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The Effect of Product Innovation and Sales Growth on Profitability in Technology Subsectors Listed on the Indonesia Stock Exchange, 2019-2023

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Abstract: Indonesia's digital economy is propelled by the technology industry, which demands ongoing innovation and adjustments to stay ahead. Within this intense competitive environment, profitability serves as the primary indicator of effective business strategies, highlighting the importance of examining key internal factors that influence profits for decision-makers. The objective of this investigation was to evaluate how product innovation and sales expansion affect profitability in 30 firms from the technology sub-sector traded on the Indonesia Stock Exchange over the period from 2019 to 2023. Employing a quantitative associative approach with secondary financial information, the study utilised multiple linear regression analysis on panel data spanning five years, combining cross-sectional and time-series elements. Results reveal that product innovation exerts a positive and meaningful influence on profitability, while sales growth demonstrates a positive yet statistically insignificant individual impact. Nevertheless, simultaneously these factors have a substantial joint effect on profitability, accounting for 48.2% of the variability. This work underscores the critical importance of innovative practices and strategies for market growth in improving the fiscal outcomes of technology companies in Indonesia. The outcomes are anticipated to guide leaders in enhancing R&D expenditures and fostering enduring sales development.

Keywords: Product Innovation, Sales Growth, Profitability.

INTRODUCTION

The rapid acceleration of digital technology has reshaped business models at both global and national levels (Gupta & Sinha, 2021). Advances in artificial intelligence, cloud computing, and big data analytics have transformed how firms manage operations, interact with consumers, and create additional value through product differentiation (Babina et al., 2024). As a result, technology-driven industries have become one of the central engines of global economic development (Xu et al., 2023). Leading international corporations continually introduce new technological breakthroughs to strengthen their competitive positioning (Wang & Zhang, 2021). A similar pattern is evident in Southeast Asia, where rapid digitalisation fuels the expansion of the technology sector. Indonesia, in particular, has emerged as one of the

region's largest digital economic hubs, supported by increasing technology adoption and the vibrant growth of digital-based industries (Lee & Kim, 2024).

Data from the Indonesia Stock Exchange (BEI) show a substantial rise in the market capitalization of the technology subsector between 2019 and 2023, driven primarily by accelerated digital transformation after the COVID-19 pandemic and the public listing of several technology-oriented startups through Initial Public Offerings. However, Financial Services Authority (OJK) reports in 2024 reveal that profitability among technology firms remains unstable due to the high costs of digital expansion and capital market volatility. Several case-based observations also indicate that many technology companies face difficulties in balancing aggressive market expansion with the need to maintain long-term financial stability (Siagian & Siagian, 2025). Most technology firms continue to struggle to uphold operational efficiency and fully monetise their innovations amid increasingly intense industry competition (Panda & Nanda, 2023).

Profitability plays a pivotal role in evaluating how effectively management allocates corporate resources and ensures business sustainability (Rahmawati & Sari, 2023). Firms with strong profitability tend to utilise assets more efficiently, maintain tighter cost control, and deliver superior returns to shareholders (Chen et al., 2025). In contrast, declining profitability often signals weaknesses in management strategies. Within capital markets, profitability functions as a key determinant influencing investor confidence and shaping perceptions of overall firm performance (Zhao & Wang, 2023). The Return on Assets (ROA) ratio, in particular, is widely used to measure a company's ability to generate net income from the total assets it manages, thereby reflecting managerial effectiveness in optimizing resource allocation (Singh et al., 2024; Tarihoran & Endri, 2021).

Given the strategic significance of profitability, identifying factors that drive profit generation has become increasingly important, especially in highly dynamic technology-based industries. In this environment, sustained profitability cannot rely solely on cost efficiency; rather, firms must continually create and deliver new value to maintain competitive differentiation. Product innovation, therefore emerges as a critical determinant of profitability enhancement. Firms that innovate effectively can secure higher profit margins through product differentiation and by attracting new market segments willing to pay premium prices for superior features (Cao & Li, 2025). Innovation in the technology sector includes not only the development of entirely new products but also improvements in features, production processes, and integration systems aligned with user needs.

