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Developing an Operational Performance Model for The Aircraft Maintenance, Repair, and Overhaul (MRO) Industry in Indonesia: The Mediating Role of Inventory Control Performance

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Abstract: Aviation companies which are involved in Maintenance, Repair, and Overhaul sector are facing challenges in terms of attaining high performance due to inventory complexity, material availability, and the emergence of a new need for having extended digital capabilities. This paper attempts to propose an operational performance model by investigating the inventory control performance's influence mechanism on the relationship between ERP Flexibility, Inventory Management, and Digital Transformation Integration on the one hand and Operational Performance on the other. The paper builds upon the framework advanced by Saputra et al. (2025), who examined the role of digital transformation integration and inventory management in the aircraft MRO industry. The current study extended the framework by including Inventory Control Performance as the mediator. The data were collected from 196 respondents working in an aviation company involved in MRO activities in Indonesia, and they were analyzed using Partial Least Squares Structural Equation Modeling. The analysis revealed that ERP Flexibility, Inventory Management, and Digital Transformation Integration positively and significantly predicted Inventory Control Performance ($\beta = 0.504$, 0.550, and 0.485; $p < 0.001$). Inventory Control Performance, in turn, significantly and positively predicted Operational Performance ($\beta = 0.326$; $p < 0.001$). The mediation was also found significant. The model can explain 82.2% of the variance in Inventory Control Performance and 83.3% of the variance in Operational Performance; thus, it can be used to manage inventory control capabilities in aviation companies involved in MRO activities.

Keywords: ERP Flexibility, Inventory Management, Digital Transformation Integration, Inventory Control Performance, Operational Performance, MRO.

Abstrak: *Perusahaan penerbangan sektor Maintenance, Repair, and Overhaul (MRO) menghadapi tantangan dalam mencapai kinerja operasional yang optimal akibat kompleksitas pengelolaan persediaan, ketidakpastian ketersediaan material, serta kebutuhan akan kapabilitas digital yang terintegrasi. Penelitian ini bertujuan mengembangkan model Operational Performance dengan menguji peran Inventory Control Performance sebagai variabel mediasi pada hubungan antara ERP Flexibility, Inventory Management, dan Digital Transformation Integration terhadap Operational Performance. Model penelitian dikembangkan dari studi Saputra et al. (2025) mengenai integrasi transformasi digital dan optimalisasi manajemen persediaan pada sektor MRO pesawat dengan memperluas model* *melalui penambahan Inventory Control Performance sebagai mekanisme yang menjelaskan bagaimana kapabilitas teknologi dan pengelolaan persediaan meningkatkan Operational Performance. Data penelitian diperoleh dari 196 responden pada perusahaan penerbangan sektor MRO di Indonesia dan dianalisis menggunakan metode Partial Least Squares Structural Equation Modeling (PLS-SEM). Hasil penelitian menunjukkan bahwa ERP Flexibility, Inventory Management, dan Digital Transformation Integration berpengaruh positif dan signifikan terhadap Inventory Control Performance dengan nilai β masing-masing sebesar 0,504; 0,550; dan 0,485 ($p < 0,001$). Selanjutnya, Inventory Control Performance berpengaruh positif dan signifikan terhadap Operational Performance ($\beta = 0,326$; $p < 0,001$) serta memediasi secara signifikan pengaruh ketiga variabel independen terhadap Operational Performance. Model penelitian mampu menjelaskan 82,2% variasi Inventory Control Performance dan 83,3% variasi Operational Performance. Penelitian ini memberikan kontribusi teoritis dan praktis dengan menunjukkan bahwa penguatan kapabilitas pengendalian persediaan yang terintegrasi berperan penting dalam meningkatkan Operational Performance pada perusahaan penerbangan sektor MRO.*

***Kata kunci*:** ERP Flexibility, Inventory Management, Digital Transformation Integration, Inventory Control Performance, Operational Performance, MRO.

INTRODUCTION

Aviation company involved in Maintenance, Repair, and Overhaul (MRO) play a significant role in ensuring airframes airworthiness, flight safety, and overall operations. Unlike aircraft manufacturers, aviation MROs operate in a much more complex environment due to the nature of their activity. It includes a wide range of factors from various sources of supply and the accuracy of information to meeting specific airframe aviation standards and the degree of organization of interrelated processes, such as maintenance planning, engineering, buying, procurement, logistics, inventory, and quality control in order to deliver aircraft without delays. Consequently, the success of any MRO service is determined not only by the quality of its operations and technical capabilities but also by its ability to organize and manage inventory and other important aspects to ensure the ongoing operations of aircraft.

To optimize and standardize multiple maintenance-related processes while ensuring the synchronization and adherence of all elements to specific standards, various ERP systems have been created, which offer extensive functionality aimed at addressing all aspects of material planning and purchasing, storage and distribution, and maintenance. Even though the implementation of ERP systems in the aviation industry can help companies manage interrelated maintenance processes, improve information exchange, inventory control, and other aspects, ERP software per se is not a solution to all problems. The functioning of the enterprise resource planning system and its successful implementation and utilization within the framework of an integrated approach that includes synchronized Inventory Management practices as well as strategic and technological transformations to optimize business processes is vital if the organization wants to improve its performance.

Such challenges in operational performance are illustrated by the operational data of the Indonesian national carrier’s maintenance and repair facility, which is selected as the case organization for this study. As seen from the information provided below, multiple aircraft experienced long Aircraft on Ground (AOG) due to the delays in C-Check maintenance services, which caused significant losses for the company.

Table 1. Maintenance Status of Long Aircraft on Ground (Long AOG) Aircraft

No	AC-Reg	Maintenance Type	Remaining Days	Estimated Loss ($)
1	PK-*GR	C-Check	> 1 Year	$ 8.775.000,00
2	PK-*GM	C-Check	> 6 Months	$ 4.200.000,00
3	PK-*JI	C-Check	> 6 Months	$ 4.200.000,00
4	PK-*HT	C-Check	> 6 Months	$ 4.200.000,00
5	PK-*FR	C-Check	> 6 Months	$ 4.200.000,00
6	PK-*FQ	C-Check	> 6 Months	$ 4.200.000,00
7	PK-*FF	C-Check	> 6 Months	$ 4.200.000,00
				$33.975.000,00

Source: Company Data from the Indonesian MRO Aviation Industry (2024)

Table 1 shows that 7 Aircraft experienced Long Aircraft on Ground(Long AOG) resulting to loss of about USD 33.975 million in operations. Hence it can be concluded that the target completion time for C- Check is not being met. Long Aircraft on Ground indicates that there is need to improve inventory control, coordination and information management to ensure that spares are available as required at the time of maintenance.

Furthermore, the Turn Around Time(TAT) of rotable spares is too long and is not meeting the set standards as can be seen in table 2.

Table 2. Average Turnaround Time (TAT) of Rotable Components

No	Vendor Area	Qty	Avg TAT RO	KPI	Gap
1	Vendor International	12872	117	95	22
2	Vendor Domestik	2245	34	95	-63
3	Shop Internal	30367	26	65	-48

Source: Company Data from the Indonesian MRO Aviation Industry (2024)

Table 2 reports that the average Turn Around Time (TAT) of rotable components managed by international suppliers is at 117 days, compared to the company's target of 95 days. The TAT is expected to increase material waiting time, delaying maintenance and lowering performance. In addition, findings from internal audits show that several reports are manually extracted from various eMRO modules and compiled in Microsoft excel before they become decision-making or managerial reports. This observation indicates that the current ERP system does not support end-to-end business process integration or that it does not deliver timely, integrated information for decision-making.

Prior studies reveal that ERP Flexibility, Inventory Management, and Digital Transformation Integration are strategic capabilities that can enhance organizational performance. ERP flexibility is a critical capability that improves the strategic business process and information scope by upgrading inventory management capabilities (Saputra et al., 2025; Harianto et al., 2024). Inventory Management is another essential organizational capability that can provide the level of inventory, materials availability, and performance (Pradata & Ernawati, 2024; Alfian et al., 2025). Digital Transformation Integration can also augment the information's quality, collaboration within the organization, and decision-making leading to improved performance (Ali et al., 2024; Santoso et al., 2022; Valle Enrique et al., 2022).

