EFFECTS OF SUPPLY CHAIN PROCUREMENT AND SUPPLY CHAIN AGILITY ON OPERATIONAL PERFORMANCE: THE MEDIATING ROLE OF DIGITAL TECHNOLOGY AT SOEKARNO–HATTA INTERNATIONAL AIRPORT

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Abstract

The airport industry is characterized by real-time, complex, and high-intensity operations, making it highly dependent on supply chain reliability to maintain service continuity and operational performance. Soekarno–Hatta International Airport, as Indonesia's primary national gateway, faces challenges related to increasing passenger volumes, growing operational complexity, and potential disruptions in the supply of critical assets and spare parts. This study examines the effects of supply chain procurement and supply chain agility on operational performance, with digital technology serving as a mediating variable. A quantitative survey was conducted with 268 respondents, and the data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The findings indicate that supply chain procurement and agility have positive and significant effects on digital technology adoption and operational performance. Digital technology also significantly mediates these relationships. The study concludes that improving airport operational performance requires strengthening supply chain procurement and agility, integrated with the optimal utilization of digital technology.

Keywords: Supply Chain Procurement, Supply Chain Agility, Digital Technology, Operational Performance

INTRODUCTION

The airport industry is a service ecosystem that relies heavily on seamless operations and real-time resource readiness. Airports not only manage aircraft and passenger movements but also ensure the availability of infrastructure, security services, baggage handling systems, terminal facilities, maintenance support, and spare parts. This complexity requires precise supply chain management, as even minor disruptions such as delays in critical items, specification mismatches, or unstable supplier performance can directly affect service quality, disruption recovery time, and operating costs. Statistics Indonesia (BPS) reported that in December 2024, domestic air passengers reached 5.9 million, while international passengers totaled 1.7 million. Cumulatively from January to December 2024, passenger volumes amounted to 63.7 million domestic and 19.0 million international, representing growth of 1.76% and 21.46%, respectively, compared with the previous year.

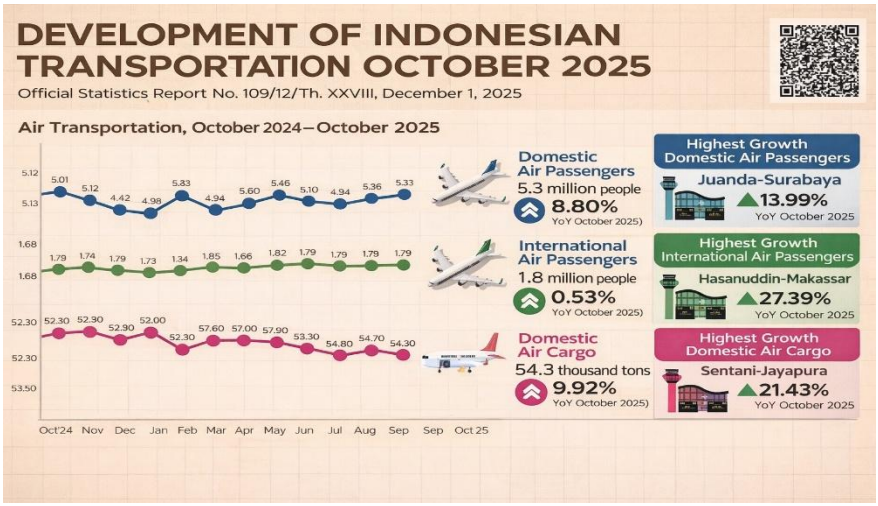

Figure 1.
Air Transportation Data, October 2024–2025
Source: BPS, 2025

At Soekarno–Hatta International Airport, the consequences of supply chain disruptions become increasingly significant due to the high intensity of operations. According to Antara News, Soekarno–Hatta served approximately 50.96 million passengers in 2023. During the peak 2025 Eid travel period (21 March–11 April 2025), the airport reportedly handled 3.559.461 passengers, recorded 23.476 aircraft movements, and achieved an on-time performance of around 73%. This operational scale indicates that delays or inefficiencies in procurement particularly for critical assets and spare parts can directly affect service quality, operating cost efficiency, and the airport's reputation.

Previous studies have provided a conceptual foundation for digital procurement, agility, and performance, yet notable gaps remain in terms of constructs, underlying mechanisms, and industry context. In general, digital procurement, procurement policies, and supply chain resilience have been reported to positively influence organizational performance (Al Awadhi et al., 2025). Procurement digitalization has also been associated with enhanced supply chain resilience by strengthening information-processing capacity, with information sharing and supply chain risk management identified as critical mechanisms that mediate this relationship (Harju et al., 2023). Within the e-procurement context, evidence from Indonesian manufacturing indicates that e-procurement implementation has a significant effect on company performance (Masudin

et al., 2021). However, extending these findings to the airport sector where operations are real-time and highly sensitive to service disruptions still requires empirical validation.

