
Driving Sustainable Aviation Performance through Digital Readiness and Environmental Stewardship: Does Work Experience Matter?

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Abstract: Sustainable aviation performance examines digital readiness, environmental stewardship, knowledge sharing, and technology usage behavior separately; therefore, their integrative influence and work experience as a boundary condition remain unclear. This study developed and tested models using work experience as a boundary condition. Data from 228 employees in the Indonesian aviation sector were analyzed using PLS-SEM, MICOM, and Multi-Group Analysis. Digital readiness (DR) positively influenced sustainable aviation performance (SAMP) ($\beta = 0.241$; $p < 0.001$) and technology usage behaviour ($\beta = 0.268$; $p < 0.001$). Environmental stewardship (ES) positively influenced both outcomes ($\beta = 0.208$; $p = 0.024$ and $\beta = 0.333$; $p < 0.001$) and knowledge sharing (KS) ($\beta = 0.318$; $p < 0.001$ and $\beta = 0.242$; $p = 0.002$). Technology usage behaviour (TUB) positively affected SAMP ($\beta = 0.314$; $p < 0.001$) and partially mediated the influence of DR, ES, and KS. The model explained 48.6% of the variance in sustainable aviation performance and 52.8% of the variance in TUB, whereas work experience showed no significant differences between ≤ 5 years (WEA) and > 5 years (WEB). This research contributes to the capability–enactment–performance mechanism, in which organizational systems and technology applications outweigh employee seniority.

Keywords: Digital readiness, digital transformation, environmental stewardship, knowledge sharing, organizational capabilities, sustainable aviation performance, technology usage behaviour, work experience.

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INTRODUCTION

The aviation sector is an important part of economic development because it increases human mobility, boosts international trade, and integrates the supply chain. This encourages economic growth in the region. Conversely, the sector still faces sustainability challenges in the form of increased carbon emissions and energy consumption, operational inefficiency, and the need to harmonize economic growth with environmental responsibility. Data (Airports Council International, 2025; International Energy Agency, 2025) show that the aviation sector accounts for approximately 2–3% of global CO₂ emissions and is experiencing an increasing number of passengers annually. This increase affects the operational capacity and energy efficiency of the aviation industry as a whole. Therefore, sustainable aviation performance relies not only on technological innovation but also on the capacity of organizations to integrate digital, environmental, knowledge, and human-behavioral aspects into the operational processes of the aviation sector.

Sustainable aviation performance encompasses multiple dimensions, including technical efficiency, economic performance, operational safety, social responsibility, and environmental impact (Haksevenler, Temel, & Topal, 2023; Raimundo, Baltazar, & Cruz, 2023). This is because the characteristics of the aviation sector differ from those of other sectors. The aviation sector operates in an environment with strict regulations, high safety standards, dependence on technology, and significant efforts to diminish environmental consequences, making it challenging to achieve sustainability performance in the aviation sector. To achieve sustainability, it is necessary to integrate technical efficiency, operational management capacity, and organizational capacity into the business operations of the aviation sector (Kaffash, Chomachaei, & Aktas, 2026).

The technology used in the aviation sector improves efficiency, safety, and the quality of decision-making. This technology is used for data-based flight operations and maintenance prediction systems, operational coordination platforms, analytics, and safety management (Tyagi, Tripathi, & Bouarfa, 2023; Verhagen, Marcu, Neerincx, & Tielman, 2024). The successful implementation of digital transformation through digital technology depends on the capabilities of aviation-sector organizations. Organizations must also be able to apply the technology by integrating it into their work processes and strategies, and human resource capabilities are key. In addition, digital transformation will be more effective if it is supported by the right organizational culture, management structure, and employee capabilities (Abed Alhameed & Emeagwali, 2026).

The aviation sector's environmental responsibility must manifest as organizational and employee commitment. The responsibilities undertaken reflect the commitment of the organization and its employees. In the aviation sector, employees are responsible for complying with regulations, policies, and procedures; using technology; and engaging in environmentally friendly behavior. Organizational commitment can be realized by improving fuel and energy efficiency, reducing emissions and waste, using aviation technology or sustainable fuels, complying with environmental regulations, and managing operational practices by involving all employees in creating an environmentally friendly aviation sector (Aldahmashi et al., 2023; Bamidele, Ozturen, Haktanir, & Ogunmokun, 2023; Haksevenler et al., 2023). Responsible environmental stewardship reflects the strategic orientation of an organization and represents environmental commitment in the decisions and operational actions associated with aviation activities.

While information and coordination are key aspects of aviation, learning through operational experience relates to implementing operational practices through a shared understanding of failures and successes. Knowledge sharing facilitates organizations in optimally using their internal experiences and competencies to support performance. Conversely, suboptimal knowledge exchange can increase safety risks, weaken coordination, and decrease the quality of decision-making (Sekelová, Korba, Koščáková, & Tymofiiiv, 2023; Tyagi et al., 2023). In contrast, knowledge sharing can maximize and optimize an organization's experience, expertise, and operational efficiency. Knowledge transfer in aviation systems can improve organizational efficiency and adaptability (Park & Kim, 2021). The use of digital technology can strengthen knowledge-sharing processes, which can improve organizational performance (Duan, Deng, & Wibowo, 2024).

Research on digital readiness, environmental stewardship, knowledge sharing, and technology use behavior in relation to sustainability performance has evolved; however, many studies still examine these variables separately. Prior studies have mostly focused on sectors such as education, healthcare, manufacturing, and organizations (Le & Tham, 2024; Marjerison, Andrews, & Kuan, 2022; VanDerSchaaf, Daim, & Basoglu, 2023). There is still an opportunity to understand these interactions within the aviation sector. The aviation sector is synonymous with strict regulations, significant operational risks, and a high dependence on coordination between units (Alotaibi, Wilson, & Traynor, 2025; Bamidele et al., 2023; Desmaryani, Soleh, Irmanelly, & Wiarta, 2024; Zhang, Zhou, Zeng, & Zou, 2023). In addition, moderation research, which examines how relationships with performance vary according to levels of digital readiness and sustainability practices, has not been explored in depth (Bamidele et al., 2023; Marjerison et al., 2022). In the aviation sector, standard procedures, experience-based decision-making, and cross-functional coordination are crucial. Work experience can greatly influence employees' interpretation and implementation of technology and sustainability practices (Biede et al., 2023; He & Sun, 2023; Zemlyak, Gusarova, & Sivakova, 2022). Previous studies have examined work experience more as a demographic characteristic than as a determinant of employees' ability to leverage technology, implement sustainability practices, and share knowledge in a dynamic work environment (Chao & Yizhou, 2025; Liu et al., 2024). This limits understanding of how organizational and employee factors affect flight sustainability performance and the conditions that constrain those relationships among employees with limited work experience.

This study advances the literature on aviation sustainability by developing an integrative model incorporating digital readiness, environmental stewardship, knowledge sharing, and technology use behavior to achieve sustainable aviation. It also provides a conceptual contribution by viewing work experience not only as a demographic characteristic but also as a form of team interaction during work activities, involving the accumulation of operational knowledge, cognitive maturity, and adaptability. This model provides an understanding of how work experience affects technology adoption and sustainability in the aviation industry. The study also expands empirical knowledge through model testing in the aviation sector, which has distinctive characteristics, including strict regulations, high operational risks, significant environmental impacts, and reliance on coordination between humans and machines.

This study sought to extend and empirically evaluate an integrative model examining the relationships among digital readiness, environmental stewardship, knowledge sharing, technology use behavior, and sustainable aviation performance. It also examined the moderating effect of work experience as a boundary condition.