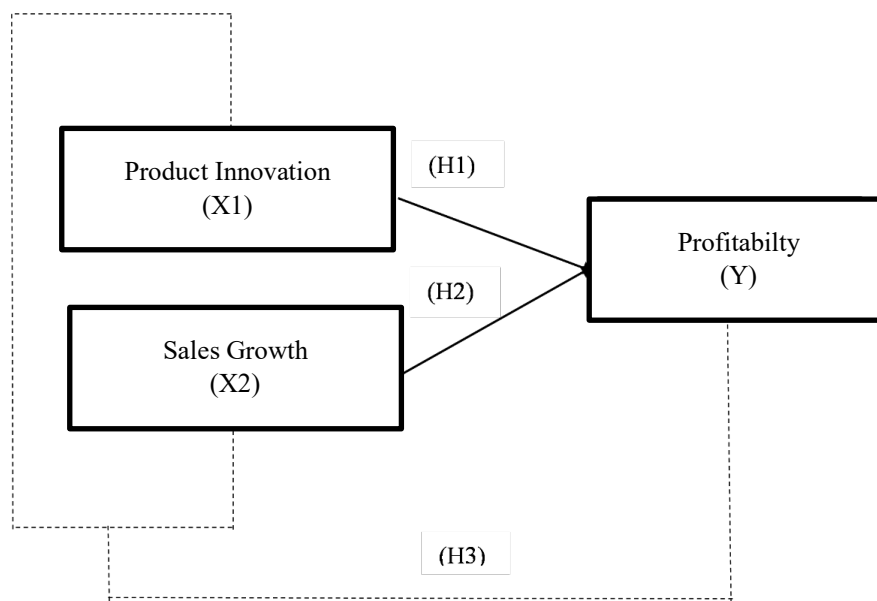
Research and Development (R&D) activities are widely recognized as one of the primary indicators of product innovation and a foundation for building sustainable competitive advantages (Wibawaningsih & Surbakti, 2025). Babina et al. (2024) found that firms with high R&D intensity generally achieve stronger financial performance due to superior adaptability to technological shifts. However, Siagian and Siagian (2025) argue that excessive R&D expenditures can reduce short-term profitability if the innovations produced are not adequately commercialised. Product innovation itself refers to the firm's ability to create or improve products using new technologies, features, or functions to provide higher value and reinforce market competitiveness (Poroshyn et al., 2024). R&D intensity is commonly measured by the ratio of R&D expenses to net sales, reflecting the extent to which firms commit resources to innovation-driven activities (Rađenović et al., 2023; Zhou & Gao, 2024).

Empirical evidence also shows that product innovation is closely linked to profitability through the mechanism of sales growth. Innovative products that offer unique value propositions typically stimulate market demand, which subsequently drives increases in sales volume. Sales growth serves as a key indicator of a firm's success in expanding its market reach and strengthening its competitive position (Sharma & Jain, 2023; Grasela Allo et al., 2025). From the perspective of firm growth theory, rising sales volumes allow companies to

achieve economies of scale, reduce per-unit costs, and ultimately enhance profitability (Amrita & Wahyuni, 2025; Jiang & Tang, 2022). However, rapid sales growth does not always translate into higher profits. In the short term, aggressive market expansion can increase promotional costs, elevate working capital requirements, and heighten credit risk, all of which may compress profit margins (Purba & Wulandari, 2025; Hsieh & Lin, 2022). Therefore, the relationship between sales growth and profitability is complex and requires effective managerial control to prevent cost escalation from outweighing the benefits of expanded revenue.

Prior research also reports inconsistent findings concerning the effects of product innovation and sales growth on profitability. Studies by Wibawaningsih and Surbakti (2025) and Pranata and Sutrisno (2024) found that R&D intensity positively contributes to profitability. In contrast, Feronika and Kurniawati (2022) reported that high R&D expenditure may reduce profitability when firms fail to commercialize their innovations effectively. These inconsistencies indicate that innovation-driven sales growth does not always result in higher profits, especially when firms are unable to manage operational costs or convert increased sales into net income.