Although prior studies offer substantial background information on the role of core capabilities to achieve Inventory Management and performance, several research gaps motivate this study. First, there is an empirical research gap since the evidence on the impact of digital capabilities on inventory management is inconclusive. For example, Saputra et al. (2025) found that among the tested digital capabilities, only ERP Flexibility significantly predicts Inventory Management Optimization, while Artificial Intelligence-Based Forecasting and Big Data capabilities have no significant impact. Second, there is a contextual research gap because most previous studies have used manufacturing, logistics, and supply chain management as the context. In contrast, the current study focuses on the airline MRO industry, which has unique characteristics, including complex material management, stringent aviation safety regulations, and volatile spare-parts demand (Aldieri et al., 2023; Sajeevan et al., 2022; Wang et al., 2023). Besides the contextual gap, there is also a methodological research gap because most previous studies have adopted the mediation-only approach. In contrast, this study attempts to integrate the following variables – ERP Flexibility, Inventory Management, Digital Transformation Integration, Inventory Control Performance, and Operational Performance – into a theoretical model and examine the direct and moderating relationships.

This study builds upon the theoretical model proposed by Saputra et al. (2025) by including Inventory Management and Digital Transformation Integration as independent variables. In addition, this study adds Inventory Control performance as a mediator to propose how other variables affect Operational Performance (see Figure 1). Specifically, the hypothesized model suggests that Inventory Management mediates the relationship between ERP Flexibility and Inventory Control Performance. It also posits that Digital Transformation Integration predicts Inventory Control Performance directly and indirectly through Inventory Management. Finally, the study assumes that ERP Flexibility, combined with Inventory Management and Digital Transformation Integration, has a simultaneous effect on Inventory Control Performance.

METHODS

This study employed a quantitative approach with an explanatory research design to examine the effects of ERP Flexibility, Inventory Management, and Digital Transformation Integration on Inventory Control Performance and Operational Performance in an Indonesian airline operating in the Maintenance, Repair, and Overhaul (MRO) sector and utilizing an Enterprise Maintenance, Repair, and Overhaul (eMRO) system. A cross-sectional design was adopted, with data collected at a single point in time through a structured survey questionnaire. The study population consisted of employees of the airline involved in activities related to MRO operations, inventory management, logistics, procurement, maintenance, and other relevant functions. A total of 226 questionnaires were distributed, of which 196 responses were returned and met the established inclusion criteria for analysis. The resulting sample was considered adequate for PLS-SEM based on the recommended minimum sample requirements of Hair et al. (2021).

Both primary and secondary data were utilized in this study. Primary data were collected through an online questionnaire using Google Forms, while secondary data were obtained from relevant scholarly literature, company-related resources, and observations concerning eMRO and inventory management practices. The measurement instrument was developed by adapting measurement items from previous empirical studies. The research model consisted of five constructs: ERP Flexibility, Inventory Management, Digital Transformation Integration, Inventory Control Performance, and Operational Performance. Each construct was measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The collected data were analyzed using SmartPLS 4 through Partial Least Squares Structural Equation Modeling (PLS-SEM). The analysis involved descriptive statistics, measurement model assessment, and structural model assessment. The measurement model was evaluated in terms of convergent validity, discriminant validity, and construct reliability. Convergent validity was assessed using outer loadings and Average Variance Extracted (AVE), with recommended threshold values of 0.70 and 0.50, respectively. Construct reliability was evaluated using Cronbach's alpha, rho_A, and composite reliability, with values above 0.70 considered acceptable. Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT) and the Fornell-Larcker criterion.

The structural model was assessed using the coefficient of determination (R^2) to evaluate the explanatory power of the endogenous constructs. Hypothesis testing was conducted using the bootstrapping procedure in SmartPLS 4 to assess direct and indirect effects. The statistical significance of the structural relationships was determined at the 5% significance level, with a p-value below 0.05 and a T-statistic above 1.96 indicating a significant relationship (Hair et al., 2021). Mediation effects were assessed through the significance of the indirect effects between the independent variables and Operational Performance through Inventory Control Performance.

The development of the research model and hypotheses was grounded in three complementary theoretical perspectives: the Resource-Based View (RBV) as the grand theory, Dynamic Capability Theory as the middle-range theory, and Supply Chain Management Theory as the applied theory. RBV emphasizes that valuable organizational resources and capabilities can generate strategic value and contribute to superior performance (Barney et al., 2021; Kozlenkova et al., 2023). Dynamic Capability Theory focuses on an organization's ability to develop, integrate, and reconfigure resources and capabilities in response to changes in the business environment (Teece, 2023; Mikalef & Gupta, 2021). Meanwhile, Supply Chain Management Theory emphasizes the effective management and integration of material and information flows to improve supply chain and operational performance (Ivanov & Dolgui, 2021; Bag et al., 2022). These theoretical perspectives, together with relevant empirical evidence, provide the foundation for examining the relationships among the five constructs in the proposed research model.

The proposed model examines the direct effects of ERP Flexibility, Inventory Management, and Digital Transformation Integration on Inventory Control Performance and Operational Performance, as well as the effect of Inventory Control Performance on Operational Performance. In addition, Inventory Control Performance is positioned as a mediating variable to explain how the three independent variables contribute to Operational Performance. The proposed research model is presented in Figure 1.

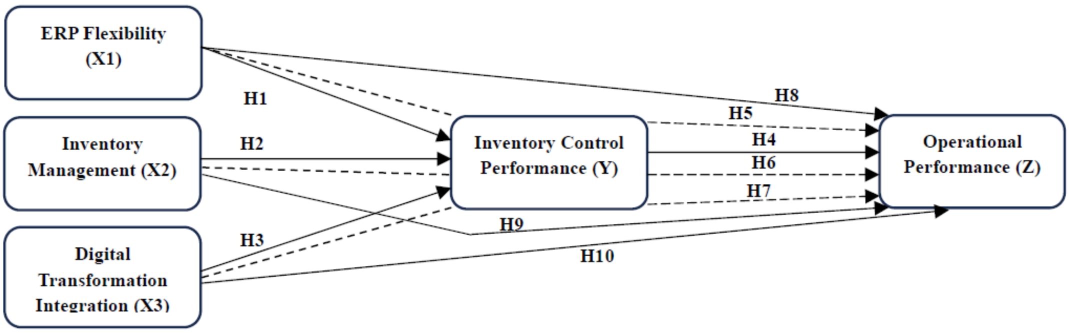

Figure 1. Research Hypothesized Model

1. The Effect of ERP Flexibility on Inventory Control Performance

According to RBV, ERP Flexibility is a strategic capability which when leveraged by firms can enhance information integration, data quality, and business process quality which in turn boosts a firm's inventory control performance (Barney et al., 2021; Kozlenkova et al., 2023). In particular, a flexible ERP system can help the MRO industry in an airline to provide accurate and real-time data regarding spare-parts information which ultimately enhances an organization's Inventory Control Performance. Previous studies conducted by Saputra et al. (2025), Pradata & Ernawati (2024), Harianto et al. (2024) demonstrate the positive influence of ERP Flexibility on Inventory Control Performance. Therefore, this study hypothesizes that:
H1: ERP Flexibility has a positive effect on Inventory Control Performance.

2. The Effect of Inventory Management on Inventory Control Performance

According to Supply Chain Management Theory, Inventory Management is a crucial practice for firms to ensure inventory accuracy and operational performance is achieved through effective management of the material (Ivanov & Dolgui, 2021; Bag et al., 2022). In Inventory Management, firms are able to carry out effective management of material thus ensuring that required spares are acquired when needed. Previous works conducted by Pradata & Ernawati (2024), Alfian et al. (2025) and Ali et al. (2024) have shown the positive role

played by Inventory Management on Inventory Control Performance. Thus, this study hypothesizes that:
H2: Inventory Management has a positive effect on Inventory Control Performance.