Moreover, the literature reveals inconsistent findings regarding indirect (mediating) mechanisms in supply chain digital transformation. (Alabdali & Salam, 2022) reported a significant mediation effect through supply chain procurement in the relationship between digital transformation and competitive advantage. In contrast, (Aljawazneh, 2024) found that supply chain digitization did not significantly mediate the link between supply chain agility and operational performance in a specific context. These discrepancies suggest the need to re-examine the model in a setting that is more representative of airport operations. In addition, although (Masudin et al., 2021), provided relevant evidence(Farooqui & Shamim, 2024) reported a significant indirect effect and concluded that the relationship constituted partial mediation.

These inconsistent findings indicate the need to re-test the model in a setting that is more closely aligned with airport operations. In response to this gap, the present study is important for empirically examining the effects of supply chain procurement and supply chain agility on operational performance, with digital technology as a mediating variable, in the context of Soekarno–Hatta International Airport. Accordingly, this study aims to analyze the direct effects of supply chain procurement and supply chain agility on operational performance, as well as their indirect effects through the utilization of digital technology at Soekarno–Hatta International Airport.

REVIEW OF LITERATURE

Supply Chain Management

Supply chain management (SCM) is an integrated process for coordinating the flows of products, information, and funds among parties within a supply chain network to ensure the effective and efficient delivery of goods and services. Bowersox et al. (2020) emphasize that logistics primarily concerns the movement of products and information across partners, whereas the supply chain represents a collaborative business–supplier framework for providing goods, services, and information to end users. In line with this view, Chopra (2019) defines SCM as the management of material, information, and financial flows to balance efficiency and responsiveness. Theeraworawit et al. (2022) further argue that SCM effectiveness is shaped by cross-actor collaboration and the integrated governance of material flows, data/information, and financial resources. Moreover, Van Nguyen et al. (2024) conceptualize SCM as the coordination of strategies and processes across organizations and partners to consistently enhance operational outputs and service performance.

Supply Chain Procurement

Supply chain procurement is a strategic function within SCM that ensures the availability of goods and services in accordance with required specifications, quality, quantity, timing, and cost through integrated processes. Sourcing–procurement activities play a critical role in managing the flow of goods, information, and resources across firms (Alkhatib & Momani, 2023). From a process perspective, procurement is commonly conceptualized as a procure-to-pay (P2P) cycle that links upstream suppliers with downstream operational needs. Harju et al. (2023) describe it as a sequence of buyer–supplier transactions, ranging from price quotation to invoicing and payment.

At Soekarno–Hatta International Airport, procurement is mission-critical because it directly affects service continuity, safety, and operational reliability; delays or inaccuracies can trigger asset downtime and disrupt service flows. Recent developments

indicate that procurement is increasingly driven by digitalization. Harju et al. (2023) note that many procurement technologies originated from the internet and e-procurement, reshaping P2P processes from sourcing to payment. However, this transformation requires organizational readiness and risk mitigation. Dudić et al. (2024) highlight the importance of a risk-aware approach, individual training and support, and strengthening trust and supplier collaboration within digital procurement environments.

Supply Chain Agility

Supply chain agility refers to a supply chain's capability to respond quickly and appropriately to demand fluctuations and disruptions while maintaining cost efficiency and service reliability. Alkhatib and Momani (2023) emphasize that agility requires collaborative practices such as information sharing, real-time decision-making, and support for tracking–tracing and risk sharing. Consistent with this, Bowersox et al. (2020) argue that operational responsiveness is highly dependent on real-time information to preserve resource flexibility and facilitate coordination across partners. From an SCM perspective, agility reflects the need for supply chains to remain flexible in the face of changing customer requirements and supply conditions (Aljawazneh, 2024). Empirical evidence further indicates that information sharing strengthens agility by enabling supplier involvement in rapid responses when demand shifts (Setyawan Firmansyah & Siagian, 2022).

In digital contexts, Aljawazneh (2024) reports that agility influences digitization and that digitization, in turn, affects operational performance, although the mediating role of digitization is not always consistent. Therefore, within the real-time and mission-critical airport environment, digital support (e.g., monitoring, data integration, and asset tracking) is expected to make agility more effective in improving operational performance. This relationship is thus important to re-examine empirically.

Digital Technology

Digital technology in supply chains refers to the use of data-driven technologies to strengthen connectivity, process integration, visibility, and real-time decision-making. Digitalization encompasses technologies such as artificial intelligence (AI), the Internet of Things (IoT), big data, cloud computing, and blockchain, which enable automation and improve efficiency (Al Tera et al., 2024; Alkhatib & Momani, 2023). Their implementation enhances traceability and process control and improves performance through greater supply chain visibility (Al Tera et al., 2024; Aljawazneh, 2024).

Within procurement, digital capabilities particularly data analytics are positively associated with supply chain performance and may serve as an enabling mechanism that links procurement activities to improved outcomes (Hallikas et al., 2021). Bowersox et al. (2020) highlight the benefits of automation and data analytics for operational decision-making, while also noting the continued need for risk mitigation in digitally enabled supply chains.

