



WORKING PAPER

THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE B

Agenda Item 7: Operational safety risks

7.1: Facilitation of data-driven decision-making in support of safety intelligence to support safety risk management

**THE REFORM AND PRACTICE IN OPERATIONAL RISK
AND MANAGEMENT IN CIVIL AVIATION IN CHINA**

(Presented by People's Republic of China)

EXECUTIVE SUMMARY

This paper presents China's experience in its reform and practice in operational risk management in civil aviation. The Civil Aviation Administration of China (CAAC) issued an advisory circular *Guide on Implementing Operational Control Risk Management System for Air carriers* (AF-FS-121-2015-125), providing air carriers with new operational control risk management concept and methodology as well as guidance on system building and implementation. The Guide breaks down risk assessment down to the level of operational control of each flight, using quantified evaluation of operational risks based on the entire operational process, thereby promoting a systematic analysis of sources of risks to flight operation from multiple dimensions, such as human, aircraft, environment, etc, and assigns numeric values to represent the risk levels. Meanwhile corresponding mitigating measures are developed targeting key risk factors as a result of risk assessment, so as to proactively control and manage risks, giving strong support to operational decision-making of air carriers.

Action: The Conference is invited to:

- a) push for incorporating this work approach and implementation model into Annex 6 – *Operation of Aircraft*; and
- b) share China's approach and experience in building operational risk management system with other regions.

1. INTRODUCTION

1.1 *Annex 19 - Safety Management* of the *Convention on International Civil Aviation* (Doc 7300) clearly states that "risk management" is at the core of the safety management system. Operational control is central to the entire operation of an air carrier. The operational control department

¹ Chinese version provided by China.

is the command center for organizing and implementing the flights, as well as the decision-making and information distribution body in case of abnormal or emergency events. Building an effective operational control risk management system is a major reform in risk management for air carriers.

1.2 In order to guide air carriers in developing and implementing a risk-based operational control risk management system using information technology as a tool and numeric valuation as expression, the Flight Standards Department of the Civil Aviation Administration of China (CAAC) officially issued an advisory circular *Guide on Implementing Operational Control Risk Management System for Air carriers* (hereinafter referred to as “the Guide”) on 28 September 2015, which aims to provide standards and guidance for the airlines in their development and implementation of an operational control risk management system.

2. DISCUSSION

2.1 The reform

2.1.1 Using risk management as the key to safety management system (SMS), the Guide refines risk assessment down to the operational process of each flight. Using system engineering theory to relegate the vast and complicated risk factors into three main dimensions: human, aircraft and environment, and two main stages: pre-flight and in-flight, it sets out a risk assessment index system involving various operational aspects including crew, aircraft, meteorology and airport, etc. The risk factors are assessed by experts who assign values to them. With the quantification of risks, the experience of veteran experts are transferred into an digitalized knowledge base, thus contributing to better risk management and control as well as knowledge transfer to younger generation of operational control professionals.

2.1.2 System building and implementation normally include steps such as data quality assessment, risk assessment index extraction, algorithm modeling, system data integration, system development, putting system online and continuous improvement, etc. On the level of system use, the Guide requires air carriers to establish operational control risk management policies, set up risk management expert teams, build operational control risk sources database, establish expert and operational control personnel training mechanisms, and identify system functional requirements and system implementation procedures, so as to continuously improve the mechanism, maintain a culture of safety of operation control system and ensure continued functionality of the system.

2.1.3 The advisory circular includes detailed information on management policy, establishment of risk assessment index, risk assessment methodology, risk classification, system building process, examples of system function, etc. Air carriers may use it as a technical model to develop a risk management and control system based on their own operation.

2.2 The practice

2.2.1 In terms of implementation, all fifty two air carriers currently operating in mainland China have built a risk control system, or 100 per cent rate of implementation. The operational risk control system is data-integrated with SMS and is fully capable of all-around functionalities including pre-assessment three days pre-flight, in-flight risk monitoring and control, and post-flight data comparison, etc. Result of implementation of the system shows that long-term statistics of actual operation data can serve as the basis for other modules in the operational control system to inform or optimize operational decision-making.

2.2.2 At present, assessment methods used by the air carriers vary, e.g. fuzzy membership function, risk matrix, and support vector machines. From no apparent risk to unacceptable risk, the risks are evaluated and assigned a value at each level, resulting in a valuation for each risk factor as well as overall risk value and level for the flight. In real-life operation, the air carrier can develop and implement the most effective mitigation measures based on risk identification, and exercise complete closed-loop control from data collection, assessment of individual risk factor, determination of flight operational risk level to development and implementation of risk mitigation measures.

2.3 Key messages

2.3.1 The original intention of building a risk management system is to make first-line operating personnel closer to the expert level in their field. The system serves as reminder and assistance; it is the numerical and visual representation of risk management. It does not replace the judgment of the licensed personnel.

2.3.2 The risk management system is not an independent system on its own; instead, with data sharing and automatic data extraction from other subsystems of the operation, such as crew, aircraft, weather, intelligence, terminals, and business travel, it evaluates each flight operation based on internalized risk assessment system and method of valuation. The risk management system must first eliminate operation violations not compliant with operational standards; once it determines that basic operational standards are met, it assigns numeric differentiation to the risks (high, medium, low), and recommends risk mitigation measures based on the sources of risks.

2.3.3 Building a risk control and management system is key to building a corporate safety culture. The civil aviation community in China deeply understands that only by fostering a robust safety culture can the awareness of risk control permeate into all aspects of operation, thus effectively improving corporate safety assurance capabilities.

3. CONCLUSION

3.1 The Guide provides air carriers with a new operational control risk management concept, methodology and approach in system building. Numerical evaluation of flight operational risks is the application and expression of the safety management concept in the operational field. It is proposed to amend 3.2.4 in Annex 6, adding a note to 3.2.4: “Note: States are encouraged to build a data-based operational risk management system to facilitate the collection and processing of safety information that may not be collected by the incident reporting system.”

3.2 It is recommended to note the positive result of the application of risk management system for air carriers in China, either as reminder and assistance to first-line operational control personnel, or to provide data support and basis for decision-making in other work. It is recommended to share China's experience in building operational risk management system with other regions.

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