Such divergent findings highlight the presence of a research gap that requires deeper investigation. The technology subsector listed on the Indonesia Stock Exchange (BEI) offers a particularly relevant context due to its rapid growth, high competition, and relatively volatile financial performance. A comprehensive empirical examination is therefore needed to better understand the interplay between product innovation, sales growth, and profitability in this industry especially considering that managerial efficiency may play a crucial moderating role in translating innovation and sales expansion into sustained financial gains.



Source: (Wibawaningsih and Surbakti, 2025; Tarihoran and Endri, 2021)

Figure 1. Research Framework

This study examines the effect of two independent variables Product Innovation, measured through R&D intensity, and Sales Growth on Profitability, measured using Return on Assets (ROA). Conceptually, Product Innovation (X_1) is expected to positively influence Profitability (Y) because effective R&D activities that result in competitive and value-added products can strengthen a firm’s market position and improve its profit margins. Likewise, Sales Growth (X_2) is hypothesized to have a positive effect on Profitability (Y), as increasing

sales volumes signal strong market acceptance and allow firms to benefit from economies of scale, which in turn can enhance overall financial performance.

Hypotheses:

H₁: Product innovation affects profitability

H₂: Sales growth affects profitability

H₃: Product innovation and sales growth affect profitability.

METHOD

This study employs an associative quantitative approach aimed at identifying the presence and magnitude of the influence exerted by two independent variables, Product Innovation (X_1) and Sales Growth (X_2) on the dependent variable, Profitability (Y). A descriptive quantitative design was adopted, in which all collected data were processed and statistically analyzed to validate the hypotheses formulated earlier. The research utilizes panel data, combining time-series observations over five years (2019–2023) with cross-sectional data drawn from companies within the technology sector listed on the Indonesia Stock Exchange (BEI). Panel data were chosen because they allow the analysis to generate more comprehensive and reliable estimates by observing firm performance across time, comparing variations between firms, and controlling for unobservable individual characteristics.

The population in this study consists of all issuers categorised under the technology sector based on the IDX Industrial Classification (IDX-IC) for 2025, totalling 47 companies. The sample was determined using purposive sampling to ensure that the selected firms met the specific criteria required for the study. The criteria include technology-sector companies that were continuously listed on the BEI from 2019 to 2023 and consistently published complete annual financial statements throughout the observation period, as well as companies that disclosed data related to Research and Development (R&D) expenditures, net sales, and net profit. After screening based on these requirements, 30 companies qualified as the final sample. Because the observation period covers five consecutive years, the total panel data analyzed in this study amount to 150 observations (30 companies \times 5 years).

The variables used in this research include Profitability (Y) as the dependent variable, measured using Return on Assets (ROA), calculated as net profit after tax divided by total assets. Product Innovation (X_1) serves as the first independent variable and is measured through R&D intensity, which is expressed as the ratio of R&D expenditures to net sales. Sales Growth (X_2) is the second independent variable and is calculated using the percentage increase in net sales from the previous year. The analytical model applied is a multiple linear regression model with the following equation: $ROA_{it} = \alpha + \beta_1(R\&D\ Intensity_{it}) + \beta_2(Sales\ Growth_{it}) + \varepsilon_{it}$, where α denotes the constant term, β_1 and β_2 represent the regression coefficients of the independent variables, and ε_{it} is the error term associated with each observation.

Data processing was carried out using SPSS software version 26. Before regression testing, several classical assumption tests were conducted, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests, to ensure that the regression model meets the required statistical assumptions. Following the validation of these assumptions, multiple linear regression analysis was performed to examine both the individual and simultaneous effects of Product Innovation and Sales Growth on Profitability. The t-test was used to determine the partial significance of each independent variable, while the F-test assessed the joint significance of both variables in influencing ROA. Furthermore, the coefficient of determination (R^2) was calculated to measure the proportion of variation in Profitability that can be explained by Product Innovation and Sales Growth.