3. The Effect of Digital Transformation Integration on Inventory Control Performance

According to Dynamic Capability Theory, Digital Transformation Integration enables firms to realize higher information management quality, improved business process quality, and increased organizational flexibility which ultimately boosts a firm’s performance (Teece, 2023). Specifically, Digital Transformation Integration helps the airline’s MRO industry to enhance visibility of inventory thus supporting the Inventory Control Performance. Studies by Harianto et al. (2024), AlNuaimi et al. (2022) and Ali et al. (2024) provide evidence on the positive effect of Digital Transformation Integration on Inventory Control Performance. Therefore, this study hypothesizes that:
H3: Digital Transformation Integration has a positive effect on Inventory Control Performance.

4. The Effect of Inventory Control Performance on Operational Performance

According to Supply Chain Management Theory, Inventory Control Performance is vital for operational performance in ensuring that material availability is optimized across the supply chains (Ivanov & Dolgui, 2021). In particular, Inventory Control Performance helps in ensuring that there is availability of required spares for the MRO industry required for maintaining aircraft which supports achieving higher levels of Operational Performance. A number of scholars such as Pradata & Ernawati (2024), Santoso et al. (2022) and Ali et al. (2024) have demonstrated the positive influence of Inventory Control Performance on the Operational Performance. Thus, this study hypothesizes that:
H4: Inventory Control Performance has a positive effect on Operational Performance.

5. The Mediating Role of Inventory Control Performance in the Relationship between ERP Flexibility and Operational Performance

According to RBV, Information Technology capabilities have the potential to generate economic value if they are leveraged to create business capabilities that lead to sustainable competitive advantage (Barney et al., 2021; Kozlenkova et al., 2023). ERP Flexibility as a business capability enhances information technology quality thus building inventory control capabilities which ultimately enhances a firm’s operational performance. Previous studies conducted by Saputra et al. (2025), Santoso et al. (2022) and Harianto et al. (2024) provide evidence on the mediating role of Inventory Control Performance in the relationship between ERP Flexibility and Operational Performance. Therefore, this study hypothesizes that:
H5: Inventory Control Performance mediates the relationship between ERP Flexibility and Operational Performance.

6. The Mediating Role of Inventory Control Performance in the Relationship between Inventory Management and Operational Performance

Based on Supply Chain Management Theory, it is argued that effective Inventory Management leads to improved Inventory Control Performance which ultimately enhances the Operational Performance of a firm (Ivanov & Dolgui, 2021; Bag et al., 2022). This is because Inventory Management helps a firm to achieve inventory accuracy thus supporting the realization of higher Operational Performance. Studies by Pradata & Ernawati (2024), Alfian et al. (2025) and Ali et al. (2024) have demonstrated the mediating role played by Inventory Control Performance in the relationship between Inventory Management and Operational Performance. Thus, this study hypothesizes that:
H6: Inventory Control Performance mediates the relationship between Inventory Management and Operational Performance.

7. The Mediating Role of Inventory Control Performance in the Relationship between Digital Transformation Integration and Operational Performance

Based on Dynamic Capability Theory, Digital Transformation Integration has a positive relationship with Inventory Control Performance which in turn enhances the Operational Performance of a firm (Teece, 2023). Specifically, Digital Transformation Integration enables a firm to improve its information management quality thus building inventory control capabilities which ultimately lead to improved Operational Performance of the organization. Studies conducted by Harianto et al. (2024), Mikalef & Gupta (2021) and Ali et al. (2024) provide evidence on the mediating role of Inventory Control Performance in the relationship between Digital Transformation Integration and Operational Performance. Therefore, this study hypothesizes that:

H7: Inventory Control Performance mediates the relationship between Digital Transformation Integration and Operational Performance.

8. The Effect of ERP Flexibility on Operational Performance

According to RBV, ERP Flexibility is a strategic business capability which when leveraged by firms can enhance business process quality that supports achieving higher levels of a firm's operational performance (Barney et al., 2021; Kozlenkova et al., 2023). Specifically, ERP Flexibility helps a firm to realize more effective management of inventory thus supporting improved levels of Operational Performance. Studies by Santoso et al. (2022), Harianto et al. (2024) and Saputra et al. (2025) demonstrate the positive influence of ERP Flexibility on Operational Performance. Thus, this study hypothesizes that:

H8: ERP Flexibility has a positive effect on Operational Performance.

9. The Effect of Inventory Management on Operational Performance

Based on Supply Chain Management Theory, Inventory Management, when performed effectively can help firms realize supply chain efficiency which supports the achievement of higher levels of Operational Performance (Ivanov & Dolgui, 2021; Bag et al., 2022). In particular, Inventory Management ensures that required materials are available when they are needed thus supporting the realization of higher Operational Performance. Various studies conducted by Pradata & Ernawati (2024), Alfian et al. (2025) and Ali et al. (2024) provide sufficient evidence on the positive relationship between Inventory Management and Operational Performance. Therefore, this study hypothesizes that:

H9: Inventory Management has a positive effect on Operational Performance.

10. The Effect of Digital Transformation Integration on Operational Performance

According to Dynamic Capability Theory, Digital Transformation Integration has the potential to improve business process quality thus supporting Operational Performance of the firm (Teece, 2023). For instance, Digital Transformation Integration helps the airline's MRO industry to realize higher levels of information quality through which higher levels of Operational Performance can be achieved. Research works conducted by Harianto et al. (2024), Valle Enrique et al. (2022) and Ali et al. (2024) provide evidence on the positive effect of Digital Transformation Integration on Operational Performance. Thus, this study hypothesizes that:

H10: Digital Transformation Integration has a positive effect on Operational Performance.

Table 3. Operationalization of Research Variables

Variable	Operational Definition	Dimensions	Indicators	Scale
ERP Flexibility (X1) Saputra et al. (2025); Santoso, Siagian, & Tarigan (2022)	The ability of the Enterprise Maintenance, Repair and Overhaul (eMRO) system in an aircraft MRO organization to adapt to emerging needs, facilitate the exchange of information between functions, and provide flexibility in business processes to improve the effectiveness of MRO operations (Saputra et al., 2025; Santoso, Siagian, & Tarigan, 2022).	System Adaptability Information IntegrationBusiness Process Flexibility Real-time Information Availability Cross-functional Coordination Decision Support Capability	1. The ERP system is flexible enough to meet the changing needs of operations (Saputra et al., 2025). 2. The ERP system provides integrated information throughout the company (Santoso, Siagian, & Tarigan, 2022). 3. The ERP system accommodates changes in business processes (Saputra et al., 2025). 4. ERP information is delivered to the user at the right time (Santoso et al., 2022). 5. The ERP system facilitates coordination within the company (Santoso et al., 2022). 6. The ERP system provides the information needed to make decisions (Saputra et al., 2025; Santoso et al., 2022).	Likert (1–5)
Inventory Management (X2) Pradata & Ernawati (2024); Alfian, Mulyati, & Maniah (2025)	The organization's ability to plan, procure, store, control, and distribute materials in a manner that allows for the continued performance of Maintenance, Repair and Overhaul (MRO) operations (Pradata & Ernawati, 2024; Alfian et al., 2025).	Material Planning Material Availability Inventory Monitoring Inventory Control Inventory Accuracy Maintenance Support	1. Planning the amount of materials needed is done accurately (Pradata & Ernawati, 2024). 2. Materials are available when needed for maintenance (Alfian et al., 2025). 3. The amount of materials is always known with the information system (Pradata & Ernawati, 2024). 4. The availability of materials is well managed (Alfian et al., 2025). 5. The number of items in the system matches the number of items in the warehouse (Pradata & Ernawati, 2024). 6. Inventory management meets the needs of maintenance (Alfian et al., 2025).	Likert (1–5)
Digital Transformation Integration (X3) Harianto et al. (2024); Ali et al. (2024); Valle Enrique et al. (2022)	The extent to which digital technology is used to link business processes, facilitate the exchange of information, support cross-functional collaboration, and drive integrated decision-making in an aircraft MRO organization (Harianto et al., 2024; Ali et al., 2024; Valle Enrique et al., 2022).	System Integration Real-time Information Data Accessibility Digital Collaboration Information Exchange Decision Support	1. The information system is integrated (Harianto et al., 2024). 2. Information systems provide timely information (Ali et al., 2024). 3. Information systems provide information throughout the organization (Harianto et al., 2024). 4. Coordinating between organizational parties is well organized using digital technology (Valle Enrique et al., 2022). 5. Information systems deliver information quickly and accurately (Ali et al., 2024). 6. Digital technology helps make it easier for managers to make decisions (Harianto et al., 2024; Ali et al., 2024).	Likert (1–5)
Inventory Control Performance (Y) Sudarmi & Sunaryo (2024); Pradata & Ernawati (2024)	The effectiveness of inventory control practices to ensure inventory accuracy, availability of materials, and improved inventory management to achieve uninterrupted MRO operations (Sudarmi & Sunaryo, 2024; Pradata & Ernawati, 2024).	Inventory Accuracy Material Availability Stockout Control Overstock Control Inventory Efficiency Maintenance Support Timeliness of Material Availability	1. Inventory records are accurate (Sudarmi & Sunaryo, 2024). 2. Available materials are needed for maintenance (Pradata & Ernawati, 2024). 3. Stockouts decrease (Sudarmi & Sunaryo, 2024). 4. Excess stock is well controlled (Pradata & Ernawati, 2024). 5. Inventory management is efficient (Sudarmi & Sunaryo, 2024). 6. Inventory control helps meet the needs of maintenance (Pradata & Ernawati, 2024).	Likert (1–5)