THEORETICAL INTEGRATION FRAMEWORK AND HYPOTHESES DEVELOPMENT

Theoretical Integration for Sustainability Performance in the Aviation Sector

The achievement of sustainable performance in the aviation sector is determined not only by technological advancements but also by the effectiveness of organizations in managing environmental resources, knowledge, and employees. In a sector with a high level of reliability, such as aviation, sustainability depends on an organization's ability to adapt to technological innovations, manage operational risks, and integrate environmentally friendly practices into its business operations (Kaffash et al., 2026; Martín-Domingo, Efthymiou, & Mujica Mota, 2025). Therefore, a holistic and sustainable approach is essential for understanding the relationship between technological elements, organizations, and individuals in achieving aviation sustainability. This study amalgamates five theoretical perspectives: Dynamic Capability View (DCV), Natural Resource-Based View (NRBV), Unified Theory of Acceptance and Use of Technology (UTAUT), Knowledge-Based View (KBV), and Human Capital Theory (HCT). These theories are integrated to show that aviation sustainability performance is a process that involves organizations building digital readiness as adaptive capabilities; employees using technology effectively; organizations implementing environmentally friendly practices; knowledge being shared and transformed into organizational capabilities; and work experience affecting the effectiveness of the process.

These five theories function as complementary perspectives. DCV describes the organizational process of developing adaptive capabilities through digital readiness. UTAUT explains how these capabilities are translated into TUB. NRBV relates to an organization's ability to achieve environmental goals through responsible environmental stewardship. KBV pertains to the transformation of organizational knowledge into operational capability. HCT explains the influence of work experience as a limiting condition that determines the extent to which individuals can transform digital resources, environments, and knowledge into sustainable performance.

The DCV states that organizations must have the capacity to identify environmental changes, capitalize on opportunities, and reconfigure resources to maintain performance in dynamic environments (Wang & Li, 2023; Yu, Zheng, Lin, & Yuan, 2023). In digital evolution, digital preparedness reflects an organization's ability to build technology-based infrastructure, develop digital competencies tailored to technological strategies and operational needs, and prepare itself for digital changes (Abdou, 2025; Zhang, Gao, & Li, 2023). This readiness includes not only the existence of technology but also employee digital competence, leadership support, organizational culture, data security, and the alignment of digital strategies with operational needs (Alotaibi et al., 2025; Jewapatarakul & Ueasangkomsate, 2024). Organizations with a high level of digital readiness have a greater ability to improve operational efficiency and support sustainability goals (Al-Dmour, Al-Dmour, Al-Dmour, & Basheer Amin, 2026). In the aviation sector, digital readiness must enable the use of various technologies, such as maintenance and operational data analysis, digital safety systems, and ecological surveillance. These innovations lead to enhanced efficiency, prevention of operational risks, improved decision-making, and reduced environmental impact (Abdul Hamid, 2022; Al-Dmour et al., 2026). Therefore, an organization's digital capabilities are a major factor in sustainably improving performance, considering that technology can improve process efficiency and decision-making.

H₁: Digital readiness positively influences sustainability in the aviation industry.

An organization's readiness for technology will not result in improved performance if it is not used effectively. The Unified Theory of Acceptance and Use of Technology (UTAUT) asserts that the decision to adopt technology is shaped by determinants including perceived advantages, ease of use, social influence, and the level of support provided by the organization (Gao, Kumar, Kumari, Huang, & Kumar, 2026; Khoa, 2025). Behaviors associated with the use of technology indicate the extent to which technology is utilized sustainably and appropriately, tailored to an organization's operational needs. The TUB connects an organization's digital readiness with the achievement of operational and sustainability results, explaining that technology use is shaped by perceptions of benefits, ease of use, social influence, and the organization's supporting conditions (Khan, Mehmood, & Kwan, 2024). Organizations with elevated levels of digital readiness can provide an environment that supports technology use through training, infrastructure, and digital culture (Alotaibi et al., 2025). In the aviation sector, digital readiness allows employees to understand the benefits of digital systems, such as maintenance, safety, and operational coordination systems, thereby increasing the consistent use of technology (Wu, Zhang, Li, & Liu, 2022). Digital technology does not provide value if users are unable or unwilling to use it in operational activities. Therefore, organizations with an elevated degree of digital readiness will be able to create effective technology-use behaviors, accompanied by improved employee digital competencies, organizational system support, and a technology-use culture implemented by the organization.

H₂: Digital readiness positively affects technology usage behavior.

The incorporation of digital systems within the aviation sector, including predictive maintenance, safety reporting systems, operational information systems, data analytics, and environmental monitoring technologies, enhances the quality of decision-making and mitigates operational inefficiencies (Abdul Hamid, 2022; Shah, Wei, & Ghani, 2021). The application of technology effectively improves information accuracy, accelerates coordination, minimizes human error, improves resource efficiency, and strengthens operational risk management in the aviation industry. In addition, strategic and appropriate technology integration can allow aviation organizations to maximize fuel usage, reduce emissions, improve maintenance, and avoid risks that directly affect their activities. Technology serves as both an operational tool and a tactical mechanism for achieving organizational sustainability goals (Khan et al., 2024).

H₃: Technology usage behavior positively affects sustainability aviation performance.

Beyond technological considerations, sustainability necessitates that organizations effectively manage environmental resources. The NRBV states that an organization's capacity to mitigate environmental impacts, improve resource efficiency, and implement environmentally sustainable practices can provide a foundation for achieving sustainable excellence (de Almeida, Gohr, & Santos, 2020; Zhao, Li, Xie, & He, 2026). Responsible environmental stewardship reflects the ability of organizations and employees to act in an environmentally responsible manner through energy efficiency, emissions reduction, and environmentally sound operational practices (Yoo, 2024; Zacher, Rudolph, & Katz, 2023). In the aviation sector, employees' pro-environmental behavior is crucial because the efficacy of environmental policies relies heavily on the execution of flight operations, including emission reduction, fuel efficiency, waste management, and the implementation of sustainable work practices (Zacher et al., 2023).

H₄: Environmental stewardship positively influences sustainability aviation performance.

An organization's environmental stewardship can influence how employees use technology. In organizations with a strong commitment to environmental sustainability, technology is regarded as a means of improving efficiency and as a tool for achieving sustainability goals (Zafar & Suseno, 2024). The sustainability of the aviation sector can be achieved through the application of technologies such as emissions monitoring systems, energy-efficiency solutions, and environmental evaluations, which rely heavily on employee involvement and initiative. Employees with a strong environmental orientation are highly motivated to leverage technology and support environmentally friendly practices (Ruiu, Ruiu, Ragnedda, & Addeo, 2024).

H₅: Responsible environmental stewardship positively affects technology use behavior.

KBV states that knowledge serves as a strategic asset for organizations by enabling the transfer of experiences, information, and solutions between individuals, thereby improving organizational learning and decision-making (Saleem, Pinto, & Malik, 2024). In addition, knowledge sharing increases employees' understanding of the technology used, as they learn the benefits of using it and the procedures for using it, and gain direct practical experience within the scope of one work unit. In the aviation sector, knowledge sharing is crucial because it involves various interconnected work units, such as pilots, technicians, airport operators, regulators, and safety personnel, who have high levels of interdependence (Park & Kim, 2021). The complexity of flight operations demands not only the presence of formal information, such as procedures and work guidelines, but also tacit knowledge derived from employees' experiences in handling unforeseen operational conditions during flights. By sharing knowledge and experience related to safety, energy efficiency, technology maintenance, and environmental management, organizational learning is transformed, improving decision-making quality and operational sustainability while encouraging innovation, coordination, and work process effectiveness (Duan et al., 2024; Khan et al., 2024).

H₆: Knowledge sharing has a positively affects sustainable aviation performance.

In the aviation sector, knowledge dissemination provides an opportunity for employees to deepen their knowledge of technology use and usage procedures and develop skills to solve technical problems faced by employees. In organizations that implement a strong knowledge-sharing culture, an employee's technology experience can be a learning opportunity for other employees, thus increasing the acceptance and utilization of technology according to operational needs (Kaewsang-on et al., 2022). The exchange of experiences contributes to reducing barriers to technology use and improving individuals' ability to use digital systems (Duan et al., 2024). However, if not used properly, knowledge sharing can cause problems for employees. Knowledge sharing is a crucial activity that organizations can undertake to improve their capabilities and the utilization of technology in the aviation sector.

