International Journal of Economics, Business and Management Research

Vol. 10, No.09; 2026

ISSN: 2456-7760

Effect of Operating Expense Intensity (OEI) and Raw Material Cost on Company Profit With Firm Size as a Moderating Variable (an Empirical Study on Food and Beverage Companies Listed on the Indonesia Stock Exchange)

Rena Nur Fauziah[1], Siti Istikhoroh[2], Taudlikhul Afkar[3]
[1,2,3]Master of Management, Faculty of Economics and Business,
Universitas PGRI Adi Buana Surabaya, Surabaya, Indonesia
Corresponding author: Rena Nur Fauziah,

doi.org/10.51505/IJEBMR.2026.10916 URL: https://doi.org/10.51505/IJEBMR.2026.10916

Received: Aug 29, 2026 Accepted: Sep 09, 2026 Online Published: Sep 15, 2026

Abstract

This study examines the effect of operating expense intensity (OEI) and raw material cost on profitability, and the moderating role of firm size, in food and beverage companies listed on the Indonesia Stock Exchange during 2020 to 2025. Using a quantitative approach with secondary data and purposive sampling, 18 firms with 108 firm-year observations were analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) with a two-stage moderation approach and 5,000 bootstrap subsamples. The results show that operating expense intensity and raw material cost significantly and negatively affect profitability, with raw material cost as the strongest predictor, explaining 39.6 percent of the profitability variance. Firm size does not weaken these effects; the interaction coefficients are significant but strengthen rather than weaken cost pressure, so the moderation hypotheses are rejected and firm size acts as a quasi moderator. The findings imply that cost-structure efficiency, particularly of raw materials, is decisive for profitability, and that scale alone does not protect earnings from cost pressure in a raw-material-intensive industry.

Keywords: Operating expense intensity, Raw material cost, Profitability, Firm size, PLS-SEM

Introduction

Profitability is a primary indicator of successful business management because it reflects a firm's ability to generate earnings from the resources it controls. High profitability signals managerial success in managing resources and provides a positive signal to stakeholders regarding business sustainability (Ali, 2024). In food and beverage firms, profitability faces high cost pressure, both from operating expenses and raw material costs, so the effectiveness of cost management becomes an important determinant of profitability.

Vol. 10, No.09; 2026

ISSN: 2456-7760

Operating expense intensity (OEI) captures the intensity of operating expenses, namely selling expenses as well as general and administrative expenses, relative to sales, and it also reflects managerial efficiency. The larger the proportion of operating expenses to revenue, the greater the pressure on maintaining profitability, because each unit of sales leaves a smaller portion to form earnings. Raw material cost, meanwhile, is the main component of the cost of goods manufactured and directly affects the profit margin. The food and beverage industry is highly dependent on raw materials, both domestic commodities and imports, whose prices fluctuate with the season, international prices, and the exchange rate, so that most of these prices lie beyond management's control (Pertiwi, 2025).

Profitability performance across issuers in this subsector varies: some firms maintain a high return on assets, while others experience margin erosion due to rising raw material prices and operating expenses. Such diversity indicates that the determinants of profitability stem not only from external market factors, but from the firm's internal capability to control its cost structure. Differences in capacity, resources, and market power across firms further suggest that the effect of cost structure on profitability is not always the same for every firm. Therefore, this study positions firm size, proxied by the natural logarithm of total assets, as a moderating variable. According to economies of scale theory, larger firms are presumed to be better able to absorb cost increases through scale efficiency and bargaining power over suppliers (Samuelson, 2021), although the empirical evidence remains mixed (Ahmed, 2023).

Prior research on the relationship between costs and financial performance is still inconsistent. Some studies find a significant effect of cost on earnings (Ali, 2024), while others do not (Tarigan, 2022). This inconsistency opens room to re-examine the effect of operating expense intensity and raw material cost on profitability while considering the role of firm size. The novelty of this study lies in the use of cost-structure ratios that neutralize the influence of scale as predictors of profitability, with firm size as a moderating variable, tested using PLS-SEM in the food and beverage context for the 2020 to 2025 period.

The objective of this study is to analyze the effect of operating expense intensity and raw material cost on profitability and the moderating role of firm size. Theoretically, the study enriches the literature on management accounting and financial management; practically, its results provide a basis for management in formulating cost-control strategies and for investors in assessing the quality of a firm's cost management.