Variable	Operational Definition	Dimensions	Indicators	Scale
			7. Needed materials are available when needed (modified from Pradata & Ernawati, 2024; Sudarmi & Sunaryo, 2024).	
Operational Performance (Z) Santoso, Siagian, & Tarigan (2022); Harianto et al. (2024); Kristanti, Anshori, & Andriani (2023)	The level of operational performance of the organization characterized by efficiency, effectiveness, productivity, and quality of service and the ability to meet targets during the MRO process (Santoso, Siagian, & Tarigan, 2022; Harianto et al., 2024; Kristanti, Anshori, & Andriani, 2023).	Timeliness Productivity Operational Efficiency Service Quality Operational Reliability (AOG Reduction) Overall Operational Performance	1. Maintenance activities are carried out on time (Santoso et al., 2022). 2. Productivity is increased (Harianto et al., 2024). 3. The utilization of organizational resources is maximized (Santoso et al., 2022). 4. Services provided meet standard requirements (Kristanti et al., 2023). 5. The number of Aircraft on Ground is reduced (modified from Santoso et al., 2022). 6. Organizational performance is improving (Harianto et al., 2024; Kristanti et al., 2023).	Likert (1–5)

Source: Developed by the author (2026).

RESULTS AND DISCUSSION

Respondent and Descriptive Statistics

1. Respondent Characteristics

A total of 226 questionnaires were collected through Google Forms for this study. Following the data screening process, which involved evaluating response completeness, consistency, and compliance with the established research criteria, 196 questionnaires were retained for further analysis, while 30 questionnaires were excluded because they did not satisfy the study requirements. Consequently, the study achieved a usable response rate of 86.73%, indicating that the final dataset was adequate for subsequent statistical analyses.

Table 4. Characteristics of the Respondents

No.	Characteristics	Category	Number of Respondents	Percentage (%)
1	**Gender**	Male	122	62,24
		Female	74	37,76
2	**Age**	< 30 years	25	12,76
		30–39 years	115	58,67
		40–49 years	54	27,55
		≥ 50 years	2	1,02
3	**Highest Educational Attainment**	Senior High School (or Equivalent)	10	5,1
		Diploma (D3)	32	16,33
		Bachelor's Degree (S1)	130	66,33
		Master's Degree (S2)	24	12,24
4	**Length of Employment**	< 5 years	24	12,24
		5–10 years	117	59,69
		11–15 years	51	26,02
		> 15 years	4	2,04
5	**Work Unit**	Inventory Control	41	20,92
		Warehouse	33	16,84
		Logistics & Material Delivery	31	15,82
		Finance	21	10,71
		Quality Assurance / Quality Control	19	9,69
		Purchasing	16	8,16

Engineering	13	6,63
Engineer / Mechanic	11	5,61
Material Planning	6	3,06
Internal Audit	1	0,51
Procurement	1	0,51
Asset Management	1	0,51

Source: Processed Research Data (2026)

2. Descriptive Statistics

Descriptive statistical analysis was conducted to provide an overview of respondents' perceptions regarding each research variable. In this study, descriptive statistics include the mean and standard deviation values. The mean value indicates the general tendency of respondents' responses toward each construct, while the standard deviation reflects the level of variation or dispersion among respondents' answers.

Table 5. Results of Descriptive Statistical Analysis of Research Variables

	Sample Mean (M)	Standard Deviation (STDEV)
Digital Transformation Integration (X3) -> Inventory Control Performance (Y)	0,486	0,036
Digital Transformation Integration (X3) -> Operational Performance (Z)	0,320	0,047
ERP Flexibility (X1)_ -> Inventory Control Performance (Y)	0,505	0,039
ERP Flexibility (X1)_ -> Operational Performance (Z)	0,355	0,044
Inventory Control Performance (Y) -> Operational Performance (Z)	0,331	0,068
Inventory Management (X2) -> Inventory Control Performance (Y)	0,550	0,034
Inventory Management (X2) -> Operational Performance (Z)	0,348	0,051

Source: Processed Data from SEM-PLS (2026)

Based on Table 5, the Sample Mean (M) of all structural relationships was between 0.320 and 0.550. Thus, it can be concluded that all relationships between research constructs are positive. The relationship between Inventory Management (X2) and Inventory Control Performance (Y) has the highest Sample Mean (M) of 0.550, whereas the connection between Digital Transformation Integration (X3) and Operational Performance (Z) has the lowest mean of 0.320. Additionally, the Standard Deviation (STDEV) of all relationships was between 0.034 and 0.068, which shows that the predicted path coefficients were close to the mean, indicating that all bootstrap samples were consistent.

Evaluation of Measurement Model (Outer Model)

The evaluation of the measurement model (outer model) was conducted to assess the reliability and validity of the measurement instruments and ensure that each indicator accurately measures the theoretical construct. The assessment includes testing of convergent validity, discriminant validity, and construct reliability. All analyses were conducted using the Structural Equation Modeling–Partial Least Squares (SEM-PLS) method and SmartPLS software.

