). Training the workforce makes companies more efficient and motivated (Gunawan et al., 2025). emphasized that optimal labor management is a key strategy to ensure production cost stability (Rohma & Sholihah 2022). Empirical findings from Dewi et al. (2024), Saputri (2023), Banamakani et al. (2023), Rahmawati (2019), Maulana (2019), Mulyana (2018), and Lubis D.S (2018) support this argument, showing that direct labor costs significantly influence COGM.

**H2:** Direct labor costs significantly affect the cost of goods manufactured.

### 2.4.3. Effect of Factory Overhead Costs on Cost of Goods Manufactured (COGM)

Factory overhead costs comprise all indirect production costs that are not directly attributable to specific products but are essential for the production process. These include utility costs (electricity and water), equipment maintenance, machinery depreciation, security services, and indirect labor. Although these costs are often perceived as fixed or supporting, their accumulation can significantly affect total production cost if not managed properly. The accumulation of uncontrolled factory overhead costs significantly reduces production cost efficiency in a study on the medium-scale manufacturing sector (Ciceu Lisnawati & Apip, 2018).

Effective overhead control requires accurate allocation and cost tracing methods. states that factory overhead, along with direct materials and labor, forms the complete cost calculation of finished goods (Mulyadi, 2019). unmanaged factory overhead costs have been proven to affect the operational efficiency of the company (Retno et al., 2022). Several studies, such as those by Dewi & Murti (2024), Banamakani et al. (2023), Al Farizi (2022), Rahmawati (2020), Maulana (2019), Lubis (2018), Arni (2018), Anggorowati et al. (2019), Ati (2015), showing that factory overhead costs significantly influence COGM.

**H3:** Factory overhead costs significantly affect the cost of goods manufactured.

### 2.4.4. Inflation as a Moderating Variable

Inflation refers to the persistent rise in the general price level of goods and services, which affects both consumers and producers. In the production context, inflation increases the cost of raw materials, labor wages, and utilities, making it harder for companies to maintain cost efficiency. The increase in inflation has caused an unexpected rise in raw material prices and electricity rates, making it difficult for companies to accurately compile their production cost budgets (Don et al., 2022). As a macroeconomic variable, inflation can serve as a moderating factor that changes the strength or direction of the relationship between production cost components and COGM. High inflation leads to uncertainty in HPP planning due to unpredictable input price volatility (Monica & Munandar, 2024).

The Contingency Theory supports this dynamic by suggesting that organizations must adapt their cost control strategies based on changes in the external environment, such as inflation. When inflation rises sharply, raw material prices may spike unpredictably, and



utility costs may fluctuate, leading to a weakened ability to forecast production costs accurately. This causes the influence of cost components on COGM to either intensify or become more volatile. Inflation instability forces accounting managers to continuously revise cost control strategies to avoid significant deviations in production costs (Putu et al., 2025)

Salim & Fadilla (2021) noted that inflation contributes to uncertainty in planning and budget execution, while Ilham et al (2025) emphasized its potential to disrupt cost structures and performance benchmarks. Saputri (2023) found that inflation significantly moderates the relationship between raw material costs and COGM, but shows a weaker moderating effect on direct labor costs. This suggests that the impact of inflation varies depending on the nature of each cost component.

**H4:** Inflation moderates the effect of raw material costs on the cost of goods manufactured.

**H5:** Inflation moderates the effect of direct labor costs on the cost of goods manufactured.

**H6:** Inflation moderates the effect of factory overhead costs on the cost of goods manufactured.

### 3. Methods

#### 3.1. Research Object

This research targets manufacturing companies traded on the Indonesia Stock Exchange (IDX) from 2021 to 2023. The study concentrates on firms that supply comprehensive information regarding production cost elements specifically raw material expenses, direct labor expenses, and factory overhead expenses along with inflation data, which serves as a moderating factor. Manufacturing enterprises were chosen as the research focus due to their significant role in contributing to the country's Gross Domestic Product (GDP) and their heightened vulnerability to production cost variations, especially during periods of changing inflation rates.

#### 3.2. Research Design and Approach

This study employs a quantitative research design utilizing secondary data analysis to examine the relationships between production cost components, COGM, and inflation's moderating effects. The research adopts a positivist philosophical approach, emphasizing objective measurement and statistical analysis to test hypotheses and develop generalizable findings (Creswell, J. W., & Creswell, 2018). The research design incorporates both descriptive and explanatory elements. The descriptive component provides comprehensive statistical summaries of key variables, while the explanatory component examines causal relationships through regression analysis. This dual approach ensures both thorough data understanding and robust hypothesis testing (Hair et al., 2019).

