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# Improving Coordination Between the Ministries and the Private Sector in Aircraft Spare Parts Import Policy to Support the MRO Sector in Indonesia

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## ABSTRACT

The Maintenance, Repair, and Overhaul (MRO) sector in Indonesia continues to face challenges, particularly the lack of harmonized policies for importing aircraft spare parts across government ministries, resulting in administrative complexity, higher costs, and reduced industry competitiveness. The research aims to identify key policy factors that can improve the aircraft spare parts import process and strengthen the competitiveness of Indonesia's MRO industry. The novelty of this research lies in its multi-stakeholder policy analysis, integrating perspectives from government regulators, MRO practitioners, and aviation observers to identify regulatory and institutional barriers affecting import activities. The research employs a qualitative approach using a Focus Group Discussion (FGD) involving participants representing relevant ministries, MRO companies, aviation associations, and industry experts. The findings indicate that regulatory harmonization among ministries and the simplification of import procedures are the most critical factors for reducing processing time and operational costs. Participants also highlight the importance of fiscal incentives, integrated digital licensing systems, and stronger domestic MRO capabilities to enhance industry competitiveness. Furthermore, the research emphasizes the need for structured inter-ministerial coordination and closer collaboration between government agencies and private-sector MRO providers to accelerate technology adoption, workforce development, and operational efficiency. These findings provide practical policy recommendations for strengthening Indonesia's aviation maintenance ecosystem through coordinated regulations, streamlined import procedures, and sustainable industry collaboration.

**Keywords:** import policies, aircraft spare parts, Maintenance, Repair, and Overhaul (MRO)

## INTRODUCTION

Transportation is a vital sector that supports the development of various aspects of life, including economic activities, socio-cultural interactions, education, and politics. In Indonesia, the transportation sector also plays a strategic role in stimulating economic growth and regional development. According to Budi Karya Sumadi, Minister of Transportation of the Republic of Indonesia for the 2019–2024 period, transportation generates a significant multiplier effect, including job creation, strengthened logistics networks, the emergence of new economic centers, and the promotion of equity and social justice. Therefore, transportation system development must be implemented in a phased, sustainable, and integrated

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manner through a comprehensive planning approach (Indriastiwi et al., 2023).

Indonesia, as an archipelagic country with complex geographical conditions, comprising thousands of islands and vast maritime areas, faces significant challenges in ensuring effective transportation connectivity. In this context, air transportation plays a critical role as the fastest and most efficient mode for connecting remote regions and supporting national mobility. According to the Air Transport Action Group (n.d.), aviation is not only the fastest mode of transportation but also one of the most reliable and safest, particularly in areas with limited accessibility and changing weather conditions.

Within the aviation ecosystem, several key stakeholders interact and influence the industry's performance. These stakeholders include regulators (government), operators, and the public (Elhamy & Eltawil, 2025). Regulators are responsible for formulating policies, regulations, and supervision mechanisms to ensure the safety and sustainability of the aviation system. Operators are responsible for providing infrastructure and carrying out operational activities, including airlines, airport operators, and air navigation service providers. In addition, several supporting actors play essential roles in the aviation value chain, such as Maintenance, Repair, and Overhaul (MRO) companies, aircraft manufacturers, fuel suppliers, and aviation training institutions.

In airline operations, two important aspects must be balanced: safety and commercial sustainability. Strict technical and operational regulations govern safety aspects to ensure the airworthiness of aircraft operations. Meanwhile, the commercial aspect focuses on business efficiency and operational profitability (Fardnia et al., 2021). Both aspects are interrelated because maintaining operational safety requires adequate investment in aircraft maintenance, spare parts availability, and regulatory compliance.

Data from the National Transportation Safety Committee (KNKT) in Figure 1 show that several factors influenced aviation accidents in Indonesia between 2007 and 2025. Human factors accounted for 61% of accidents, followed by technical factors at 22%, environmental factors at 11%, and facility factors at 6% (Komite Nasional Keselamatan Transportasi, n.d.). These data indicate that technical factors, including aircraft maintenance and spare parts management, remain major contributors to aviation accidents in Indonesia. Therefore, it requires serious attention in aviation safety policies.

Figure 1 also illustrates the distribution of aviation accident causes during the 2007–2025 period. Several accident investigations conducted by KNKT highlight the relationship between technical failures and maintenance issues. For example, the Adam Air 574 accident in 2007 was related to a navigation system failure, while the AirAsia QZ8501 incident in 2014 involved repeated damage to the Rudder Travel Limit Unit (RTLU). Similarly, the Lion Air JT-610 accident in 2018 and the Sriwijaya Air SJ-182 accident in 2021 were also associated with maintenance practices and component conditions. These cases demonstrate that inadequate spare parts management and maintenance systems can have serious consequences for aviation safety. To ensure safe and reliable flight operations, aircraft maintenance must be carried out routinely and continuously in accordance with established regulations and procedures. Proper maintenance ensures that aircraft operate safely, reliably, and economically throughout their operational life cycle (Fahriza et al., 2021). Therefore, the availability of certified aircraft spare parts is crucial to maintaining aircraft airworthiness and operational efficiency.