Operational Performance

Operational performance represents the tangible outcomes of an organization's operational strategies and activities and is commonly assessed in terms of quality, productivity, and cost (Aljawazneh, 2024). In the SCM context, it further encompasses cost, quality, delivery or fulfillment reliability, and flexibility (Rubiyatno & Theodorus, 2024). In airport operations, operational performance is reflected in the ability to ensure the availability of critical materials and spare parts, minimize downtime, and deliver timely maintenance; accurate spare-part availability is essential to prevent disruptions and

sustain service reliability (Alomar & Nikita, 2025). Consistent with this view, frequently used indicators include flexibility, resource efficiency, cost reduction, shorter delivery time, delivery reliability, and visibility (Hallikas et al., 2021). Accordingly, this study defines operational performance as the extent to which airport work units achieve efficient and reliable operational processes in managing spare parts and equipment, as reflected in quality, timeliness, cost efficiency, and adaptability.

Based on the literature review above, the conceptual framework of this study is as follows:

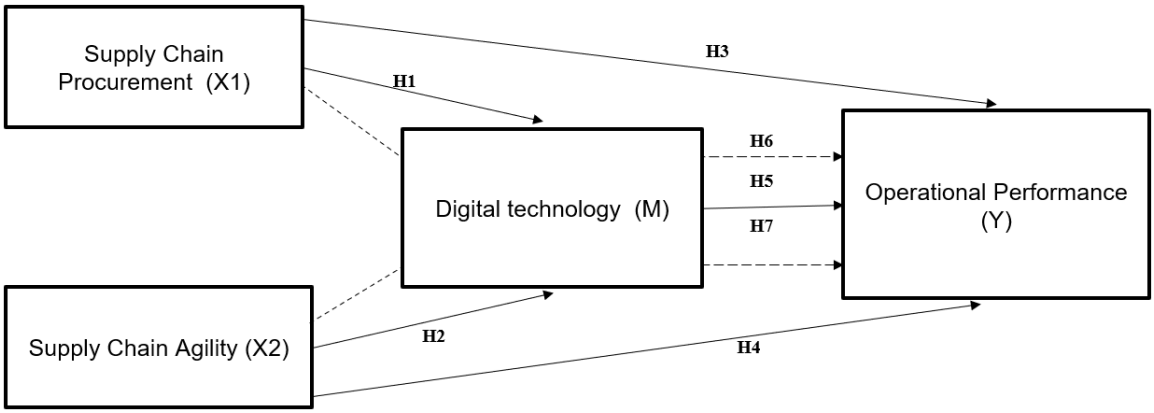

Figure 2.
Research Model

Hypothesis Development

H1: Supply chain procurement has a positive effect on digital technology at Soekarno–Hatta International Airport.

Well-managed supply chain procurement encompassing supplier selection, information integration, and process control tends to promote the use of digital technologies, as procurement complexity increasingly requires real-time data, transparency, and accountability. Jahani et al. (2021) argue that the adoption of Industry 4.0 technologies in procurement, such as data analytics, system integration, and automation, generates strategic value by enhancing the effectiveness of procurement processes. Susantya et al. (2022) similarly report that top management support and an information-sharing culture have a positive and significant effect on e-procurement adoption, suggesting that higher procurement process maturity strengthens the uptake of digital systems. In the aviation sector, Motaung and Sifolo (2023) show that digital procurement in airport operating companies delivers process-efficiency benefits, while its adoption is closely linked to process readiness and cross-functional integration. Moreover, Al Awadhi et al. (2025) emphasize that digital procurement is intertwined with stronger procurement policies and processes and supports organizational performance, indicating that robust procurement governance constitutes a key foundation for effective digitalization.

H2: Supply chain agility has a positive effect on digital technology at Soekarno–Hatta International Airport.

Supply chain agility reflects an organization's capability to respond rapidly to demand changes and disruptions through process adjustments, cross-party coordination, and responsive decision-making. Alamsjah and Yunus (2022) show that supply chain agility is positively associated with Supply Chain 4.0 maturity, which is characterized by

the use of digital technologies in supply chain processes. Zhang et al. (2023) similarly find that organizational agility drives digital transformation, underscoring agility capabilities as key enablers of readiness for, and adoption of, digital transformation. Chang and Octoyuda (2024) further confirm that agility-related dimensions (e.g., learning agility) contribute to digital technology adoption, indicating that more agile organizations tend to adopt digital technologies more quickly. In addition, Badawi et al. (n.d.) highlight the role of supply chain agility in facilitating the implementation of sustainable procurement practices through system and process integration practices that are closely aligned with process digitalization and system integration in operational settings.

H3: Supply chain procurement has a positive effect on operational performance at Soekarno–Hatta International Airport.