1. Convergent Validity

The results of the estimation of the measurement model can be seen in Figure 2

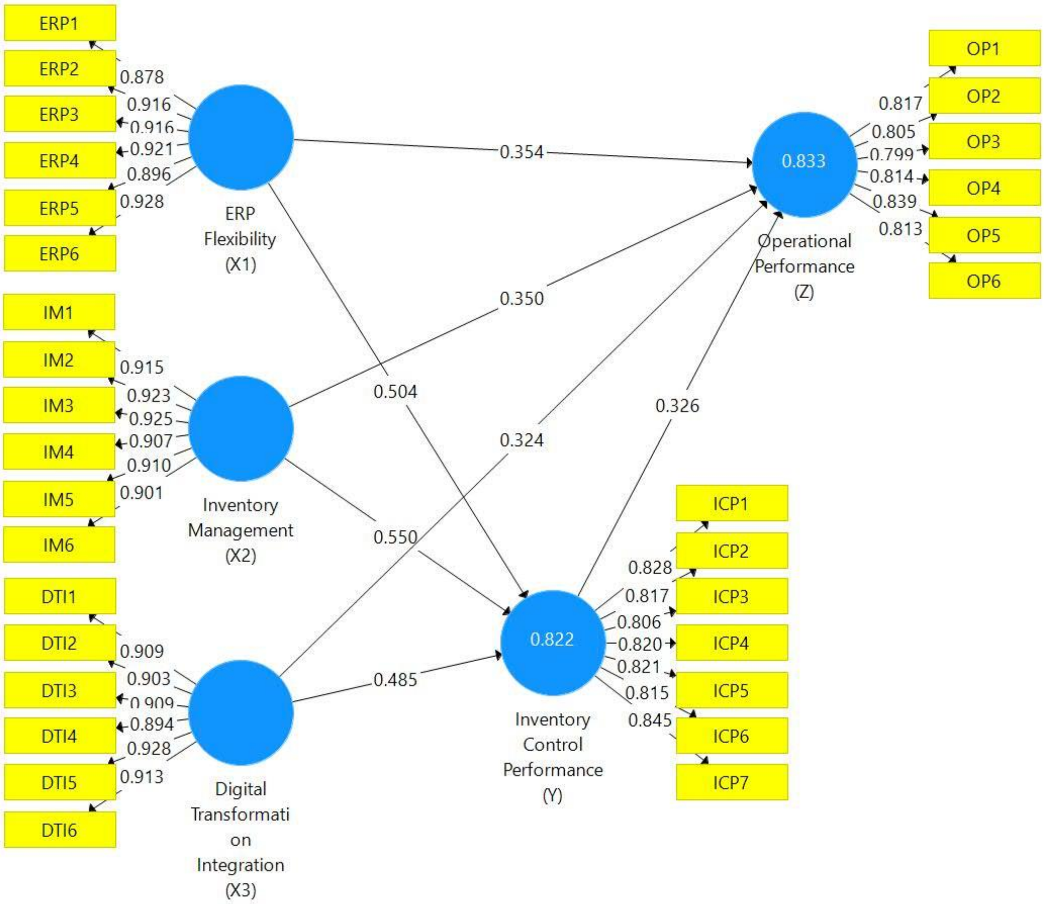

Figure 2. Structural Model Research Model

The structural model's path coefficients demonstrate that ERP Flexibility (X1), Inventory Management (X2), and Digital Transformation Integration (X3) positively influence Inventory Control Performance (Y) with coefficients of 0,504; 0,55; 0,485 respectively. Inventory Control Performance (Y) positively affects Operational Performance (Z) with a coefficient of 0,326. Thus, the model explains 82,2% of variance in Inventory Control Performance and 83,3% of variance in Operational Performance.

The results of the convergent validity test confirm that all indicators have outer loading above 0,70. Therefore, it can be concluded that all indicators meet the recommended criteria for convergent validity and can be used to measure the constructs in the research model.

Table 6. The Outer Loading Values Each Indicator

	Digital Transformation Integration (X3)	ERP Flexibility (X1)	Inventory Control Performance (Y)	Inventory Management (X2)	Operational Performance (Z)	Remarks
DTI1	0,909					Valid
DTI2	0,903					Valid
DTI3	0,909					Valid
DTI4	0,894					Valid
DTI5	0,928					Valid
DTI6	0,913					Valid
ERP1		0,878				Valid
ERP2		0,916				Valid
ERP3		0,916				Valid
ERP4		0,921				Valid
ERP5		0,896				Valid

	Digital Transformation Integration (X3)	ERP Flexibility (X1)	Inventory Control Performance (Y)	Inventory Management (X2)	Operational Performance (Z)	Remarks
ERP6		0,928				Valid
ICP1			0,828			Valid
ICP2			0,817			Valid
ICP3			0,806			Valid
ICP4			0,820			Valid
ICP5			0,821			Valid
ICP6			0,815			Valid
ICP7			0,845			Valid
IM1				0,915		Valid
IM2				0,923		Valid
IM3				0,925		Valid
IM4				0,907		Valid
IM5				0,910		Valid
IM6				0,901		Valid
OP1					0,817	Valid
OP2					0,805	Valid
OP3					0,799	Valid
OP4					0,814	Valid
OP5					0,839	Valid
OP6					0,813	Valid

Source: Processed Data from SEM-PLS (2026)

Based on Table 6 below, it can be seen that all indicators have outer loading above 0.7, which is good. Most of the indicators have outer loading above 0.9, which means that these indicators sufficiently represent the item. Thus, it can be concluded that all the indicators met the convergent validity criterion. Therefore, no indicator was excluded from the model since all of them were appropriate according to the set criterion for convergent validity.

2. Reliability Analysis and Average Variance Extracted

Another aspect that should be evaluated is the reliability of the measurement model. There are several reliability aspects that should be assessed Cronbach's Alpha, rho_A, Composite Reliability or CR, and Average Variance Extracted or AVE. According to Hair et al. (2021), Cronbach's Alpha, rho_A, and CR should be above 0.7, while AVE should be more than 0.5. This implies that the measurement model has achieved reliability if Cronbach's Alpha, rho_A, and CR are above 0.7. On the other hand, the model has adequate convergence validity if AVE is above 0.5. Therefore, a measurement model with Cronbach's Alpha, rho_A, and CR above 0.7 and AVE above 0.5 is reliable enough to proceed to the next step of analysis, which is structural model assessment.

Table 7. Reliability and AVE Test Results

Variabel	Cronbach's Alpha	rho_A	Composite Reliability	AVE	Remarks
ERP Flexibility (X1)	0,958	0,960	0,966	0,826	Valid
Inventory Management (X2)	0,960	0,961	0,968	0,835	Valid
Digital Transformation Integration (X3)	0,958	0,960	0,966	0,827	Valid
Inventory Control Performance (Y)	0,920	0,920	0,936	0,675	Valid
Operational Performance (Z)	0,898	0,899	0,922	0,663	Valid

Source: Processed Data from SEM-PLS (2026)

Based on Table 7 below, it can be seen that all constructs have Cronbach's Alpha values above the recommended level of 0.7. Specifically, the Cronbach's Alpha varies between 0.898 and 0.960. This implies that each construct was consistently measuring the underlying concept. The construct that had the highest Cronbach's Alpha was Inventory Management (X2) with 0.960 while the one with the lowest Cronbach's Alpha was Operational Performance (Z) with 0.898. It is important to note that although Operational Performance (Z) had the lowest Cronbach's Alpha value among all the other constructs, it is still reliable since its value is higher than 0.7 as recommended by Hair et al. (2021).

3. Discriminant Validity (HTMT)

In addition to Cronbach's Alpha test, we also tested discriminant validity by estimating the Heterotrait Monotrait Ratio (HTMT). According to Henseler et al. (2015) and Hair et al. (2021), the suggested maximum HTMT value is 0.9. Therefore, if the HTMT value is less than 1, there is evidence of discriminant validity. This means that the constructs are different from each other. The HTMT test results are presented in Table below.

Table 8. Heterotrait Monotrait Ratio (HTMT) Results

Variable	(X3)	(X1)	(Y)	(X2)	(Z)
Digital Transformation Integration (X3)	–				
ERP Flexibility (X1)	0.090	–			
Inventory Control Performance (Y)	0,582	0,550	–		
Inventory Management (X2)	0.039	0.059	0,572	–	
Operational Performance (Z)	0,586	0,573	0,863	0,557	–

Source: Processed Data from SEM-PLS (2026)

Based on Table 8, the results of the HTMT test reveal that all constructs of this study have HTMT ratios varying from 0,039 to 0,863. Thus, there was found the lowest value of the Heterotrait-Monotrait Ratio between such constructs as Digital Transformation Integration (X3) and Inventory Management (X2). Contrariwise, the highest Heterotrait-Monotrait Ratio was discovered for the pair of Inventory Control Performance (Y) and Operational Performance (Z) with the value of 0,863.

4. Discriminant Validity Analysis (Fornell Larcker Criterion)

According to Hair et al. (2021), discriminant validity is achieved when an item's indicator has a higher value of the square root of the Average Variance Extracted (AVE) than all the correlations with other constructs in the structural model. In general, the Fornell Larcker Criterion aims to assess whether a construct's indicators are more related to their own construct than to any other construct in the model. Therefore, it implies that discriminant validity is met if all diagonal entries of the correlation matrix are greater than the corresponding off-diagonal entries..