The aircraft maintenance sector also represents a significant economic opportunity. Aircraft acquisition generates substantial downstream economic activities, including maintenance services throughout the aircraft lifecycle. For example, purchasing one aircraft can generate maintenance-related business opportunities worth six to ten times the aircraft's initial value. Aircraft such as the Boeing 737-800 or Airbus A320 typically incur maintenance costs ranging from USD 660 to USD 1,200 per flight hour, depending on the maintenance package selected (Moenck et al., 2023). With average flight hours of 3,000–4,000 hours per year, routine maintenance costs can reach USD 2–5 million per aircraft annually.

Indonesia has significant potential in the aircraft maintenance market due to the rapid growth of its aviation industry. The national MRO market continues to expand alongside fleet growth and rising

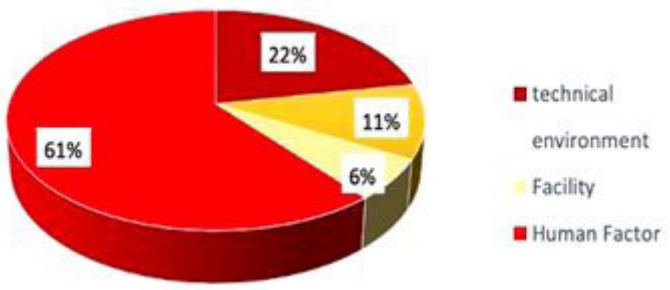


Figure 1 Factors Causing Aviation Accidents During 2007−2025

Source: Komite Nasional Keselamatan Transportasi (n.d.)

air transportation demand. However, only about 40% of the national MRO market can currently be served by domestic MRO providers, with the remaining maintenance activities conducted abroad due to limited capacity and technological capabilities in Indonesia (Gumarianto, 2025). This condition leads to the outflow of potential foreign exchange that can otherwise be retained domestically to support human resource development, infrastructure, and technological improvements in the aviation sector.

Figure 2 illustrates the development and potential of the Asia-Pacific MRO market, highlighting Indonesia's opportunity to strengthen its competitiveness within this rapidly expanding sector. In the Asia-Pacific region, the MRO industry is projected to grow significantly, with the market expected to reach approximately USD 809.04 billion by 2032 (Data Bridge Market Research, 2025). This growth presents a major opportunity for Indonesia to increase its participation in the regional aviation maintenance market.

Despite the promising market potential, Indonesia's MRO industry still faces structural challenges related to the availability of aircraft spare parts and import policies. Aircraft spare parts are highly specialized and certified components that must be supplied by Original Equipment Manufacturers (OEMs) such as Boeing and Airbus. As a result, approximately 99% of aircraft spare parts used in Indonesia are imported. The Indonesian government still imposes import duties on many aircraft spare parts, primarily to protect domestic industries and generate tax revenue. In contrast, countries such as Singapore and Malaysia have implemented import duty exemptions and streamlined customs procedures to support their aviation maintenance industries.

Several policy initiatives have been introduced in Indonesia to improve the competitiveness of the MRO sector. For instance, Minister of Finance Regulation No. 26/PMK.010/2022 has reduced import tariffs for 21 tariff items at the 8-digit Harmonized System (HS) level. In 2024, a total of 98 out of 312 aircraft spare part tariff items were expected to receive a 0% import duty rate (approximately 31.41%) (Fahriza et al., 2021). Although this policy aims to improve the competitiveness of domestic MRO services, industry stakeholders still report implementation challenges, particularly related to administrative procedures and the limited scope of tariff exemptions.

Table 1 (see Appendices) presents a comparison of government support policies for the MRO industry in several countries, including Singapore, Thailand, the United Arab Emirates (UAE), and Indonesia. The comparison shows that countries such as Singapore have developed comprehensive policy frameworks that integrate fiscal incentives, infrastructure development, and institutional support through initiatives like the Seletar Aerospace Park. These policies include tax exemptions, free trade zone status, investment incentives, and integrated training facilities that significantly strengthen their aviation maintenance ecosystem (Fahriza et al., 2024).

Table 1 (see Appendices) also serves as a benchmark to highlight the gap in government support for the MRO industry between Indonesia and countries such as Singapore, Thailand, and the United Arab Emirates. These countries provide more comprehensive policies through integrated Free Trade Zones (FTZs), full fiscal incentives, more open foreign ownership, and strong infrastructure and human

