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Digital Transformation and Organizational Resilience in Indonesia's Freight Forwarding Industry: Evidence from Operational Efficiency and Profitability Performance

Naura Marshalia Putri[1]* and Aldi Akbar[1]

[1]Department of Business Administration, Telkom University, Indonesia

*Corresponding Author Email: nauramarshalia@student.telkomuniversity.ac.id.

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Abstract

This study examines the role of service digitalization in strengthening organizational resilience and financial performance within Indonesia's freight forwarding industry. The research employs a quantitative comparative approach using a before-and-after analysis based on 46 paired monthly observations from PT Dwiharta Logistindo following the implementation of an internal digital system (DWISOFT). Operational efficiency is measured using Total Asset Turnover (TATO), while profitability is measured using Return on Investment (ROI). The findings indicate that the average TATO slightly increased from 0.1091 to 0.1102 after digitalization; however, the difference is not statistically significant ($p = 0.797$). In contrast, profitability improved significantly, with ROI increasing from 0.00189 to 0.00714 ($p = 0.002$). These results suggest that digital transformation contributes more substantially to organizational resilience through cost efficiency, operational stability, and improved financial adaptability rather than through increased asset utilization efficiency. This study contributes to the growing discussion on digital governance and resilience in the logistics sector by providing firm-level empirical evidence from an emerging economy context. The findings also offer practical implications for freight forwarding and logistics companies seeking to strengthen operational sustainability and long-term competitiveness through internal digital transformation initiatives.

Keywords: Digital transformation, Organizational resilience, Freight forwarding, Operational efficiency, Logistics digitalization

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Introduction

In recent years, the global logistics industry has undergone significant transformation driven by digital technological advancements. The COVID-19 pandemic further accelerated digital transformation across industries, forcing organizations to redesign traditional business processes and adopt digital solutions to maintain operational continuity and competitiveness (Hashemi et al., 2022). The emergence of Logistics 4.0 as part of the Industry 4.0 paradigm has reshaped supply chain management through automation, data integration, and real-time decision-making (Egorov et al., 2021; Zaripova et al., 2024; Pozzo et al., 2022).

According to the 2023 World Bank Logistics Performance Index (LPI), Indonesia ranked 61st globally with an overall score of 3.0, below several ASEAN countries such as Singapore (1st; 4.3), Malaysia (26th; 3.6), Thailand (34th; 3.5), Vietnam (43rd; 3.3), and the Philippines (43rd; 3.3). Indonesia also recorded relatively low rankings in customs efficiency (59th) and tracking and tracing capabilities (65th), indicating persistent challenges in logistics performance and digital integration (World Bank, 2023). These performance gaps highlight the need for continued digital transformation initiatives within logistics companies to improve information visibility, coordination efficiency, and service reliability. These challenges increase operational costs and encourage logistics companies to accelerate digital transformation initiatives to improve competitiveness and operational sustainability. The adoption of technologies in logistics improves operational efficiency, reduces errors, and enhances service quality (Seeboo, 2025; Hordieiev et al., 2025). Empirical evidence indicates that information system implementation can improve both operational and financial performance by enhancing coordination efficiency and supporting more effective business processes (Yang et al., 2025). Improved service quality is also one of the benefits that can be achieved through the effective implementation of digital systems (Utami & Hidayat, 2024).

Empirical studies indicate that digitalization can significantly improve logistics performance, including reducing delivery time, minimizing documentation errors, and increasing inventory visibility (Yin & Sun, 2025). Digital transformation has been shown to improve firm performance by enhancing innovation capability and reducing operational inefficiencies, thereby strengthening the value creation process within organizations (Cheng et al., 2026). Digital transformation can improve organizational performance by enhancing information accessibility, reducing coordination costs, and increasing operational efficiency across business processes (Jing & Fan, 2024). Digital transformation has been recognized as an important mechanism through which digital capabilities can improve organizational performance by enhancing operational flexibility, quality, and financial outcomes (Prakasa & Jumani, 2024). Previous studies have shown that digitalization significantly enhances financial performance through improvements in profitability, sales growth, and operational efficiency across various business sectors (Abakpa & Dvouletý, 2025). Previous research has shown that supply chain digitalization can strengthen organizational performance by enhancing integration, agility, and information flow across operational activities (Ikrima et al., 2024).

In Indonesia, digital transformation in the logistics sector has become a strategic priority to address high logistics costs and improve national competitiveness. As an archipelagic country, Indonesia faces challenges related to infrastructure limitations and inter-regional coordination.

Government initiatives such as the National Logistics Ecosystem (NLE) aim to integrate logistics services across institutions, improve efficiency, and enhance service quality through digital systems (Ricardianto et al., 2023). These findings indicate persistent infrastructure and system integration challenges across Indonesia's logistics sector despite ongoing digitalization initiatives.