#### 3.3. Population and Sample

The population comprises all manufacturing companies listed on the Indonesia Stock Exchange during 2021-2023. These companies are also highly exposed to changes in input costs and macroeconomic variables, including inflation, which makes them a relevant focus for cost structure analysis. Purposive sampling technique was applied based on predetermined criteria ensuring data completeness and relevance (Sekaran & Bougie, 2016). The sample was selected using the following criteria:

**Table 1. Sampling Criteria**

Description	Company Total
Population: manufacturing companies listed on the Indonesia Stock Exchange (IDX) in the years 2021- 2023.	616
Companies that did not publish financial statements on the IDX during the years 2021–2023	(22)
Sample total	594

### 3.4. Data Collection and Source

This research employs secondary data gathered via documentation techniques. Financial information encompassing raw material expenses, direct labor expenses, factory overhead expenses, and cost of goods manufactured (COGM) was sourced from the financial statements of manufacturing firms accessible through the Indonesia Stock Exchange's official website ([www.idx.co.id](http://www.idx.co.id)). Inflation statistics, utilized as a moderating factor, were retrieved from Bank Indonesia's official website ([www.bi.go.id](http://www.bi.go.id)).

### 3.5. Data Analysis Techniques

This research employs four stages of data analysis. First, descriptive statistics summarize the characteristics and distribution of the data. Second, classical assumption tests are conducted, including normality, multicollinearity, heteroscedasticity, and autocorrelation, to ensure model validity. Third, moderated regression analysis (MRA) is applied to test the effect of production cost components on COGM and the moderating role of inflation. Finally, hypothesis testing is done through partial tests (t-test), simultaneous tests (F-test), and coefficient of determination ( $R^2$ ) to evaluate the significance and explanatory power of the model.

### 3.6. Variable Measurement

**Table 2. Measurement of Variable**

Variable	Operational Definition	Indicator	Scale
Cost of Goods Manufactured (Y)	COGM is the total cost a company incurs to produce finished goods during a specific accounting period (Simamora et al., 2024)	$COGM = \text{Total Production Cost} + \text{Beginning WIP} - \text{Ending WIP}$	Nominal
Raw Material Costs (X1)	Material cost refers to the amount of raw materials used in the production process to produce finished goods (Ramadhan et al., 2022)	$RM = \text{Beginning Raw Materials} + \text{Raw Material Purchases} - \text{Ending Raw Materials Inventory}$	Nominal
Direct Labor Costs (X2)	Direct labor cost represents the compensation provided to employees who are directly involved in the process of producing finished products (Utami et al., 2020).	$DLC = \sum DLC$	Nominal
Factory Overhead Costs (X3)	Factory overhead consists of all indirect production costs excluding direct materials and direct labor. This includes expenses such as depreciation of machinery, utilities, factory rent, and maintenance costs (Utami et al., 2020).	$FOH = \sum FOH$	Nominal
Inflation (Z)	Inflation can be defined as a persistent upward movement in the prices of goods and services across an economy for a given duration (Simanungkalit, 2020).	$\text{inflation} = \frac{CPI_t - CPI(y-1)}{CPI(y-1)} \times 100\%$	Nominal

## 4. Results and Discussion

### 4.1. Research Results

#### 4.1.1. Descriptive Statistical Analysis

The descriptive statistics aim to highlight the distribution patterns of each variable by presenting key indicators such as the average (mean), middle value (median), standard deviation, as well as the lowest and highest recorded values. These measures help illustrate the variability and central tendencies in the dataset and provide a more thorough insight of the financial characteristics of the observed firms.

**Table 3. Descriptive Statistics Test Result**

Variable	N	Minimum	Maximum	Mean	Std Deviation
RM	594	201	3517	1386177,92	3426256,29
DLC	594	112	9149	153728,55	592438,69
FOC	594	103	2412	617930,84	2089154,88
COGM	594	1022	50117	2155601,65	5052029,59
INFLATION	594	0,019	0,055	0,03327	0,0156
Valid N (listwise)	594				

Source: Output SPSS 25

The descriptive statistical analysis shown data for each variable. RM range from 201 to 3517 average of 1386177,92 and standard deviation 3426256,29, while direct labor cost has a minimum 112, maximum 9149 average of 153728,55 and standard deviation 592438,69. The Factory Overhead Cost variable has a minimum 103, maximum 2412 average value of 617930,84 and standard deviation 2089154,88. The Cost of Goods Manufactured has a minimum 1022, maximum 50117, average 2155601,65 and standard deviation 5052029,59. the inflation has a minimum 0,019, maximum 0,055, average 0,033 and standard deviation 0,0156.

