

Profitability Ratio Analysis of PT Dayamitra Telekomunikasi Tbk, 2021–2025

Jasmine Medina Amalia^{1*}, Icha Elvira², Deswita Cakra Anggraini³, Risky Budianto⁴

¹⁻⁴ Universitas Negeri Surabaya, Indonesia

email: jasmine.23075@mhs.unesa.ac.id¹

Article Info :

Received:
06-10-2026
Revised:
21-10-2025
Accepted:
27-10-2026

Abstract

Profitability ratios indicate how effectively companies convert revenue and financial resources into earnings. This study analyzed the profitability of PT Dayamitra Telekomunikasi Tbk from 2021 to 2025 using a quantitative descriptive design. Secondary data were obtained from published annual reports and financial statements for five consecutive fiscal years. Gross profit margin (GPM), operating profit margin (OPM), net profit margin (NPM), return on assets (ROA), and return on equity (ROE) were calculated and compared annually using reported year-end asset and equity balances. GPM increased from 46.9% in 2021 to 51.6% in 2024 before declining to 50.4% in 2025. OPM rose from 39.9% to 44.9% during 2021–2024, then decreased to 43.6% in 2025. NPM peaked at 23.2% in 2023 and declined to 22.2% in 2025 despite continued nominal net profit growth. ROA increased from 2.4% to approximately 3.6%, while ROE rose consistently from 4.1% to 6.4%. These results indicate improving earnings relative to assets and equity alongside weakening revenue-based margins in the final reporting years. The contrasting movements underline the importance of assessing profitability through multiple indicators rather than relying exclusively on revenue or earnings. Management should examine cost developments and earnings retention. The descriptive single-company design limits causal interpretation and generalizability.

Keywords: Financial Performance, Gross Profit Margin, Profitability, Return on Assets, Return on Equity.



©2026 Authors.. This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.
(<https://creativecommons.org/licenses/by-nc/4.0/>)

INTRODUCTION

Telecommunications tower infrastructure occupies a capital-intensive segment of the digital economy in which network expansion depends on the continued availability and utilization of physical assets. The commercial transition toward advanced mobile networks places additional pressure on telecommunications operators to generate economic value from technological investment rather than assume that increasing connectivity demand necessarily produces higher financial returns (Whalley & Curwen, 2024). Financial-ratio research within the telecommunications industry has consequently positioned profitability as an integral component of corporate financial strategy and performance evaluation (Mubarok et al., 2024). For infrastructure providers, revenue expansion may coexist with changes in operating expenditure, depreciation, financing costs, and asset productivity, creating potential differences between accounting earnings and the efficiency of capital utilization. Efficiency-oriented research on PT Dayamitra Telekomunikasi Tbk has similarly emphasized resource utilization as a relevant dimension of corporate performance assessment within the telecommunications infrastructure industry (Nandika et al., 2024). These characteristics establish a basis for examining whether the company's financial performance during 2021–2025 demonstrates consistent profitability across revenue, asset, and equity measures.

Recent scholarship on telecommunications profitability has increasingly examined financial performance across different operating periods rather than relying exclusively on isolated annual earnings. Comparative analyses of profitability before, during, and after the COVID-19 pandemic demonstrate the relevance of temporal conditions when interpreting financial ratios within the telecommunications industry (Putri et al., 2025). Research integrating financial ratios with managerial behavior has also examined changes in telecommunications companies' financial performance across distinct economic periods, extending the analytical perspective beyond conventional accounting comparisons (Malino et al., 2025). Profitability-based financial assessments further establish the usefulness of examining the relationship between reported earnings and corporate financial

performance through measurable accounting indicators (Lestari et al., 2024). Methodological developments in financial-ratio analysis indicate that the construction and interpretation of accounting ratios require careful consideration of relationships among their underlying financial components (Linares-Mustarós et al., 2022). Gross profit margin (GPM), operating profit margin (OPM), and net profit margin (NPM) provide complementary information regarding profitability at successive stages of revenue and expense recognition. Return on assets (ROA) and return on equity (ROE) extend this assessment by evaluating earnings relative to total assets and shareholders' equity, allowing profitability to be examined through both operational margins and capital utilization.

Despite these analytical developments, the available literature addresses different financial dimensions and observation periods without establishing a continuous profitability profile of PT Dayamitra Telekomunikasi Tbk covering 2021–2025. Previous company-specific research examined financial performance before and after the initial public offering during 2018–2023, emphasizing the assessment of corporate financial conditions surrounding a significant financing event (Astuti et al., 2024). Another investigation evaluated the efficiency of PT Dayamitra Telekomunikasi Tbk through data envelopment analysis, providing an efficiency-oriented framework that differs from the interpretation of accounting-based profitability ratios over successive reporting periods (Nandika et al., 2024). At the industry level, research examining debt-to-equity and debt-to-asset ratios has concentrated on the relationship between financing structure and profitability rather than the simultaneous development of multiple profitability indicators within an individual telecommunications infrastructure company (Raharja et al., 2025). Studies investigating profitability determinants across telecommunications companies have likewise emphasized explanatory factors and broader corporate observations, producing evidence that addresses a different analytical question from a firm-specific longitudinal assessment (Rizka et al., 2025). The resulting empirical gap concerns the absence, within the selected literature, of an integrated analysis of GPM, OPM, NPM, ROA, and ROE for PT Dayamitra Telekomunikasi Tbk throughout 2021–2025, particularly regarding possible differences between movements in revenue-based margins and returns generated from corporate assets and equity.

The identified gap has practical implications because movements in profitability margins and capital-based returns may reflect different dimensions of financial performance within the same company. The financial figures considered in the present analysis indicate that PT Dayamitra Telekomunikasi Tbk recorded an NPM of 23.2% in 2023, followed by decreases to 22.6% in 2024 and 22.2% in 2025, despite continued revenue growth. This pattern raises a specific analytical question concerning whether changes in operating profitability correspond to changes in returns generated from the company's assets and shareholders' equity. Financial-ratio research within the telecommunications industry provides a basis for examining profitability as an outcome associated with broader financial management and corporate strategy (Mubarok et al., 2024). Evidence addressing the relationship between financial leverage and profitability further illustrates the relevance of distinguishing operating earnings from financial outcomes influenced by corporate financing arrangements (Raharja et al., 2025). Period-based investigations of telecommunications financial performance also demonstrate the analytical relevance of evaluating corporate financial conditions across successive reporting periods rather than interpreting financial results from a single observation (Malino et al., 2025). A differentiated interpretation of profitability indicators is consequently relevant to investors, management, and financial analysts because accounting earnings alone may not adequately represent the returns obtained from the financial resources committed to telecommunications operations (Lestari et al., 2024).