Table 9. Discriminant Validity Test Results (Fornell Larcker criterion)

Variabel	X3	X1	Y	X2	Z
Digital Transformation Integration (X3)	**0,909**				
ERP Flexibility (X1)	0,088	**0,909**			
Inventory Control Performance (Y)	0,547	0,517	**0,822**		
Inventory Management (X2)	0,033	0,054	0,539	**0,914**	
Operational Performance (Z)	0,546	0,533	0,876	0,518	**0,814**

Source: Processed Data from SEM-PLS (2026)

The discriminant validity results listed in Table 9 show that the square root of the average variance extracted (√AVE) for each construct is higher than the inter-construct correlations for the rows and columns. This shows that the constructs all have more variance extracted from the indicators than the variance shared with other constructs listed in the table. Therefore, it can be said that all constructs have achieved discriminant validity because there are no two constructs that share more than 50% of their indicators.

5. Construct Reliability and Validity

The major aim of assessing construct reliability is to evaluate the extent to which items used measure the underlying constructs consistently. In this study, construct reliability was assessed using cronbach's alpha, rho_A, and composite reliability. According to Hair et al. (2022), a construct is considered reliable if the Cronbach's Alpha, rho_A, and composite reliability values are higher than 0.70. On the other hand, the study used average variance extracted (AVE) to assess convergent validity. In this case, constructs with AVE values higher than 0.50 were considered valid.

Table 10. Construct Reability Test Result

	Cronbach's Alpha	Composite Reliability	Remarks
Digital Transformation Integration (X3)	0,958	0,966	Reliable
ERP Flexibility (X1)_	0,958	0,966	Reliable
Inventory Control Performance (Y)	0,920	0,936	Reliable
Inventory Management (X2)	0,960	0,968	Reliable
Operational Performance (Z)	0,898	0,922	Reliable

Source: Processed Data from SEM-PLS (2026)

Based on Table 10, the results of the construct reliability assessment indicate that all constructs in this research model are reliable because the Cronbach's Alpha and Composite Reliability values for all constructs exceed the recommended threshold of 0,7. It can also be seen that the reliability for all constructs falls between 0,922 (Operational performance, Z) and 0,968 (Inventory management, X2). Thus, based on Table 9 we can conclude that all constructs in this study are reliable enough for further analysis within the SEM-PLS framework.

Structural Model (Inner Model)

The coefficient of determination, or R 2 was used to evaluate the variance explained of the endogenous variables by the exogenous variables. The authors, Hair et al., (2021) suggest that if R 2 is equal or higher than 0,75, the predictive relevance is very high, predictive relevance is moderate if the coefficient falls between 0,5 and 0,75 and low if it is below 0,5. Thus, the coefficient of determination helps to illustrate how much variance of the predictive variables contributes to the outcome variable in the structural model of the study.

Table 11. R-Square (R^2) Assessment Results

	R Square	R Square Adjusted	Categories
Inventory Control Performance (Y)	0,822	0,819	Strong
Operational Performance (Z)	0,833	0,829	Strong

Source: Processed Data from SEM-PLS (2026)

Based on Table 11 below, the Inventory Control Performance (Y) construct has an R-Square (R 2) of 0.822 and an Adjusted R-Square of 0.819. This implies that the variance of Inventory Control Performance is explained by ERP Flexibility (X1), Inventory Management (X2), and Digital Transformation Integration (X3) is jointly explained by 82.2%. On the other hand, 17.8% is explained by factors not included in the model proposed in this study.

Moreover, Operational Performance (Z) construct has an R-Square (R 2) of 0.833 and an Adjusted R-Square of 0.829. This suggests that 83.3% of variance in Operational Performance is explained by ERP Flexibility (X1), Inventory Management (X2), and Digital Transformation Integration (X3) through Inventory Control Performance (Y) as a intervening variable. On the other hand, 16.7% of the variance is explained by factors not included in the model proposed in this study.

Direct Influence Hypothesis Testing

The analysis proceeded to test the direct influence hypothesis stated in the research model. The bootstrapping procedure was done using SmartPLS software. The structural paths were evaluated using p-values at 5% significance level. According to Hair et al. (2021), a structural relationship is significant if the T-statistic is greater than 1.96 or if the P-value is less than 0.05. These criteria were used to establish if the null hypothesis could be rejected or not.

Table 12. Hypothesis Testing Results

Relationships Between Variables	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values	Result
ERP Flexibility (X1) → Inventory Control Performance (Y)	0,504	0,505	0,039	13,007	0,000	Significant
Inventory Management (X2) → Inventory Control Performance (Y)	0,550	0,550	0,034	16,277	0,000	Significant
Digital Transformation Integration (X3) → Inventory Control Performance (Y)	0,485	0,486	0,036	13,433	0,000	Significant
Inventory Control Performance (Y) → Operational Performance (Z)	0,326	0,331	0,068	4,767	0,000	Significant
ERP Flexibility (X1) → Operational Performance (Z)	0,354	0,355	0,044	7,977	0,000	Significant
Inventory Management (X2) → Operational Performance (Z)	0,350	0,348	0,051	6,828	0,000	Significant
Digital Transformation Integration (X3) → Operational Performance (Z)	0,324	0,320	0,047	6,942	0,000	Significant

Source: Processed Data from SEM-PLS (2026)

Based on Table 12, all direct relationships among the constructs exhibit T-statistics greater than 1.96 and P-values lower than 0.05, indicating that each direct effect is statistically significant at the 5% significance level. Furthermore, all path coefficients are positive, confirming positive and significant relationships among the constructs in the proposed research model. Therefore, all hypotheses concerning the direct effects are supported and accepted.

a. **ERP Flexibility → Inventory Control Performance**
   ERP Flexibility has a positive and significant effect on Inventory Control Performance ($\beta = 0.504$, $t = 13.007$, $p < 0.001$). This finding suggests that greater ERP flexibility enhances inventory control by improving real-time information integration, cross-functional coordination, and decision-making capabilities.
b. **Inventory Management → Inventory Control Performance**
   Inventory Management positively and significantly affects Inventory Control Performance ($\beta = 0.550$, $t = 16.277$, $p < 0.001$). Effective inventory management practices improve material planning, inventory monitoring, and overall inventory control effectiveness.
c. **Digital Transformation Integration → Inventory Control Performance**
   Digital Transformation Integration has a positive and significant effect on Inventory Control Performance ($\beta = 0.485$, $t = 13.433$, $p < 0.001$). The integration of digital technologies enhances information visibility, process automation, and data-driven inventory management.
d. **Inventory Control Performance → Operational Performance**

Inventory Control Performance positively and significantly influences Operational Performance (β = 0.326, t = 4.767, p < 0.001). Effective inventory control ensures material availability, reduces operational delays, and improves resource utilization within Aircraft MRO operations.

e. ERP Flexibility → Operational Performance

ERP Flexibility exerts a positive and significant effect on Operational Performance (β = 0.354, t = 7.977, p < 0.001). A flexible ERP system strengthens operational performance by enabling real-time information sharing, improving coordination, and increasing organizational responsiveness.

f. Inventory Management → Operational Performance

Inventory Management has a positive and significant impact on Operational Performance (β = 0.350, t = 6.828, p < 0.001). Effective inventory management contributes to operational efficiency by ensuring material availability while minimizing stock shortages and excess inventory.

g. Digital Transformation Integration → Operational Performance

Digital Transformation Integration positively and significantly affects Operational Performance (β = 0.324, t = 6.942, p < 0.001). Digital integration improves operational efficiency by enhancing information quality, streamlining business processes, and supporting faster organizational decision-making.

Mediation Effect Analysis (Specific Indirect Effects)

The mediation analysis (specific indirect effects) was performed to determine whether Inventory Control Performance has a mediating effect on the relationships between ERP Flexibility, Inventory Management, and Digital Transformation Integration and Operational Performance. Specifically, the mediation was tested by using Specific Indirect Effects derived from bootstrapping procedure available in SmartPLS. According to Hair et al. (2021), indirect (mediation) effects are significant if their T-statistic is greater than 1.96, and P-value is lower than 0.05 at 5% significance level.