#### 4.1.2. Classical Assumption Test

##### a. Normality Test

The normality test aims to assess whether the residuals of the regression model are normally distributed, which is one of the key classical assumptions in linear regression analysis. In this study, the Skewness and Kurtosis approach is used to evaluate data normality. However, the results indicate that the data in this study are not normally distributed. Therefore, outlier detection and treatment are necessary to improve data distribution and meet the assumptions of classical linear regression.

**Table 4. Normality Test Using Skewness and Kurtosis**

Table 4: Normality Test Using Skewness and Kurtosis					
	N	Skewness		Kurtosis	
		statistic	Std error	statistic	Std error
Unstandardized Residual	469	0.074	0.113	-0.430	0.225
Valid N (listwise)	469				

Source: Output SPSS 25

The skewness and kurtosis values shown in Table 4 are 0.4593 and 1.8865, respectively both within range +1,96 and -1,96. Therefore, we can conclude that the data in this study follows a normal distribution.



b. Multicollinearity Test Result

The analysis demonstrates that all independent variables, namely raw material costs, direct labor costs, and factory overhead costs, have Tolerance levels greater than 0.10 with VIF values lower than 10, confirming that multicollinearity does not occur.

**Table 5. Multicollinearity Test**

Model	Collinearity Statistic	
	tolerance	VIF
1 (Constant)		
Raw Material Costs	0.416	2.405
Direct Labor Costs	0.264	3.791
Factory Overhead Costs	0.289	3.465
Inflation	0.998	1.002

Source: Output SPSS 25

c. Heteroscedasticity Test Result

The results show that all variables have significance values above 0.05, indicating the absence of heteroscedasticity. Thus, the regression model satisfies the classical assumption of homoscedasticity, ensuring the reliability of the regression estimates.

**Table 6. Heteroscedasticity Test**

Model	t	Sig
(Constant)	6.365	0.000
Raw Material Costs	-1.360	0.174
1 Direct Labor Costs	-1.940	0.053
Factory Overhead Costs	-0.415	0.679
Inflation	-0.344	0.731

Source: Output SPSS 25

d. Autocorrelation test

The autocorrelation test aims to determine whether there is a relationship between residuals in the regression model. In classical linear regression, residuals are assumed to be independent. Violation of this assumption may lead to biased and inefficient parameter estimates. This study uses the Durbin-Watson (DW) test, with a result of  $DW = 1.991$ , which lies between  $dU = 1.86007$  and  $4 - dU = 2.1399$  ( $1.86007 < 1.991 < 2.1399$ ). Thus, the regression model is free from autocorrelation, and the residuals are independently distributed.

**Table 7. Autocorrelation Test**

Model Summary			
Model	R	R Square	Durbin-Watson
1	0.997	0.993	1.991

Source: Output SPSS 25

e. Multiple Regression Analysis

**Table 8. Multiple Regression Analysis**

Coefficients			
Model	unstandardized	t	Sig
	B		
(Constant)	1.384	36.714	0.000
RM	0.599	127.970	0.000
DLC	0.069	9.957	0.000
FOC	0.301	49.233	0.000

Source: Output SPSS 25

Based on the results presented in table 8, the multiple linear regression equation used in this study is as follows:

$$\text{COGM} = 1.384 + 0.599 \text{ RM} + 0.069 \text{ DLC} + 0.301 \text{ FOC} + e$$

#### 4.1.3. Hypothesis Test Result

a. F Test

**Table 9. F Test Result**

	Model	Sum of squares	f	Mean square	f	sig
1	Regression	1619.024	3	539.675	27611.103	0,000
	Residual	9.089	465	0.020		
	Total	1628.113	468			

Source: Output SPSS 25

Based on the table 9 above, it can be seen that the F-statistic value is 27611.103, which is greater than the critical value of 3.01, and the significance level is 0.000. Therefore, it can be concluded that the variables Raw Material Costs (RM), Direct Labor Costs (DLC), and Factory Overhead Costs (FOC) have a simultaneous and significant effect on the dependent variable, Cost of Goods Manufactured (COGM).