H₇: Knowledge sharing has a favorable influence on technology usage behavior.

Organizational capabilities, such as digital readiness and environmental stewardship, as well as knowledge capabilities that aviation sector organizations possess, such as knowledge sharing, do not directly result in sustainability. Instead, these capabilities require technology use behavior to achieve sustainable flights. In addition, the efficacy of this process hinges on human resources' abilities, with work experience being a key factor.

Mediation Role of Technology Usage Behaviour

Knowledge sharing provides individuals with an understanding of technology, work procedures, and best practices developed within an organization. In the aviation sector, disseminating knowledge related to technology use is important because the sector's digital systems require continuous learning from their users. An individual's technological experience can serve as a source of learning for others, thereby increasing organizations' capacity to use technology effectively (Deng, Duan, & Wibowo, 2023; Duan et al., 2024). Knowledge sharing enhances employees' proficiency in using technology and contributes to sustainability in the aviation industry.

H₈: Technology-use behavior patterns serve as intermediaries between knowledge sharing and sustainable aviation performance.

In the digital transformation of the aviation sector, high digital readiness is achieved by facilitating infrastructure, systems, and competencies that provide employees with opportunities to use technology optimally. The sustainability impact is realized when technology is integrated into operational processes, such as controlling emissions, optimizing resources, improving safety, and making decisions based on flight activity data (Al-Dmour et al., 2026). TUB plays a transformative role in translating an organization's digital readiness into sustainability. Organizations with a high level of digital readiness have the systems, support, and competencies that facilitate the efficient application of technology (Cimbaljević et al., 2024).

H₉: Technology use behavior mediates the relationship between digital readiness and sustainable aviation performance.

Responsible environmental stewardship demonstrates an organization's and its employees' commitment to environmental protection. However, this commitment will not be sustainable without being realised through operational processes. In the aviation sector, technology plays a role in transforming environmental orientation into tangible actions. Emission monitoring systems, energy consumption analyses, and operational efficiency technologies require user engagement to achieve their environmental goals (Ruii et al., 2024). Employees with a strong environmental orientation tend to better understand the importance of using technology to mitigate environmental impacts (Huang et al., 2023). TUB serves as an intermediary that mediates the relationship between environmental stewardship and sustainable aviation practice.

H₁₀: Technology-use behavior serves as an intermediary in the association between environmental stewardship and sustainable aviation performance.

Work Experience as a Boundary Condition

Work experience is an element of human capital formed through the accumulation of knowledge, skills, problem-solving abilities, and an understanding of real-world working conditions. Human capital theory suggests that an individual's education, training, and work experience collectively enhance their potential contribution to an organization. Industry-specific experience reflects more specialised forms of human capital, enabling employees to acquire a comprehensive understanding of technical characteristics, operational requirements, and technology applications (Shin, Amaral, Barros, & Morgan, 2025). In digital transformation and sustainability, employee expertise, proficiency, and competencies are essential for transforming digital investments into improved organizational performance (He & Chen, 2024). Experience contributes to the development of knowledge, pattern recognition, situational awareness, and professional judgment (Ha, Doan, & Ngo, 2023; Lin & Wu, 2025). However, seniority does not invariably equate to competence, as abilities may decline without practice, current experience, and continuous knowledge renewal (Biede et al., 2023; Liu et al., 2024; Mizzi, Lohmann, & Carim Junior, 2024). Consequently, work experience is regarded as an accumulation of operational exposure and assessment maturity, rather than a singular measure of competence.

The five-year limit was used as an operational dividing point to compare ≤ 5 and > 5 years of work experience, rather than as a universal standard of professional maturity. Such categorizations have precedents in cabin crew research, but they do not demonstrate that competencies are automatically formed after five years of work (Chao & Yizhou, 2025).

H₁₁: Digital readiness has a different impact on sustainable aviation performance between the two groups with different work experiences.

- H₁₂: Digital readiness has a different impact on technology usage behavior between the two groups with different work experiences.*
- H₁₃: Environmental stewardship has a different impact on sustainable aviation performance between the two groups with different work experiences.*
- H₁₄: Environmental stewardship has a different impact on technology usage behavior between the two groups with different work experiences.*
- H₁₅: Knowledge sharing has a different impact on sustainable aviation performance across the two groups with different work experiences.*
- H₁₆: Knowledge sharing has a different impact on technology usage behaviour between the two groups with different work experiences.*
- H₁₇: Technology usage behavior has different impacts on sustainable aviation performance between the two groups with different work experiences.*

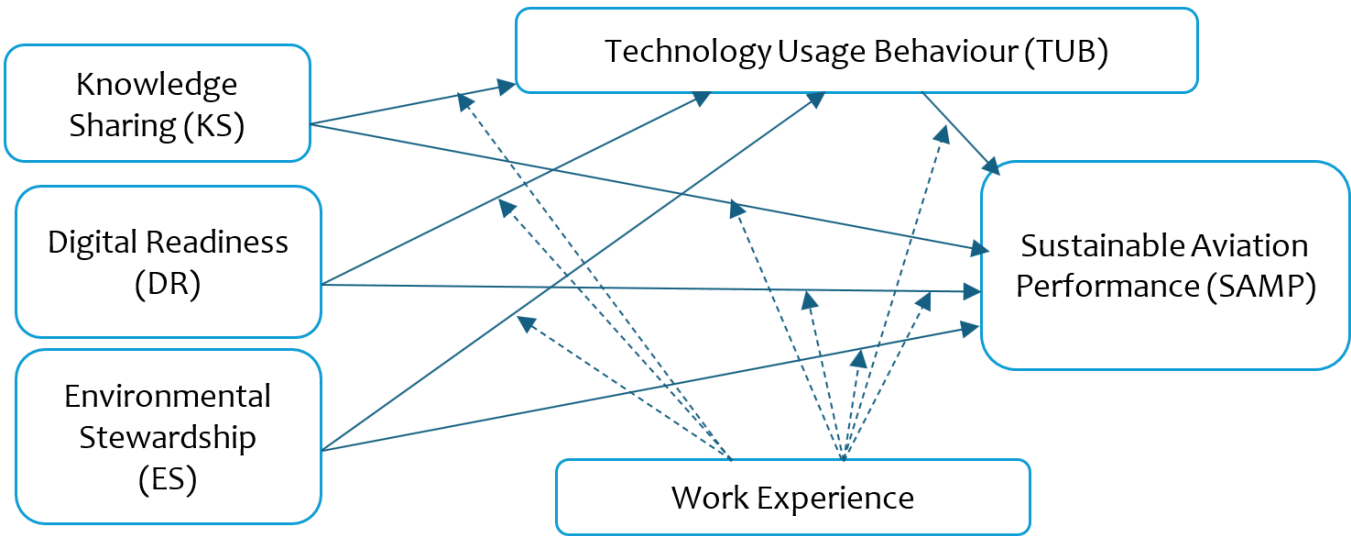


Figure 1: Research Framework

Note: ————— : Indicates hypothesized structural relationships.
----- : Indicates work experience as a grouping variable.

Figure 1 illustrates the conceptual framework of this study, showing the relationships among Digital Readiness (DR), Environmental Stewardship (ES), Knowledge Sharing (KS), technology usage behavior (TUB), and Sustainable Aviation Performance (SAMP). Solid arrows indicate the hypothesized structural relationships, whereas dashed arrows indicate Work Experience (WE) as a grouping variable or boundary condition used in Multi-Group Analysis (MGA). Work Experience divides respondents into groups of ≤5 years (WEA) and >5 years (WEB) to test whether the model’s structural relationships differ according to work experience.

METHODOLOGY

Research Design

This study adopts a quantitative methodology with an explanatory design to explore the relationships between digital readiness, environmental stewardship, knowledge sharing, technology use behavior, and aviation sustainability performance. The PLS-SEM method was chosen for its effectiveness in prediction and its ability to develop theories through complex structural models that integrate diverse theoretical frameworks (Hair & Alamer, 2022; Liengaard, 2024). Additionally, PLS-SEM has the advantage of comparing path coefficients

between groups in models, making it an ideal research method that focuses on model development and prediction (Cheah, Amaro, & Roldán, 2023).