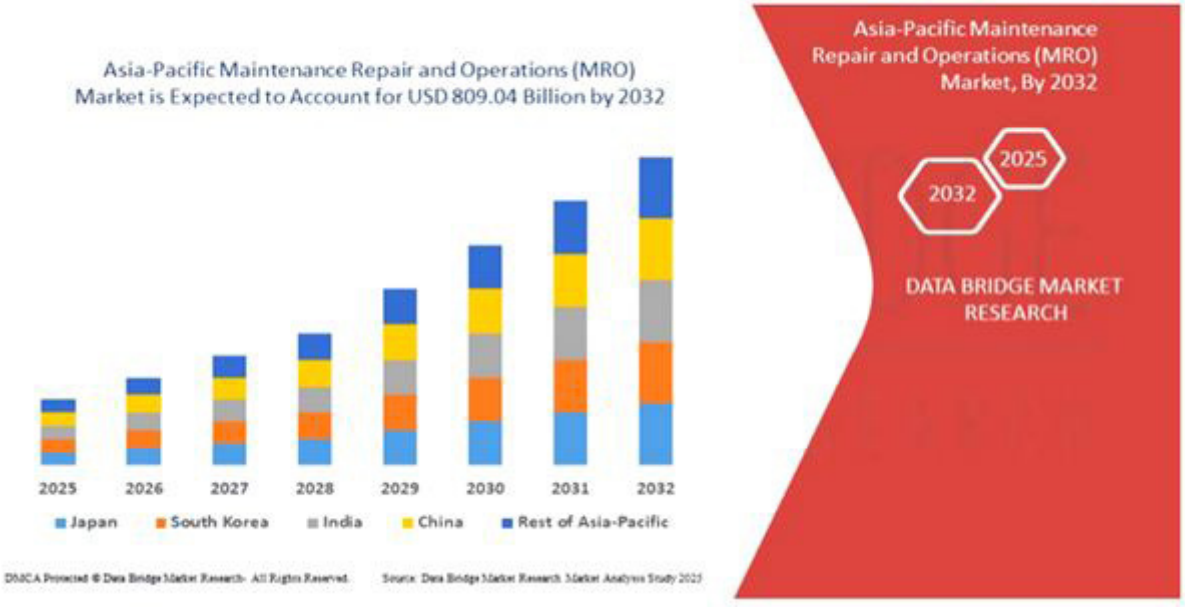


Figure 2 Asia-Pacific Maintenance, Repair, and Overhaul (MRO)

Source: Data Bridge Market Research (2025)

resource support. In contrast, support in Indonesia remains limited and less integrated, indicating the need for stronger regulations and a more developed MRO industry ecosystem. Despite several existing regulations in Indonesia, such as Minister of Trade Regulation No. 16 of 2025, Minister of Finance Regulation No. 26/PMK.010/2022, and Government Regulation No. 50 of 2019, policy implementation in the MRO sector remains fragmented. Coordination among relevant ministries, including the Ministry of Transportation, the Ministry of Trade, the Ministry of Industry, and the Ministry of Finance, has not been fully harmonized. This situation creates regulatory overlaps and administrative complexities that may affect the efficiency of aircraft spare parts import processes and reduce the competitiveness of Indonesia's MRO industry (Widodo & Wandebori, 2025).

Furthermore, existing literature generally focuses on logistics efficiency and financial aspects of spare parts supply chains, while the broader policy implications for aviation safety and industry competitiveness remain underexplored. Limited research has examined how policies on aircraft spare parts imports influence maintenance efficiency, operational safety, and the overall development of the MRO ecosystem in developing countries such as Indonesia. Therefore, the research aims to analyze the key policy factors affecting aircraft spare parts import mechanisms in Indonesia and their implications for the competitiveness of the national MRO industry. By examining stakeholder perspectives and policy implementation challenges, this research seeks to identify regulatory gaps and propose policy improvements that can enhance the efficiency, safety, and competitiveness of Indonesia's aviation maintenance sector.

The research gap regarding the management of aircraft spare parts import policies to support the development of Indonesia's MRO sector remains limited, particularly in cross-sectoral policies among the Ministries of Transportation, Finance, and Trade. Although several previous studies have examined the importance of policy integration and coordination between institutions in the MRO sector, most have focused on technical and operational aspects without considering the impact of import policies on the sustainability of the domestic MRO industry. Existing research, such as Fahriza et al. (2021) and Widodo and Wandebori (2025), has shown that efficient import policies can enhance the competitiveness of the MRO industry. However, research on the lack of harmonization across ministries and the weak coordination among institutions in managing this policy remains rare. Furthermore, the challenges of managing aircraft spare parts imports, which affect national aviation safety and the development of the local MRO industry, remain underexplored. Research conducted by Fahriza et al. (2024) and Hallensleben et al. (2025) has demonstrated the impact of poorly coordinated import policies on the smooth operation of MRO. However, the previous research is still limited in explaining how these policies can optimize import management and support the sustainability of the MRO sector in Indonesia. This research gap creates an opportunity for further research to explore how policy strategies can optimize the efficient management of aircraft spare parts imports and support the development of a sustainable MRO sector in Indonesia, as suggested by Fahriza et al. (2021) and Shishodia (2025), by focusing on safety, efficiency, and operational readiness in the MRO sector.

A study by Franciscus (2021) has found that overlapping regulations among the Ministry of Industry, the Ministry of Finance, the Ministry of Trade, and the Ministry of Transportation hamper investment and efficiency in MRO. According to Franciscus (2021), only about 30% of Indonesia's MRO industry can be absorbed locally, while 70% is still shipped abroad. The long-term strategy is to create an Aerospace Park point in Indonesia with adequate aircraft maintenance infrastructure. According to Juma'in and Nugroho (2024), exempting aircraft spare parts from import duties can enhance the competitiveness of the domestic MRO industry and encourage greater exports of MRO services by reducing operational costs Setiawan et al. (2025) and Nam et al. (2023). Differences in policies across agencies slow the spare parts import process (Ministry of Industry, Ministry of Trade, and Directorate General of Customs and Excise). Hence, the solution can be a single-window policy for MRO spare parts. Equally important, the strategic role of the regulator (the Ministry of Transportation) as a public policy actor in coordinating cross-sector interests and overseeing the development of the national MRO ecosystem has also not been widely analyzed institutionally. However, strong policy leadership from the transportation sector is a crucial prerequisite for building an effectively competitive national aviation industry.