The present research is positioned as a company-specific longitudinal profitability assessment that differs from broader sectoral examinations of financial determinants and efficiency-based corporate evaluations. Earlier research on PT Dayamitra Telekomunikasi Tbk concentrated on financial performance surrounding its initial public offering and covered the period ending in 2023, whereas the present analysis incorporates financial observations through 2025 to examine subsequent developments within a consistent five-year framework (Astuti et al., 2024). Unlike the efficiency assessment based on data envelopment analysis, the proposed investigation evaluates profitability through accounting indicators that distinguish gross earnings, operating earnings, net earnings, asset returns, and equity returns (Nandika et al., 2024). The simultaneous interpretation of these indicators is consistent with methodological discussions emphasizing that financial ratios represent different relationships among accounting components and should not automatically be treated as interchangeable measures of performance (Linares-Mustarós et al., 2022). The firm-specific temporal approach also differs from

telecommunications profitability research organized around comparisons between pandemic-related economic periods because it emphasizes changes within one infrastructure company across successive financial years (Putri et al., 2025). The proposed contribution lies in integrating five profitability indicators into a single longitudinal assessment capable of identifying the direction, consistency, and divergence of profitability movements, without claiming to establish causal relationships between financial structure, operational decisions, and corporate earnings.

This research aims to analyze the profitability performance of PT Dayamitra Telekomunikasi Tbk during 2021–2025 through a comprehensive examination of five accounting-based profitability ratios. The assessment covers GPM, OPM, NPM, ROA, and ROE calculated from the company's financial statements for each observation year. The analysis identifies annual changes in these indicators and examines the consistency of profitability performance throughout the five-year period. Particular attention is directed toward differences between revenue-based profit margins and returns generated from corporate assets and shareholders' equity. The research also evaluates whether changes in reported revenue are accompanied by corresponding movements in profitability indicators, providing a differentiated description of the company's earnings performance. Its scientific contribution consists of extending the firm-specific empirical evidence on telecommunications infrastructure profitability through an integrated longitudinal analysis of financial ratios that represent distinct dimensions of corporate performance. Its practical contribution is to provide management, investors, and financial analysts with a structured basis for evaluating historical profitability, recognizing differences among financial indicators, and interpreting corporate performance within the limits of descriptive financial analysis.

RESEARCH METHODS

This study employed a quantitative descriptive design to examine the annual profitability of PT Dayamitra Telekomunikasi Tbk during 2021–2025, with the company serving as the unit of analysis and five fiscal years constituting successive observations. The application of financial ratios to evaluate corporate profitability is consistent with established approaches to assessing financial performance in the telecommunications industry (Mubarak et al., 2024). The annual observations were organized chronologically to facilitate descriptive comparisons across reporting periods, reflecting the temporal orientation of previous investigations into telecommunications financial performance (Malino et al., 2025). Secondary financial data were collected through documentation of the company's published annual reports and financial statements covering the five-year observation period. The extracted accounting information comprised revenue, gross profit, operating profit, net profit after tax, total assets, and total equity, with each financial item recorded according to its respective reporting year. The use of published corporate financial statements as documentary evidence is consistent with previous research examining the financial performance of PT Dayamitra Telekomunikasi Tbk (Astuti et al., 2024).

Profitability was measured using five financial indicators: gross profit margin (GPM), operating profit margin (OPM), net profit margin (NPM), return on assets (ROA), and return on equity (ROE), which collectively capture distinct dimensions of corporate earnings performance (Lestari et al., 2024). Revenue-based profitability was calculated using $GPM = (\text{gross profit} / \text{revenue}) \times 100\%$, $OPM = (\text{operating profit} / \text{revenue}) \times 100\%$, and $NPM = (\text{net profit after tax} / \text{revenue}) \times 100\%$. Capital-based profitability was measured using $ROA = (\text{net profit after tax} / \text{total assets}) \times 100\%$ and $ROE = (\text{net profit after tax} / \text{total equity}) \times 100\%$, with the denominators based on the reported annual amounts rather than average balances. Each profitability indicator was calculated for the five reporting years, tabulated chronologically, and compared across consecutive periods to identify annual increases, decreases, and differences in financial performance patterns (Putri et al., 2025). Consistent definitions of financial components and ratio calculations were maintained throughout the observation period to support comparability and reduce interpretive inconsistencies associated with accounting-ratio measurements (Linares-Mustarós et al., 2022). The analysis was restricted to descriptive comparisons of the calculated indicators without inferential hypothesis testing or causal estimation, ensuring that the interpretation remained confined to the observed financial performance of the company.

RESULTS AND DISCUSSION

Gross and Operating Profitability Performance

The profitability performance of PT Dayamitra Telekomunikasi Tbk during 2021–2025 was evaluated using Gross Profit Margin (GPM) and Operating Profit Margin (OPM) to examine the company's ability to generate earnings from its reported revenue (Lestari et al., 2024). GPM represents the proportion of revenue retained after deducting the cost of revenue, making it an important indicator of gross earnings performance (Alqurni & Nindiasari, 2022). OPM provides a broader measurement by incorporating operating expenses, allowing the assessment of profitability after the company's principal operating activities have been recognized (Anu et al., 2024). The application of these indicators enables comparisons between revenue growth and earnings retention across consecutive financial reporting periods (Mubarak et al., 2024). Differences between gross and operating margins may reveal variations in financial performance that cannot be adequately explained by revenue movements alone (Atul et al., 2022). The analysis consequently emphasizes annual changes in reported financial ratios while avoiding causal interpretations beyond the available descriptive accounting evidence (Linares-Mustarós et al., 2022).