Population and Sampling Procedures

The target group for this study comprised employees in Indonesia's aviation sector who were involved in aviation operations. Participants who completed the questionnaire came from various operational sectors, including pilots, cabin crew, ground-handling officers, aircraft maintenance technicians, and air traffic control (ATC) officers.

The sampling approach used was purposive sampling because this study required respondents who had direct experience with flight operations and the application of digital technology in routine tasks. The criteria for participation in this study were as follows: a minimum of one year of professional practice in the aviation sector, direct involvement in flight operation activities, and the use of digital systems or technology in work execution.

The sample size in this study follows the recommendations of PLS-SEM, which considers the complexity of the structural model and the statistical ability to detect inter-construct relationships (Hair & Alamer, 2022). The adequacy of the sample was established through an a priori statistical power analysis with a significance level of 5%, a medium effect size ($f^2 = 0.15$), a power level of 80%, and four predictors for the main endogenous construct, ensuring that the minimum requirement of 85 respondents was satisfied. After data screening, 228 respondents were included in the PLS-SEM analysis.

Measurement of Research Variables

The instrument used in this study employed a five-category Likert scale, with measurements ranging from 1 (strongly disagree) to 5 (strongly agree). All indicators were adapted from previous research and tailored to the aviation industry. Details of the instruments are presented in Appendix A. SAMP was evaluated using five indicators across the economic, social, and environmental dimensions. TUB was evaluated using four indicators measuring the application of digital technology to enhance accuracy, safety, resource efficiency, and task completion. Knowledge Sharing, Digital Readiness, and Environmental Stewardship were each assessed using five indicators representing organizational knowledge exchange, readiness to adopt digital technology, and organizational and individual participation in environmental management.

The initial instrument comprised 24 items in total. Following evaluation of the measurement model, seven indicators (DR2, ES1, ES2, KS4, TUB3, SAMP2, and SAMP3) were excluded because of insufficient outer loadings. Their removal enhanced composite reliability and average variance extracted without diminishing the conceptual scope of the variables. Consequently, the final measurement model included 17 indicators.

Data Collection Procedure

This study used an electronic questionnaire distributed through Google Forms. The questionnaire was distributed online and in person through visits to Soekarno-Hatta International Airport and Halim Perdanakusuma Airport in Indonesia. Data filtering was carried out to verify the completeness of respondents' answers, compliance with the research criteria, and the absence of inconsistent response patterns. Study construct coding was conducted to facilitate identification, using the following codes: digital readiness (DR), environmental stewardship (ES), knowledge sharing (KS), technology use behavior (TUB), and sustainable aviation performance (SAMP).

Data Analysis Techniques

Partial least squares structural equation modelling (PLS-SEM) was used for data analysis with SmartPLS 4 software. The measurement model was characterized by components such as outer loadings, reliability, average variance extracted (AVE), and discriminant validity. Reliability was assessed using composite reliability, and discriminant validity was evaluated using the Fornell–Larcker criterion. Indicators with outer loadings between 0.40 and 0.70 were considered for removal if their removal improved reliability and AVE without

reducing construct validity. Composite reliability values above 0.70 and AVE values above 0.50 were used as criteria for accepting the measurement model.

Structural model evaluation included collinearity assessment using VIF, path coefficient testing through bootstrapping procedures, determination of the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). SRMR and NFI values were used to assess model suitability. PLS-MGA analysis was performed by comparing two or more participant groups. In this study, the groups compared were those with ≤ 5 years and > 5 years of work experience. However, before conducting PLS-MGA, measurement invariance was evaluated using the MICOM procedure, which includes configurational invariance, compositional invariance, equality of mean values, and equality of composite variances.

RESULTS AND DISCUSSION

Measurement Model

Prior to assessing the structural model, the measurement model was evaluated to ascertain that the constructs in this study demonstrated acceptable reliability and validity. The measurement model was assessed by examining the outer loadings, Composite Reliability (CR), Average Variance Extracted (AVE), discriminant validity using the Fornell–Larcker Criterion, and collinearity using the Variance Inflation Factor (VIF). The Composite Reliability values were above 0.70 (0.772–0.827), and the AVE values were above 0.50 (0.514–0.580). The results regarding the reliability and validity criteria are presented in Table 1.

Table 1: Final Measurement Model Test Results

Constructs	LF	CR	AVE	FL	VIF
Digital Readiness (DR)		0.809	0.514	0.717	
DR1	0.711				1.284
DR3	0.741				1.287
DR4	0.700				1.328
DR5	0.715				
Environmental Stewardship (ES)		0.799	0.570	0.755	
ES3	0.717				1.216
ES4	0.800				1.306
ES5	0.746				1.203
Knowledge Sharing (KS)		0.827	0.544	0.737	
KS1	0.726				
KS2	0.716				1.378
KS3	0.754				1.337
KS5	0.754				1.331
Sustainable Aviation Performance (SAMP)		0.805	0.580	0.761	
SAMP1	0.826				1.386
SAMP4	0.739				1.272
SAMP5	0.715				1.189
Technology Usage Behaviour (TUB)		0.772	0.531	0.729	
TUB1	0.700				1.132
TUB2	0.704				1.168
TUB4	0.781				1.282

Note: LF= Loading Factor; CR= Composite reliability; AVE= Average variance extracted; FL = Fornell-Larcker; VIF= Variance Inflation Factor.

The outer loading values were ≥ 0.70 , ranging from 0.700 to 0.826. The indicator with the highest loading value was found in SAMP1 (0.826), while the lowest loading values were found in DR4 and TUB1 (0.700). Although some indicators were at the minimum limit, all indicators still met the measurement feasibility criteria

of PLS-SEM. In DR, all indicators had loading values between 0.700 and 0.741, with a Composite Reliability value of 0.809 and an Average Variance Extracted of 0.514. These results show that Digital Readiness satisfies the established criteria for reliability and validity. ES showed indicator loading values between 0.717 and 0.800, with a CR value of 0.799 and an AVE of 0.570. These results show that the indicators used to measure Environmental Stewardship adequately represent the construct. Furthermore, KS had loading values between 0.716 and 0.754, a CR value of 0.827, and an AVE of 0.544. This shows that the KS indicators have good consistency in explaining the construct. All indicators in SAMP had loading values between 0.715 and 0.826, with a CR of 0.805 and an AVE of 0.580. These results show that SAMP has good measurement quality in representing the sustainability performance of the aviation industry. Meanwhile, TUB showed indicator loading values between 0.700 and 0.781, with a CR value of 0.772 and an AVE of 0.531. These results show that TUB fulfils the reliability and validity requirements of IRT.

The validity of the discriminant was evaluated using the Fornell–Larcker criterion. Based on the test results, the square root of the AVE was higher than the correlations with the other constructs in the model. The Fornell–Larcker values for each construct were as follows: DR = 0.717, ES = 0.755, KS = 0.737, SAMP = 0.761, and TUB = 0.729. Therefore, discriminant validity was established for all constructs in the study. The preliminary examination of the measurement model showed that seven indicators, namely DR2, ES1, ES2, KS4, TUB3, SAMP2, and SAMP3, were excluded from the final model. Their removal was carried out after considering the initial outer-loading values and changes in composite reliability and AVE. All retained indicators had outer loadings of ≥ 0.700 , ranging from 0.700 to 0.826. Composite reliability values ranged from 0.772 to 0.827, while AVE values ranged from 0.514 to 0.580. Thus, the final measurement model met the benchmarks for convergent reliability and validity. Therefore, all indicators retained in the final model met the requirements for use in the next stage of structural model analysis.

STRUCTURAL EQUATION MODELING

Structural Model Evaluation

Once the measurement model meets the reliability and validity criteria, the subsequent step is to assess the structural model (structural model assessment). Structural model assessment is conducted to measure the model's predictive power by testing the coefficient of determination (R^2), adjusted R^2 , predictive relevance (Q^2), and effect size (f^2). The results of these evaluation tests are presented in Table 2.