b. T test

**Table 10. T Test Result**

	Model	Unstandardized Coefficients (B)	t	Sig
1	(Constant)	1.384	36.714	0.000
	RM	0,599	127.970	0.000
	DLC	0,069	9.957	0.000
	FOC	0.301	49.233	0.000

Source: Output SPSS 25

According to the data presented in Table 10, all independent variables demonstrate a positive and significant effect on the cost of goods manufactured (COGM). The t-statistic for raw material costs is 127.970 ( $t > 2.248$ ; Sig. = 0.000), indicating a positive and significant relationship with COGM, thus Hypothesis 1 is accepted. Likewise, direct labor costs show a t-value of 9.957 with a significance level of 0.000, supporting Hypothesis 2 that these costs also positively and significantly affect COGM. Furthermore, factory overhead costs yield a t-value of 49.233 (Sig. = 0.000), confirming that they too have a significant and positive impact on COGM. Therefore, all three hypotheses (H1, H2, and H3) are accepted.

c. Moderated Regression Analysis

**Table 11. Moderated Regression Analysis**

Model	Coefficients		
	unstandardized	t	Sig
	B		
(Constant)	3.352	17.045	.000
RM	.159	4.154	.000
DLC	.137	2.285	.023
FOC	.269	5.349	.000
INFLATION	-.004	-.230	.818
RM_INFLATION	.028	9.082	.000
DLC_INFLATION	-.009	-1.785	.075
FOC_INFLATION	-.002	-.373	.709

Source: Output SPSS 25

As outlined in table 11, the following results were obtained:

$$Y = 3.352 + 0.159RM + 0.137DLC + 0.269FOC + 0.028RM\_INFLATION - 0.009DLC\_INFLATION - 0.002FOC\_INFLATION + e$$

Based on the regression equation, it can be explained that:

- 1) Hypothesis 4 shows a t-statistic value of 9.082, which is greater than the t-table value of 2.248, and a significance level of  $0.000 < 0.05$ . It can therefore be concluded that inflation moderates the effect of raw material costs on the cost of goods manufactured (H4 is accepted).
- 2) Hypothesis 5 has a t-statistic value of -1.785, which is less than 2.248, and a significance level of  $0.075 > 0.05$ , indicating that inflation does not moderate the effect of direct labor costs on the cost of goods manufactured (H5 is rejected).
- 3) Hypothesis 6 has a t-statistic of -0.373, which is lower than 2.248, and a significance level of  $0.709 > 0.05$ , suggesting that inflation does not moderate the effect of factory overhead costs on the cost of goods manufactured (H6 is rejected).
- d. Determination Coefficient Test Results

**Table 11. Moderated Regression Analysis**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.997	0.993	0.993	0.13363

Source: Output SPSS 25

Referring to Table 11, the R Square coefficient is 0.993, or 99,3%. This indicates that the independent variables explain 99,3% of the variation in the dependent variable. The remaining 0,7% is influenced by other factors not examined in this study.

## 4.2. Discussion

### 4.2.1. The Effect of Raw Material Costs on Cost of Goods Manufactured

The research results indicate that raw material costs have a positive and significant effect on the cost of goods manufactured (COGM), with a t-value of 127.970 and a significance level of 0.000. This finding confirms Hypothesis 1 and underscores the central role of raw materials as a primary component of production costs. Logically, any increase in raw material costs will directly raise COGM because raw materials are the main inputs in the production process. In the manufacturing industry, raw material costs typically constitute the largest portion of total production costs, so even small changes in raw material prices can significantly impact COGM. Factors such as fluctuations in commodity prices, exchange rates, and procurement costs strengthen this relationship by directly influencing total raw material expenditures. This study is consistent with the findings of Dewi & Murti (2024) and Saputri (2023), who also found a positive and proportional relationship between raw material costs and COGM.

However, several other studies show variations in the strength of this effect depending on the sectoral context and source of raw materials. For example, Banamakani et al. (2023), (Rahmawati, 2019), found that companies highly dependent on imported raw materials are more vulnerable to cost increases caused by exchange rate volatility and changes in global commodity prices. These findings indicate that the impact of raw materials on COGM is not universal but is influenced by company characteristics and external market conditions. In the international context, related studies in developed countries, such as those by Firmansyah & Damanik (2024) highlight that risk management capacity and the use of advanced technology

can reduce the sensitivity of raw material costs to global price fluctuations, unlike companies in developing countries that may have such limitations. This sectoral vulnerability means that even small changes in global prices can have a significant impact on production cost increases. This view aligns with the findings of (Mulyana, 2018), and (Lubis D.S, 2018), (Arni, 2018), all of which confirm the positive influence of raw material costs on COGM. This influence occurs because an increase in raw material prices directly raises the production costs that companies must incur, thereby increasing the COGM. In this context, the greater the proportion of raw materials in the cost structure, the greater the impact of price changes on COGM.