Gross profit increased from IDR 3,218,397 million in 2021 to IDR 3,654,068 million in 2022, accompanied by an increase in GPM from 46.9% to 47.3%, indicating a modest improvement in gross earnings retention (Astuti et al., 2024). The upward movement continued in 2023, when gross profit reached IDR 4,275,245 million and GPM increased to 49.2%, reflecting stronger gross earnings relative to the company's revenue (Setiawan, 2024). In 2024, GPM reached 51.6%, its highest recorded value during the observation period, alongside gross profit of IDR 4,801,056 million (Putri et al., 2025). These changes indicate that gross profit grew proportionally faster than revenue during the first four years, although the individual factors influencing this relationship were not separately examined (Malino et al., 2025). The progressive increase in GPM suggests an improving relationship between revenue generation and the direct costs recognized in the company's financial statements (Ismayani, 2025). Similar financial-ratio approaches have been applied to assess profitability developments among Indonesian telecommunications companies through comparisons of earnings and revenue indicators (Pratama et al., 2022). The observed movement provides a descriptive basis for assessing gross profitability without establishing whether operational efficiency, pricing adjustments, or other factors produced the improvement (Hardiana et al., 2025).

The annual GPM pattern changed in 2025, when the ratio declined to 50.4% despite gross profit increasing slightly to IDR 4,806,129 million (Astuti et al., 2024). Revenue increased from IDR 9,307,786 million in 2024 to IDR 9,534,083 million in 2025, exceeding the proportional increase recorded in gross profit (Mubarak et al., 2024). This divergence resulted in a 1.2-percentage-point reduction in GPM, indicating that the company retained a smaller proportion of revenue as gross earnings than in the previous year (Alqurni & Nindiasari, 2022). The decline represents a change in profitability performance rather than an absolute decrease in gross profit, since the reported gross earnings remained positive and increased marginally (Ismayani, 2025). Evaluating nominal earnings together with financial ratios is necessary because increases in reported profit do not automatically correspond to improvements in proportional profitability (Putri et al., 2025). Table 1 presents the reported gross profit, revenue, and calculated GPM values used to identify these annual movements (Lestari et al., 2024).

Table 1. Gross Profit Margin of PT Dayamitra Telekomunikasi Tbk (IDR Million)

Year	Gross Profit	Revenue	GPM
2021	3,218,397	6,869,569	46.9%
2022	3,654,068	7,728,930	47.3%
2023	4,275,245	8,683,800	49.2%
2024	4,801,056	9,307,786	51.6%
2025	4,806,129	9,534,083	50.4%

Table 1 demonstrates that GPM increased for three consecutive annual comparisons before declining in the final observation year, indicating a change in the direction of gross profitability development (Putri et al., 2025). The largest annual improvement occurred between 2023 and 2024,

when the margin increased by 2.4 percentage points, exceeding the increases recorded in the preceding intervals (Lestari et al., 2024). Although GPM decreased in 2025, its value remained 3.5 percentage points above the 2021 level, demonstrating that the earlier gains were not completely reversed (Astuti et al., 2024). The changing relationship between gross profit and revenue indicates that profitability should be assessed through proportional earnings rather than relying exclusively on reported sales expansion (Atul et al., 2022). Financial performance assessments in the telecommunications sector require attention to changing cost structures because infrastructure-related expenditures may influence the relationship between revenue and earnings (Mubarok et al., 2024). Nevertheless, the available figures do not establish which specific cost components contributed to the margin reduction observed in 2025 (Linares-Mustarós et al., 2022). The GPM results consequently identify changes in gross earnings retention while leaving the underlying operational explanations outside the scope of the descriptive analysis (Hardiana et al., 2025).

Operating profitability was subsequently assessed using OPM to determine the proportion of revenue retained as operating profit after recognizing the relevant operating expenses (Alqurni & Nindiasari, 2022). Operating profit increased from IDR 2,740,179 million in 2021 to IDR 3,153,337 million in 2022, accompanied by an improvement in OPM from 39.9% to 40.8% (Anu et al., 2024). The ratio increased further to 42.4% in 2023, when operating profit reached IDR 3,677,590 million, indicating continued improvement in operating earnings relative to revenue (Setiawan, 2024). In 2024, operating profit rose to IDR 4,178,946 million, while OPM reached 44.9%, representing the highest operating margin during the five-year observation period (Malino et al., 2025). This progression indicates that the company generated an increasing proportion of operating earnings from reported revenue between 2021 and 2024 (Lestari et al., 2024). The simultaneous increases in GPM and OPM suggest broadly consistent improvements at the gross and operating profitability levels during these four reporting years (Pratama et al., 2022). Table 2 presents the annual operating profit, revenue, and calculated OPM values used to evaluate these changes (Mubarok et al., 2024).

Table 2. Operating Profit Margin of PT Dayamitra Telekomunikasi Tbk (IDR Million)

Year	Operating Profit	Revenue	OPM
2021	2,740,179	6,869,569	39.9%
2022	3,153,337	7,728,930	40.8%
2023	3,677,590	8,683,800	42.4%
2024	4,178,946	9,307,786	44.9%
2025	4,152,972	9,534,083	43.6%

Table 2 indicates that OPM declined from 44.9% in 2024 to 43.6% in 2025, representing a reduction of 1.3 percentage points after three consecutive annual increases (Putri et al., 2025). Operating profit decreased from IDR 4,178,946 million to IDR 4,152,972 million, while revenue continued increasing during the same reporting interval (Astuti et al., 2024). This divergence indicates that additional revenue in 2025 was not accompanied by proportional growth in operating earnings, unlike the pattern observed during the preceding years (Malino et al., 2025). The reduction in OPM was slightly greater than the decline in GPM, suggesting that profitability weakened at both stages of the income statement (Alqurni & Nindiasari, 2022). However, the difference between these movements cannot independently establish whether changes in operating expenses were responsible for the observed deterioration (Linares-Mustarós et al., 2022). Research examining telecommunications financial performance emphasizes the relevance of evaluating multiple ratios because individual indicators capture different dimensions of corporate profitability (Hardiana et al., 2025). The 2025 results indicate weaker operating earnings retention despite continued revenue expansion, although the operating margin remained above its initial 2021 level (Lestari et al., 2024).

A comparison of GPM and OPM reveals that both indicators increased between 2021 and 2024 before experiencing reductions in 2025, demonstrating similar directional movements across the observation period (Mubarok et al., 2024). GPM increased by 4.7 percentage points between 2021 and 2024, while OPM increased by 5.0 percentage points during the corresponding interval (Astuti et al., 2024). These improvements suggest that the proportion of revenue retained as gross and operating earnings increased simultaneously during the first four reporting years (Anu et al., 2024). The decline

in both margins during 2025 indicates a weakening of earnings retention at two related accounting levels rather than an isolated movement in one indicator (Ismayani, 2025). Nevertheless, the observed margins provide no direct evidence regarding changes in customer composition, infrastructure utilization, or individual operating expenses (Nandika et al., 2024). The descriptive findings support continued examination of revenue-related costs and operating expenditure components to understand the financial conditions associated with margin changes (Fitriyani & Kustanto, 2025).