Literature Review

Resource-Based View

The resource-based view sees the firm as a bundle of resources and capabilities that are the principal determinants of competitive advantage and performance (Barney, 1991; Barney et al., 2021). Resources generate a sustained advantage when they are valuable, rare, difficult to imitate, and non-substitutable. The ability to manage costs efficiently is a strategic organizational capability because it is built from cost-control routines, production experience, and long-term

Vol. 10, No.09; 2026

ISSN: 2456-7760

relationships with suppliers, making it difficult for competitors to imitate. A firm that produces the same output while consuming fewer resources holds a superior cost position, reflected in higher profitability. This view underlies the mechanism through which cost structure affects profitability: the larger the proportion of sales absorbed to finance operating expenses and raw materials without a matching increase in productivity, the lower the firm's ability to generate earnings. More recent restatements of the theory situate resources within a value-creation framework, emphasising that advantage stems from a firm's ability to create and appropriate value rather than from resource possession alone (Barney et al., 2021).

Economies of Scale and Contingency Theory

Economies of scale describe the condition in which average cost per unit declines as production volume increases (Samuelson, 2021), stemming from labor specialization, the spreading of fixed costs, bargaining power in procurement, and access to cheaper technology and financing. However, a firm that is too large may experience diseconomies of scale due to coordination complexity and bureaucracy, so the direction of firm size's effect is an empirical question. Contingency theory holds that there is no universally applicable management practice; its effectiveness depends on fit with contextual factors such as organizational size (Otley, 1980, 2016). Organizational size is thus a contingency variable that conditions the strength of the relationship between cost intensity and profitability.

Profitability, Operating Expense Intensity, Raw Material Cost, and Firm Size

Profitability is measured by return on assets (net income after tax divided by total assets), which reflects the efficiency of using all resources without being affected by the financing structure. Operating expense intensity is the ratio of operating expenses to net sales; a high ratio indicates inefficiency that erodes operating profit. Raw material cost is the intensity of raw material usage relative to net sales; in the food and beverage industry, the capability to manage raw materials through inventory management, supplier contracts, and material substitution is an important determinant of performance. Firm size, proxied by the natural logarithm of total assets, describes operating capacity and resources.

Prior Studies

Operating and production costs affect the net income of food and beverage firms (Ali, 2024; Noor, 2025), whereas some studies do not find a significant effect of raw material cost on profitability (Tarigan, 2022). Regarding moderation, firm size has been found to moderate the finance and profitability relationship (Ahmed, 2023), although evidence is mixed. This diversity confirms the need to re-test using cost-intensity measures and firm-size moderation in the Indonesian food and beverage context.

Hypothesis Development

Higher operating-expense intensity signals a weak capability to manage support activities and leaves a smaller portion of sales to form earnings (Barney, 1991; Ali, 2024). Raw material cost,

Vol. 10, No.09; 2026

ISSN: 2456-7760

as the main component of production cost, lowers the margin when its intensity is high (Pertiwi, 2025; Noor, 2025). Large firms may spread semi-fixed operating expenses over larger volumes and hold stronger bargaining power over suppliers, and are therefore presumed to dampen cost pressure (Ahmed, 2023). Accordingly:

H1: Operating expense intensity has a negative effect on profitability.
H2: Raw material cost has a negative effect on profitability.
H3: Firm size weakens the negative effect of operating expense intensity on profitability.
H4: Firm size weakens the negative effect of raw material cost on profitability.

Methodology

This study uses a causal-associative quantitative approach with secondary data in the form of audited annual financial statements of food and beverage subsector firms listed on the Indonesia Stock Exchange for the 2020 to 2025 period. The population is all food and beverage subsector firms according to the Indonesia Stock Exchange industry classification. The sample was selected by purposive sampling with the criteria of being listed throughout the period, publishing complete audited financial statements, disclosing the details of operating expenses and raw material usage, and earning a profit in each year from 2020 to 2025. This yielded 18 firms and 108 firm-year observations. Cost variables use intensity measures (ratios to net sales) to neutralize the influence of scale. Raw material cost is measured as the ratio of raw material usage, taken from the notes to the financial statements, to net sales; for one issuer whose notes do not separate raw material usage, the value is proxied by raw material purchases, which is acknowledged as a measurement limitation. Because the sample is restricted to firms that consistently earned a profit throughout the period, the design involves selection on the dependent variable; this criterion keeps profitability within a positive range, and the resulting selection bias is acknowledged and revisited in the conclusion.