SAMP had an R^2 value of 0.486, with an adjusted R^2 of 0.477. This shows that digital readiness, environmental stewardship, knowledge sharing, and technology usage behavior can simultaneously explain 48.6% of the variation in Sustainable Aviation Performance, whereas the remaining 51.4% is explained by extraneous variables excluded from the study framework. The R^2 values were categorized as 0.25, 0.50, and 0.75, indicating weak, moderate, and substantial explanatory abilities of the model, respectively. Thus, the R^2 value for Sustainable Aviation Performance indicates a moderate explanatory ability, showing that a combination of technological, environmental, knowledge-sharing, and technology-use behavior factors makes an important contribution to explaining aviation sustainability.

The TUB analysis revealed an R^2 of 0.528 and an adjusted R^2 of 0.522. This indicates that DR, ES, and KS collectively accounted for 52.8% of the total variance, showing that the model has moderate predictive ability in explaining how digital readiness, environmental orientation, and knowledge-sharing processes affect technology-use behavior in aviation organizations.

The Q^2 value for SAMP was 0.497, while that for TUB was 0.410. Both values exceeded 0 and the 0.35 threshold, indicating that the model has strong predictive applicability for both endogenous constructs.

The results of the effect-size test showed that all structural relationships had f^2 values in the small category, ranging from 0.041 to 0.115. The largest influence was Environmental Stewardship on TUB ($f^2 = 0.115$), followed by Digital Readiness on TUB and TUB on SAMP, each with an f^2 value of 0.091. Although all effects were relatively small, each construct contributed to the model's explanatory ability.

Table 2: Structural Model Evaluation

Structural path	f ²	R-square	R-square adjusted	Q ²
Effect Size (F ₂)				
DR -> SAMP	0.046			
DR -> TUB	0.091			
ES -> SAMP	0.041			
ES -> TUB	0.115			
KS -> SAMP	0.052			
KS -> TUB	0.060			
TUB -> SAMP	0.091			
Sustainable Aviation Performance		0.486	0.477	0.497
Technology Usage Behaviour		0.528	0.522	0.410

Note: DR= Digital Readiness; ES= Environmental Stewardship; KS= Knowledge Sharing; SAMP= Sustainable Aviation Performance; TUB= Technology Usage Behaviour.

Fit Model Evaluation

The results of the fitted model (Table 3) show an SRMR value of 0.086, which is still below the limit of 0.10; therefore, the model can be considered to have a fairly acceptable level of suitability, even though it does not meet the strict criterion of 0.08. An NFI value of 0.640 indicates that the suitability of the incremental model was low. Collectively, the model exhibited a marginally acceptable fit.

Table 3: Model Fit Evaluation

Fit Criterion	Saturated model	Estimated model
SRMR	0.086	0.086
d_ULS	1.135	1.135
d_G	0.360	0.360
Chi-square	459.756	459.756
NFI	0.640	0.640

Direct Hypothesis Results

Structural model evaluation was performed using the bootstrapping procedure in SmartPLS 4.0 by analyzing the path coefficient (β), t-statistic, and p-value. The test criteria required a statistical t-value exceeding 1.96 and a p-value below 0.05 at the 5% significance level. The hypothesis-testing results in Table 4 show that all structural relationships proposed in the research model have a substantial and meaningful influence, and that all research hypotheses (H1–H7) were accepted.

The test results showed that all immediate relationships in the model had substantial and meaningful effects because their t-statistic values exceeded 1.96 and their p-values were below 0.05. Digital Readiness positively affected Sustainable Aviation Performance ($\beta = 0.241$; $t = 3.545$; $p < 0.001$) and TUB ($\beta = 0.268$; $t = 3.682$; $p < 0.001$); thus, H1 and H2 were accepted. Environmental Stewardship positively affected Sustainable Aviation Performance ($\beta = 0.208$; $t = 2.254$; $p = 0.024$) and TUB ($\beta = 0.333$; $t = 5.280$; $p < 0.001$); thus, H4 and H5 were accepted. Furthermore, KS positively affected Sustainable Aviation Performance ($\beta = 0.318$; $t = 3.744$; $p < 0.001$) and TUB ($\beta = 0.242$; $t = 3.034$; $p = 0.002$); thus, H6 and H7 were accepted. TUB also positively affected Sustainable Aviation Performance ($\beta = 0.314$; $t = 3.962$; $p < 0.001$), so H3 was accepted.

SAMP and KS showed the greatest influence ($\beta = 0.318$), followed by TUB ($\beta = 0.314$), Digital Readiness ($\beta = 0.241$), and ES ($\beta = 0.208$). Environmental Stewardship was the most influential factor for TUB ($\beta = 0.333$). These findings indicate that improving sustainable aviation performance requires a combination of effective knowledge exchange, technology utilization, digital readiness, and employee and aviation-organization commitment to environmental stewardship.

Table 4: Direct Hypothesis Test Results

Path Relationship	β	mean	STDEV	T statistics	P values	Remarks
DR -> SAMP	0.241	0.243	0.068	3.545	0.000	H ₁ accepted
DR -> TUB	0.268	0.273	0.073	3.682	0.000	H ₂ accepted
ES -> SAMP	0.208	0.205	0.092	2.254	0.024	H ₄ accepted
ES -> TUB	0.333	0.332	0.063	5.280	0.000	H ₅ accepted
KS -> SAMP	0.318	0.323	0.085	3.744	0.000	H ₆ accepted
KS -> TUB	0.242	0.244	0.080	3.034	0.002	H ₇ accepted
TUB -> SAMP	0.314	0.314	0.079	3.962	0.000	H ₃ accepted

Note: DR= Digital Readiness; ES= Environmental Stewardship; KS= Knowledge Sharing; SAMP= Sustainable Aviation Performance; TUB= Technology Usage Behaviour

Indirect Hypothesis Results

The mediation effect was tested to evaluate the role of TUB as a mediating variable in the association between DR, ES, and KS and Sustainable Aviation Performance (SAMP). The results of the indirect-effects analysis are presented in Table 5. The proposed mediation relationships demonstrated favorable and notable effects, leading to the acceptance of hypotheses (H8–H10).

The empirical outcomes demonstrated that TUB positively and significantly mediated the relationships between KS, DR, ES, and SAMP. The largest indirect influence was found in the Environmental Stewardship pathway, mediated by TUB on Sustainable Aviation Performance ($\beta = 0.105$; $t = 2.969$; $p = 0.003$), followed by Digital Readiness ($\beta = 0.084$; $t = 2.537$; $p = 0.011$) and Knowledge Sharing ($\beta = 0.076$; $t = 2.653$; $p = 0.008$). H8, H9, and H10 were accepted in this study. As the immediate impacts of the three variables on Sustainable Aviation Performance were also positive and significant, TUB acted as a complementary partial mediator. These findings indicate that digital readiness, environmental stewardship, and knowledge sharing improve sustainable aviation performance both explicitly and implicitly through the application of technology in flight operations.

Table 5: Indirect Hypothesis Test Results

Path Relationship	β	mean	STDEV	T statistics	P values	Remarks
KS -> TUB -> SAMP	0.076	0.075	0.029	2.653	0.008	H ₈ accepted
DR -> TUB -> SAMP	0.084	0.086	0.033	2.537	0.011	H ₉ accepted
ES -> TUB -> SAMP	0.105	0.105	0.035	2.969	0.003	H ₁₀ accepted

Note: DR= Digital Readiness; ES= Environmental Stewardship; KS= Knowledge Sharing; SAMP= Sustainable Aviation Performance; TUB= Technology Usage Behaviour

MICOM Test (Measurement Invariance of Composite Models)

Before conducting the Multi-Group Analysis (MGA) based on work experience, measurement invariance testing was performed to ensure that the research constructs had equivalent meanings and were measured consistently across the groups being compared. This test was conducted using the Measurement Invariance of Composite Models (MICOM) procedure. MICOM testing consists of three stages: (1) configural invariance, (2) compositional invariance, and (3) equality of composite means and variances. The results of the MICOM test are presented in Table 6.