Table 13. Specific Indirect Effects (Mediation) Assessment Results

Relationships Between Variables	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values	Result
ERP Flexibility (X1) → Inventory Control Performance (Y) → Operational Performance (Z)	0,165	0,166	0,035	4,651	0,000	Significant
Inventory Management (X2) → Inventory Control Performance (Y) → Operational Performance (Z)	0,179	0,182	0,040	4,444	0,000	Significant
Digital Transformation Integration (X3) → Inventory Control Performance (Y) → Operational Performance (Z)	0,158	0,161	0,037	4,264	0,000	Significant

Source: Processed Data from SEM-PLS (2026)

Based on Table 13, all specific indirect effects exhibit T-statistics greater than 1.96 and P-values below 0.05, indicating that all mediation effects are statistically significant at the 5% significance level. Accordingly, Inventory Control Performance significantly mediates the relationships between ERP Flexibility, Inventory Management, and Digital Transformation Integration and Operational Performance. Therefore, all proposed mediation hypotheses are supported and accepted.

h. ERP Flexibility → Inventory Control Performance → Operational Performance

ERP Flexibility has a positive and significant indirect effect on Operational Performance through Inventory Control Performance (β = 0.165, t = 4.651, p < 0.001). This result indicates that Inventory Control Performance serves as a significant mediating mechanism through which ERP flexibility enhances operational performance.

i. **Inventory Management → Inventory Control Performance → Operational Performance**

Inventory Management positively and significantly influences Operational Performance through Inventory Control Performance ($\beta = 0.179$, $t = 4.444$, $p < 0.001$). The findings suggest that effective inventory management improves operational performance by strengthening inventory control effectiveness.

j. **Digital Transformation Integration → Inventory Control Performance → Operational Performance**

Digital Transformation Integration exerts a positive and significant indirect effect on Operational Performance through Inventory Control Performance ($\beta = 0.158$, $t = 4.264$, $p < 0.001$). This finding confirms that Inventory Control Performance mediates the relationship between digital transformation integration and operational performance, highlighting the strategic role of inventory control in translating digital capabilities into operational improvements.

Summary of Hypothesis Testing Results

Table 13 provides a summary of the hypothesis testing results to present an overall evaluation of the proposed research model. The summary includes all hypotheses examined in this study, along with the decisions on whether each hypothesis is supported or not supported based on the SEM-PLS analysis results.

Table 14. Summary of Hypothesis Testing Results

N0	Relationships Between Variables	Result
H1	ERP Flexibility (X1) → Inventory Control Performance (Y)	Significant
H2	Inventory Management (X2) → Inventory Control Performance (Y)	Significant
H3	Digital Transformation Integration (X3) → Inventory Control Performance (Y)	Significant
H4	Inventory Control Performance (Y) → Operational Performance (Z)	Significant
H5	ERP Flexibility (X1) → Inventory Control Performance (Y) → Operational Performance (Z)	Significant
H6	Inventory Management (X2) → Inventory Control Performance (Y) → Operational Performance (Z)	Significant
H7	Digital Transformation Integration (X3) → Inventory Control Performance (Y) → Operational Performance (Z)	Significant
H8	ERP Flexibility (X1) → Operational Performance (Z)	Significant
H9	Inventory Management (X2) → Operational Performance (Z)	Significant
H10	Digital Transformation Integration (X3) → Operational Performance (Z)	Significant

Source: Processed Data from SEM-PLS (2026)

Based on Table 14, all the hypotheses stated in this study were accepted. The hypothesis test results reveal that all the direct and indirect relationships have a positive and significant effect at a 5% significance level.

Based on Table 14, ERP Flexibility, Inventory Management, and Digital Transformation Integration have a positive and significant effect on Inventory Control Performance. Moreover, Inventory Control Performance significantly and positively affects Operational Performance. Consequently, ERP Flexibility, Inventory Management, and Digital Transformation Integration have a positive and significant direct effect on Operational Performance.

Aside from the direct effect, Inventory Control Performance mediates the effect of ERP Flexibility, Inventory Management, and Digital Transformation Integration on Operational Performance. By improving ERP Flexibility, Inventory Management, and Digital Transformation Integration, the Operational Performance can be improved through the enhancement of Inventory Control Performance. Thus, it can be stated that the research model fully captures the relationships between the variables, and all the hypotheses are supported, based on the results of the SEM-PLS analysis.

DISCUSSIONS

ERP Flexibility Positively and Significantly Affects Inventory Control Performance

The results of the first hypothesis (H1) indicate that ERP Flexibility has a positive and significant effect on Inventory Control Performance, with a path coefficient of 0.504, a T-statistic of 13.007, and a p-value of 0.000. Therefore, H1 is supported. This finding suggests that greater ERP flexibility improves the effectiveness of inventory control by enabling organizations to adapt their systems to operational changes, integrate information across functions, enhance inventory data accuracy, and strengthen cross-functional coordination. In the Aircraft Maintenance, Repair, and Overhaul (MRO) industry, these capabilities are essential for managing large volumes of critical spare parts requiring accurate and real-time information. This result supports the Resource-Based View (RBV), which emphasizes information technology capabilities as strategic organizational resources that enhance operational value (Barney et al., 2021; Kozlenkova et al., 2023). The finding is consistent with Saputra et al. (2025), Pradata and Ernawati (2024), and Harianto et al. (2024), who reported that ERP flexibility enhances inventory control through improved data integration, information quality, and business process coordination.

Inventory Management Positively and Significantly Affects Inventory Control Performance

The second hypothesis (H2) demonstrates that Inventory Management has a positive and significant effect on Inventory Control Performance, with a path coefficient of 0.550, a T-statistic of 16.277, and a p-value of 0.000. Thus, H2 is supported. This coefficient is the highest among the exogenous variables, indicating that Inventory Management is the strongest predictor of Inventory Control Performance. Effective inventory management, including material planning, stock level control, inventory monitoring, and information management, improves inventory accuracy while reducing material shortages and excess stock. These practices are particularly critical in the MRO industry, where spare-part availability directly affects maintenance continuity and minimizes Aircraft on Ground (AOG) incidents. This finding supports Supply Chain Management Theory, which highlights effective material and information flow as key drivers of supply chain performance (Ivanov & Dolgui, 2021; Bag et al., 2022; Ali et al., 2024). The result is consistent with Pradata and Ernawati (2024), Alfian et al. (2025), and Ali et al. (2024).

Digital Transformation Integration Positively and Significantly Affects Inventory Control Performance

The third hypothesis (H3) confirms that Digital Transformation Integration positively and significantly influences Inventory Control Performance, with a path coefficient of 0.485, a T-statistic of 13.433, and a p-value of 0.000. Therefore, H3 is supported. The finding indicates that greater digital integration enhances inventory control by improving real-time visibility, accelerating information sharing, increasing data accuracy, and facilitating timely decision-making. In the MRO industry, digital integration strengthens coordination among maintenance planning, engineering, procurement, warehousing, and logistics. This finding supports Dynamic Capability Theory, which argues that digital capabilities enable organizations to adapt to changing business environments and improve operational effectiveness (Teece, 2023; Mikalef & Gupta, 2021). The result aligns with Harianto et al. (2024), Ali et al. (2024), and Valle Enrique et al. (2022).

Inventory Control Performance Positively and Significantly Affects Operational Performance

The fourth hypothesis (H4) shows that Inventory Control Performance has a positive and significant effect on Operational Performance, with a path coefficient of 0.326, a T-statistic of 4.767, and a p-value of 0.000. Accordingly, H4 is supported. Effective inventory control ensures material availability, improves inventory accuracy, minimizes stock shortages and excess inventory, and supports smooth operational activities. In the MRO sector, effective inventory control is crucial because maintenance operations rely on timely and accurate spare-part availability. This finding supports Supply Chain Management Theory, which emphasizes efficient material and information management as a foundation for operational excellence (Ivanov & Dolgui, 2021; Bag et al., 2022; Ali et al., 2024). The result is consistent with Pradata and Ernawati (2024), Ali et al. (2024), and Santoso et al. (2022).