Cybersecurity readiness also remains a significant challenge for organizations undergoing digital transformation. According to the 2024 Cisco Cybersecurity Readiness Index, only 12% of organizations in Indonesia were classified as having a mature level of cybersecurity readiness, while a substantial proportion remained at the formative or beginner stages. Common cyber threats include supply chain attacks, credential theft, and social engineering, which may increase operational risks as logistics processes become increasingly digitalized. The report also highlights a shortage of skilled cybersecurity professionals, suggesting that human resource readiness remains a critical barrier to the successful implementation of digital transformation initiatives (Cisco, 2024).

In addition to efficiency challenges, logistics companies are increasingly required to maintain operational continuity and adaptability amid rapidly changing business environments, global supply chain disruptions, and increasing operational complexity. Effective and efficient supply chain management is essential for maintaining business stability and supporting long-term organizational sustainability in increasingly complex logistics environments (Ricardianto et al., 2022). In this context, organizational adaptability and operational continuity become increasingly important for logistics companies operating in dynamic business environments. Digital transformation is therefore often associated with efforts to improve efficiency, organizational adaptability, and operational sustainability.

In the freight forwarding sector, digitalization plays a critical role in transforming export–import processes. The adoption of electronic documentation systems, digital transactions, and automated workflows has improved efficiency, transparency, and cost control compared to traditional manual systems (Gruchmann et al., 2020; Kristiyanti et al., 2024). Digital systems also support faster customs clearance and improve compliance with international trade regulations (Pius & Murugan, 2025). However, in practice, many freight forwarding companies in Indonesia still face challenges in fully implementing digital systems, which can result in inefficiencies such as document-processing delays and additional operational costs.

Most previous studies on logistics digitalization focus on macro-level logistics systems, general supply chain digitalization, or technology adoption at the industry level (Egorov et al., 2021; Zaripova et al., 2024; Ricardianto et al., 2023; Bekmurzaev et al., 2020). These studies typically emphasize technology adoption or service quality rather than directly measuring changes in firm-level operational efficiency and profitability after a specific digital system is implemented. Firm-level, longitudinal financial evidence, especially from a single freight forwarding company observed continuously before and after a digitalization event, remains scarce (Setyawan et al., 2023; Lee et al., 2023). This is the research gap this study addresses: rather than inferring financial outcomes from perceptions of digitalization, it uses the company's own monthly financial ratios as the outcome measure.

The originality of this study lies in three features taken together: (1) it evaluates an internally built, non-customer-facing digital system (DWISOFT) rather than a vendor platform or industry-wide initiative; (2) it separates efficiency (TATO) from profitability (ROI) as two conceptually distinct outcomes rather than treating "financial performance" as a single construct, following the reasoning of Li et al. (2025) and Liu & Li (2025) that digitalization's effects on different performance dimensions in logistics firms need not move together; and (3) it uses 92 consecutive monthly observations spanning nearly eight years, offering more temporal resolution than the annual or cross-sectional data used in most prior Indonesian logistics studies (Rosdiana et al., 2025; Firdausiyah et al., 2024).

This study aims to examine differences in operational efficiency (TATO) and profitability (ROI) before and after the implementation of DWISOFT at PT Dwiharta Logistindo, and to evaluate as a secondary, interpretive aim what this pattern implies for how internal digitalization may relate to organizational adaptability in the freight forwarding context. The study does not aim to establish causality between DWISOFT and financial performance or to directly measure organizational resilience as a construct. Using a before-and-after comparative design with 46 paired monthly observations per period, the study finds that ROI increased significantly after DWISOFT's implementation while TATO did not change significantly. The remainder of this paper reviews the relevant literature (Literature Review), describes the research design, site, data collection, data analysis, and validation procedures (Methodology), reports the descriptive and inferential results (Results), interprets and situates these findings (Discussion), and closes with conclusions, practical and policy implications, and limitations.

Literature Review

Conceptual Foundation of Digital Transformation

Digital transformation refers to a fundamental organizational shift driven by the integration of digital technologies into business processes, structures, and value creation mechanisms (Vial, 2019). Digital transformation is increasingly recognized as a strategic process that reshapes organizational structures, processes, and capabilities to adapt to changing business environments (Hanelt et al., 2021). Through digitalization, firms apply digital technologies to optimize existing business processes by enabling more efficient coordination between processes and creating additional customer value (Verhoef et al., 2021). Unlike simple technological adoption, digital transformation involves structural changes that reshape how organizations operate and compete. Bharadwaj et al. (2013) further emphasize that digital transformation must be aligned with business strategy to generate sustainable competitive advantage.

However, the literature also suggests that the impact of digital transformation is not uniform across all performance dimensions. While digital technologies are expected to improve efficiency and decision-making through data integration and automation, their effectiveness depends on how well they are embedded within organizational processes and capabilities. Previous studies have reported positive associations between digital transformation, innovation capability, and firm performance by facilitating innovation and improving organizational effectiveness through data-driven decision-making processes (Zheng & Bu, 2024).

Digital Transformation and Operational Efficiency

From a process perspective, digitalization is often associated with improvements in operational efficiency. Davenport (1993) and Hammer and Champy (1993) argue that process automation and business process reengineering can reduce redundancy, minimize human error, and shorten processing time. These improvements theoretically lead to more efficient utilization of organizational resources.