Data Analysis

The analysis uses Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 (Ghozali, 2021), which suits predictive models with a relatively small sample and does not require a normality assumption. Each construct is measured with a single indicator, so the outer loading equals 1.000 and validity and reliability tests are not relevant. The structural model is evaluated through collinearity (variance inflation factor below 5), the coefficient of determination (R-squared), effect size (f-squared) with thresholds of 0.02, 0.15, and 0.35 (Cohen, 1988), and predictive relevance (Q-squared). Moderation is tested using the two-stage approach, and the hypotheses are tested through bootstrapping with 5,000 subsamples using a one-tailed test ($t > 1.645$; $p < 0.05$). PLS-SEM was preferred over covariance-based SEM because it is a variance-based, prediction-oriented technique appropriate for relatively small samples, does not require multivariate normality, and can accommodate single-indicator constructs and the simultaneous estimation of moderation (Hair et al., 2022; Dash & Paul, 2021; Becker et al., 2023). The 108 firm-year observations are treated as a pooled dataset; the panel structure of the

Vol. 10, No.09; 2026

ISSN: 2456-7760

data is not modeled explicitly and is noted as a limitation, so the results are interpreted as associations rather than dynamic panel effects.

Results & Discussions

Descriptive Statistics

The objects are 18 food and beverage firms that consistently earned a profit throughout 2020 to 2025, yielding 108 firm-year observations. Descriptive statistics are presented in Table 1.

Table 1: Descriptive Statistics of Variables

Variable	N	Minimum	Maximum	Mean	Std. Dev.
Profitability / ROA (Y)	108	0.001	0.342	0.106	0.067
Operating Expense Intensity (X1)	108	0.000	0.498	0.195	0.127
Raw Material Cost (X2)	108	0.134	0.955	0.477	0.209
Firm Size / Ln Assets (Z)	108	27.238	33.015	29.277	1.578

Source: Authors, 2026

The mean return on assets of 0.106 indicates that sample firms generate net income of about 10.6 percent of total assets. The mean raw material cost (0.477) far exceeds the mean operating expense intensity (0.195), confirming the dominance of raw material cost in the industry's cost structure. Firm size ranges from 27.238 to 33.015 with a mean of 29.277, reflecting a wide variation in scale.

Structural Model Evaluation

Because each construct has a single indicator, the outer loading equals 1.000 and evaluation focuses on the structural model. The collinearity test (Table 2) shows that operating expense intensity and some interaction terms have variance inflation factor values slightly above 5, which is common in moderation models and is noted as a limitation.

Table 2: Inner Model Variance Inflation Factor Values

Path / Predictor	VIF	Note
Operating Expense Intensity (X1)	5.094	> 5
Raw Material Cost (X2)	4.896	< 5
Firm Size (Z)	1.591	< 5
Firm Size x OEI	4.938	< 5
Firm Size x Raw Material Cost	4.763	< 5

Source: Authors, 2026

The coefficient of determination of profitability is 0.396 (adjusted 0.366), which is moderate and means the model explains 39.6 percent of the variation in profitability. The effect size shows that raw material cost contributes the most (0.445), followed by operating expense intensity (0.205)

and firm size (0.081). The predictive relevance value of 0.333 (> 0) indicates good predictive relevance. The structural model is shown in Figure 1.