Effective supply chain procurement ensures the timely availability of inputs, specification compliance, supplier stability, and cost efficiency, thereby directly improving service timeliness, process reliability, and operational efficiency particularly in airport operations that depend on critical spare parts. Gitahi (2022) reports that procurement planning, e-procurement, and procurement evaluation have a positive and significant effect on operational performance. Consistent with this, Mebrate and Shumet (2024) find that e-procurement practices (e-payment, e-tendering, and e-sourcing) are significant predictors of operational performance. Furthermore, Al Awadhi et al. (2025) highlight that strengthening modern procurement especially when supported by digital procurement positively correlates with improved performance outcomes, including operational efficacy, resource optimization, and value creation. Similarly, Hallikas et al. (2021) show that procurement digitalization, particularly through data and analytics capabilities, is positively associated with supply chain operational performance, reinforcing the argument that robust procurement especially when digitally enabled contributes to enhanced operational performance.

H4: Supply chain agility has a positive effect on operational performance at Soekarno–Hatta International Airport.

Supply chain agility reflects an organization's capability to respond rapidly to demand changes and disruptions through process adaptation, flexibility, and fast decision-making. Setyawan Firmansyah and Siagian (2022) show that supply chain agility has a direct effect on operational performance. Consistently, Aljawazneh (2024) reports a significant relationship between supply chain agility and operational performance through agility dimensions such as sensing, flexibility, and speed. El-Khalil and Mezher (2020) similarly confirm that agility is an important determinant of operational performance in manufacturing contexts. In addition, Syamil et al. (2025) find that agility particularly manufacturing agility exerts the strongest influence on operational performance. In the dynamic and service-continuity driven environment of Soekarno–Hatta International Airport, supply chain agility is expected to support the availability of critical materials, reduce downtime, and improve the timeliness of operational processes.

H5: Digital technology has a positive effect on operational performance at Soekarno–Hatta International Airport.

Digital technologies in the supply chain (e.g., system integration, real-time visibility, data analytics, and process automation) enable organizations to improve operational speed, accuracy, and efficiency. Saryatmo and Sukhotu (2021) demonstrate that a digital supply chain has a significant effect on operational performance, particularly in terms of quality, productivity, and cost reduction. Lee et al. (2022) likewise find that digital supply chains enhance organizational performance through improvements in

supply chain performance. In post-disruption settings, Al Tera et al. (2024) show that supply chain digitalization improves performance by strengthening communication and information efficiency as well as cost effectiveness. Moreover, Syahruddin (2024) emphasizes that digital maturity contributes to enhanced operational efficiency across sectors. In the context of Soekarno–Hatta International Airport, the adoption of digital technologies is therefore expected to reinforce timeliness, process reliability, and operational cost efficiency.

H6: Supply chain procurement has a positive and significant effect on operational performance mediated by digital technology at Soekarno–Hatta International Airport.

Effective supply chain procurement such as rigorous supplier selection, information integration, and process control encourages organizations to leverage digital technologies to make procurement processes faster, more transparent, and more seamlessly integrated across stakeholders. Jahani et al. (2021) emphasize that applying Industry 4.0 technologies in procurement (e.g., system integration, automation, and analytics) provides strategic value by improving procurement effectiveness. At the same time, digital technology has been shown to enhance performance outcomes: Al Tera et al. (2024) report that supply chain digitalization improves performance through more efficient information and communication flows as well as greater cost effectiveness. Consistently, Al Awadhi et al. (2025) find that digital procurement is positively associated with improvements in organizational and operational outcomes, including operational efficacy and resource optimization. Regarding the mediating mechanism, Wu et al. (2016) demonstrate that e-procurement value mediates the relationship between procurement-related factors and system integration, thereby translating procurement processes into improved supply chain performance.

H7: Supply chain agility has a positive and significant effect on operational performance mediated by digital technology at Soekarno–Hatta International Airport.

Supply chain agility reflects an organization's capability to respond rapidly to changes and disruptions through process flexibility and cross-party coordination. In practice, such agility often requires digital support such as system integration, real-time visibility, automation, and analytics to enable fast and consistent responses.

Zhang et al. (2023) show that organizational agility has a significant effect on digital transformation performance, suggesting that more agile organizations are more likely to be driven toward adopting digital technologies. Aljawazneh (2024) likewise reports that supply chain agility influences supply chain digitization, and that digitization, in turn, affects operational performance (although the overall mediation effect was not significant in that specific context). Furthermore, Al Tera et al. (2024) demonstrate that supply chain digitalization positively affects supply chain performance, with improvements occurring through enhanced supply chain visibility. Salamah et al. (2024) also emphasize that supply chain digitalization strengthens performance by reinforcing integration and process efficiency, which ultimately leads to better operational outcomes.

RESEARCH METHOD

His study employs a quantitative causal research design with a cross-sectional approach, in which data were collected at a single point in time from respondents involved in the supply chain at Soekarno–Hatta International Airport (Sekaran & Bougie, 2020).