In financial terms, operational efficiency is commonly reflected in activity ratios such as Total Asset Turnover (TATO), which measures how effectively a firm utilizes its assets to generate revenue (Brigham & Houston, 2019). Higher efficiency is expected to result in increased asset productivity.

However, prior studies rarely distinguish between process efficiency improvements and measurable asset efficiency outcomes. Improvements in administrative processes do not necessarily translate into higher asset turnover, particularly in industries where asset structures remain relatively stable, such as freight forwarding. This creates a gap between theoretical expectations and measurable financial outcomes.

Digital Transformation and Profitability

In addition to efficiency, digital transformation is widely associated with improvements in financial performance, particularly profitability. By reducing operational costs, minimizing errors, and improving process speed, digitalization can enhance profit margins and overall financial returns.

Return on Investment (ROI) is commonly used to assess profitability, as it reflects the firm's ability to generate net income from its assets (Van Horne & Wachowicz, 2012). Unlike efficiency measures, profitability is more sensitive to cost reductions and process improvements, making it a more direct indicator of the financial impact of digitalization.

Nevertheless, the literature often assumes that improvements in efficiency and profitability occur simultaneously. In practice, these two dimensions may respond differently to digital transformation, depending on whether the primary impact of digitalization lies in cost reduction or asset utilization (Setyawan et al., 2023)

Resource-Based View (RBV) Perspective

The Resource-Based View (RBV) is frequently used in digital transformation research to explain how organizational resources and capabilities may support performance improvement. In this study, RBV serves as a conceptual lens for understanding the potential role of digital systems in organizational performance rather than as a theory being directly tested. According to Barney (1991), firms achieve competitive advantage through resources that are valuable, rare, inimitable, and non-substitutable (VRIN). Competitive advantage may also be influenced by strategic choices that enable firms to differentiate their services while maintaining operational efficiency in dynamic market environments (Gómez et al., 2021).

Digital systems, organizational capabilities, and data integration can be considered strategic resources under this framework. However, RBV also emphasizes that performance outcomes depend

on how effectively these resources are utilized; the mere presence of digital technology does not guarantee improved efficiency or profitability. In the context of freight forwarding, internal digital systems such as DWISOFT may enhance administrative efficiency and reduce operational errors, but their impact on broader financial indicators such as asset turnover may be limited if the system primarily improves internal processes rather than revenue-generating activities.

Organizational Adaptability as a Contextual Lens

Prior organizational-behavior and digital-transformation literature suggests that digital capability can support organizational adaptability by improving data integration, communication speed, and decision-making effectiveness (Haryanti et al., 2024; Egorov et al., 2021). Recent evidence from Indonesia's logistics sector also suggests that digital transformation can strengthen supply chain resilience by improving process integration and organizational responsiveness under market uncertainty (Handijaya et al., 2024; Rosdiana et al., 2025).

This study does not measure organizational resilience with a dedicated instrument, and TATO and ROI are not resilience indicators. Accordingly, the discussion below treats organizational adaptability strictly as a contextual, interpretive lens for the financial findings not as a construct the study tests.

Research Gap and Contribution

Although previous studies generally report positive associations between digital transformation, operational efficiency, and financial performance, empirical evidence at the firm level particularly in the freight forwarding sector remains limited. Most previous studies focus on macro-level logistics systems, supply chain digitalization, or technology adoption, while firm-level longitudinal evidence based on financial performance indicators remains relatively limited. Furthermore, few studies have specifically evaluated differences in operational efficiency and profitability before and after the implementation of an internal digital system. More importantly, there is limited research that critically examines whether digitalization affects efficiency and profitability in the same way. This distinction is important, as improvements in internal processes may lead to cost efficiency without necessarily improving asset utilization.

Therefore, this study contributes firm-level evidence on differences in operational efficiency (TATO) and profitability (ROI) before and after the implementation of an internal digital system in a company that has not yet integrated its system with customer-facing or national logistics platforms. This scope condition may itself help explain the asymmetric performance pattern observed.

Research Methodology

Research Design

This study employs a quantitative approach with a comparative before-and-after (single-group, non-experimental) design to examine differences in financial performance surrounding the implementation of an internal digital system in one freight forwarding company. The study applies a deductive approach, drawing on digital transformation literature, RBV as a conceptual perspective, and financial performance concepts to interpret the findings. This before-and-after design compares two time periods within a single firm and does not include a control group or comparison firm;

consequently, it can describe an association between the DWISOFT implementation date and changes in financial ratios, but it cannot rule out the contribution of concurrent factors, most notably Indonesia's broader post-pandemic economic recovery, which coincides closely with the 2022 digitalization cutoff.