With these gaps in mind, a more in-depth study is required that not only maps the challenges related to aircraft spare parts import policies but also develops a holistic management strategy grounded in institutional coordination, logistics efficiency, and aviation safety considerations. Such an approach is important to understand how policy alignment, regulatory simplification, and cross-sector collaboration can support the sustainability and competitiveness of the national MRO industry. Therefore, the research seeks to address the following research questions: How do current aircraft spare parts import policies affect the competitiveness of Indonesia's MRO industry? What policy strategies can be implemented to improve regulatory coordination, logistics efficiency, and aviation safety within the national aviation maintenance ecosystem? Considering these gaps, an in-depth study is needed that not only maps the challenges of the aircraft spare parts import policy but also develops a holistic management strategy grounded in an institutional approach, logistical efficiency, and aviation safety. These gaps serve as a crucial basis for formulating research questions.

## METHODS

The research employs a qualitative descriptive approach to examine policy factors influencing aircraft spare parts imports and their implications for the development of Indonesia's MRO industry. Data are collected through a Focus Group Discussion (FGD), in-depth interviews, observation, and document analysis. The FGD serves as the main data-gathering technique to facilitate the exchange of perspectives among diverse stakeholders involved in aviation policy and industry practices. Participants are selected through purposive sampling based on their expertise, institutional roles, and experience with aircraft spare parts import policies and the MRO sector.

The FGD has involves eight participants, representing key stakeholders from government institutions, industry associations, and the aviation sector. The participants consist of (1) one representative from the Ministry of Transportation, (2) one representative from the Ministry of Trade, (3) one representative from the Ministry of Industry, (4) one representative from the Ministry of Finance, (5) one representative from the Fiscal Policy Agency, (6) one representative from the Indonesia Aircraft Maintenance Services Association (IAMSA), (7) one aviation industry practitioner from an MRO company, and (8) one aviation observer with expertise in aviation policy and industry development. These participants are purposively selected to ensure comprehensive insights into the regulatory, fiscal, operational, and industrial aspects of aircraft spare parts import policies. The FGD was conducted on August 22, 2024, at Mercure Tangerang Centre Hotel and lasted approximately one full day. A semi-structured discussion protocol guides the session to ensure consistency in the topics discussed while allowing participants to share their experiences and perspectives freely. All discussions are audio-recorded, documented, and transcribed verbatim for subsequent thematic analysis (Sugiyono, 2008).

The collected data are analyzed using qualitative descriptive and thematic analysis to identify key themes related to regulatory coordination, administrative procedures, logistics efficiency, and domestic MRO industry capacity. Supporting data from policy documents, aviation safety reports, and industry publications are also examined to provide contextual understanding of aircraft spare parts import mechanisms and the aviation maintenance ecosystem. To ensure the credibility and validity of the findings, the researchers apply source triangulation by comparing information obtained from the FGD, in-depth interviews, and documentary evidence. This triangulation process enables the researchers to verify the consistency of information across different sources and strengthen the reliability of conclusions regarding policy improvements needed to enhance the competitiveness and operational efficiency of Indonesia's MRO industry.

## RESULTS AND DISCUSSION

FGD is conducted to explore various perspectives on policies, challenges, and opportunities faced by the MRO industry in Indonesia. The discussion involves representatives from government agencies, industry practitioners, aviation observers, and policy analysts who possess relevant expertise in aviation policy and industrial development. The objective of the discussion is to deepen understanding of aircraft spare parts import policies and identify strategic steps to strengthen the competitiveness of the MRO industry. Participants also examine the role of government regulations and private sector initiatives in supporting sustainable industry growth. The FGD is expected to provide insights that can contribute to improving aviation safety and operational efficiency in Indonesia. Such discussions are important in generating collaborative policy recommendations that involve multiple stakeholders.

The FGD was held on Thursday, August 22, 2024, at the Mercure Tangerang Centre Hotel under the theme "*Improving Aviation Safety by Developing Competitive Maintenance, Repair, and Overhaul*." The event aimed to discuss policies to strengthen Indonesia's aviation maintenance ecosystem. The forum also served as a platform for exchanging knowledge between regulators, practitioners, and industry observers. Through this dialogue, participants discussed policy challenges related to aircraft spare parts imports and industry competitiveness. The discussion was designed to encourage collaboration between public institutions and private sector actors. As a result, the FGD contributed to building a shared understanding of the strategic direction needed to develop Indonesia's MRO industry. The detailed results and questions can be seen in Tables 2 and 3 in the Appendices.

One of the main themes emerging from the FGD is the importance of regulatory harmonization among government institutions involved in aircraft spare parts import policies. Participants highlight that overlapping regulations between ministries often create administrative barriers for industry actors. These regulatory inconsistencies may delay the importation process and disrupt aircraft maintenance operations. Stakeholders emphasize the need for improved coordination between ministries responsible for trade, finance, transportation, and industry. Harmonized regulations can reduce bureaucratic complexity and increase the efficiency of import procedures. This finding aligns with studies emphasizing the importance of regulatory coordination to facilitate efficient industrial operations (Ichou & Veress, 2023).

Another important issue discussed during the FGD is the role of digital systems in import administration, particularly the Indonesian National Single Window System (INSW). Participants explain that the SINSW system allows better monitoring of import procedures and improves transparency in the licensing process. The system also helps to reduce

the risk of counterfeit aircraft components entering the supply chain. By enabling better coordination among government agencies, SINSW contributes to more efficient management of spare parts imports. Participants agree that digital integration of import procedures can significantly reduce administrative delays. These findings are consistent with research highlighting the importance of efficient regulatory systems for supporting the MRO industry (Nam et al., 2023).