The observed profitability trajectory has implications for evaluating financial performance because sustained revenue growth was not accompanied by uninterrupted improvements in gross and operating margins (Putri et al., 2025). The stronger margins recorded in 2024 identify that year as the most favorable observation for gross and operating earnings retention within the examined period (Lestari et al., 2024). Conversely, the 2025 reductions suggest that subsequent revenue expansion coincided with less favorable proportional earnings performance, despite the persistence of positive operating profit (Setiawan, 2024). From a financial management standpoint, these differences provide a basis for examining how reported revenues correspond to the costs recognized at successive stages of the income statement (Atul et al., 2022). Comparisons involving telecommunications infrastructure companies also require consideration of capital intensity and the distinction between income-statement profitability and returns generated from invested resources (Nandika et al., 2024). Gross and operating margins should consequently be interpreted alongside net profitability and capital-based returns rather than treated as independent measures of corporate financial strength (Fitriyani & Kustanto, 2025). The subsequent assessment of NPM, ROA, and ROE can extend this interpretation while maintaining the descriptive boundaries established by the research methodology (Malino et al., 2025).

Net Profitability and Earnings Retention

Net Profit Margin (NPM) measures the proportion of revenue retained as net profit after accounting for operating expenses, financing-related items, taxation, and other recognized income or expenses (Alqurni & Nindiasari, 2022). Unlike GPM and OPM, this indicator provides a more comprehensive representation of profitability because it incorporates financial components beyond the company's principal operating activities (Ismayani, 2025). The examination of NPM is particularly relevant for assessing whether revenue expansion is accompanied by proportional improvements in final earnings available to the company (Putriani et al., 2025). Financial performance assessments involving telecommunications companies require attention to net earnings because operational profitability does not necessarily produce equivalent changes in after-tax financial results (Nashia & Pratiwi, 2025). The annual NPM values of PT Dayamitra Telekomunikasi Tbk were calculated consistently using reported net profit and revenue for each financial year between 2021 and 2025 (Linares-Mustarós et al., 2022). These calculations provide a descriptive basis for identifying changes in earnings retention without attributing the observed fluctuations to unexamined financial or operational determinants (Salsabila & Husnan, 2026).

The company's net profit reached IDR 1,381,071 million in 2021, generating an NPM of 20.1% against reported revenue of IDR 6,869,569 million (Atul et al., 2022). In 2022, net profit increased to IDR 1,785,068 million, while revenue reached IDR 7,728,930 million, producing an improved NPM of 23.1% (Lestari et al., 2024). The 3.0-percentage-point increase indicates that net earnings expanded more rapidly than revenue, reflecting stronger proportional earnings retention during the annual comparison (Ismayani, 2025). Net profit continued increasing in 2023 to IDR 2,010,328 million, accompanied by revenue of IDR 8,683,800 million and an NPM of 23.2% (Putri et al., 2025). Although nominal net profit increased substantially, the margin improved by only 0.1 percentage points, indicating a considerably smaller proportional gain than in 2022 (Mubarok et al., 2024). The difference illustrates that higher absolute earnings do not necessarily indicate an equivalent improvement in profitability when revenue expands at a comparable rate (Suardi et al., 2025). The 2023 NPM represented the highest recorded value during the five-year period, establishing an important reference for evaluating the subsequent changes in net profitability (Salsabila & Husnan, 2026).

The upward movement in NPM ended in 2024, although net profit increased from IDR 2,010,328 million to IDR 2,107,671 million during the reporting interval (Setiawan, 2024). Revenue expanded from IDR 8,683,800 million to IDR 9,307,786 million, while NPM declined from 23.2% to 22.6%, indicating slower proportional growth in net earnings (Alqurni & Nindiasari, 2022). A similar pattern occurred in 2025, when net profit increased to IDR 2,119,352 million and revenue reached IDR

9,534,083 million, accompanied by a further NPM reduction to 22.2% (Putriani et al., 2025). The continued increase in nominal earnings indicates that the declining margin did not represent an absolute reduction in the company's reported net profit (Shabrina & Yulianti, 2021). Between 2024 and 2025, net profit increased by IDR 11,681 million, while revenue increased by IDR 226,297 million, producing a weaker relationship between incremental revenue and incremental net earnings (Linares-Mustarós et al., 2022). The consecutive reductions in NPM during 2024 and 2025 consequently indicate declining proportional profitability rather than a deterioration into financial losses (Kartika et al., 2025).

The different movements of NPM, GPM, and OPM provide additional information about the distribution of earnings across successive stages of the income statement (Hardiana et al., 2025). While GPM and OPM reached their highest values in 2024, NPM peaked one year earlier, indicating that improvements in gross and operating earnings were not accompanied by uninterrupted growth in net profitability (Lestari et al., 2024). This divergence demonstrates that favorable operating-margin developments can coexist with weaker after-tax earnings retention when financial components below operating profit exhibit different movements (Raharja et al., 2025). Nevertheless, the available descriptive data cannot establish the specific contributions of financing expenses, taxation, or other non-operating items to the observed margin changes (Rizka et al., 2025). NPM was calculated by dividing annual net profit after tax by reported revenue and multiplying the resulting value by 100% to maintain consistency across observations (Atul et al., 2022). The application of an identical measurement procedure allows the annual results to be compared without introducing differences arising from alternative ratio definitions (Putri et al., 2024). Table 3 presents the financial values and calculated NPM percentages used to evaluate the development of net profitability throughout the observation period (Santi et al., 2024).

Table 3. Net Profit Margin of PT Dayamitra Telekomunikasi Tbk (IDR Million)

Year	Net Profit	Revenue	NPM
2021	1,381,071	6,869,569	20.1%
2022	1,785,068	7,728,930	23.1%
2023	2,010,328	8,683,800	23.2%
2024	2,107,671	9,307,786	22.6%
2025	2,119,352	9,534,083	22.2%

Table 3 demonstrates that net profit increased continuously throughout 2021–2025, although the corresponding NPM values followed a different trajectory after reaching their highest level in 2023 (Putriani et al., 2025). The margin declined by 0.6 percentage points in 2024 and another 0.4 percentage points in 2025, indicating a cumulative reduction of 1.0 percentage point from its recorded peak (Alqurni & Nindiasari, 2022). Despite these reductions, the 2025 NPM remained 2.1 percentage points above its 2021 level, suggesting that the earlier improvement in earnings retention was only partially reversed (Ismayani, 2025). The coexistence of growing nominal profit and declining proportional profitability indicates that earnings expansion should not be interpreted independently of the revenue required to generate those earnings (Akin et al., 2025). Changes in financial ratios may reflect movements in either the numerator or denominator, making the examination of both accounting components necessary for meaningful interpretation (Linares-Mustarós et al., 2022). These findings reinforce the distinction between absolute financial growth and the capacity to preserve net earnings relative to total revenue (Nashia & Pratiwi, 2025).