Research Site

The research site is PT Dwiharta Logistindo, an Indonesian freight forwarding firm that began implementing an internal digitalization system, DWISOFT, in 2022. DWISOFT is a desktop-based system built and maintained by the company's internal IT team, developed to modernize work processes that had previously relied on manual procedures and physical record-keeping. The system comprises several core modules: job order management, booking, billing, finance, accounting, spare-part management, and operational tracking. Beyond billing and operational management, DWISOFT is also used to manage export–import documentation, including the input and storage of documents such as invoices, packing lists, house and master bills of lading, and customs documents (PIB and PEB). Its principal functional aims are to reduce the risk of human error, accelerate administrative processing, and increase the transparency of data that had previously been scattered across manual channels. As of the observation period, DWISOFT remains an internal system: it is not yet connected to customers or to national digital logistics platforms such as the National Logistics Ecosystem (NLE). This scope internal-facing rather than customer-facing or revenue-facing is a substantive input to the interpretation of why ROI, but not TATO, changed significantly (see Discussion).

Data Collection

The data used in this study are secondary monthly financial data obtained from the internal accounting records of PT Dwiharta Logistindo, comprising balance sheets and income statements for each calendar month. The observation period covers March 2018 to October 2025 and is divided into two periods of equal length: before digitalization (March 2018–December 2021, 46 months) and after digitalization (January 2022–October 2025, 46 months). The post-digitalization period represents all 46 months for which post-implementation financial data were available at the time of the study. To provide an equal-length comparison period, the 46 months immediately preceding DWISOFT implementation were selected as the pre-digitalization period. Because the study uses the complete set of available monthly financial records for both periods rather than a drawn subset, it applies a census approach rather than sampling; the unit of analysis is the company's monthly financial ratio. Monthly observations were used because PT Dwiharta Logistindo internally evaluates operational and financial performance on a monthly reporting basis, although the authors acknowledge that activity and profitability ratios are more commonly analyzed using quarterly or annual periods, and that monthly TATO in particular may be more sensitive to short-term seasonal shipment volume than to underlying asset productivity.

Access to the company's internal financial data was granted by PT Dwiharta Logistindo's management for the purposes of this academic study, on condition that only the derived monthly ratios (TATO and ROI) not the underlying balance sheet and income statement figures are reported publicly. No customer-, employee-, or transaction-level personal data were accessed; the dataset consists solely of company-level monthly financial totals. The authors did not independently audit

the underlying accounting records and rely on the figures as recorded in the company's internal system; this reliance is stated as a limitation in the closing section.

Data Analysis

Digitalization is operationalized as a nominal, two-level condition: 0 = pre-digitalization period, 1 = post-digitalization period. Operational efficiency is measured using Total Asset Turnover (TATO), calculated as net sales divided by total assets (Brigham & Houston, 2019). Profitability is measured using Return on Investment (ROI), calculated as net income divided by total assets (Brigham & Houston, 2019; Van Horne & Wachowicz, 2012).

Data analysis was conducted using IBM SPSS. After data cleaning and ratio calculation for each monthly observation, descriptive statistics (mean, standard deviation) were computed for TATO and ROI in each period. Normality was assessed using the Shapiro–Wilk test, appropriate for group sizes below 50 (Sugiyono, 2023). Because TATO was normally distributed in both periods (Shapiro–Wilk $p = .114$ and $p = .443$) while ROI was not ($p < .001$ in both periods), TATO was analyzed using a paired-sample t-test and ROI using the Wilcoxon signed-rank test. Statistical significance was evaluated at the 5% level ($\alpha = .05$); effect sizes (Cohen's d for the t-test, $r = Z/\sqrt{N}$ for the Wilcoxon test) were computed alongside significance tests to characterize the magnitude, not only the presence, of any difference.

Data Validation

Two safeguards were used to support the validity of the comparison. This pairing should be distinguished from month-to-month matching based on economic characteristics, season, cargo volume, or calendar month (e.g., March 2018 is not specifically paired with a corresponding month after digitalization); the pairing is structural, period 1's 46 observations against period 2's 46 observations, in the paired-test sense of two equal-sized related groups, not a month-to-month matched pair. This structural pairing is acknowledged as a design constraint because individual months were not matched on calendar period, seasonality, cargo volume, or other economic characteristics. Accordingly, the results are interpreted as period-level differences within the same firm rather than as evidence of causal correspondence between individual monthly observations. Second, ratio calculations were re-verified by recomputing TATO and ROI directly from the monthly balance sheet and income statement figures and cross-checking these against the SPSS output (Shapiro–Wilk statistics, paired-samples t-test output including t, df, mean difference, SD, and Cohen's d/Hedges' g, and the Wilcoxon signed-rank test output including the test statistic, standardized test statistic, and asymptotic significance) before reporting. The operational definitions, indicators, and measurement formulas for all variables are summarized in Table 1.