RESULTS AND DISCUSSION

Based on data from technology subsector companies listed on the Indonesia Stock Exchange for the period spanning 2019 to 2023, an initial descriptive analysis reveals substantial variations in financial performance. The profitability variable, assessed via Return on Assets (ROA), shows an average value of 5.62 percent, with a broad range extending from a minimum of -1.08 percent to a maximum of 12.34 percent. This average suggests that most Indonesian technology firms are still in a growth phase, where extensive expansion efforts and heavy investments prevent them from reaching optimal asset efficiency. Meanwhile, commitment to innovation is gauged through the Research and Development (R&D) intensity variable, which averages 3.87 percent. Although this figure indicates that companies are allocating resources to R&D activities, the investment level remains relatively low when compared to the R&D allocations of leading global technology enterprises. On another front, the sales growth variable averages 8.25 percent, exhibiting considerable fluctuations across periods. This situation highlights how Indonesia's technology market dynamics are heavily shaped by external factors, such as shifts in digital consumer behavior and post-pandemic macroeconomic conditions, leading to inconsistent sales outcomes.

Before hypothesis testing, the regression model employed must be verified as valid and reliable through a series of classical assumption tests. The results confirm that the regression model satisfies all classical assumption criteria. The normality test, conducted on 150 observations, yields a significance value of 0.200, which exceeds the 0.05 threshold. This outcome concludes that the residual data follows a normal distribution, thereby meeting the requirements for parametric statistical analysis.

Next, the multicollinearity test was performed to ensure no excessively strong linear relationships exist among the independent variables. The findings indicate that both independent variables, R&D intensity and sales growth, exhibit no signs of multicollinearity. This is supported by a Tolerance value of 0.996 (above 0.10) and a Variance Inflation Factor (VIF) of 1.004 (well below the 10 limit), confirming that these variables are suitable for inclusion in the regression model. Additionally, the heteroscedasticity test verifies that the regression model is free from issues of unstable residual variance. The significance values obtained are 0.580 for R&D intensity and 0.727 for sales growth. Since both exceed 0.05, it can be inferred that the regression model shows no evidence of heteroscedasticity.

The final test, autocorrelation assessment, was carried out to confirm that the model's residuals are independent across time periods. With 150 observations (N=150), two independent variables (K=2), and a 95% confidence level ($\alpha=0.05$), the Durbin-Watson table provides a lower bound (dU) of 1.7602 and an upper bound (4-dU) of 2.3198. The computed Durbin-Watson statistic from the data processing is 1.874. Given that this value falls within the autocorrelation-free range ($1.7602 < 1.874 < 2.3198$), the regression model is deemed free from autocorrelation disturbances. Since all classical assumptions from normality and multicollinearity to heteroscedasticity and autocorrelation have been adequately met, this multiple linear regression model is declared valid and dependable for proceeding to the interpretation and discussion of hypothesis testing results.

Table 1. Multiple Linear Regression Test Output

Variable	Cofisien (β)	Std. Error	t	Sig.
Constant	1,771	0,892	1,985	0,049
R&D (X_1)	0,461	0,126	3,649	0,001
SG (X_2)	-0,085	0,143	-0,593	0,557

Source: SPSS Data Processed, 2025

From the multiple linear regression analysis, the following equation was derived: $Y = 1.771 + 0.461 X_1 - 0.085 X_2 + e$. The interpretation of this equation is as follows: the constant

value (a) of 1.771 indicates that if both independent variables R&D intensity (X1) and sales growth (X2) are zero, the profitability level (measured by ROA) is projected to be 1.771. The regression coefficient β_1 of 0.461 suggests that for every one-unit increase in R&D intensity (X1), profitability rises by 0.461 units, assuming all other variables remain constant. Meanwhile, the coefficient β_2 of -0.085 reflects that each one-unit addition to sales growth (X2) could potentially decrease profitability by 0.085 units, provided that other variables are held steady.