The relationship between NPM and the previously examined gross and operating margins reveals differences in profitability development across the company's income statement (Lestari et al., 2024). Between 2023 and 2024, GPM increased from 49.2% to 51.6% and OPM increased from 42.4% to 44.9%, while NPM declined from 23.2% to 22.6% (Putri et al., 2025). These opposing movements indicate that improvements in gross and operating earnings retention did not translate into a corresponding improvement in after-tax profitability during 2024 (Mubarak et al., 2024). The difference between OPM and NPM widened from 19.2 percentage points in 2023 to 22.3 percentage points in 2024, suggesting a larger proportional separation between operating and net earnings (Linares-Mustarós et al., 2022). This widening identifies the financial components separating operating profit from net profit as relevant areas for further examination, particularly when assessing the relationship between

profitability and capital structure (Huwaidi et al., 2026). However, the available data do not establish whether financing costs, tax-related adjustments, or other recognized financial items were primarily responsible for the difference (Rizka et al., 2025). The combined interpretation of revenue-based profitability indicators consequently provides a more differentiated assessment than evaluations relying exclusively on individual margin values (Malino et al., 2025).

The declining NPM observed during 2024 and 2025 presents an important consideration for financial management because revenue expansion was accompanied by progressively smaller proportional net earnings (Putriani et al., 2025). From an accounting perspective, the pattern identifies the need to examine financial components affecting the conversion of operating profit into net profit rather than concentrating exclusively on revenue performance (Santi et al., 2024). An increase in nominal profitability should also be distinguished from improvements in earnings retention, particularly when additional revenue generates relatively limited increases in reported net income (Shabrina & Yulianti, 2021). For investment-related assessments, NPM provides relevant information about corporate profitability but does not independently establish changes in market valuation or shareholder returns (Akin et al., 2025). Research addressing Indonesian telecommunications companies similarly places profitability indicators alongside other financial variables when examining corporate financial characteristics (Huwaidi et al., 2026). The observed margin changes should consequently be assessed together with the company's asset utilization and equity-based earnings performance to avoid conclusions based on revenue-related measures alone (Mustafa et al., 2026).

The five-year NPM series indicates an initial period of strengthening earnings retention followed by two years of moderate margin deterioration despite continued growth in reported net profit (Putri et al., 2025). The highest NPM of 23.2% in 2023 contrasts with the highest gross and operating margins recorded in 2024, reflecting differences in the timing of profitability improvements across financial indicators (Lestari et al., 2024). Such differences demonstrate the importance of examining financial ratios according to their specific accounting components rather than treating all profitability measures as interchangeable (Linares-Mustarós et al., 2022). The analysis remains limited to five annual observations from one company and cannot determine whether the identified margin pattern represents a persistent financial tendency beyond the research period (Salsabila & Husnan, 2026). Its descriptive design also prevents conclusions concerning the statistical significance of annual changes or the causal influence of financing decisions and operational policies on profitability (Rizka et al., 2025). Further investigation using disaggregated expenses, financing information, and longer reporting periods would provide a stronger basis for explaining the observed differences between operating and net earnings (Raharja et al., 2025). Assessment of Return on Assets and Return on Equity offers an additional basis for examining whether the company's increasing net profit was accompanied by improvements in earnings generation relative to its reported assets and equity (Tutcu et al., 2024).

Asset and Equity Returns: Financial Performance and Implications

Return on Assets (ROA) measures the proportion of net profit generated relative to a company's total assets, providing an indicator of earnings performance associated with its reported asset base (Nandika et al., 2024). Return on Equity (ROE) evaluates net profit relative to shareholders' equity, allowing an assessment of earnings generation from the capital recorded as equity (Kroy & Desmiza, 2025). Both indicators complement revenue-based profitability ratios by examining financial returns in relation to balance sheet components rather than revenue alone (Tutcu et al., 2024). For telecommunications infrastructure companies, these measurements are relevant because substantial investments in physical assets may influence the relationship between reported earnings and invested resources (Mubarok et al., 2024). The calculations employed annual net profit, total assets, and total equity as reported in the company's financial statements for each observation year (Linares-Mustarós et al., 2022). Comparing these indicators across 2021–2025 provides a descriptive assessment of asset-based and equity-based profitability without estimating the causal effects of investment or financing decisions (Lestari et al., 2024).

The company's ROA increased from 2.4% in 2021 to 3.2% in 2022, indicating an improvement in net earnings relative to the reported asset base (Astuti et al., 2024). During this interval, net profit increased from IDR 1,381,071 million to IDR 1,785,068 million, while total assets decreased from IDR 57,728,318 million to IDR 56,071,558 million (Nandika et al., 2024). The combined movement of higher earnings and lower reported assets contributed mathematically to the increase in the calculated

return (Atul et al., 2022). In 2023, ROA increased to 3.5%, accompanied by net profit of IDR 2,010,328 million and total assets of IDR 57,278,715 million (Malino et al., 2025). The ratio increased further to 3.6% in 2024, when net profit reached IDR 2,107,671 million against total assets of IDR 58,139,702 million (Salsabila & Husnan, 2026). In 2025, ROA remained at 3.6% after rounding, despite further increases in net profit and reported total assets (Putri et al., 2025). Table 4 presents the annual financial components and calculated ROA values used to examine these developments (Tutcu et al., 2024).