The discussion also emphasizes the importance of simplifying administrative procedures for importing aircraft spare parts. Participants note that complex licensing processes can slow down the delivery of critical aircraft components. Delays in spare parts availability may affect maintenance schedules and airline operational reliability. Therefore, simplifying the administrative process can support more efficient aircraft maintenance operations. A streamlined regulatory framework will also reduce compliance costs for MRO companies. Such improvements are considered essential for maintaining operational efficiency within the aviation sector.

Another key theme emerging from the FGD is the significance of fiscal policy support for the MRO industry. Participants emphasize that import tariffs and tax policies directly influence the competitiveness of domestic maintenance providers. Fiscal incentives, such as tax reductions or import duty exemptions, can help to lower operational costs. Lower costs can allow Indonesian MRO companies to compete more effectively with regional competitors. Participants also stress the importance of aligning fiscal policies with national industrial development strategies. Previous research has shown that fiscal incentives can significantly improve industrial competitiveness (Liangrokapart & Sittiwatethanasiri, 2023; Abdillah & Belgiawan, 2023).

Stakeholders at the Fiscal Policy Agency also emphasize the importance of developing a clear roadmap for Indonesia's MRO industry. Such a roadmap provides long-term direction for industry development and policy coordination. The roadmap can help to align fiscal incentives, infrastructure development, and industrial capacity building. Participants argue that strategic planning is necessary to reduce Indonesia's dependence on foreign MRO services. A clear development roadmap also helps to attract investment in aviation maintenance facilities. With coordinated planning, Indonesia can strengthen its position as a regional aviation maintenance hub.

Another important theme discussed during the FGD is aviation safety and regulatory oversight in the MRO industry. Participants emphasize that strict certification and surveillance systems are necessary to maintain aircraft safety standards. Regulatory oversight ensures that maintenance procedures comply with international aviation standards. The Ministry of Transportation plays a key role in supervising MRO certification processes. Regular inspections and compliance audits are conducted to ensure service quality. Previous research confirms that strict regulatory supervision increases trust in aviation maintenance services (Putri & Kusumawati, 2021).

Participants also discuss the need to strengthen domestic MRO capacity to reduce dependence on overseas maintenance providers. Currently, many aircraft maintenance activities are still performed abroad due to limited domestic capabilities. Strengthening domestic capacity requires investment in infrastructure, technology, and skilled labor. Therefore, government support through training programs and industrial development policies is necessary. Expanding domestic MRO capabilities helps to retain economic value within the country. Such policies can also contribute to strengthening the national aviation ecosystem.

In addition to infrastructure development, stakeholders emphasize the importance of human resource development in the aviation maintenance sector. Skilled technicians and engineers are essential for maintaining aircraft safety and reliability. Participants suggest expanding training programs and certification systems for aviation maintenance personnel. Collaboration between industry and educational institutions helps to improve workforce readiness. Therefore, human resource development is a critical component of the long-term growth of the MRO industry. Improving workforce skills also strengthens Indonesia's competitiveness in the global aviation market.

Technological innovation is also identified as an important driver of competitiveness in the MRO industry. Participants discuss the potential use of advanced technologies such as artificial intelligence and drone-based inspection systems. These technologies can significantly improve efficiency and accuracy in aircraft maintenance operations. Automation and predictive maintenance systems can reduce operational costs and minimize downtime. Technological adoption also supports faster turnaround times for aircraft maintenance. Research has shown that technological innovation can significantly improve productivity in the MRO industry (Saptomo & Surya, 2022).

Another issue raised during the discussion is the importance of efficient tariff management and goods classification in the import process. Accurate classification of aircraft components is necessary to ensure correct tariff implementation. Inefficient classification systems can create delays and increase operational costs. Participants emphasize the need for better coordination between customs authorities and industry actors. A more efficient classification system helps to accelerate the importation process. This finding is supported by research showing that effective tariff management can improve supply chain efficiency (Efthymiou et al., 2022).

Cost management is also identified as an important factor affecting the competitiveness of the MRO industry. Participants note that fluctuations in import tariffs and operational costs can reduce profitability. High operational costs may discourage

investment in domestic aviation maintenance services. Therefore, policies that stabilize tariffs and reduce regulatory uncertainty are necessary. Efficient cost management strategies can help the industry to maintain competitiveness in global markets. Previous research indicates that supportive fiscal policies can help MRO companies to remain competitive internationally (Hallensleben et al., 2025).

The role of industry associations, particularly the IAMSA, is also highlighted during the discussion. IAMSA acts as a representative organization advocating policies that support the development of the MRO industry. The association collaborates with government agencies to improve regulatory frameworks and industry standards. IAMSA also facilitates knowledge sharing among MRO companies and aviation stakeholders. Through these initiatives, IAMSA contributes to strengthening the national aviation maintenance ecosystem. Similar roles of industry associations in supporting sectoral development have been highlighted in previous studies (Chandola et al., 2022).

Finally, participants emphasize the importance of collaboration between government, industry, and academic institutions in developing the MRO sector. Such collaboration can support evidence-based policymaking and long-term industry development. Academic studies, such as Regulatory Impact Analysis, can help to evaluate the effects of policy decisions on industry performance. Collaborative research initiatives may also contribute to technological innovation and workforce development. Partnerships between state-owned enterprises and private companies can strengthen the MRO supply chain. Previous studies highlight that collaborative approaches can accelerate industrial capacity development (Fahriza et al., 2024; Franciscus, 2021; Fajariansyah et al., 2021).