Table 2. T-Test Output

Variable	Coeffisien (β)	Std. Error	t	Sig.
Constant	1,771	0,892	1,985	0,049
R&D (X ₁)	0,461	0,126	3,649	0,001
SG (X ₂)	-0,085	0,143	-0,593	0,557

Source: SPSS Data Processed, 2025

From the processed t-test results table, the key findings can be summarized as follows: Regarding the R&D intensity variable (X1), the calculated t-value stands at 3.649, whereas the t-table value at a 95% confidence level is 1.682, indicating that the calculated t substantially surpasses the t-table. Moreover, the observed significance level is 0.001, well under the 0.05 cutoff. These results demonstrate that R&D intensity exerts a genuine and substantial influence on profitability, leading to the complete acceptance of the first hypothesis (H1). Conversely, for the sales growth variable (X2), the calculated t-value is merely 0.593, falling below the t-table value of 1.682. The resulting probability value (sig.) is 0.557, which clearly exceeds the 0.05 significance threshold. This suggests that sales growth does not have a statistically meaningful impact on corporate profitability, resulting in the rejection of the second hypothesis (H2).

Table 3. F-Test Output

Model	F	F Table	Sig.
1	3,438	3,06	0,004

Source: SPSS Data Processed, 2025

The simultaneous testing results, as detailed in the F-test table, reveal a calculated F-value of 3.438, compared to the F-table value of 3.06 at a 95% confidence level. Since the calculated F exceeds the table value and the recorded significance level is only 0.004 (below the critical threshold of 0.05), it can be concluded that the two independent variables R&D intensity and sales growth collectively exert a significant impact on profitability. Therefore, the third hypothesis (H3) is accepted. These findings bolster empirical evidence regarding the crucial role of internal factors in shaping the financial performance of companies within Indonesia's technology subsector, while also helping to resolve the conflicting results observed in prior studies.

This research provides strong empirical evidence that substantial investments in product innovation, particularly through research and development (R&D) play a significant role in improving corporate profitability. Consistent R&D spending signals a firm's commitment to long-term innovation, helping it build competitive advantages that are difficult for rivals to imitate. Through technological exploration and product enhancement, firms strengthen their strategic position, making innovation not merely an operational option but a central driver of financial performance in rapidly evolving markets.

The study further reveals that R&D enhances internal efficiency by improving production processes, reducing operational waste, and increasing product quality. These advancements

lower marginal costs and allow companies to deliver superior products that better meet customer expectations. Additionally, innovation enables firms to expand into new market segments and respond to shifting consumer preferences, thereby securing new revenue channels. Despite these advantages, the research acknowledges that R&D may initially reduce profits due to high upfront costs and long commercialization timelines, highlighting the importance of strong managerial ability in transforming innovation spending into marketable products.

In analysing sales growth, this study challenges the common assumption that rising sales volumes automatically translate into increased profits. Although higher sales indicate expanding market presence, they are often accompanied by elevated operational expenses, greater promotional spending, and higher customer acquisition costs. As a result, revenue growth can be offset by declining margins, particularly in digital markets characterised by aggressive competition and expensive scaling requirements. Thus, sales growth alone is not a reliable indicator of improved profitability unless accompanied by cost discipline and operational efficiency.

However, the research uncovers a meaningful synergy when R&D investment and sales growth are examined together. While sales expansion by itself may not increase earnings, innovative and differentiated products significantly amplify the profit potential of each sale. Firms with strong R&D capabilities can command better prices, reduce promotional inefficiencies, and target customers more effectively. Innovation provides the strategic value that makes sales growth productive, and this interaction becomes especially critical in industries where product uniqueness directly shapes market performance.

This synergy also enhances the precision and efficiency of marketing activities. Instead of relying on broad, costly promotional campaigns, firms with innovative products can focus their marketing efforts on highlighting technological advantages or distinctive features. Such targeted approaches improve conversion rates and reduce wasted spending, enabling firms to generate more profit from each marketing unit invested. The findings, therefore emphasize that technology-driven companies must integrate product development and market expansion into a unified strategic framework to achieve sustainable financial outcomes.

The study also stresses that long-term profitability in Indonesia's evolving digital economy requires a balanced approach that blends innovation with disciplined scaling. Rapid growth that is not supported by strong technological infrastructure or operational efficiency can damage profitability, while innovation without proper commercialisation can result in products that fail to gain traction. Firms must therefore synchronize R&D and sales strategies to ensure that innovations meet real market needs and that growth occurs within the limits of organizational capacity.