Hypothesis testing was conducted to examine the causal relationships among the study variables, including both direct effects and indirect effects through a mediating variable.

The sample size was determined using the recommended ratio of 5–10 respondents per indicator (Hair et al., 2019). With 28 measurement indicators, the required sample was set at 268 respondents (28 × 9.5). Respondents were selected using purposive sampling, with eligibility criteria including employees in supply chain and operational units (managers, supervisors, coordinators, senior staff, and staff) who had at least one year of work experience. The analyzed variables comprised Supply Chain Procurement, Supply Chain Agility, Digital Technology, and Operational Performance, and the hypotheses were tested using structural equation modeling (SEM) with the partial least squares (PLS) approach.

This study relies on primary data obtained from employees working at Soekarno–Hatta International Airport. Of the 268 respondents, the dominant profile indicates that most respondents were male (n = 234; 87.3%), aged 31–40 years (n = 122; 45.5%), held a bachelor's degree (n = 146; 54.5%), occupied technician positions (n = 126; 47.0%), and had 6–10 years of tenure (n = 101; 37.7%). Respondent characteristics are presented in Table 1.

Table 1.
Respondent Characteristics

Gender	**Frequency**	**Percentage (%)**
Male	234	87.3
Female	34	12.7
Age group	**Frequency**	**Percentage (%)**
20-30 Years	114	42.5
31-40 Years	122	45.5
41-50 Years	21	7.8
> 50 Years	11	4.1
Education level	**Frequency**	**Percentage (%)**
Senior high school/equivalent	36	13.4
Diploma (D1/D2/D3/D4)	72	26.9
S1	146	54.5
S2	14	5.2
Employment at Soekarno–Hatta International Airport	**Frequency**	**Percentage (%)**
Yes	268	100.0
Job Position	**Frequency**	**Percentage (%)**
Director	1	0.4
Head of Division	16	6.0
Manager	9	3.4
Staff	37	13.8
Supervisor	79	29.5
Technician	126	47.0

Lama Bekerja	Frequency	Percentage (%)
1-5 Years	93	34.7
6-10 Years	101	37.7
11-15 Years	49	18.3
> 15 Years	25	9.3

Table 2. Descriptive Statistics

Variabel	Mean	Std. Deviation
Supply Chain Procurement	3.837	0.588
Supply Chain Agility	3.754	0.560
Digital Technology	3.758	0.560
Operational Performance	3.815	0.557

The descriptive analysis indicates that all study variables have mean scores above 3 and standard deviations below 1, reflecting generally positive respondent perceptions. Supply chain procurement, supply chain agility, digital technology, and operational performance exhibit relatively high average values, with supply chain procurement showing the most prominent mean and achieving the highest average score (M = 3.837), suggesting that supply chain procurement is perceived to be implemented at a high level.

Validity Test Results

The measurement model evaluation indicates that all indicators for each construct demonstrate adequate convergent validity, as the outer loading values exceed 0.70. Therefore, all indicators are considered acceptable for inclusion in the structural model analysis. The cross-loading assessment further shows that each indicator loads highest on its intended construct compared with other constructs, confirming discriminant validity.

Table 3.
Average Variance Extracted (AVE)

Variable	Average Variance Extracted (AVE)
Supply Chain Procurement	0.536
Supply Chain Agility	0.536
Digital Technology	0.548
Operational Performance	0.534

Source: Data processed using PLS, 2026.

In addition, the Fornell–Larcker criterion indicates that the square root of the AVE for each construct is higher than the inter-construct correlations, while the HTMT assessment yields values below 0.90. Accordingly, the measurement model is deemed satisfactory meeting both convergent and discriminant validity requirements, and the analysis can proceed to the structural model stage.

Reliability Test Results

Table 4.
Reliability Test Results

Variable	Cronbach's alpha	Composite Reliability (rho_c)	rho_A	Information
Supply Chain Procurement	0.856	0.890	0.860	Reliable

Supply Chain Agility	0.784	0.853	0.787	Reliable
Digital Technology	0.794	0.858	0.795	Reliable
Operational Performance	0.913	0.926	0.915	Reliable

Source: Data processed using PLS, 2026.

Based on the construct reliability results, all variables in this study demonstrate strong reliability. Supply Chain Procurement (X1) records a Cronbach's alpha of 0.856, ρA of 0.860, and composite reliability of 0.890. These values exceed the commonly recommended minimum threshold (≥ 0.70), indicating high internal consistency among the indicators in measuring supply chain procurement. Similar results are observed for Supply Chain Agility (X2), Digital Technology (M), and Operational Performance (Y). Overall, the findings confirm that all constructs in the research model satisfy reliability criteria and are therefore appropriate for further analysis in the structural model.