It is also important to discuss that improved coordination among relevant ministries can have a direct impact on reducing operational costs in the domestic MRO industry. Better policy alignment and streamlined import procedures for aircraft spare parts can reduce import-related costs, including administrative fees, customs processing costs, and delays due to regulatory overlap. More efficient import processes also accelerate the availability of critical aircraft components, enabling MRO companies to perform maintenance activities more efficiently. As a result, improved coordination can help to reduce aircraft maintenance turnaround time, allowing airlines to return aircraft to operation more quickly and improving overall operational efficiency in the aviation sector.

Furthermore, it is necessary to examine whether the current level of policy coordination is strong enough to enable Indonesia to compete with established regional MRO hubs, such as Singapore and Malaysia. These countries have developed highly efficient policy frameworks that ensure rapid availability of spare parts, supported by integrated logistics systems and strong fiscal incentives. In contrast, Indonesia still faces challenges related to regulatory fragmentation and administrative complexity in the importation of spare parts. Therefore, strengthening policy coordination and improving the efficiency of spare parts supply chains are crucial for enhancing Indonesia's competitiveness in the regional MRO market.

## CONCLUSION

Indonesia's aircraft spare parts import policies play a critical role in determining the competitiveness of the national MRO industry. The research finds that regulatory fragmentation and administrative complexity remain major obstacles in the import process, affecting maintenance efficiency and operational costs. Therefore, harmonization of regulations across ministries, particularly the Ministry of Transportation, the Ministry of Trade, the Ministry of Finance, and the Ministry of Industry, is essential to eliminate overlapping policies and streamline procedures. In addition, simplifying administrative processes can accelerate customs clearance and ensure the timely availability of aircraft spare parts required for maintenance operations. These improvements are crucial not only for enhancing operational efficiency but also for maintaining aviation safety standards. Strengthening policy coordination will ultimately improve the overall competitiveness of Indonesia's aviation maintenance sector.

Several actionable policy implications emerge from the research findings. First, the government should establish a formal inter-ministerial coordination mechanism, such as a joint task force or a permanent policy coordination forum, to align regulatory frameworks governing aircraft spare parts imports. Second, the development of a more integrated single-window import system specifically designed for aviation components can significantly simplify licensing, customs clearance, and certification processes. Third, priority regulatory reforms should focus on harmonizing tariff classifications, simplifying import permit requirements, and accelerating the certification process for aircraft components. Implementing these policy measures can reduce bureaucratic delays, improve logistics efficiency, and strengthen the competitiveness of domestic MRO companies. Such reforms will also support Indonesia's ambition to become a regional hub for aviation maintenance services.

In addition to regulatory and administrative improvements, fiscal incentives and industrial capacity development remain essential components of MRO industry policy. Import duty exemptions or tax incentives for aircraft spare parts can significantly reduce operational costs and increase the price competitiveness of domestic MRO services. At the same time, strengthening domestic MRO infrastructure, including internationally certified maintenance facilities and skilled human resources, is necessary to reduce dependence on overseas maintenance providers. Collaboration between domestic MRO companies, OEMs, and private-sector partners should

also be encouraged to facilitate technology transfer and knowledge sharing. These collaborative initiatives will enhance operational efficiency and support the adoption of the best international practices. Addressing these interconnected factors holistically will also strengthen the resilience and long-term sustainability of Indonesia's MRO industry.

A comprehensive conclusion from the research emphasizes that strengthening synergy among government institutions and aligning aviation-related policies are essential for improving the governance of aircraft spare parts importation in Indonesia. Effective coordination among the Ministry of Transportation, the Ministry of Trade, the Ministry of Finance, and the Ministry of Industry can reduce regulatory fragmentation and create a more coherent policy framework to support the development of the national MRO ecosystem. From an operational perspective, improved regulatory harmonization and simplified import procedures can significantly enhance efficiency by reducing administrative delays, lowering import-related operational costs, and shortening aircraft maintenance turnaround time in domestic MRO facilities. Strategically, these policy improvements are critical to strengthening Indonesia's position in the regional aviation maintenance market, enabling the country to compete more effectively with established MRO hubs such as Singapore and Malaysia by ensuring faster availability of spare parts, more efficient maintenance services, and a more competitive industrial environment.

The research also makes an academic contribution by providing a multi-stakeholder analysis of aircraft spare parts import policies and their implications for the development of the MRO industry in a developing aviation market. By integrating insights from regulators, industry practitioners, and policy experts, the research highlights the institutional and regulatory dynamics that influence aviation maintenance competitiveness. The research contributes to the literature on aviation policy and industrial competitiveness by demonstrating how regulatory coordination, fiscal policy, and technological innovation interact within the MRO ecosystem. In particular, it extends existing discussions by linking aircraft spare parts import policy with aviation safety and industry development. This integrated perspective provides a more comprehensive understanding of policy challenges in emerging aviation markets.

Despite these contributions, the research has several limitations that should be considered when interpreting its findings. The research relies primarily on qualitative data from FGDs, which reflect the perspectives of selected stakeholders and may not capture the full diversity of views within the aviation sector. In addition, the research does not provide a detailed quantitative assessment of the economic impacts of import policies, such as cost reductions, improvements in turnaround time, or measurable safety outcomes. Future research can adopt a mixed-methods approach by integrating quantitative analysis with qualitative insights to provide a more comprehensive evaluation of policy impacts. Comparative studies across ASEAN aviation markets may also help to identify best practices in regulatory harmonization and industry development. Furthermore, future studies can explore the role of digital technologies, such as customs automation, blockchain certification, and AI-based supply chain management, in improving policy effectiveness and strengthening the competitiveness of Indonesia's MRO industry.