ERP Flexibility Positively and Significantly Affects Operational Performance Through Inventory Control Performance

The fifth hypothesis (H5) indicates that ERP Flexibility has a positive and significant indirect effect on Operational Performance through Inventory Control Performance, with an indirect effect coefficient of 0.165, a T-statistic of 4.651, and a p-value of 0.000. Therefore, H5 is supported. This result suggests that ERP flexibility enhances operational performance by improving inventory control effectiveness. Flexible ERP systems facilitate better information integration, higher data quality, and improved coordination, which subsequently increase material availability and operational efficiency. This mediating relationship supports the Resource-Based View (RBV), which proposes that information technology capabilities generate organizational value when transformed into operational capabilities (Barney et al., 2021; Kozlenkova et al., 2023). The finding is consistent with Saputra et al. (2025), Pradata and Ernawati (2024), Santoso et al. (2022), and Harianto et al. (2024).

Inventory Management Positively and Significantly Affects Operational Performance Through Inventory Control Performance

The sixth hypothesis (H6) confirms that Inventory Management positively and significantly affects Operational Performance through Inventory Control Performance, with an indirect effect coefficient of 0.179, a T-statistic of 4.444, and a p-value of 0.000. Thus, H6 is supported. Effective inventory management improves operational performance by strengthening inventory control, reducing operational disruptions, and ensuring material availability. In the MRO industry, this finding highlights that inventory planning alone is insufficient unless supported by effective inventory control practices. This result supports Supply Chain Management Theory, emphasizing integrated material and information management as a driver of operational performance (Ivanov & Dolgui, 2021; Bag et al., 2022; Ali et al., 2024). The finding is consistent with Pradata and Ernawati (2024), Alfian et al. (2025), and Ali et al. (2024).

Digital Transformation Integration Positively and Significantly Affects Operational Performance Through Inventory Control Performance

The seventh hypothesis (H7) demonstrates that Digital Transformation Integration has a positive and significant indirect effect on Operational Performance through Inventory Control Performance, with an indirect effect coefficient of 0.158, a T-statistic of 4.264, and a p-value of 0.000. Therefore, H7 is supported. The finding indicates that digital transformation improves operational performance by enhancing inventory control through greater system integration, better inventory visibility, and more effective cross-functional coordination. This result supports Dynamic Capability Theory, which emphasizes digital capabilities as essential for organizational adaptability and operational improvement (Teece, 2023; Mikalef & Gupta, 2021). The finding is consistent with Harianto et al. (2024), Ali et al. (2024), and Valle Enrique et al. (2022).

ERP Flexibility Positively and Significantly Affects Operational Performance

The eighth hypothesis (H8) shows that ERP Flexibility has a positive and significant effect on Operational Performance, with a path coefficient of 0.354, a T-statistic of 7.977, and a p-value of 0.000. Thus, H8 is supported. ERP flexibility enhances operational performance by improving process integration, information quality, and organizational responsiveness to operational changes. In the MRO industry, these capabilities facilitate effective coordination among maintenance planning, engineering, procurement, warehousing, and logistics. This finding supports the Resource-Based View (RBV) and is consistent with Santoso et al. (2022), Harianto et al. (2024), and Saputra et al. (2025).

Inventory Management Positively and Significantly Affects Operational Performance

The ninth hypothesis (H9) confirms that Inventory Management positively and significantly affects Operational Performance, with a path coefficient of 0.350, a T-statistic of 6.828, and a p-value of 0.000. Therefore, H9 is supported. Effective inventory management improves operational performance by optimizing stock levels, ensuring material availability, reducing stock-related risks, and increasing resource utilization efficiency. These capabilities are particularly important in the MRO industry, where spare-part availability directly determines maintenance effectiveness. This finding supports Supply Chain Management Theory and is consistent with Pradata and Ernawati (2024), Alfian et al. (2025), and Ali et al. (2024).

Digital Transformation Integration Positively and Significantly Affects Operational Performance

The tenth hypothesis (H10) indicates that Digital Transformation Integration has a positive and significant effect on Operational Performance, with a path coefficient of 0.324, a T-statistic of 6.942, and a p-value of 0.000. Accordingly, H10 is supported. Digital transformation integration enhances operational performance by improving information quality, accelerating data exchange, increasing process transparency, and supporting faster decision-making. In the MRO industry, digital integration enables better coordination among maintenance planning, engineering, procurement, warehousing, and logistics, resulting in more efficient maintenance operations. This finding supports Dynamic Capability Theory and is consistent with Harianto et al. (2024), Valle Enrique et al. (2022), and Ali et al. (2024).

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study extends the research model proposed by Saputra et al. (2025) by examining the effects of ERP Flexibility, Inventory Management, and Digital Transformation Integration on Operational Performance through the mediating role of Inventory Control Performance in the Aircraft Maintenance, Repair, and Overhaul (MRO) industry. The findings confirm that all proposed hypotheses are supported, indicating that technological capabilities, inventory management practices, and digital transformation contribute significantly to operational performance, both directly and indirectly through effective inventory control. The main conclusions of this study are as follows:

1. ERP Flexibility has a positive and significant effect on Inventory Control Performance. Greater ERP flexibility enhances business process integration, real-time information sharing, and system adaptability, thereby improving inventory control effectiveness.

2. Inventory Management has a positive and significant effect on Inventory Control Performance. Effective inventory planning, stock control, and material management improve inventory accuracy and strengthen inventory control in MRO organizations.
3. Digital Transformation Integration has a positive and significant effect on Inventory Control Performance. Higher levels of digital integration improve information quality, operational coordination, and the overall effectiveness of inventory control.
4. Inventory Control Performance has a positive and significant effect on Operational Performance. Effective inventory control improves material availability, supports maintenance activities, enhances operational efficiency, and contributes to superior operational performance.
5. ERP Flexibility has a positive and significant indirect effect on Operational Performance through Inventory Control Performance. This finding indicates that the operational benefits of ERP flexibility are strengthened when supported by effective inventory control.
6. Inventory Management has a positive and significant indirect effect on Operational Performance through Inventory Control Performance. Effective inventory management improves operational performance by enhancing the efficiency of inventory control processes.
7. Digital Transformation Integration has a positive and significant indirect effect on Operational Performance through Inventory Control Performance. This finding demonstrates that the impact of digital transformation on operational performance is amplified through improved inventory control.
8. ERP Flexibility has a positive and significant direct effect on Operational Performance. Flexible ERP systems improve coordination, information accessibility, and business process efficiency, leading to better operational outcomes.
9. Inventory Management has a positive and significant direct effect on Operational Performance. Effective inventory management supports maintenance continuity, reduces material delays, and enhances operational efficiency.
10. Digital Transformation Integration has a positive and significant direct effect on Operational Performance. Integrated digital technologies improve information quality, accelerate decision-making, strengthen cross-functional coordination, and enhance overall operational performance.

Limitations

This study has some limitations that should be considered when interpreting the results and generalizing the findings. First, the study was conducted at a single Aircraft MRO company in Indonesia, thus restricting the scope of generalizability. Second, the research model used only three exogenous constructs and one mediator, thus excluding other relevant constructs that might affect the relationships between ERP Flexibility, Inventory Management, Digital Transformation Integration, Inventory Control Performance, and Operational Performance. Third, this study was cross-sectional, thus only capturing the relationships between the constructs at one point in time.

Recommendations

Future studies may consider expanding this research model by including additional concepts, such as Supply Chain Integration, Information Quality, Warehouse Management Capability, Procurement Performance, Maintenance Process Effectiveness, Supply Chain Resilience, Organizational Agility, and Human Resource Capability. In addition, future studies may aim to test this model using a larger sample of participants from different countries/regions to increase the generalizability of the findings. Moreover, future researchers may consider building upon the findings of this study and the work of Saputra et al. (2025) by re-examining

Artificial Intelligence-Based Forecasting and Big Data Analytics using a digital maturity measure. Additionally, longitudinal, mixed-methods, and alternative approaches such as Covariance-Based Structural Equation Modeling (CB-SEM), System Dynamics, and Machine Learning can be used to obtain more robust theoretical and practical insights.

Author Contributions

The authors contributed equally to this work. All of them were involved in writing the original manuscript, data analysis and interpretation, and critical review of the final version of the manuscript. All of them read and approved the final version of the manuscript.

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