In the first stage (configural invariance), the results showed that both groups of respondents, namely, the ≤ 5 -year work-experience group and the > 5 -year work-experience group, used the same measurement indicators, data-collection procedures, and analysis algorithms. Thus, the configural invariance requirement was satisfied. In the second stage (compositional invariance), the test data revealed that the entire construct had a composite correlation value (C) greater than the 5% quantile limit of the permutation results and a significance value greater than 0.05. The p-values for DR and ES were 0.790 and 0.767, respectively; the p-values for KS and SAMP were 0.764 and 0.168, respectively; and the p-values for the TUB constructs were 0.790,

0.767, 0.764, and 0.845, respectively. All these values meet the criteria for compositional invariance; therefore, we can conclude that the composition of the indicators in each construct is equivalent between the cohorts. The third phase involved assessing the equivalence of the composite means and variances. The test results showed that the entire set of constructs met the criterion for composite-mean equivalence. The p-values for the mean differences of the constructs were above 0.05, namely, DR ($p = 0.981$), ES ($p = 0.712$), KS ($p = 0.224$), SAMP ($p = 0.344$), and TUB ($p = 0.545$). This shows that there is no substantial difference in the average scores between the work-experience groups. Furthermore, the equivalence test of the composite variances also showed results that met the criteria for the two groups. The p-values indicated no significant differences between the WEA and WEB employee groups: DR ($p = 0.264$), ES ($p = 0.759$), KS ($p = 0.246$), SAMP ($p = 0.148$), and TUB ($p = 0.974$).

In light of the MICOM test results, this study achieved full measurement invariance (FMIE). This indicates that Digital Readiness, Environmental Stewardship, Knowledge Sharing, Sustainable Aviation Performance, and TUB have the same measurement meaning across respondent groups with ≤ 5 and >5 years of work experience. Therefore, group comparison analysis using PLS-MGA can be conducted because differences in path coefficients between the groups are not influenced by differences in the measurement instruments.

Table 6: Result MICOM Test

Construct	Step 2: Compositional invariance				Step 3a: Equality of means				Step 3b: Equality of variances			FMIE
	C	5%	p	CI	Diff	95% PI	p	PMIE	Diff	95% PI	p	
DR	0.987	0.980	0.168	Yes	0.004	[-0.250, 0.254]	0.981	Yes	0.210	[-0.353, 0.358]	0.264	Yes
ES	0.998	0.978	0.790	Yes	-0.051	[-0.258, 0.256]	0.712	Yes	-0.066	[-0.353, 0.358]	0.759	Yes
KS	0.997	0.981	0.767	Yes	0.158	[-0.258, 0.263]	0.224	Yes	-0.249	[-0.418, 0.429]	0.246	Yes
SAMP	0.998	0.980	0.764	Yes	0.123	[-0.252, 0.264]	0.344	Yes	-0.304	[-0.427, 0.396]	0.148	Yes
TUB	0.999	0.981	0.845	Yes	-0.081	[-0.258, 0.235]	0.545	Yes	-0.010	[-0.448, 0.457]	0.974	Yes

Note: C= Correlation; CI= Compositional invariance; Dif.= Differences; p = significant; PMIE= Partial Measurement Invariance Established; FMIE = Full measurement invariance established; DR= Digital Readiness; ES= Environmental Stewardship; KS= Knowledge Sharing; SAMP= Sustainable Aviation Performance; TUB= Technology Usage Behaviour

Multigroup Analysis (MGA)

After the MICOM test showed that all test stages had achieved full measurement invariance, Partial Least Squares Multi-Group Analysis (PLS-MGA) was conducted to determine whether differences existed in structural relationships based on work experience. Respondents were categorized into two distinct groups: those with five years or less of work experience (WEA) and those with more than five years of work experience (WEB). The MGA test examined differences in path coefficients between the WEA and WEB groups. Differences between the groups were considered significant if the p-value was < 0.05 . The results of the MGA tests are presented in Table 7.

All structural relationships showed two-tailed p-values exceeding 0.05, suggesting that there were no substantial differences between the groups based on work experience. Thus, work experience was not a significant moderating factor that strengthened or weakened the relationships among digital readiness, environmental stewardship, knowledge sharing, technology use behavior, and sustainable aviation performance.

The MGA results demonstrated that the association between Digital Readiness and Sustainable Aviation Performance had path coefficients of 0.210 and 0.150 in the WEA and WEB groups, respectively, with a

coefficient difference of 0.060 (two-tailed p-value = 0.712). Although the group with ≤ 5 years of work experience showed a slightly higher path coefficient, the difference was not significant. Furthermore, the relationship between Digital Readiness and TUB showed path coefficients of 0.375 in the WEA and 0.195 in the WEB, with a coefficient difference of 0.180 (two-tailed p = 0.215). These results indicate that Digital Readiness tends to have a stronger relationship with technology use behavior among groups with less work experience; however, this trend does not reflect a significant difference between the groups.

In the association between Environmental Stewardship and Sustainable Aviation Performance, the WEA group had a path coefficient of 0.218, whereas the WEB group had a coefficient of -0.005 , with a difference of 0.222 (two-tailed p = 0.236). Although there were differences in the direction of the relationship between the groups, the results were not significant. Therefore, it cannot be concluded that work experience causes different effects of Environmental Stewardship on Sustainable Aviation Performance. The relationship between ES and TUB showed path coefficients of 0.292 in the WEA group and 0.349 in the WEB group, with a difference of -0.056 (two-tailed p-value = 0.672). This evidence demonstrates that the impact of ES on how employees use technology is the same in the WEA and WEB groups, even though the two groups have different levels of work experience.

The MGA results show that the relationship between Knowledge Sharing and Sustainable Aviation Performance has path coefficients of 0.108 and 0.337 in the WEA and WEB groups, respectively, with a coefficient difference of -0.229 (two-tailed p-value = 0.169). Although the group with greater work experience showed a stronger correlation coefficient, the difference was not significant. Similarly, the relationship between Knowledge Sharing and TUB showed coefficients of 0.157 in the WEA group and 0.322 in the WEB group, with a difference of -0.164 (two-tailed p = 0.299). The findings suggest that, while employees with extensive work experience generally exhibit a stronger link between knowledge sharing and technology utilization, this variation is not statistically significant.

Table 7: Multigroup Test Results Analysis

Path	Path coef- WEA	Path coef-WEB	diff (WEA- WEB)	p-value 1-tailed (WEA vs WEB)	p-value 2-tailed (WEA vs WEB)	Remarks
DR -> SAMP	0.210	0.150	0.060	0.356	0.712	H11 Unsupported
DR -> TUB	0.375	0.195	0.180	0.108	0.215	H12 Unsupported
ES->SAMP	0.218	-0.005	0.222	0.118	0.236	H13 Unsupported
ES -> TUB	0.292	0.349	-0.056	0.664	0.672	H14 Unsupported
KS -> SAMP	0.108	0.337	-0.229	0.915	0.169	H15 Unsupported
KS -> TUB	0.157	0.322	-0.164	0.851	0.299	H16 Unsupported
TUB -> SAMP	0.333	0.297	0.036	0.418	0.835	H17 Unsupported

Note: WEA= Work experience ≤ 5 years; WEB = Work experience > 5 years; DR= Digital readiness; ES= Environmental stewardship; KS= Knowledge sharing; SAMP= Sustainable aviation performance; TUB= Technology usage behavior.

MGA testing of the association between TUB and Sustainable Aviation Performance showed a path coefficient of 0.333 in the WEA group and 0.297 in the WEB group, with a difference of 0.036 (two-tailed p-value = 0.835).

These results indicate that TUB's influence on sustainable aviation performance was similar across both work experience groups. Work experience did not significantly moderate the relationship between TUB and SAMP.