## AUTHOR CONTRIBUTIONS

Conceived and designed the analysis, A. W., H. P., and D. D. K.; Performed the analysis, A. W., D. D. K., and E. S.; Wrote the paper, A. W.; Provided a very important guideline where qualitative research could still be conducted within the domain of Management Science, H. P.; Actively provided guidance through offline and online meetings and implemented a combination of qualitative public policy models within the management study, D. D. K.

## DATA AVAILABILITY

The participants of the research did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research, supporting data are not available.

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## APPENDICES

Table 1 Comparison of Support from Other Countries' Governments for the Maintenance, Repair, and Overhaul (MRO) Industry

| Support Aspects | Singapore | Thailand | United Arab Emirates (UAE) | Indonesia |
|---|---|---|---|---|
| Free Trade Zone (FTZ) | Seletar Aerospace Park | Eastern Economic Corridor | Dubai | Limited flight (Kawasan Ekonomi Khusus (KEK)) |
| Tax Incentives (Import Duty, VAT) | 100% Free | Free of VAT & import duty | 100% Free | Not automatic, requires Surat Keterangan Terbang Darurat (SKTD) |
| Investment Incentives | 10-year tax allowance | Tax holiday up to 8 years | Full exemption | Limited through Peraturan Pemerintah 50/2019 |
| Foreign Ownership | 100% allowed | Up to 100% in EEC | 100% and full repatriation | Max. 67% in strategic sectors |
| Technical Facilities and Human Resources | R&D + Training (Nephelometric Turbidity Unit, A*Star) | Training & U-Tapao Aircraft Hangar | Integrated aviation hub | Limited, not yet integrated |

Source: International Air Transport Association (2023)

Table 2 Summary of Interview Results and Forum Group Discussion (FDG)

| No. | Discussion | Source person | Results | Researchers' Findings |
|---|---|---|---|---|
| 1 | Spare Parts Import Policy | A1 – Ministry of Trade (N1) | The Ministry of Trade regulates the import policy for spare parts, ensuring they are efficiently and affordably available to the Maintenance, Repair, and Overhaul (MRO) industry. | Appropriate import policies support the smooth operation of the MRO industry by ensuring the availability of spare parts that meet needs and standards. |
| 2 | MRO Industry Road Map | D2 – Fiscal Policy Agency (N2) | A roadmap for the development of the MRO industry in Indonesia to increase global competitiveness, as well as a fiscal strategy that supports the industry's sustainability. | The government needs to continue encouraging development programs that make the MRO industry more competitive in both domestic and international markets. |
| 3 | Guidance and Supervision of MRO Industry Industrial Activities | H3 – Directorate of Airworthiness and Aircraft Operations, Ministry of Transportation (N3) | The government provides guidance and supervision through strict regulations to maintain the quality and operational standards of the MRO industry. | Good development will ensure that the MRO industry in Indonesia can meet national and international standards, maintaining aviation quality and safety. |
| 4 | Government Strategy to Support the MRO Industry | I4 – Ministry of Industry (N4) | The government's strategy includes incentive policies and capacity development to support the MRO industry's independence in meeting domestic and international needs. | The development of the MRO industry requires ongoing government support through policies and incentives that foster the sector's independence and competitiveness. |
| 5 | Innovation in MRO and Global Competitiveness | A5 – Indonesia Aircraft Maintenance Services Association (IAMSA) (N5) | Innovations in maintenance processes and new technologies, such as drones and AI, can enhance the competitiveness of Indonesia's MRO industry. | Technological innovation in the Maintenance, repair, and overhaul industry is needed to improve efficiency and quality, enabling this sector to compete with other countries in the global market. |
| 6 | Explanation of the Classification of Goods for the Sake of Smooth Imports | Ministry of Finance (N6) | Proper classification of goods in imports can facilitate the supply of spare parts and equipment required by the MRO industry, while accounting for fiscal tariffs. | Proper classification of goods and supportive fiscal policies will facilitate the smooth supply of MRO goods and sustain this industry in Indonesia. |
| 7 | Costs Borne by the MRO Industry | GS7 – Practitioner (N7) | Unstable fluctuations in rates and costs can affect the competitiveness of the MRO industry, especially in terms of operational and material costs. | Solutions to mitigate the impact of cost fluctuations are crucial for the MRO industry to remain competitive and sustainable in the long term. |
| 8 | The Needs of the MRO Industry to Face Global Competition | AL8 – Practitioner (N8) | The MRO industry in Indonesia needs to improve its service quality, capacity, and technology to compete in the international market. | Improving service quality and capacity, as well as developing technology, are very important for the global competition in the MRO industry. |