Inner Model (Structural Model) Results

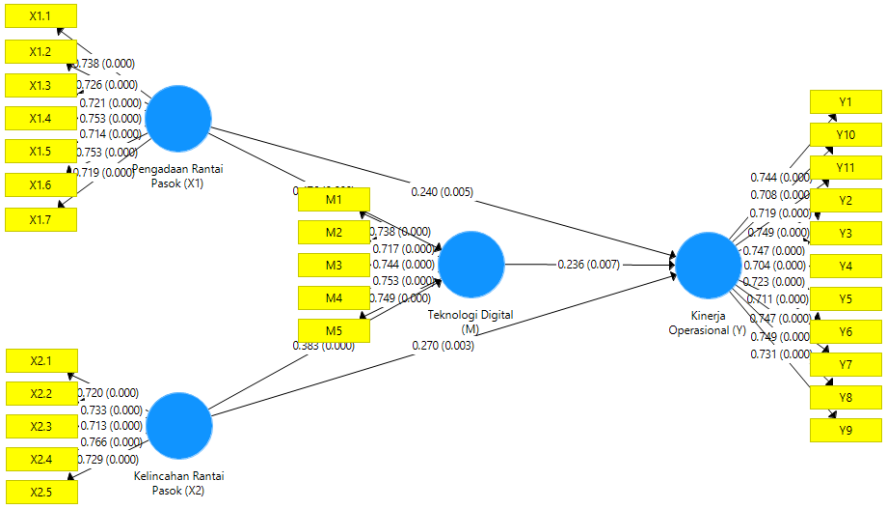

Figure 3.
Structural Model (Inner Model)
Source: Data processed using PLS, 2026.

Coefficient of Determination (R-Square) Results

Table 5.
Nilai R-Square

Variable	R Square	R Square Adjusted
Operational Performance (Y)	0.445	0.439
Digital Technology (M)	0.616	0.613

Source: Data processed using PLS, 2026.

Based on Table 5, the adjusted R-squared value for Digital Technology is 0.613, indicating that 61.3% of the variance in digital technology is explained by Supply Chain Procurement and Supply Chain Agility. This suggests that both variables make a strong contribution to the utilization of digital technology within the supply chain. Furthermore, the adjusted R-squared value for Operational Performance is 0.439, implying that 43.9% of the variance in operational performance is explained by Supply Chain Procurement, Supply Chain Agility, and Digital Technology. These findings support the role of digital technology as a mediating variable that enhances the model's explanatory power for

operational performance, although other factors beyond the proposed model may also influence operational performance.

Predictive Relevance (Q^2) Results

Predictive relevance (Q^2), also known as the Stone–Geisser Q^2 value, is used in PLS-SEM to evaluate a model's out-of-sample predictive capability for endogenous constructs. Q^2 is not equivalent to R^2 and should not be calculated using the formula

Nilai $Q^2 = 1 – (1 – R^2) \times (1 – R^2)$

Nilai $Q^2 = 1 – (1 – 0.445) \times (1 – 0.616) = 0{,}787$

Instead, Q^2 is obtained through blindfolding (with an omission distance) or through PLSpredict, which assesses how well the model can predict omitted (or holdout) data points. Based on the blindfolding results (Table 5), the Q^2 value is 0.787. Because Q^2 is greater than zero, the model demonstrates predictive relevance for the endogenous construct(s). A Q^2 value of this magnitude indicates strong predictive capability, meaning the structural model has substantial ability to predict the indicators of the endogenous construct(s) in the sample.

Goodness-of-Fit Results

Based on the model goodness-of-fit assessment, the Standardized Root Mean Square Residual (SRMR) value of 0.072 indicates that the model demonstrates an acceptable fit. Referring to the criteria reported by Suriana et al. (2022), SRMR values below 0.10 are considered acceptable, while values below 0.08 indicate a good fit. Therefore, the SRMR result suggests that the model fits the empirical data well in terms of residual discrepancies.

RESULT AND DISCUSSION

Path Coefficients (Direct Effect) Results

Table 6.
Path Coefficients (Direct Effects)

Variable	Original Sample (β)	Sample Mean	Standard Deviation	T Statistics	P Values	Result
X1 → M	0.476	0.472	0.066	7.255	**0.000**	**Supported**
X2 → M	0.383	0.386	0.064	6.023	**0.000**	**Supported**
X1→ Y	0.240	0.234	0.086	2.800	**0.005**	**Supported**
X2 → Y	0.270	0.281	0.090	2.991	**0.003**	**Supported**
M → Y	0.236	0.231	0.087	2.722	**0.007**	**Supported**

Source: Data processed using PLS, 2026.

