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AGENDA ITEM 3: AVIATION SAFETY

**FATIGUE RISK MANAGEMENT SYSTEM (FRMS):
ENHANCING AVIATION SAFETY IN INDONESIA**

(Presented by The Republic of Indonesia)

INFORMATION PAPER

SUMMARY

Fatigue is a significant human performance hazard that can impair alertness, decision-making, situational awareness, communication, and operational performance, thereby affecting aviation safety. In Indonesia, increasing air traffic demand, 24-hour operations, shift work, remote aerodrome services, and personnel shortages have heightened fatigue risks among air navigation personnel. While existing duty and rest time regulations provide a foundation for fatigue management, they may not adequately address all operational risks. As recommended in ICAO Annex 11 and ICAO Doc 9966, the Fatigue Risk Management System (FRMS) offers a science-based, data-driven approach to complement prescriptive regulations. This paper examines the potential of FRMS to enhance aviation safety in Indonesia, identifies implementation challenges, and proposes strategies for its phased adoption.

FATIGUE RISK MANAGEMENT SYSTEM (FRMS): ENHANCING AVIATION SAFETY IN INDONESIA

1. INTRODUCTION

- 1.1 Recognizing the importance of managing safety risks caused by fatigue, the Directorate General of Civil Aviation (DGCA) is currently developing a national regulatory framework for the implementation of the Fatigue Risk Management System (FRMS). The regulations currently being developed are intended to complement existing prescriptive provisions regarding work time limits, duty time, and rest periods, through a fatigue risk management approach that is *performance-based* and *data-driven*, in accordance with the principles set forth in ICAO Annex 11 and ICAO Doc 9966 (Manual for the Oversight of Fatigue Management Approaches).
- 1.2 The development of this regulatory framework represents Indonesia's commitment to strengthening proactive safety management while effectively supporting the implementation of the State Safety Programme (SSP). Once established, the regulation is expected to provide clear guidance for air navigation service providers in implementing FRMS, as well as to facilitate effective and sustained regulatory oversight of fatigue-related safety risks.
- 1.3 Indonesia faces complex operational conditions that may have the potential to elevate fatigue levels among air navigation service personnel performing strategic and critical aviation safety functions, reinforcing the urgency of a gradual shift from a prescriptive fatigue management approach toward an integrated, risk-based FRMS, while maintaining an equivalent or higher level of aviation safety.

2. DISCUSSION

2.1 Fatigue as an Evolving Aviation Safety Challenge

The continued growth of Indonesia's aviation industry has placed increasing operational demands on air navigation service personnel.

Fatigue can be caused by various operational factors, including long working hours, night flights, shift-based work patterns, early-morning departure schedules, high air traffic density, staff shortages, the need for air traffic controllers (ATC) to maintain a high level of alertness, challenging weather conditions, commuting times to the workplace, and a lack of opportunities to get sufficient sleep.

If not properly managed, fatigue may lead to serious implications for flight performance and safety, including reduced situational awareness, delayed response times, communication errors, poor decision-making, reduced alertness, and an increased likelihood of aviation incidents and accidents.

Accordingly, fatigue must be regarded as an operational safety risk, rather than merely a human resources issue.

2.2 FRMS as a Proactive Safety Management Approach

FRMS enables organizations to identify, assess, monitor, and mitigate fatigue risks in accordance with the characteristics of their operational environment, while maintaining an equivalent or higher level of safety. As an integrated component of the Safety Management System (SMS), FRMS supports continuous safety improvement through fatigue reporting, risk assessment, safety performance monitoring, and ongoing review of the effectiveness of implemented mitigation measures.

2.3 Challenges in Implementing FRMS in Indonesia

The implementation of FRMS faces challenges, starting with a regulatory framework that is still under development; this requires regulations and implementation guidelines that are aligned with ICAO Annex 11 and ICAO Doc 9966, including mechanisms for the approval and oversight of FRMS. Varying levels of organisational readiness also create obstacles, including the maturity of the SMS, the availability of resources, and management's commitment to integrating the FRMS into the existing safety management system.

Safety culture and data availability also need to be improved, given that fatigue reporting is not yet functioning optimally due to the inadequate implementation of the Just Culture principle, whilst the available data and fatigue indicators remain limited in supporting risk-based decision-making. Furthermore, staff shortages, increased air traffic volumes and 24-hour operations limit the flexibility of scheduling and rest periods, whilst budgetary constraints on system development and skills enhancement add to the challenges that must be overcome. The implementation of the FRMS is also hampered by limitations in staff competence, particularly in the fields of fatigue science and risk analysis.

2.4 Strategic Opportunities

Despite the existing challenges, Indonesia has the opportunity to implement FRMS as part of strengthening the State Safety Programme (SSP), through the development of regulations and implementation guidelines for FRMS, reinforcing a reporting culture based on Just Culture principles, enhancing the competencies of regulators and air navigation service providers, developing fatigue-related Safety Performance Indicators (SPI), and collaborating with ICAO and other member states, to support FRMS implementation through capacity building and the sharing of best practices.

Capacity building can be enhanced through a series of structured efforts, including FRMS training for inspectors and air navigation service personnel, the arrangement of workshops, seminars, and courses on FRMS implementation, technical assistance from ICAO or other member states that have already implemented FRMS, as well as the enhancement of competency in fatigue data analysis, risk assessment, and FRMS oversight.

Sharing best practices can be realized through various forms of knowledge exchange, such as sharing experiences of successful FRMS implementation in other states, the exchange of information on fatigue reporting methods, safety indicators, and risk mitigation strategies, learning from FRMS implementation outcomes, audits, and fatigue-related investigations, collaboration in research and development of fatigue management methods, as well as the establishment of regional discussion forums as a platform for exchanging experiences and solutions to FRMS implementation challenges.

3. ACTION BY THE CONFERENCE

- 3.1 The Conference is invited to note the information contained in this Paper.

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