Table 3 Summary of Questions and Answers

| No. | Discussion | Source person | Question Source (Participants) | Question | Answer/Solution |
|---|---|---|---|---|---|
| 1 | Spare Parts Import Policy | A1 – Ministry of Trade (N1) | Capt. DPKA (DP) | 1. What are the latest regulations regarding the import of spare parts? | The latest regulations govern the import of new spare parts, but used parts are also subject to special provisions. Licensing is carried out through the Indonesian National Single Window (SINSW). |
| | | | | 2. How do you ensure that spare parts arrive on time? | The licensing process is carried out through an integrated system to ensure spare parts arrive on time and minimize counterfeiting of goods. |
| | | | | 3. Are there any plans to reduce the cost of importing spare parts for MRO? | The government, through fiscal policy, is evaluating incentives to reduce import costs by providing facilities to registered MRO companies. |
| 2 | Maintenance, Repair, and Overhaul (MRO) Industry Road Map | D2 – Fiscal Policy Agency (N2) | Capt. DPKA (DP) | 1. What concrete steps has the government taken to increase MRO competitiveness? | The government, through incentive and capacity-development policies, encourages investment and provides facilities to support the competitiveness of Indonesia's MRO sector. |
| | | | | 2. What are the main challenges in implementing this road map? | The main challenge is to increase local capacity in component development and reduce dependence on imports for the MRO sector. |
| | | | | 3. How can fiscal policy help the MRO industry to grow? | Fiscal policies such as reducing import duties and providing incentives for MRO will increase the industry's competitiveness in Indonesia. |
| 3 | Guidance and Supervision of MRO Industry Activities | H3 – DKPPU, Ministry of Transportation (N3) | Representative from PT Citilink Indonesia | 1. How does the Ministry of Transportation ensure quality standards in the MRO industry? | The Ministry of Transportation conducts periodic certification and audits of registered MRO to ensure airworthiness and safety standards are met. |
| | | | | 2. What monitoring mechanisms are implemented? | Supervision is carried out through periodic inspections by the Principal Airworthiness Inspector (PAI) and annual audits that align with International Civil Aviation Organization (ICAO) standards. |
| | | | | 3. To what extent does this supervision comply with international standards? | Supervision is carried out in accordance with international standards set by ICAO to ensure quality. |
| 4 | Government Strategy to Support the MRO Industry | I4 – Ministry of Industry (N4) | Mr. AF (IAMSA) | 1. How does the government support MRO to become independent? | The government is providing fiscal incentives and facilitating licensing to encourage the independence of the domestic Maintenance, repair, and overhaul industry and to ensure its resilience. |
| | | | | 2. What new policies can encourage the growth of the Maintenance, repair, and overhaul sector? | The government is developing a policy to reduce import duties on aircraft components and to incentivize MROs to increase domestic capacity. |
| | | | | 3. Which programs support the development of the MRO industry capacity? | Capacity-building programs include providing facilities, subsidizing workforce training, and facilitating international market access for domestic MROs. |

Table 3 Summary of Questions and Answers
(Continued)

| No. | Discussion | Source person | Question Source (Participants) | Question | Answer/Solution |
|---|---|---|---|---|---|
| 5 | Innovation in MRO and Global Competitiveness | A5 – Indonesia Aircraft Maintenance Services Association (IAMSA) (N5) | Representative from FL Technic Indonesia | 1. What are the latest technological innovations applied in the MRO industry? | Drone technology for inspection and AI for aircraft maintenance have been implemented to improve maintenance efficiency and accuracy. |
| | | | | 2. How can this innovation increase Indonesia's competitiveness? | Technological innovations such as AI and drones are increasing the speed and accuracy of maintenance, making Indonesia's MRO more efficient and competitive in the global market. |
| | | | | 3. How can Indonesian MRO face tough competition from other countries? | Improving service quality, enhancing maintenance capacity, and adopting new technologies will strengthen Indonesia's MRO competitiveness in the global market. |
| 6 | Explanation of the Classification of Goods for the Sake of Smooth Imports | Ministry of Finance (N6) | GS7 (Practitioner) | 1. What is the importance of goods classification in imports for the MRO industry? | Proper classification of goods ensures that the goods required by MRO are available at the appropriate rates, streamlining the import process and increasing efficiency. |
| | | | | 2. How do customs tariffs affect the smooth flow of imports? | Appropriate tariff policies facilitate the import of goods at lower costs and speed up their arrival, reducing operational costs. |
| | | | | 3. Are there any obstacles in the goods classification process that impact MRO? | The Ministry of Finance is working to reduce barriers by ensuring that MRO-required goods are correctly classified in the customs system. |
| 7 | Costs Borne by the MRO Industry | GS7 – Practitioner (N7) | Representative from PT Indonesia AirAsia | 1. What are the main factors that influence operational costs in MRO? | Key factors include raw material costs, import tariffs, and labor costs. Efficient cost management can reduce the operational burden of the MRO industry. |
| | | | | 2. How to reduce the impact of costs on business continuity? | Reducing dependence on imported components and improving operational efficiency are key steps in reducing the impact of costs on business continuity. |
| | | | | 3. Are there any solutions to reduce dependence on fluctuating import costs? | The government can provide incentives or fiscal policies to reduce import tariffs for the MRO sector. |
| 8 | The Needs of the MRO Industry to Face Global Competition | AL8 – Practitioner (N8) | Representative from FL Technic Indonesia | 1. What should be done to improve the quality of MRO services? | Improving human resource training and adopting the latest technology are important steps to improve the quality of Indonesian MRO services. |
| | | | | 2. What are the main challenges facing the MRO industry in Indonesia in the global competition? | The main challenges are high costs and dependence on imported components, which affect the competitiveness of the MRO industry in Indonesia in the international market. |
| | | | | 3. What steps can be taken to improve capacity and quality in the MRO industry? | The development of Approved Maintenance Organization centers and increased international cooperation will help to improve the capacity and quality of MRO in Indonesia. |