Based on the path coefficient results in Table 9, all direct relationships among variables in the proposed model are positive and statistically significant at the 5% significance level (p-value < 0.05). Supply chain procurement has a positive and significant effect on digital technology (β = 0.476; t = 7.255), and supply chain agility also shows a positive and significant effect on digital technology (β = 0.383; t = 6.023). These findings indicate that effective procurement practices and higher supply chain agility encourage greater utilization of digital technology. Furthermore, supply chain procurement (β = 0.240; t = 2.800) and supply chain agility (β = 0.270; t = 2.991) are shown to have positive and significant effects on operational performance. Digital technology also exhibits a positive and significant effect on operational performance (β =

0.236; t = 2.722). Therefore, all direct-effect hypotheses (H1–H5) are supported, confirming that supply chain procurement, supply chain agility, and digital technology are key determinants of improved operational performance.

Indirect Effects (Mediation) Hypothesis Testing

Table 7.
Path Coefficients (Indirect Effect)

Variable	Original Sample (β)	Sample Mean	Standard Deviation	T Statistics	P Values	Result
X1 → M → Y	0.112	0.110	0.046	2.425	0.016	Partial Mediation
X2 → M → Y	0.090	0.089	0.035	2.563	0.011	Partial Mediation

Source: Data processed using PLS, 2026

Based on the indirect path coefficient results in Table 10, digital technology is confirmed to function as a mediating variable in the relationships between supply chain procurement and operational performance, as well as between supply chain agility and operational performance. The indirect effect of supply chain procurement on operational performance through digital technology is significant (β = 0.112, t = 2.425, p = 0.016), indicating a positive mediation effect at the 5% significance level. Similarly, the indirect effect of supply chain agility on operational performance via digital technology is also positive and significant (β = 0.090, t = 2.563, p = 0.011).

These results suggest partial mediation, as supply chain procurement and supply chain agility remain significantly associated with operational performance through their direct paths while also exerting significant indirect effects via digital technology. Therefore, H6 and H7 are supported, confirming that digital technology strengthens the effects of supply chain procurement and supply chain agility on operational performance.

H1 Supply Chain Procurement and Digital Technology

The findings indicate that stronger procurement management reflected in effective supplier selection, information integration, and process control is associated with greater utilization of digital technologies to support procurement activities and cross-stakeholder coordination.

This result is consistent with Jahani et al. (2021), who emphasize that the adoption of Industry 4.0 technologies in procurement (e.g., data analytics, system integration, and automation) enhances procurement process effectiveness. Al Awadhi et al. (2025) likewise show that procurement digitalization is closely linked to strengthened procurement governance and improved operational efficiency. In the Indonesian public sector, Susantya et al. (2022) find that organizational and process-related factors such as top management support and an information-sharing culture play a critical role in driving e-procurement adoption. Moreover, in the context of airport operating companies, Motaung and Sifolo (2023) report that digital procurement delivers process-efficiency and performance benefits, although its success depends on process readiness and cross-functional integration.

Accordingly, digital system support such as e-procurement platforms, supplier portals, and data integration becomes essential to make procurement processes more efficient, standardized, and accountable.

H2 Supply Chain Agility and Digital Technology

The findings indicate that the more agile an organization is in responding to change with speed and flexibility, the stronger the impetus to leverage digital technologies such as data integration, real-time visibility, and automation to accelerate cross-stakeholder coordination and decision-making.

This evidence aligns with Zhang et al. (2023), who demonstrate that organizational agility has a significant effect on digital transformation performance. Alamsjah and Yunus (2022) likewise show that supply chain agility is associated with higher Supply Chain 4.0 maturity, reflecting greater maturity in the use of digital technologies across supply chain processes. Aljawazneh (2024) further strengthens the empirical basis by reporting that supply chain agility positively influences supply chain digitization, suggesting that agility encourages organizations to expand digital technology adoption. In addition, Alkhatib and Momani (2023) emphasize the role of digital technologies in providing information and visibility that enable rapid responses and coordination, which directly corresponds to agility requirements in dynamic operational environments.

Within the operational context of Soekarno–Hatta International Airport characterized by demand volatility, potential service disruptions, and multi-stakeholder coordination, operational agility is likely to be more effective when reinforced by digital technologies such as monitoring systems, data integration, and analytics.

H3 Supply Chain Procurement and Operational Performance

Accordingly, the findings suggest that effective procurement management contributes directly to improved operational performance. Supply chain procurement comprises a set of activities aimed at ensuring the timely availability of goods and service inputs through procurement planning, supplier selection, process control, and evaluation. These practices ultimately influence service timeliness, process reliability, and operational cost efficiency. Gitahi (2022) reports that procurement planning, e-procurement, and procurement evaluation have a positive and significant effect on operational performance. Related evidence from Rugina and Akims (2024) also indicates that procurement practices such as outsourcing arrangements related to suppliers, materials, and logistics affect operational performance, reinforcing the view that the quality of procurement management shapes operational outcomes. In addition, Al Awadhi et al. (2025) find that strengthening modern procurement, including digital procurement, is positively associated with performance improvements such as operational efficacy, resource optimization, and value creation. Moreover, Hallikas et al. (2021) emphasize that digital capabilities in procurement particularly those supported by data analytics are positively linked to supply chain performance, which in operational contexts translates into greater accuracy, reliability, and process efficiency.