DISCUSSION

The outcomes of this study demonstrate that digital readiness is a critical factor in improving aviation sustainability performance and driving technology adoption in aviation organizations. These findings indicate that achieving technological transformation in the aviation sector depends not only on technological

infrastructure but also on the ability of organizations and employees to apply technology to operational processes. These findings validate DCV theory, which states that organizations must have adaptive capabilities to recognize changes in the environment, integrate new resources, and undergo transformations to maintain their competitiveness in a dynamic environment. This capability is increasingly important given the escalating demand for air transportation in the aviation sector, the need for operational efficiency, safety requirements, and the obligation to mitigate environmental impacts (Airports Council International, 2025; International Energy Agency, 2025). The results of this study align with the findings of (Abed Alhameed & Emeagwali, 2026), who showed that digital transformation results in improved performance only when supported by digital leadership, organizational readiness, an innovation culture, and human resource competence. This is relevant to the aviation sector, which relies heavily on data-driven technologies, including predictive maintenance, digital safety systems, operational analytics, and digital twins, to improve efficiency and reduce operational risks (Al-Dmour et al., 2026; Farsi et al., 2024; Jalil, Md Isa, Awang Marikan, & Jais, 2025).

Digital readiness and technology-use behavior show that digital readiness is the main driver of technology use. These findings reinforce the UTAUT, which states that technology acceptance and use are shaped by users' capabilities, beliefs about the benefits of technology, and organizational and environmental support. The advantages of technology are contingent on providing benefits to operators, technicians, flight crews, and support personnel who can understand and utilize it. These findings also deepen previous research by showing that digitalization in the aviation sector is related not only to technology but also to a process of organizational change involving human resources, culture, and adaptability (Abdel, Abdel, & Abdul, 2023; Yilmaz & Tuzlukaya, 2023). Achieving sustainability in aviation necessitates a balance between technological investments and human resource capacity development.

The study identifies that responsible environmental stewardship drives sustainable practices in the aviation sector and shapes technology-use behaviors that align with sustainability goals. The study's findings demonstrate that environmental orientation is a crucial determinant of how employees engage with technology in their professional settings. This finding is in line with NRBV theory, which asserts that an organization's ability to manage natural resources generates strategic advantages through the development of environmental capabilities. This concept is particularly relevant to the aviation industry, which faces major environmental challenges, such as greenhouse gas emissions, fuel consumption, and the transition to reduced-carbon aviation (Efthymiou, Martín-Domingo, & Mujica Mota, 2026; Rupcic et al., 2023) and (Kaffash et al., 2026). This shows that airline sustainability is greatly influenced by technical efficiency, economic performance, and the integrated management of environmental factors. Jia, Buyle, and Macário (2023) affirmed that airport sustainability requires a multidimensional approach that includes infrastructure, environmental governance, and organizational behavior. In support of this study, Zacher et al. (2023) affirmed that employee engagement in eco-friendly practices is essential for realizing a sustainable organization. Without employees actively carrying out environmentally friendly actions, such as using technology that improves energy efficiency, reducing waste in the aviation sector, and maximizing flight operations by implementing environmental policy rules, positive environmental outcomes in the aviation sector cannot be achieved.

This study confirms that organizational knowledge in the aviation sector is a strategic asset that helps manage operational complexity and technological evolution. This is in line with the KBV, which argues that knowledge is a critical asset that facilitates value creation through coordination, learning, and innovation. The aviation sector is in dire need of information exchange, considering that operational safety and sustainability require collaboration among the various people responsible for work in the sector, including pilots, technicians, airport managers, regulators, and flight operators. The study's findings are consistent with those of Duan et al. (2024), who found that digital technology can improve knowledge-sharing processes and performance. Digitalization enables organizations to create and develop data-driven learning systems, share insights into aviation operational standards, and accelerate the flow of critical information, thereby improving the quality of flight operations. Zahedi, Akhavan, and Naghdi Khanachah (2024) demonstrated that knowledge sharing is essential for fostering organizational innovation in the aviation field. Employees require scheduled and structured learning to understand the functions, advantages, and operational procedures of flights. However,

the effect of knowledge sharing on sustainability performance is determined not only by the amount of information shared but also by the quality and applicability of the insights and the organization's ability to convert knowledge into actions that can be implemented in aviation activities.

The study found that TUB is important for connecting organizational capabilities to achieve sustainability in the aviation sector. The findings indicate that technology will not improve sustainability performance unless it is effectively integrated into flight operations. This observation is in line with UTAUT, which defines usage behavior as the main determinant of the success of technology applications. The effective use of technology is critical because fast, precise, and data-driven operational decision-making is required in the aviation sector. Existing studies have revealed that digitalisation plays a vital role in promoting sustainability by refining business operations, stimulating innovative practices, and enhancing the optimisation of resource deployment (Ordieres-Meré, Prieto Remón, & Rubio, 2020). In addition, the application of technologies such as automated safety and control systems, as well as forecasting-based risk management, plays a crucial role in advancing aeronautical safety and sustainability (Al-Dmour et al., 2026). This study provides evidence that human behavior in technology use is a crucial factor in the relationship between technological transformation and sustainability.

TUB mediated the relationships between DR, ES, KS, and SAMP. This shows that digital readiness, environmental focus, and organizational knowledge not only directly affect sustainability but also provide further benefits when technology is applied consistently and appropriately to aviation operational activities. This is aligned with the research of Wang, Gu, Ahmad, and Xue (2022), who showed that digital capabilities improve performance through the mechanisms of digital technology use and innovation, and Abdel et al. (2023), who found that technological transformation strengthens airline sustainability by modifying operational workflows and routines. Ye, Hao, Shahzad, and Kamran (2022) further strengthened the link between environmental stewardship and sustainability by identifying that environmental strategies boost sustainable performance through green technology innovation. Moreover, Binsaeed et al. (2023) and Jalil et al. (2025) demonstrate that knowledge sharing enables organizations to understand, adopt, and apply technology to enhance innovation and sustainability. Although the indirect influence is relatively small, it remains significant because it shows that investments in organizational capabilities do not yield optimal sustainability benefits without the right technology to support them. Therefore, aviation organizations must integrate digital readiness, environmental practices, knowledge management, and technology training tailored to operational tasks (Mızrak, 2023).

The group analysis results demonstrated that work experience did not significantly influence the relationships between digital readiness, environmental stewardship, knowledge sharing, TUB, and SAMP. This indicates that the positive impacts of KS, ES, DR, TUB, and SAMP remain consistent, regardless of work experience. These findings contradict previous research stating that work experience is a major factor in the success of technological adaptation (Berényi & Deutsch, 2023). Operational understanding can be enhanced through experience, and factors such as technology readiness, job suitability, and employee characteristics exert influence (Abdul Hamid, 2022). In the digital transformation of airports, success hinges not only on employee characteristics but also on the integration of technology, management, culture, organizational structure, and innovation capabilities. In addition, system quality influences technology-use behavior (Naidoo, 2023), while organizational and technical support, as well as the employee development climate, encourage continuous digital learning. Therefore, aviation organizations not only rely on employees' work experience and seniority but also provide continuous task-based digital training, technical support, and competency evaluations for the entire workforce. This is in line with the importance of training, certification, and competency improvement in maintaining flight safety and operational excellence (Mızrak, 2023).

CONCLUSION

This study explores the impact of digital readiness, environmental awareness, and knowledge sharing on the sustainability performance of the aviation sector in Indonesia, focusing on the technology usage behavior of operational employees, including pilots, cabin crew, ground-handling officers, aircraft maintenance technicians, and air traffic controllers (ATC). The findings show that technology usage behavior significantly

improves aviation sustainability. DR, ES, and KS positively influence TUB. The results of this study validate the critical importance of integrating digital capabilities, focusing on environmental stewardship, knowledge sharing, and technology usage behavior to achieve sustainability performance in the aviation industry.

Environmental concerns have the most profound direct impact on aviation sustainability and indirectly influence TUB. These findings indicate that environmental commitments are not only related to policy formulation. This commitment must be realized in practical terms through the implementation of digital systems to improve energy efficiency, emissions control, waste management, maintenance, safety, and operational decision-making in the aviation sector.