Table 1. Operational Definition of Variables

Variable	Indicator	Description
Service Digitalization	DIG	Digitalization is defined as the implementation of the internal digital system DWISOFT at PT Dwiharta Logistindo. It is operationalized as a nominal condition: 0 = before digitalization

		(March 2018–December 2021), 1 = after digitalization (January 2022–October 2025).
Operational Efficiency	TATO	Total Asset Turnover (TATO) measures the company's ability to utilize total assets to generate sales. It is calculated as Net Sales / Total Assets (Brigham & Houston, 2019).
Profitability	ROI	Return on Investment (ROI) measures the company's ability to generate net income from total assets. It is calculated as Net Income / Total Assets (Brigham & Houston, 2019; Van Horne & Wachowicz, 2012).

Source: Author research, 2026.

Descriptive statistics are used to provide an overview of the financial performance variables in both periods. The results indicate that the average Total Asset Turnover (TATO) increased slightly from 0.1091 in the pre-digitalization period to 0.1102 in the post-digitalization period. Meanwhile, the average Return on Investment (ROI) increased more substantially from 0.00189 to 0.00714. The longitudinal comparisons of these monthly averages are visually illustrated in Figure 1 for TATO and Figure 2 for ROI.

These descriptive results show that asset utilization efficiency differed only marginally between the two periods, whereas profitability was notably higher in the post-digitalization period.

Table 2. Descriptive Statistics

Variable	Before Digitalization	After Digitalization
TATO	0.1091	0.1102
ROI	0.00189	0.00714

Source: Author research, 2026.

Table 2 shows that the average TATO increased only marginally from 0.1091 to 0.1102 between the two periods. In contrast, the average ROI increased from 0.00189 to 0.00714, indicating a larger difference in profitability than in asset utilization efficiency.

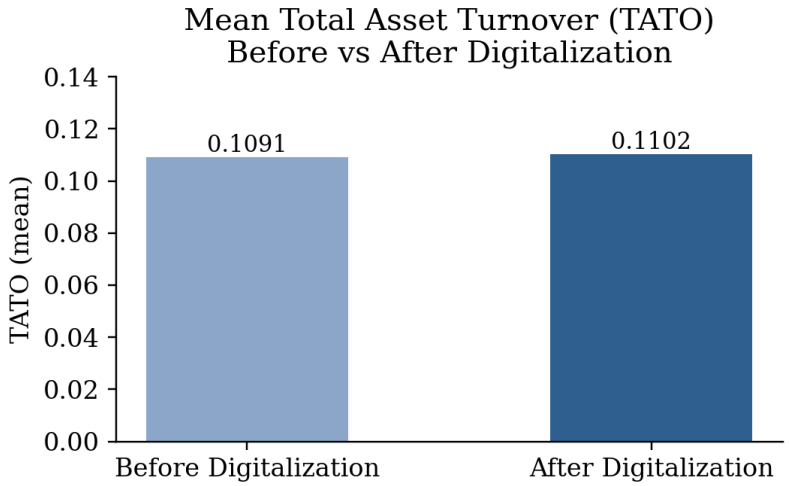


Figure 1. Mean TATO Before and After Digitalization. Source: Author research, 2026.

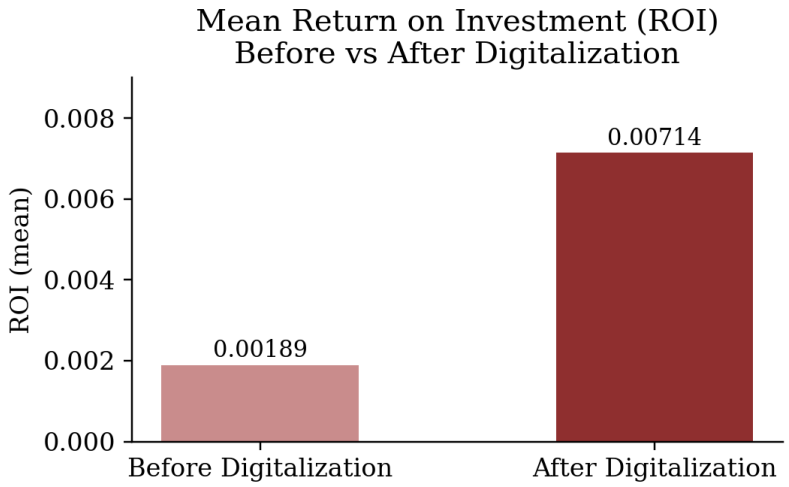


Figure 2. Mean ROI Before and After Digitalization. Source: Author research, 2026.

Normality Test

To determine the appropriate statistical test, the normality of the data was assessed using the Shapiro–Wilk test. The results show that TATO data for both periods are normally distributed, with significance values of 0.114 and 0.443, respectively. In contrast, ROI data do not meet the normality assumption, as both periods yield significance values below 0.001.

These results indicate that parametric testing can be applied to TATO, while nonparametric testing is required for ROI.

Table 3. Normality Test Result

Variable	Shapiro–Wilk Statistic	df	Sig.	Interpretation
TATO_before	.960	46	.114	Normal
TATO_after	.976	46	.443	Normal
ROI_before	.791	46	< .001	Not Normal
ROI_after	.809	46	< .001	Not Normal

Source: Author research, 2026.