H4 Supply Chain Agility and Operational Performance

The findings indicate that the greater an organization's capability to adapt rapidly and flexibly to change, the stronger the resulting operational performance. This evidence is consistent with Panigrahi et al. (2023), who demonstrate that supply chain agility has a positive effect on operational performance. Syamil et al. (2025) likewise find that manufacturing agility improves operational performance in organizations operating in developing-country contexts. Abou Kamar et al. (2023) report that dynamic capabilities, including agility, positively influence operational performance through enhanced supply chain resilience in the food–hotel supply chain setting. Moreover, Wang et al. (2025)

emphasize that under high uncertainty, supply chain agility becomes a critical enabler of operational performance because it helps organizations absorb external disruptions and maintain operational continuity. Finally, Fauziah et al. (2025) conclude that supply chain agility exerts a positive effect on operational performance, underscoring its relevance for improving operational outcomes.

H5 Digital Technology and Operational Performance

The findings confirm that more optimal use of digital technologies—such as system integration, data visibility, automation, and analytics—translates into stronger operational outcomes, including improved timeliness, higher process reliability, and greater cost efficiency.

This result is consistent with Al Tera et al. (2024), who show that supply chain digitalization has a positive effect on performance, partly by improving information and communication efficiency and strengthening resilience in post-disruption conditions. Hallikas et al. (2021) likewise report that digital procurement capability is positively associated with supply chain performance, highlighting digital capabilities within procurement as key drivers of process-level performance. In the aviation logistics context, Jurgelāne-Kaldava et al. (2025) emphasize that digitalization of the air cargo supply chain is intended to improve operational efficiency through enhanced data sharing and information integration. Kinnary et al. (2025) further suggest that digital platforms do not always exert a direct effect on operational performance; however, they positively influence supply chain capability and supply chain viability, which subsequently improve operational performance. This implies that the performance benefits of digital technology may be stronger when digital tools effectively build supply chain capabilities and long-term viability.

Specifically for Soekarno–Hatta Airport, Sari et al. (2024) find that digitalization positively affects airport operational efficiency, reinforcing the relevance of digital technology for improving operational performance in the present study. Accordingly, the effective deployment of digital technologies at Soekarno–Hatta International Airport is likely to accelerate coordination across units and suppliers, enhance process reliability, and improve overall operational efficiency.

H6 The Mediating Role of Digital Technology in the Relationship between Supply Chain Procurement and Operational Performance

The findings indicate that digital technology functions as an enabling mechanism through which supply chain procurement translates into improved operational performance. Specifically, digitalization makes procurement processes faster, more controlled, transparent, and better integrated across internal units and suppliers, thereby amplifying the operational benefits of effective procurement practices. Prior research supports this mediating pattern. Hallikas et al. (2021) show that digital procurement capabilities can act as a mediator linking data- and analytics-based capabilities to supply chain operational performance, suggesting that process improvements become more impactful when procurement is supported by digital capabilities. Alabdali and Salam (2022) also report that digital transformation influences supply chain procurement, implying that modern procurement increasingly relies on digitalization to manage data complexity and coordination. Moreover, Wu et al. (2016) explicitly test the mediating role of e-procurement value particularly through system integration and value-added services in enhancing supply chain performance, reinforcing the logic that procurement affects performance through strengthened digital procurement. In addition, Al Awadhi et al.

(2025) find that digital procurement is positively associated with organizational performance, highlighting the contribution of digital procurement capabilities to improved operational effectiveness and resource optimization.

H7 The Mediating Role of Digital Technology in the Relationship between Supply Chain Agility and Operational Performance

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CONCLUSION

Based on the hypothesis testing results, all relationships among the variables in this study are positive and statistically significant. The SEM-PLS analysis indicates that the proposed model has adequate explanatory power in capturing the relationships among Supply Chain Procurement, Supply Chain Agility, Digital Technology, and Operational Performance in the context of Soekarno–Hatta International Airport. The adjusted R-squared value of 0.613 for Digital Technology suggests that supply chain procurement and supply chain agility explain 61.3% of the variance in digital technology. Meanwhile, the adjusted R-squared value of 0.439 for Operational Performance indicates that supply chain procurement, supply chain agility, and digital technology jointly explain 43.9% of the variance in operational performance.

The results further demonstrate that supply chain procurement, supply chain agility, and digital technology have positive and significant effects on operational performance, both directly and indirectly. Digital technology is confirmed to serve as a partial mediator, strengthening the influence of supply chain procurement and supply chain agility on operational performance. In addition, the Q^2 value of 0.787 indicates strong predictive relevance, suggesting that improvements in operational performance are closely associated with the synergy between procurement capability, supply chain agility, and the integrated utilization of digital technology. Overall, this study provides empirical evidence that digital technology functions not only as a supporting factor but also as a strategic mechanism that amplifies the impact of supply chain management practices on operational performance.

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