In this research model, TUB plays an important role, as its indirect influence shows that organisational capabilities do not result in sustainability performance because of resource availability. In the aeronautical field, sustainability is achieved when employees use technology consistently and effectively, according to operational needs. Aviation sustainability performance results from applying organisational capabilities, commitment to the environment, and knowledge availability.

Sustainable aviation performance is influenced by DR, ES, and KS, which manifest as effective TUB. The MGA results show that this process is relatively consistent among employees with varying levels of work experience. Achieving aviation sustainability depends more on the quality of the organisation's systems, technological support, continuous learning, and inclusive competency development than on employees' seniority or tenure.

THEORETICAL CONSEQUENCES

This study expands the literature on sustainable aviation performance by showing that Digital Readiness, Environmental Stewardship, and Knowledge Sharing function as organizational capabilities that support aviation sustainability performance, with technology usage behavior serving as an implementation mechanism. The findings of the partial mediation analysis confirm that digital capabilities, environmental stewardship, and knowledge sharing produce optimal benefits when accompanied by the routine and procedural use of technology in the workplace. Meanwhile, the results of the PLS-MGA did not show significant differences in terms of work experience. This indicates that seniority is not a boundary condition in this model. The success of digital aviation transformation is more accurately and precisely explained by the use of digital systems, organizational capabilities, and continuous learning than by employees' work experience.

PRACTICAL IMPLICATIONS

The findings of this study have implications that can be applied to various organizational levels in the aviation sector, including staff, management, and the organization as a whole. At the staff level, this study can facilitate the integration of digital technologies in various areas, such as safety reporting, maintenance, energy monitoring, waste management, operational coordination, and evidence-based decision-making. Employees are required to undergo continuous training in digital and environmental fields, document their work experience, recommend solutions to problems faced by employees in aviation-related activities, and ensure the accuracy of information before it is used by other departments. At the supervisory and managerial levels, digital readiness and environmental responsibility in operational procedures, unit objectives, performance metrics, and employee appraisals are critical. At the corporate level, aviation organizations must formulate digital transformation and sustainability policies that align with their strategic objectives. Some policies that aviation organizations can implement include predictive maintenance systems, digital tracking of fuel consumption and emissions, integration of safety and operational data, digitization of environmental reporting, and the establishment of sustainability metrics for each business unit. In addition, companies must establish cross-functional teams covering flight operations, engineering, safety, information technology, human resources, and environmental management to guarantee that technology allocation results in improved efficiency, safety, and service reliability, as well as reduced environmental impact. Because the MGA

results showed no significant differences based on work experience, it is important to provide equal access to technology, training, and sustainability programs without differentiating between employees based on their tenure.

LIMITATION AND FUTURE RESEARCH

This study had several limitations that should be considered. The cross-sectional design and reliance on self-disclosed data limit causal inference and have the potential to give rise to single-source and socially desirable biases. Further research should use longitudinal or time-lagged designs and integrate superior assessments, technology-usage data, safety indicators, and objective environmental performance measures. The use of purposive sampling limits sample representation; therefore, probability techniques with stratified sampling based on the field of work, profession, and type of aviation organization should be considered. Although the retained indicators met the criteria for reliability and validity, the elimination of some indicators indicates the need for revalidation of instruments in different contexts and the development of multidimensional or higher-order constructs in the future. The generalizability of the results of this study is also limited because it was conducted only in Indonesia. International studies are necessary to test the resilience of such models in different environments, regulations, technologies, and organizational cultures. In addition, the five-year work-experience limit is an analytical categorization, not a universal standard of competence. Future research should assess experience using more specific measures based on tasks, technologies, organizations, and operational functions in aviation-sector unions.

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TRANSPARENCY: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study, that no vital features of the study have been omitted, and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during the writing process.

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DISCLOSURE OF AI USE: The authors used OpenAI ChatGPT (GPT-5.6 Thinking) to improve the phrasing, coherence, and cohesion of the sentences in the manuscript. Paperpal was used to perform limited paraphrasing and check English grammar and linguistic errors. Scite AI was used to identify previous literature and research relevant to the research topic. All results generated by the AI tool were critically reviewed, carefully verified, and verified with the source, and reedited by the authors. All authors declare themselves liable for the truthfulness, exactness, authenticity, interpretation, novelty, and final content of this paper.

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Appendix A: Questionnaire Items

No.	Code	Indicator	Items	Reference
Environmental Stewardship (ES)				
1	ES1	Motivation to protect the environment	I am motivated to conduct my work in a manner that minimizes environmental impact.	Jia et al. (2023) and Zacher et al. (2023)
2	ES2	Energy and resource efficiency	I took the initiative to reduce the waste of energy and resources while executing my duties.	
3	ES3	Support for environmental policies	I support the organization’s policies aimed at reducing emissions, waste, and inefficient use of resources.	
4	ES4	Awareness of environmental impacts	I understand the impact of my work on the environment and the sustainability of aviation operations.	
5	ES5	Proactive actions	I remind my colleagues to adhere to the environmental procedures relevant to our work.	
Knowledge sharing (KS)				
1	KS1	Willingness to share knowledge	I volunteered to share relevant knowledge and work experiences with my colleagues.	Deng et al. (2023); Van den Broeck, Howard, Van Vaerenbergh, Leroy, and Gagné (2021); Yeboah (2023) and Zahedi et al. (2024)
2	KS2	Organizational support	The organization I work for encourages openness in sharing work-related knowledge.	
3	KS3	The search for new knowledge	I took the initiative to acquire new knowledge that supports the safe and sustainable implementation of my work.	
4	KS4	Request and receive feedback	I actively seek input from my colleagues to improve my task performance.	
5	KS5	Quality of knowledge shared	I share work information that I have ensured is relevant and accurate to my colleagues.	
Digital readiness (DR)				
1	DR1	Digital knowledge and awareness	I am aware of the development of digital technologies relevant to the aviation sector.	Abdul Hamid (2022); Abed Alhameed and Emeagwali (2026); Audrin, Audrin, and Salamin (2024) and Silva, Marujo, and Senna (2026)
2	DR2	Understanding the functions of digital systems	I understand the functions of digital systems that are relevant to my task.	
3	DR3	Skills in using the system	I am able to use the digital systems necessary to perform my work.	
4	DR4	Convenience of using technology	I feel comfortable using digital devices and apps required for the job.	
5	DR5	Facilitating conditions	The organization I work for provides adequate training and support for using digital systems.	
Technology Usage Behaviour (TUB)				
1	TUB1	Use for accuracy and safety	I use relevant digital systems to improve the accuracy and safety of the execution of my duties.	Al-Dmour et al. (2026); Binsaeed et al. (2023); Duan et al. (2024); Farsi et al. (2024); Ordieres-Meré et al. (2020) and Rupcic et al. (2023)
2	TUB2	Frequency of digital usage	I regularly use digital technology in my daily work.	
3	TUB3	Physical resource efficiency	I use digital technology to reduce the use of paper or physical resources whenever possible in my work.	
4	TUB4	Efficiency of work execution	I use digital technology to complete my work more efficiently.	
Sustainable aviation performance (SAMP)				

No.	Code	Indicator	Items	Reference
1	SAMP1	Social performance and inclusivity	The organization I work for treats employees fairly and respects differences in their backgrounds.	Airports Council International (2025); Farsi et al. (2024); Martín-Domingo et al. (2025) Ordieres-Meré et al. (2020) and Rupcic et al. (2023)
2	SAMP2	Operational safety consistency	Safety procedures are consistently implemented in the operational activities of my work unit.	
3	SAMP3	Governance compliance	Organizations adhere to sustainability policies and standards relevant to the aviation industry.	
4	SAMP4	Utilization of environmentally friendly technology	Operational systems and technologies are used to reduce the environmental impact of the aviation industry.	
5	SAMP5	Reliability and continuity of service	The organization can maintain the reliability and continuity of flight services.	