Table 4. Return on Assets of PT Dayamitra Telekomunikasi Tbk (IDR Million)

Year	Net Profit	Total Assets	ROA
2021	1,381,071	57,728,318	2.4%
2022	1,785,068	56,071,558	3.2%
2023	2,010,328	57,278,715	3.5%
2024	2,107,671	58,139,702	3.6%
2025	2,119,352	58,350,129	3.6%

Table 4 indicates that ROA increased by 1.2 percentage points between 2021 and 2025, although the magnitude of annual improvement became smaller toward the end of the observation period (Lestari et al., 2024). Net profit increased continuously across the five years, whereas total assets initially declined in 2022 before increasing during the following reporting periods (Astuti et al., 2024). The resulting pattern indicates stronger earnings generation relative to reported assets, particularly during the earlier annual comparisons (Nandika et al., 2024). However, the unchanged rounded ROA in 2024 and 2025 suggests that additional earnings were accompanied by asset-base movements that produced only a limited change in the calculated return (Tutcu et al., 2024). The use of year-end asset balances rather than average annual assets also requires consideration when interpreting financial ratios across reporting periods (Linares-Mustarós et al., 2022). The available results do not independently establish whether the observed improvement originated from infrastructure utilization, asset restructuring, or changes in operational productivity (Hardiana et al., 2025).

The development of ROA differed from the movement of revenue-based profitability indicators during the final two years of observation (Alqurni & Nindiasari, 2022). NPM declined from 23.2% in 2023 to 22.6% in 2024 and 22.2% in 2025, while ROA increased to 3.6% and subsequently remained unchanged after rounding (Ismayani, 2025). This divergence indicates that declining earnings retention relative to revenue did not produce a corresponding reduction in the reported asset-based return (Putriani et al., 2025). The distinction is relevant because ROA depends on both net profit and the asset denominator, whereas NPM evaluates net earnings exclusively against revenue (Atul et al., 2022). A higher or stable ROA consequently cannot be interpreted as direct evidence that revenue-related cost pressures have disappeared (Kroy & Desmiza, 2025). The assessment of capital-based profitability also requires consideration of ROE, which measures earnings relative to equity rather than the company's complete asset base (Mustafa et al., 2026). Examining both indicators provides a more differentiated interpretation of financial returns across the company's reported capital components (Huwaiddi et al., 2026).

ROE increased from 4.1% in 2021 to 5.3% in 2022, reflecting a higher proportion of net earnings relative to reported total equity (Shabrina & Yulianti, 2021). The improvement continued in 2023, when ROE reached 5.9%, accompanied by net profit of IDR 2,010,328 million and total equity of IDR 34,118,352 million (Putri et al., 2025). In 2024, ROE increased to 6.3%, while total equity decreased to IDR 33,386,694 million despite continued growth in net profit (Raharja et al., 2025). The ratio reached 6.4% in 2025, when net profit increased to IDR 2,119,352 million and total equity declined slightly to IDR 33,351,201 million (Mustafa et al., 2026). These movements indicate that higher net earnings and changes in the equity denominator were associated with the progressive increase in the calculated return (Kroy & Desmiza, 2025). Table 5 presents the annual financial components used to calculate ROE throughout the five-year reporting period (Tutcu et al., 2024).

Table 5. Return on Equity of PT Dayamitra Telekomunikasi Tbk (IDR Million)

Year	Net Profit (IDR million)	Total Equity (IDR million)	ROE (%)
2021	1,381,071	33,645,609	4.1
2022	1,785,068	33,807,433	5.3
2023	2,010,328	34,118,352	5.9
2024	2,107,671	33,386,694	6.3
2025	2,119,352	33,351,201	6.4

Table 5 demonstrates that ROE increased in every reporting year, unlike GPM, OPM, and NPM, which experienced reductions during the later observation periods (Lestari et al., 2024). The increase from 4.1% in 2021 to 6.4% in 2025 represents a cumulative improvement of 2.3 percentage points in earnings relative to reported equity (Mustafa et al., 2026). During the same interval, net profit increased from IDR 1,381,071 million to IDR 2,119,352 million, while total equity decreased moderately from IDR 33,645,609 million to IDR 33,351,201 million (Astuti et al., 2024). The smaller equity denominator in 2025 contributed to the higher calculated ratio, making it necessary to distinguish increased earnings from changes in the underlying capital base (Raharja et al., 2025). Although ROE increased, the relatively limited improvement from 6.3% to 6.4% between 2024 and 2025 indicates a slower proportional increase than in the earlier years (Kroy & Desmiza, 2025). The findings support an interpretation of improving accounting returns on reported equity without independently establishing increases in shareholder wealth or market valuation (Akin et al., 2025). Differences between ROA and ROE also indicate the importance of considering asset and equity structures when evaluating financial performance in telecommunications companies (Huwaiddi et al., 2026).

Comparison of the five profitability indicators reveals different trajectories in earnings retention and capital-based returns during the 2021–2025 observation period (Mubarok et al., 2024). GPM and OPM reached their highest values in 2024 before declining in 2025, while NPM recorded its maximum value in 2023 and subsequently decreased (Putri et al., 2025). Conversely, ROA increased until 2024 and remained stable after rounding in 2025, whereas ROE continued increasing throughout the five reporting years (Tutcu et al., 2024). These differences indicate that revenue-based profitability and capital-based returns should not be treated as interchangeable indicators of corporate financial performance (Linares-Mustarós et al., 2022). Research concerning telecommunications investment and 5G value creation also highlights the relevance of broader industry conditions when considering the relationship between infrastructure investment and financial outcomes (Whalley & Curwen, 2024). Questions concerning value creation and the competitive relationship between telecommunications operators and major technology companies extend beyond the accounting indicators measured in the present research (Samaké, 2026).

The observed results provide relevant information for financial management because declining revenue-based margins in 2025 occurred alongside relatively stable asset returns and a further improvement in equity returns (Fitriyani & Kustanto, 2025). Financial evaluations should distinguish these accounting developments rather than interpreting increasing net profit as sufficient evidence of uninterrupted improvements across every profitability indicator (Akin et al., 2025). However, the investigation was restricted to one company and five annual observations, limiting the extent to which the identified patterns can be generalized to other telecommunications infrastructure providers (Salsabila & Husnan, 2026). The calculations also used reported year-end assets and equity instead of average balances, which may influence comparisons when financial positions change during the reporting year (Linares-Mustarós et al., 2022). The descriptive approach did not estimate the individual contributions of operating expenses, financing costs, asset composition, or capital structure to the observed changes in profitability (Rizka et al., 2025). Subsequent investigations could incorporate longer observation periods, comparable infrastructure companies, and disaggregated financial information to examine the accounting relationships underlying these movements (Hardiana et al., 2025). The findings establish that PT Dayamitra Telekomunikasi Tbk experienced improving capital-based returns during 2021–2025, accompanied by weaker revenue-based margins toward the end of the period (Nandika et al., 2024).