#### 4.2.2. The Effect of Direct Labor Costs on Cost of Goods Manufactured

The results show that direct labor costs have a positive and significant effect on the cost of goods manufactured (COGM), with a t-value of 9.957 and a significance level of 0.000, thus confirming Hypothesis 2. This result is logical because direct labor plays an essential role in transforming raw materials into finished goods. Labor costs are allocated directly to each unit produced, making them a substantial component of total production expenses. In manufacturing operations, an increase in direct labor costs whether due to wage adjustments, overtime, or labor shortages will directly increase COGM. This relationship reflects the principle of Contingency Theory, which suggests that labor cost management strategies should be adapted to the company's situational context. For example, during periods of inflation or rising wage levels, companies must adjust staffing, optimize labor productivity, or implement automation to maintain production efficiency without compromising product quality.

These findings are consistent with previous studies by Dewi & Murti (2024) and Saputri (2023), who reported that increases in direct labor costs significantly elevate COGM, particularly in labor-intensive industries. Similarly, Banamakani et al (2023), Rahmawati (2019) highlighted that labor cost sensitivity varies across sectors, with industries that rely heavily on skilled labor being more vulnerable to cost increases. Further, Mulyana (2018) and Lubis D.S (2018). all confirm that direct labor costs have a positive and proportional impact on COGM. Overall, these findings highlight the importance for companies to develop effective labor cost management strategies. Such strategies may include improving labor productivity, adopting flexible labor arrangements, and integrating technology to maintain cost efficiency while sustaining production quality. This enhances companies' abilities to manage labor costs effectively, which is critical in controlling overall production expenses.

#### 4.2.3. The Effect of Factory Overhead Costs on Cost of Goods Manufactured

Factory overhead costs were also found to have a positive and significant effect on COGM, with a t-value of 49.233 and a significance of 0.000, thereby supporting Hypothesis 3. Factory overhead refers to indirect production expenses such as electricity, water, equipment maintenance, and depreciation. Although these costs are not directly traceable to individual units, they are essential to maintaining production operations and must be allocated proportionally to ensure accurate cost calculations. According to Contingency Theory, the management of overhead costs must be aligned with both internal conditions such as production scale, process complexity, and technology adoption and external factors, including energy price volatility, regulatory changes, and market demand fluctuations.

This finding is consistent with (Dewi & Murti, 2024), who found that controlling energy and utility costs improved production efficiency in Indonesian manufacturing firms. Similarly, (Banamakani et al., 2023) demonstrated that overhead optimization in Iranian factories reduced unit production costs and improved competitiveness. Rahmawati (2019) emphasized that preventive maintenance reduced unexpected breakdown costs, while Lubis D.S (2018)

highlighted that efficient allocation of depreciation and repair expenses strengthened pricing accuracy. Arni (2018) and Anggorowati (2019) also reported that effective overhead cost control improved profitability, and Ati (2015) confirmed that aligning overhead management with environmental conditions enhanced cost efficiency and decision-making quality.

#### 4.2.4. The Moderating Role of Inflation in the Relationship Between Raw Material Costs and COGM

Inflation was found to moderate the relationship between raw material costs and COGM, as shown by a t-value of 9.082 and a significance of  $0.000 < 0.05$ , thus confirming Hypothesis 4. The effect of raw material costs on COGM is stronger during inflationary periods, as input prices rise significantly. Mechanistically, raw material prices are highly sensitive to inflation because they follow market dynamics and global commodity prices, often exacerbated by currency depreciation. This sensitivity occurs because raw material procurement generally involves frequent purchases whose prices adjust in real time to inflationary pressures, leaving little room for long-term price locking. In addition, many raw materials are imported or rely on imported components, making their prices directly affected by exchange rate fluctuations during inflation. Given that raw materials often constitute the largest proportion of manufacturing costs, even minor price changes during inflation can cause a disproportionate increase in total COGM. From the perspective of contingency theory, this finding suggests that cost management systems must remain flexible and responsive to environmental volatility in order to mitigate excessive cost escalation. While this study aligns with Saputri (2023), who observed that inflation amplifies raw material costs by raising purchase prices and limiting supplier credit terms, our results diverge from some findings in advanced economies. For instance, Mitra & Mishra (2025) reported that in the euro area, only about 40% of consumption deflator changes were driven by import prices, with a larger share explained by domestic profits and wages. This suggests that competitive markets and mature hedging instruments in developed economies can dampen the moderating role of inflation.