As shown in Table 3, TATO data met the normality assumption in both periods, whereas ROI data did not. Therefore, different inferential tests were required for each variable.

Result & Findings

Different Test

The paired-sample t-test for TATO shows no statistically significant difference between the pre- and post-digitalization periods: mean difference = −0.00109 (post minus pre would be +0.00109; SPSS reports the before-minus-after difference), SD of the paired difference = 0.0287, t(45) = −0.259, p = .797 (two-tailed), 95% CI of the difference [−0.0096, 0.0074]. The associated effect size is very small (Cohen's d = −0.038; Hedges' g = −0.038, 95% CI [−0.322, 0.247]), indicating that not only is the TATO difference statistically non-significant, its magnitude is negligible in practical terms.

Conversely, the Wilcoxon signed-rank test for ROI demonstrated a statistically significant and meaningful increase post-digitalization: $Test\ Statistic = 822.000$, $Standard\ Error = 91.530$, $Standardized\ Test\ Statistic\ (Z) = 3.075$, asymptotic $p = .002$(two-sided). The associated effect size ($r = Z/\sqrt{N} = 3.075/\sqrt{46} \approx .45$) indicates a moderate-to-large empirical effect. A summary of these inferential difference tests is presented in Table 4.

Table 4. Inferential Difference Test Results for TATO and ROI

Performance Dimension	Statistical Test Employed	Empirical Test Statistic	p-value	Standardized Effect Size	Empirical Decision
Operational Efficiency (TATO)	Paired-Samples t-test	$t(45) = -0.259$	0.797	$d = -0.038$	Not Significant
Profitability (ROI)	Wilcoxon Signed-Rank Test	$Z = 3.075$	0.002	$r \approx .45$	Statistically Significant

Source: Author research, 2026.

Interpretation of Research Results

Taken together, the descriptive, normality, and difference-test results indicate an asymmetric pattern: profitability (ROI) increased by a statistically significant and moderately-large margin following DWISOFT's implementation, while operational efficiency (TATO) showed no statistically or practically significant change. Because this is a single-firm, before-and-after design without a control

group, this pattern should be read as an association observed at PT Dwiharta Logistindo during this period, not as proof that DWISOFT caused the ROI increase; the Discussion section addresses rival explanations, including the post-pandemic economic recovery that coincides with the same period.

Discussion

Research Synthesis

The findings indicate an asymmetric performance pattern following DWISOFT's implementation: ROI was significantly and substantially higher in the post-digitalization period ($Z = 3.075$, $p = .002$, $r \approx .45$), while TATO showed no significant or practically meaningful change ($t(45) = -0.259$, $p = .797$, $d = -0.04$). Synthesizing across the literature reviewed, this pattern is consistent with the view that internal-facing digitalization (administrative, billing, and documentation automation, as DWISOFT is scoped) plausibly affects cost structure and processing speed, which feed directly into ROI more than it affects the sales-to-asset relationship captured by TATO (Davenport, 1993; Hammer & Champy ,1993; Verhoef et al., 2021).

An important caveat to this interpretation is that PT Dwiharta Logistindo's post-digitalization period (2022–2025) overlaps almost exactly with Indonesia's post-pandemic economic recovery. Freight volumes, trade activity, and shipping rates across the logistics sector generally recovered and in some segments rose sharply during this window for reasons unrelated to any single firm's internal system. Because this study has no control group or comparison firm that did not adopt a similar system over the same period, it cannot statistically separate the DWISOFT effect from this broader time trend. The ROI increase reported here is therefore best read as "ROI was higher after DWISOFT was implemented, in a period that also coincided with sector-wide recovery," not as "DWISOFT caused the ROI increase."

Digitalization and Operational Efficiency: Limited Impact on Asset Utilization

The results show that no statistically significant difference in TATO was observed following digitalization implementation, suggesting that the implementation of DWISOFT has not materially enhanced asset utilization. This finding contrasts with the theoretical expectation that digital transformation leads to improved efficiency through process automation and integration (Davenport, 1993; Hammer & Champy, 1993).

A plausible, scope-consistent explanation is that TATO reflects the relationship between revenue generation and total assets, so improvements in internal processes do not automatically translate into higher asset turnover. As described in the Research Site section, DWISOFT's modules (job order, booking, billing, finance, accounting, spare-part, and operational tracking) are internal and administrative in nature and are not yet connected to customers or to revenue-generating, external-facing systems such as the National Logistics Ecosystem (NLE). This scope condition is consistent with and helps explain why TATO, which depends on sales relative to assets, would be less responsive than ROI, which is sensitive to internal cost and processing efficiency.

Furthermore, the relatively stable asset base of the company may limit observable changes in TATO. Even if digitalization improves processing speed and reduces operational bottlenecks, these improvements may not be sufficient to significantly increase sales relative to total assets. Monthly

TATO values may also be influenced by seasonal fluctuations in freight forwarding activity while total assets tend to change more gradually. Consequently, short-term changes in shipment volume may affect monthly sales without producing corresponding changes in the company's asset base, potentially contributing to the relatively stable TATO observed across the two periods.