CONCLUSION

The profitability analysis of PT Dayamitra Telekomunikasi Tbk during 2021–2025 revealed improvements in earnings generation, although revenue-based profitability indicators weakened toward the end of the observation period. Gross Profit Margin increased from 46.9% in 2021 to 51.6% in 2024 before declining to 50.4% in 2025, indicating a reduction in gross earnings retention during the final year. Operating Profit Margin exhibited a similar pattern, rising from 39.9% to 44.9% before decreasing to 43.6% in 2025. Net Profit Margin reached its highest value of 23.2% in 2023 and subsequently declined to 22.2% in 2025, despite continued growth in nominal net profit. Return on Assets increased from 2.4% in 2021 to 3.6% in 2024 and remained at approximately 3.6% in 2025. Return on Equity demonstrated a consistent upward trajectory, increasing from 4.1% to 6.4% throughout the five-year period. These findings indicate that improving earnings relative to assets and equity coexisted with declining profitability relative to revenue, particularly during the final reporting years.

The differences among profitability indicators demonstrate the importance of evaluating financial performance through both income-statement margins and capital-based returns. The declining gross, operating, and net profit margins in 2025 indicate the need for closer examination of revenue-related costs, operating expenditures, and financial components affecting net earnings. Management should prioritize monitoring earnings retention while maintaining the productive utilization of telecommunications infrastructure assets and the reported equity base. For investors, the simultaneous improvement in capital-based returns and deterioration in revenue-based margins provides a more differentiated basis for evaluating the company's financial condition. The findings are limited to five annual observations from a single company and rely on descriptive financial-ratio comparisons without inferential testing or causal estimation. The use of year-end asset and equity balances further limits the interpretation of capital-based profitability, particularly when financial positions change within reporting periods. Future research should incorporate longer observation periods, comparative analyses of telecommunications infrastructure companies, and more detailed financial components to explain the factors associated with profitability changes.

REFERENCES

- Akin, I., Akin, M., Satiroglu, H., & Jhamb, M. (2025). Influence of growth, capital structure, profitability, and size on FTSE 100 enterprise value. *Journal of Corporate Accounting & Finance*, 36(2), 157–168. <https://doi.org/10.1002/jcaf.22761>
- Alqurni, P., & Nindiasari, A. D. (2022). Kinerja keuangan PT Sri Rejeki Isman Tbk ditinjau berdasarkan analisis rasio profitabilitas. *Jurnal Maneksi*, 11(1), 259–265. <https://doi.org/10.31959/jm.v11i1.1073>
- Anu, D. A., Selvi, & Dungga, M. F. (2024). Analisis rasio profitabilitas sebagai alat ukur untuk menilai kinerja keuangan perusahaan sektor telekomunikasi yang terdaftar di Bursa Efek Indonesia. *J-CEKI: Jurnal Cendekia Ilmiah*, 4(1), 1160–1171. <https://doi.org/10.56799/jceki.v4i1.6253>
- Astuti, D., Andini, R., & Lestari, U. P. (2024). Analisis kinerja keuangan perusahaan sebelum dan sesudah initial public offering (IPO) pada PT Dayamitra Telekomunikasi Tbk periode tahun 2018–2023. *Jurnal STIE Semarang*, 16(3), 162–174. <https://doi.org/10.33747/stiesmg.v16i3.760>
- Atul, U. N., Sari, Y. N. I., & Lestari, Y. J. (2022). Analisis rasio keuangan untuk mengukur kinerja keuangan perusahaan. *E-Jurnal Akuntansi TSM*, 2(3), 89–96. <https://doi.org/10.34208/ejatsm.v2i3.1396>
- Fitriyani, Y., & Kustanto, H. (2025). Pengukuran kinerja keuangan PT Tower Bersama Infrastructure Tbk dengan pendekatan rasio likuiditas, solvabilitas, aktivitas, dan profitabilitas. *Jurnal Manajemen dan Profesional*, 6(1), 153–166. <https://doi.org/10.32815/jpro.v6i1.2590>
- Hardiana, H., Hasyim, S. H., & Tikollah, M. R. (2025). Analisis perbandingan kinerja keuangan pada perusahaan telekomunikasi. *Multiplier: Jurnal Magister Manajemen*, 6(2). <https://doi.org/10.24905/mlt.v6i2.287>
- Huwaiti, M. K., Supriadi, Y. N., & Suciati, R. (2026). Analysis of profitability, capital structure, and investment decisions on firm value in telecommunication sector companies listed on Indonesia Stock Exchange period 2022–2024. *Journal of Humanities and Social Studies*, 10(1), 911–917. <https://doi.org/10.33751/jhss.v10i03.231>
- Ismayani, I. (2025). Analisis rasio profitabilitas untuk menilai kinerja keuangan PT Unilever Indonesia Tbk yang terdaftar di Bursa Efek Indonesia periode 2021–2023. *Journal Economic Excellence*