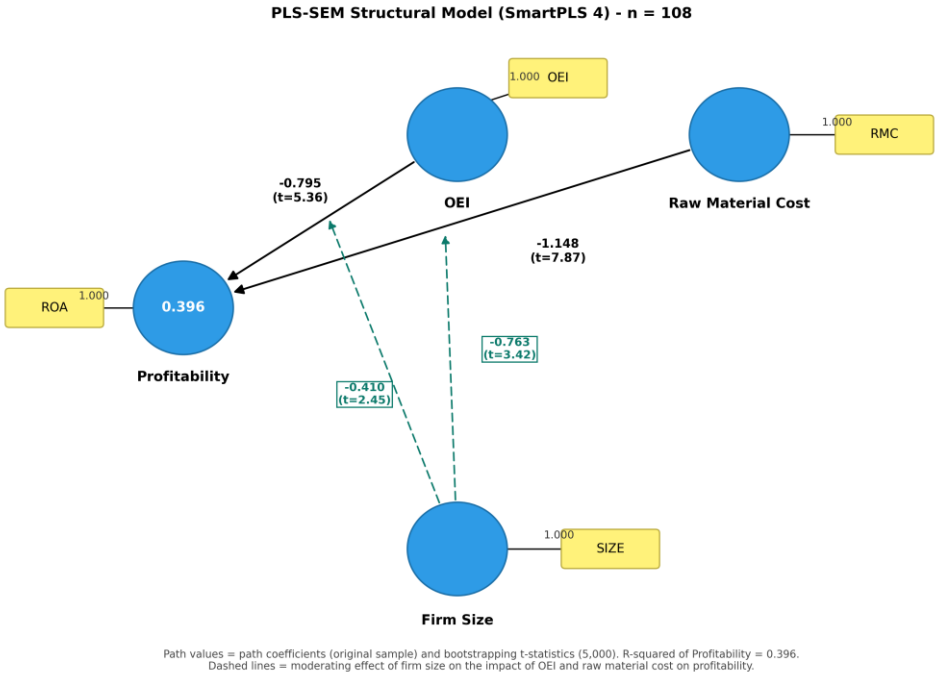

Figure 1: PLS-SEM Structural Model; Source: SmartPLS 4 output (processed data, 2026)

The hypothesis testing results through bootstrapping with 5,000 subsamples are presented in Table 3, with the direct effect of firm size included as a control path.

Table 3: Hypothesis Testing Results (Bootstrapping)

Hyp.	Path	Coef.	t-stat	p / Decision
H1	OEI -> Profitability	-0.795	5.35	0.000 Accepted
H2	Raw Material Cost -> Profitability	-1.148	7.87	0.000 Accepted
-	Firm Size -> Profitability	-0.279	2.72	0.003 Significant
H3	Firm Size x OEI -> Profitability	-0.410	2.44	0.007 Rejected
H4	Firm Size x RMC -> Profitability	-0.763	3.42	0.000 Rejected

Source: Authors, 2026; one-tailed test, t > 1.645

Vol. 10, No.09; 2026

ISSN: 2456-7760

Discussion

Operating expense intensity has a significant negative effect on profitability (coefficient -0.795; t 5.35; p 0.000), so H1 is accepted. High intensity of selling and administrative expenses depresses the profit margin, confirming that the capability to control operating expenses is a strategic resource (Barney, 1991), consistent with Ali (2024) and Noor (2025).

Raw material cost has a significant negative effect and is the strongest effect in the model (coefficient -1.148; t 7.87; p 0.000; largest f-squared 0.445), so H2 is accepted. As the main component of the cost of goods manufactured in food and beverage firms, high raw material cost intensity lowers the margin, especially because food commodity prices are volatile and largely beyond management's control. This supports Noor (2025) but differs from Tarigan (2022); the difference likely stems from the use of an intensity measure, which is more sensitive than absolute cost values.

Both interaction coefficients are significant but negatively directed, strengthening rather than weakening cost pressure, so H3 and H4 are rejected and firm size acts as a quasi moderator. This contradicts the economies of scale presumption that large firms dampen cost pressure. Larger firm size instead strengthens cost pressure, likely because a much larger purchasing and operating volume gives cost intensity a larger absolute impact, and because coordination complexity reflects diseconomies of scale. Because both the interaction coefficients and the direct effect of firm size are significant, firm size is a quasi moderator, acting simultaneously as predictor and moderator. This aligns with contingency theory (Otley, 1980, 2016): the role of firm size is contextual, and cost-structure efficiency, not scale alone, is the key to profitability. This unexpected direction is interpreted with caution: rather than dampening cost pressure, firm size amplifies it, consistent with diseconomies of scale and with contingency theory, which treats the role of firm size as context-dependent. Because the interaction terms share variance with the cost predictors, the significant negative interactions are read as evidence that scale conditions, but does not neutralize, the effect of cost intensity on profitability, and the classification of firm size as a quasi moderator follows from the joint significance of its direct and interaction effects.