This finding contrasts with studies that report significant efficiency improvements following logistics digitalization (Ricardianto et al., 2023), but is consistent with arguments suggesting that internal process improvements do not always translate into measurable asset productivity gains. Similar positive effects of digitalization on operational performance have also been reported by Yang et al. (2025) and Jing and Fan (2024), who found that digital systems can enhance coordination efficiency and supply chain performance. However, the present findings suggest that such operational improvements may not always be reflected in asset-based efficiency indicators such as TATO. This finding also aligns with studies suggesting that the benefits of digital transformation may vary depending on the performance dimension being evaluated. While digitalization often improves process visibility, coordination, and information quality, these improvements do not necessarily translate into higher asset productivity, particularly in service-oriented industries where asset structures remain relatively stable (Verhoef et al., 2021; Hanelt et al., 2021).

Digitalization and Profitability: A Notable but Not Yet Attributable Increase

The significant increase in ROI indicates a meaningful difference in profitability between the pre- and post-digitalization periods, with a moderate-to-large effect size ($r \approx .45$). This is consistent with arguments that digital transformation may be associated with improved financial performance through cost efficiency and margin improvement rather than through increased output (Yunani & Firmialy, 2025; Liu and Li, 2025). Since ROI is sensitive to changes in both cost and profit, it plausibly captures the administrative and cost-side benefits of digitalization more directly than TATO does.

This interpretation is offered cautiously and explicitly as one candidate explanation among others, not as an established causal finding: given the absence of a control group and the overlap with the post-pandemic recovery noted above, the observed ROI increase cannot be attributed solely to DWISOFT. It is consistent with the Resource-Based View, which suggests digital systems can function as strategic resources that improve firm performance when effectively utilized (Barney, 1991), but RBV support here is interpretive rather than a formal test of the theory.

Contextual Implications for Organizational Adaptability

Although this study does not directly measure organizational resilience with a dedicated instrument, the findings may offer indirect, limited insight into organizational adaptability. The significant ROI increase suggests that internal digitalization may be associated with improved cost control and administrative stability, which prior literature associates with elements of operational resilience such as responsiveness and information visibility (Haryanti et al., 2024; Egorov et al., 2021). The absence of a significant TATO change indicates that digitalization did not uniformly improve every performance dimension, consistent with the broader point that digital transformation effects are not automatic or uniform (Prakasa & Jumani, 2024).

Differential Impact: Efficiency vs Profitability

A key contribution of this study lies in demonstrating that digitalization does not necessarily improve efficiency and profitability simultaneously. While many studies assume a direct positive relationship between digital transformation and overall performance, the results here suggest that profitability may improve even when efficiency indicators remain unchanged.

This distinction is important because it challenges the common assumption that process digitalization will automatically improve all dimensions of performance. Instead, the observed pattern suggests that the post-digitalization period was associated more strongly with profitability than with asset productivity in this case. One possible mechanism is improved cost and administrative efficiency, although these mechanisms were not directly measured in the present study.

The findings suggest that financial performance indicators may respond to digitalization through different mechanisms. Profitability can improve through cost reductions and process optimization, whereas efficiency ratios such as TATO depend on broader changes in sales generation and asset utilization. This distinction highlights the importance of selecting performance indicators that are aligned with the expected outcomes of digital transformation initiatives.

Contextual Implications for Freight Forwarding Industry

The findings also reflect the specific characteristics of the freight forwarding industry. Unlike asset-intensive industries, freight forwarding relies heavily on coordination, documentation, and information processing. Therefore, internal digitalization in freight forwarding may influence administrative coordination and information processing more directly than asset turnover. However, these operational mechanisms were not directly measured in this study.

Organizational resilience, however, was not directly operationalized or measured in this study. Therefore, the observed TATO and ROI patterns should not be interpreted as empirical evidence of resilience, recovery capability, flexibility, or crisis-response capacity. Any relationship with organizational adaptability remains contextual and requires direct measurement in future research.

Additionally, the fact that DWISOFT is an internal system not yet integrated with external stakeholders such as customers or national logistics platforms may limit its impact on revenue generation. This suggests that the stage and scope of digitalization play a critical role in determining its performance outcomes.

Theoretical Implications

Theoretically, this study contributes evidence that digitalization may affect profitability and operational efficiency differently within the same firm and time frame, challenging the assumption that process digitalization automatically improves all dimensions of firm performance simultaneously. The findings offer descriptive, firm-level support consistent with RBV's emphasis that resource value depends on how a resource is deployed and used (Barney, 1991; Wernerfelt, 1984), and align with recent work distinguishing digitalization's differential effects on distinct performance outcomes in logistics firms (Li et al., 2025).