The findings of this study, while providing important insights, must be interpreted within the context of certain methodological limitations. One significant limitation is that the model did not incorporate several crucial factors known to strongly influence a firm's profitability. These excluded factors, namely Firm Size, Leverage (debt-to-equity ratio), and Operational Efficiency outside of R&D expenditures, were not utilized as control variables. Controlling for these variables is essential; for example, firm size inherently grants economies of scale and capacity for risk absorption that significantly affect overall profits; high leverage directly reduces net income through interest expense, potentially masking the true impact of R&D and sales; and operational efficiency determines how well a company manages its daily costs and assets, representing a fundamental driver of profitability independent of innovation efforts. The exclusion of these key performance determinants means there is a possibility that some of the observed relationships between R&D/sales and profitability might actually be driven by these omitted variables. Therefore, future research is strongly encouraged to incorporate a more complete set of control variables. By properly accounting for these fundamental determinants

of financial performance, subsequent studies will be more robust and better equipped to isolate the true effect of R&D and sales growth on profit, ultimately leading to more conclusive findings, future research is strongly encouraged to incorporate these fundamental control variables to more accurately isolate the true effects of innovation and market expansion on profitability. By accounting for firm size, leverage, and broader operational efficiency, subsequent studies will produce more robust and conclusive findings. Such methodological refinement will not only enhance academic validity but also offer clearer insights for practitioners and policymakers seeking to promote innovation-driven growth in Indonesia's corporate landscape.

CONCLUSION

Based on the comprehensive data analysis of technology subsector companies listed on the Indonesia Stock Exchange from 2019 to 2023, several key conclusions can be drawn regarding the drivers of corporate profitability in the digital age. First, investments in product innovation demonstrate a strong, clear, and positive effect on profitability. This confirms that companies' efforts to bolster funding for Research and Development (R&D) represent the most effective strategy for enhancing competitiveness, improving operational efficiency, and ultimately achieving higher Return on Assets (ROA). Second, although it shows a positive direction, sales growth, when examined in isolation, proves to have no significant influence on profitability. This finding underscores the challenge that increases in sales volume do not necessarily lead to optimal profit gains without stringent cost controls, given the high expenses associated with expansion and customer acquisition in the fiercely competitive technology market. Third, and most crucially, the simultaneous integration of product innovation and sales growth exerts a significant impact on boosting profitability. These two factors generate a synergistic effect, with the Coefficient of Determination at 48.2 percent affirming that nearly half of a company's profitability performance can be attributed to the strategic alignment between R&D and market expansion.

The findings of this study carry important strategic implications for business sustainability. For company management, it is recommended to optimize R&D budgets by directing them toward high-potential commercial innovation projects, ensuring that such investments directly contribute to profit growth. Additionally, collaboration between R&D and marketing divisions should be strengthened to align generated innovations with market demands and the firm's sales strategies. Ongoing sales growth must also be balanced with efficient cost management, preventing market expansion from creating operational burdens that could erode future profitability. For investors, these results serve as a valuable indicator that firms with strong innovation commitments and well-managed, stable sales growth offer superior long-term profitability prospects. Investors should prioritise technology subsector companies that not only exhibit high sales growth but also demonstrate robust dedication to product innovation (as evidenced by adequate R&D allocations). The discovery that Innovation (R&D) and Sales Growth, when combined simultaneously, are highly significant highlights that the greatest company value lies in this strategic blend. Investors ought to view this as a signal that enterprises with elevated innovation levels and steady (rather than merely rapid) sales growth possess more promising and secure long-term profitability outlooks.

That said, this research has certain limitations that could open avenues for future investigations. The independent variables employed are limited to product innovation and sales growth; therefore, upcoming studies should incorporate additional factors such as capital structure, operational efficiency, or dividend policies to provide a more holistic view of profitability. Moreover, the relatively short research period (five years) could be extended to examine long-term patterns in technology firms' profitability dynamics. The study could also be broadened through comparative analyses between technology and non-technology subsector

companies to determine whether the influence of product innovation exhibits unique characteristics in industries heavily reliant on technology. Overall, this research affirms that bolstering research-based innovation activities and enhancing sales efficiency form the core foundation for building national competitiveness in the technology industry.

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