Conclusions

This study examined the effect of operating expense intensity and raw material cost on profitability and the moderating role of firm size in 18 food and beverage firms listed on the Indonesia Stock Exchange for the 2020 to 2025 period (108 observations) using PLS-SEM. Operating expense intensity and raw material cost have a significant negative effect on profitability, with raw material cost as the strongest effect, so H1 and H2 are accepted. Firm size does not weaken these effects; the interaction coefficients are significant but strengthen them, so H3 and H4 are rejected and firm size acts as a quasi moderator.

Theoretically, the finding reinforces the resource-based view that cost-control capability is a primary determinant of profitability, but corrects the economies of scale presumption because firm size strengthens cost pressure, supporting contingency theory. Practically, food and beverage firms should prioritize cost-control efficiency, especially of raw materials, through

Vol. 10, No.09; 2026

ISSN: 2456-7760

long-term supply contracts, supplier diversification, and control of production yield, because a large firm size does not automatically protect profitability. The study is limited by collinearity in the moderation model, one issuer with a purchase-based raw material cost proxy, and sample selection on profitable firms. Future research may include loss-making firms, apply mean-centering, extend the period or sectors, and add variables such as leverage, sales growth, or inventory efficiency. In particular, restricting the sample to consistently profitable firms introduces selection on the dependent variable, so the findings should be read as applying to profitable food and beverage firms rather than to the subsector as a whole; future research incorporating loss-making firms and an explicit panel specification would test the robustness of these results.

Conflict of Interest

The authors declare no conflict of interest with respect to the research, authorship, or publication of this article.

References

Ahmed, A. M., Sharif, N. A., Ali, M. N., & Hagen, I. (2023). Effect of firm size on the association between capital structure and profitability. Sustainability, 15(14), 11196. https://doi.org/10.3390/su151411196

Ali, H. R. C., Mahsina, & Fauziah, D. A. (2024). Biaya produksi, biaya operasional, volume penjualan dan laba bersih perusahaan makanan dan minuman terdaftar di BEI. Equity, 4(2), 57-68.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120.

Becker, J.-M., Cheah, J.-H., Gholamzade, R., Ringle, C. M., & Sarstedt, M. (2023). PLS-SEM's most wanted guidance. International Journal of Contemporary Hospitality Management, 35(1), 321-346. https://doi.org/10.1108/IJCHM-04-2022-0474

Barney, J. B., Ketchen, D. J., & Wright, M. (2021). Resource-based theory and the value creation framework. Journal of Management, 47(7), 1936-1955. https://doi.org/10.1177/01492063211021655

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Lawrence Erlbaum Associates.

Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. Technological Forecasting and Social Change, 173, 121092. https://doi.org/10.1016/j.techfore.2021.121092

Ghozali, I. (2021). Partial least squares: Konsep, teknik dan aplikasi menggunakan program SmartPLS. Badan Penerbit Universitas Diponegoro.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). Sage Publications.

Noor, S. R. (2025). Pengaruh biaya bahan baku, biaya tenaga kerja dan biaya overhead pabrik terhadap laba bersih pada perusahaan sektor manufaktur. Jurnal Akuntansi, 21(1).

Vol. 10, No.09; 2026

ISSN: 2456-7760

Otley, D. T. (1980). The contingency theory of management accounting: Achievement and prognosis. Accounting, Organizations and Society, 5(4), 413-428.

Otley, D. (2016). The contingency theory of management accounting and control: 1980-2014. Management Accounting Research, 31, 45-62.

Pertiwi, R. D., Samanto, H., & Dewi, M. W. (2025). Pengaruh biaya tenaga kerja, biaya pemasaran dan volume penjualan terhadap laba bersih pada perusahaan manufaktur sub sektor makanan dan minuman yang terdaftar di BEI tahun 2020-2024. JIMAT, 2(4), 102-110.

Samuelson, P. A., & Nordhaus, W. D. (2021). Economics (20th ed.). McGraw-Hill Education.

Tarigan, S. N., & Siagian. (2022). Pengaruh biaya bahan baku, tenaga kerja langsung dan overhead pabrik terhadap profitabilitas pada sektor industri barang konsumsi yang terdaftar di BEI periode 2016-2021. JEMMA, 5(2).