Practical Implications

From a managerial perspective, the results imply that companies should define clearly what outcome they expect from a digitalization initiative before evaluating its success. If the objective is profitability improvement, an internal, administratively focused system such as DWISOFT may plausibly support that goal, though (as above) this cannot be attributed to the system alone from this evidence base. If the goal is improved asset efficiency or revenue generation, digitalization efforts may need to extend beyond internal processes to customer-facing systems and external integration, such as connection to the National Logistics Ecosystem.

Policy Implications

Although this study focuses on a single freight forwarding company and cannot support firm-generalizable policy conclusions, the pattern observed offers a narrowly scoped, hypothesis-generating implication for logistics digitalization policy in Indonesia. Government initiatives such as the National Logistics Ecosystem (NLE) that aim to integrate logistics services across institutions (Ricardianto et al., 2023) may wish to consider that internal digitalization alone without external/customer-facing integration may be more strongly associated with cost-side profitability than with asset-utilization efficiency; if a policy objective is specifically to raise sector-wide asset efficiency, internal-system adoption alone may not be sufficient. This implication should be treated as a hypothesis for further, multi-firm research rather than an established policy finding, given the single-firm, no-control-group basis of the present study.

Conclusion

This study investigated empirical differences in financial performance before and after the implementation of an internal digital platform (DWISOFT) within an Indonesian freight forwarding firm across 92 consecutive months. The findings substantiate an asymmetric performance pattern: operational asset efficiency (TATO) displayed no statistically significant change ($t(45) = -0.259, p = .797, d = -0.04$), whereas profitability (ROI) increased significantly with a moderate-to-large effect size ($Z = 3.075, p = .002, r \approx .45$).

These differences were observed at a single freight forwarding company, over two before/after periods that also coincide with Indonesia's broader post-pandemic economic recovery, and without a control group. The findings should therefore be read as evidence that ROI and TATO responded differently within this firm during this period a pattern worth further, more rigorously designed investigation rather than as proof that DWISOFT caused the profitability increase or that internal digitalization does not affect asset efficiency in general.

Overall, this study highlights that digitalization in freight forwarding companies does not automatically improve every aspect of performance simultaneously. Its association is more pronounced with profitability than with operational efficiency in this case, emphasizing the importance of selecting performance indicators aligned with the digitalization outcome actually being evaluated.

This study provides several practical insights for freight forwarding and logistics companies:

- Prioritize Cost Efficiency through Digitalization: Internal digital systems may help improve administrative efficiency, reduce operational friction, and strengthen operational coordination, which may contribute to improved profitability.
- Align Digitalization Strategy with Performance Goals: Companies should clearly define whether digital transformation is aimed at improving efficiency, profitability, or both, as these outcomes may not occur simultaneously.
- Expand Digital Integration Beyond Internal Systems : To improve asset utilization and revenue performance, digitalization should not be limited to internal processes but extended to customer-facing systems and external platforms such as logistics ecosystems.
- Enhance Data Utilization for Decision-Making: Digital systems should be leveraged not only for operational automation but also for data-driven decision-making to maximize business value.

Limitations and Future Research

This study has several limitations. First, the analysis is based on a single case study of PT Dwiharta Logistindo, which limits the generalizability of the findings to other companies or industries. Second, the study uses a before-and-after design without a control or comparison group, so the observed differences particularly the ROI increase cannot be attributed solely to DWISOFT; concurrent factors such as Indonesia's post-pandemic economic recovery, market conditions, and broader industry dynamics, which coincide closely with the study's 2022 digitalization cutoff, may also have contributed and cannot be statistically separated from the digitalization effect in this design.

Third, the pairing used for the paired-sample and Wilcoxon tests is structural (46 months in each period treated as equal-sized related groups) rather than a calendar- or season-matched pairing of specific months; this is stated explicitly here as a design constraint rather than left implicit. Fourth, this study focuses on two financial indicators, TATO and ROI, and does not directly measure organizational resilience; any resilience-related language in the Discussion is interpretive context, not a tested construct. Fifth, the underlying financial data were provided by company management and were not independently audited by the authors; only the derived ratios, not the underlying statements, were available for verification.

Future research is recommended to include additional performance measures (e.g., revenue growth, cost-efficiency ratios, operational lead time), and, where feasible, a matched comparison firm or industry benchmark to help separate the effect of internal digitalization from concurrent macroeconomic recovery. Studies comparing multiple companies or industries would also help clarify how digital transformation outcomes vary across organizational contexts.

Declaration of Competing Interest

The authors declare that there are no known competing financial interests or personal relationships that could have influenced the work reported in this study.

Use of Artificial Intelligence (AI)-Assisted Technology

The authors declare that no artificial intelligence (AI) tools were used in the preparation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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Author's Bio*

Naura Marshalia Putri, Department of Business Administration, Telkom University, Indonesia, Field of Scientific Expertise: Business Administration and Financial Management, Email: nauramarshalia@student.telkomuniversity.ac.id.

Aldi Akbar, Department of Business Administration, Telkom University, Indonesia, Field of Scientific Expertise: Financial Management and Business Administration, Email: aldiakb@telkomuniversity.ac.id , and Orcid: https://orcid.org/0000-0002-4565-6906.