#### 4.2.5. The Moderating Role of Inflation in the Relationship Between Direct Labor Costs and COGM

Inflation does not moderate the relationship between direct labor costs and Cost of Goods Manufactured (COGM), as indicated by a t-value of -1.785 and a significance level of 0.075 (Hypothesis 5 rejected). This suggests that inflation changes do not significantly alter the impact of direct labor costs on COGM. This is largely because labor costs tend to be rigid in the short term, regulated by employment contracts, collective labor agreements, or company policies, with adjustments typically made annually in line with minimum wage regulations, rather than responding monthly to inflation fluctuations. According to Contingency Theory, the effectiveness of a variable depends on its fit with the environmental context. In this case, labor cost structures are governed more by internal, long-term policies than by rapidly changing external factors like inflation, resulting in insufficient fit for inflation to significantly moderate the relationship. Wage rigidity means inflation cannot directly alter the link between direct labor costs and COGM, keeping this relationship stable despite inflation fluctuations. This finding aligns with Mitra & Mishra (2025), who argue that in developing countries, rigid labor markets and strict labor regulations reduce wage sensitivity to inflation. In contrast, developed countries with more flexible labor markets and responsive wage mechanisms exhibit higher labor cost sensitivity to inflation.

Conversely, Saputri (2023) found that inflation does moderate the effect of direct labor costs on production costs in the cosmetics sector, possibly due to sector-specific labor market dynamics, differing industry contexts, and study periods. The cosmetics industry may have



more flexible wage-setting mechanisms that amplify inflation's moderating effect, unlike the more rigid structures in general manufacturing studied here. Other influential factors such as minimum wage policies, technological efficiencies, and labor market structures also shape labor cost management, potentially overshadowing inflation's role. These insights highlight the complex and context-dependent nature of inflation's impact on labor costs, supporting Contingency Theory's view that management accounting must adapt to specific environmental and organizational factors.

#### 4.2.6. The Moderating Role of Inflation in the Relationship Between Factory Overhead Costs and COGM

Inflation does not moderate the relationship between factory overhead costs and COGM, as shown by a t-value of  $-0.373$  with a significance level of  $0.709$  (Hypothesis 6 rejected). This indicates that changes in inflation do not significantly alter the influence of factory overhead costs on COGM. These findings indicate that changes in inflation do not significantly alter the impact of overhead costs on COGM. These findings are consistent with local studies that state that overhead components such as depreciation, long-term rents, and insurance premiums are fixed or semi-variable in nature and governed by long-term contracts, thus making them less responsive to short-term inflation changes (Mutiara et al., 2025).

One possible reason is that a substantial portion of overhead costs such as depreciation, long-term equipment leases, insurance premiums, and certain utilities are fixed or semi-variable in nature and are generally governed by long-term contracts or predetermined payment schedules. These cost structures are not designed to fluctuate in direct response to short-term or monthly inflation changes. From the perspective of Contingency Theory, the absence of a moderating effect reflects a mismatch between the variable's characteristics and the external factor in question. Since factory overhead costs are largely insulated from immediate market price volatility, inflation does not create a meaningful variation in their relationship with COGM. As a result, the relationship remains stable across different inflation levels, underscoring the importance of aligning cost management strategies with the inherent stability of each cost component.

## 5. Conclusion

This study confirms that raw material costs, direct labor costs, and factory overhead costs significantly and positively impact the Cost of Goods Manufactured (COGM) in Indonesian manufacturing firms. Inflation was found to moderate only the relationship between raw material costs and COGM, intensifying cost pressure during inflationary periods, while showing no moderating effect on labor and overhead costs. These findings support Contingency Theory, which posits that cost management should be contingent on specific external conditions, such as inflation, affecting each cost component differently.

Practically, effective cost management requires an adaptive approach prioritizing dynamic raw material procurement strategies to mitigate inflation risks, while labor and overhead costs may be managed more steadily due to their relative insulation from short-term inflation volatility. Limitations include focus on only three cost components within Indonesian manufacturing, future research should broaden the variables, consider other environmental factors, and explore cross-country comparisons to enhance generalizability of contingency-based management accounting frameworks.

## 6. References

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