- Ibnu Sina*, 3(2), 70–92. <https://doi.org/10.59841/excellence.v3i2.2676>
- Kartika, R., Widia, R., Gunardi, G., & De Keizer, H. (2025). Analisis manajemen keuangan pada Unilever Tbk akibat boikot dengan metode rasio profitabilitas. *Indonesian Journal of Strategic Management*, 8(1), 130–136. <https://doi.org/10.25134/ijsm.v8i1.11181>
- Kroy, M., & Desmiza. (2025). The effect of return on assets, current ratio, debt to equity ratio, and company size on firm value: A study on telecommunications sub-sector companies in Indonesia. *Moneta: Journal of Economics and Finance*, 3(4), 233–250. <https://doi.org/10.61978/moneta.v3i4.726>
- Lestari, P., Rafiyani, A. R., Rahmawati, S. N., & Haryadi, D. (2024). Analysis of profitability ratio to financial performance of Indonesian telecommunication company Tbk (2018–2022 period). *International Journal of Applied Finance and Business Studies*, 11(4), 769–775. <https://doi.org/10.35335/ijafibs.v11i4.212>
- Linares-Mustarós, S., Farreras-Noguer, M. À., Arimany-Serrat, N., & Coenders, G. (2022). New financial ratios based on the compositional data methodology. *Axioms*, 11(12), 694. <https://doi.org/10.3390/axioms11120694>
- Malino, M., Syarifuddin, S., Sudarwadi, D., Numberi, C. L., & Sumari, J. (2025). Analysis of the financial performance dynamics of telecommunications companies in Indonesia before, during, and after the pandemic: Integration of financial ratios and managerial behavior theory. *Amkop Management Accounting Review*, 5(1), 462–476. <https://doi.org/10.37531/amar.v5i1.2693>
- Mubarak, F., Utami, T. S., Ishanifah, A., & Mawarni, A. P. (2024). Financial strategy and profitability performance: Financial ratio analysis of the telecommunications industry on the Indonesia Stock Exchange. *Telaah Bisnis*, 25(2), 78–87. <https://doi.org/10.35917/tb.v25i2.461>
- Mustafa, M., Hajar, H., & Hasan, A. (2026). The impact of net profit margin, return on assets, and return on equity on the stock prices of telecommunications companies in Indonesia. *Vifada Management and Social Sciences*, 4(1), 61–74. <https://doi.org/10.70184/c4npsv37>
- Nandika, K. Z., Sulisty, B., & Pulungan, M. A. (2024). Efficiency analysis of PT Dayamitra Telekomunikasi Tbk in the telecommunication infrastructure industry using the data envelopment analysis (DEA) method. *Jurnal Indonesia Sosial Teknologi*, 5(11), 6052–6066. <https://doi.org/10.59141/jist.v5i11.1251>
- Nashia, K. N. A., & Pratiwi, L. N. (2025). Analisis kinerja keuangan PT Telekomunikasi Indonesia Tbk tahun 2020–2024 menggunakan rasio likuiditas, rasio profitabilitas, dan rasio solvabilitas. *Journal of Fundamental Management (JFM)*, 5(2), 192–207. <https://doi.org/10.22441/jfm.v5i2.33998>
- Pratama, R. N., Purbawati, D., & Waloejo, H. D. (2022). Analisis rasio likuiditas, solvabilitas dan profitabilitas untuk menilai kinerja keuangan pada perusahaan telekomunikasi yang terdaftar di Bursa Efek Indonesia (BEI) periode 2016–2020. *Jurnal Ilmu Administrasi Bisnis*, 11(3), 587–594. <https://doi.org/10.14710/jiab.2022.35415>
- Putri, G. M., Widyarini, M., & Dewi, V. I. (2025). Profitability ratios analysis in telecommunication industry before, during, and after COVID pandemic. *Profit: Jurnal Administrasi Bisnis*, 19(2), 1–17. <https://doi.org/10.21776/ub.profit.2025.019.02.1>
- Putri, P. R., Yudistira, N., Sari, R., Aris, A. L., & Assaf, R. (2024). Analisis rasio profitabilitas dalam menilai kinerja keuangan pada PT Hanjaya Mandala Sampoerna, Tbk. *YUME: Journal of Management*, 7(3). <https://doi.org/10.37531/yum.v7i3.7149>
- Putriani, J., Desty, R., Ramadani, I., Saputra, R., & Herawati, H. (2025). Analisis rasio profitabilitas sebagai indikator kinerja keuangan di PT Wilmar Cahaya Indonesia Tbk. *Jurnal Ilmiah Metansi (Manajemen dan Akuntansi)*, 8(2), 253–258. <https://doi.org/10.57093/metansi.v8i2.411>
- Raharja, M. L., Widodo, A., & Rubiyanti, N. (2025). The influence of debt to equity ratio (DER) and debt to asset ratio (DAR) on profitability in telecommunications companies listed on the Indonesian Stock Exchange (IDX) period 2021–2024. *Formosa Journal of Multidisciplinary Research*, 4(12), 5655–5668. <https://doi.org/10.55927/fjmr.v4i12.616>
- Rizka, A., Aryaningsih, N. R., & Budianto, E. (2025). Factors affecting profitability in telecommunication sector companies listed on the Indonesia Stock Exchange for the period 2016–2023. *Indonesian Journal of Advanced Research*, 4(7), 1507–1522. <https://doi.org/10.55927/ijar.v4i7.14945>
- Salsabila, G., & Husnan, L. H. (2026). An empirical analysis of financial ratios and financial performance among telecommunication companies listed on the Indonesia Stock Exchange, 2022–

2024. *Economics and Business Journal (ECBIS)*, 4(4), 1095–1112. <https://doi.org/10.47353/ecbis.v4i4.328>
- Samaké, S.-N. (2026). Telcos and Big Tech: Value creation or destruction? *Telecommunications Policy*, 50(7), 103248. <https://doi.org/10.1016/j.telpol.2026.103248>
- Santi, A. K. A., Cahyani, A. D., Anita, & Najib, M. T. A. (2024). Analisis rasio likuiditas, rasio solvabilitas, rasio aktivitas, dan rasio profitabilitas terhadap kinerja keuangan perusahaan pada PT Nippon Indosari Corpindo Tbk. *Jurnal Akuntansi dan Ekonomi Bisnis*, 13(2), 76–96. <https://doi.org/10.33795/jaeb.v13i02.5251>
- Setiawan, E. A. (2024). Financial performance analysis of Indonesian telecommunication company. *Transaction: Journal of Taxation, Accounting, Management and Economics*, 2(1), 27–30. <https://doi.org/10.62287/transaction.vi.40>
- Shabrina, N., & Yulianti, D. M. (2021). Analisis rasio profitabilitas dan rasio likuiditas untuk menilai kinerja keuangan pada PT Astra International Tbk. *Jurnal Ilmiah Feasible (JIF)*, 3(2), 146–154. <https://doi.org/10.32493/fb.v3i2.2021.146-154.11112>
- Suardi, Yuliana, & Maksum. (2025). Analisis rasio profitabilitas pada PT Astra Agro Lestari Tbk periode 2020–2024. *Jurnal Equilibrium Manajemen Fakultas Ekonomi Universitas Panca Bhakti*, 11(1), 1–9. <https://doi.org/10.54035/jem.v11i1.564>
- Tutcu, B., Kayakuş, M., Terzioğlu, M., Ünal Uyar, G. F., Talaş, H., & Yetiz, F. (2024). Predicting financial performance in the IT industry with machine learning: ROA and ROE analysis. *Applied Sciences*, 14(17), 7459. <https://doi.org/10.3390/app14177459>
- Whalley, J., & Curwen, P. (2024). Creating value from 5G: The challenge for mobile operators. *Telecommunications Policy*, 48(2), 102647. <https://doi.org/10.1016/j.telpol.2023.102647>