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**AGENDA ITEM 6: ECONOMIC DEVELOPMENT OF
AIR TRANSPORT**

**A DATA-DRIVEN FRAMEWORK
FOR AVIATION CRISIS PREPAREDNESS
TO ACHIEVE ECONOMIC SUSTAINABILITY**

(Presented by Thailand, co-sponsored by Indonesia)

SUMMARY

This paper proposes a framework to strengthen Thailand's aviation risk preparedness, monitoring, and crisis response through digital technologies and Big Data analytics. The framework comprises an Aviation Industry Monitoring and Assessment System, an Aviation Policy Toolkit, and a Policy Prioritization mechanism. Together, these elements support early warning, evidence-based decision-making, coordinated crisis response, and enhanced resilience of Thailand's aviation industry.

A DATA-DRIVEN FRAMEWORK FOR AVIATION CRISIS PREPAREDNESS TO ACHIEVE ECONOMIC SUSTAINABILITY

1. INTRODUCTION

1.1 The global economy depends heavily on international air transport to support trade, tourism, and jobs. Global data shows that aviation and its related tourism ecosystem generated about USD 4.1 trillion in global economic activity, which equals 3.9 percent of global GDP, and supported 86.5 million jobs worldwide. Air transport also carries over one-third of global trade by value. For Thailand, aviation is a main driver of economic growth. In 2019, Thailand welcomed nearly 40 million international visitors, with tourism and aviation accounting for approximately 20 percent of national GDP. Because the network is so structurally vital, any disruptions cause severe, compounding economic and social impacts. This underscores an urgent need for advanced risk management and stronger economic resilience.

1.2 In recent years, the international aviation sector has faced severe and frequent disruptions that have changed global air travel. The COVID-19 pandemic showed how vulnerable the industry is to global health crises. During the pandemic, global passenger numbers dropped sharply by 60%, falling from 4.5 billion in 2019 to 1.8 billion in 2020. This caused airlines to lose an estimated USD 370 billion in passenger revenue. Following the COVID-19 pandemic, geopolitical tensions particularly in the Middle East have exposed the aviation industry's vulnerability to external shocks. Airspace closures forced airlines to operate longer routes. These tensions also disrupted global energy markets, causing Jet A-1 fuel prices to rise significantly. In Thailand, Jet A-1 fuel prices surged from around USD 80 to over USD 200 per barrel at their peak. This increase raised the average proportion of fuel expenses from 30 percent to 50 percent of total operating costs for these Thai carriers. As a result, Thai carriers reduced or suspended services, leading to 35,563 flight cancellations and a loss of over 6.69 million seats in transport capacity during the second and third quarters of 2020.

1.3 To help the industry during these crises, Thailand implemented several immediate relief measures. The government-initiated policy to reduce aviation and navigation fees, lowered airport rental costs, offered flexible flight slot rules, and extended credit payment terms for airlines. To protect workers and maintain operations, Thailand also temporarily extended the validity of personnel licenses, medical certificates, and required training. While these emergency steps successfully helped airlines survive their immediate cash flow problems, they were temporary solutions designed for short-term relief rather than long-term structural strength. A lack of data sharing between government agencies and airlines also made it difficult to coordinate a fast and unified response.

1.4 The lessons from the past few years show that major economic and geopolitical disruptions are no longer rare, once-in-a-generation events. In the future, these uncertainties will happen more frequently and with greater impact than in the past. To survive an era of frequent crises, the civil aviation authorities should stop waiting for a crisis to happen and start preparing in advance. We must move away from short-term, uncoordinated relief and shift toward data-driven, proactive planning. This requires an official framework supported by real-time data analytics and clear policy options.

2. DISCUSSION

2.1 To address the gaps identified above and strengthen crisis preparedness and resilience, this paper proposes a comprehensive framework for Thailand's aviation industry during periods of crisis and uncertainty.

2.2 The framework consists of three core components. The first element is an Aviation Industry Monitoring and Assessment System supported by emerging digital technologies and Big Data analytics to identify risks and assess industry conditions. The second element is an Aviation Policy Toolkit that provides a range of policy measures across key policy dimensions to support crisis mitigation and recovery. The third element is a Policy Selection Framework designed to assist policymakers in selecting timely and proportionate interventions based on the severity of the crisis and the needs of affected sectors. Together, these elements form an integrated framework that supports evidence-based decision making, enhances coordination among stakeholders.

2.3 Monitoring and evaluating the aviation industry.

2.3.1 Risk preparedness requires data-driven insights and continuous monitoring. A key strategy is developing an Aviation Industry Monitoring and Assessment System that integrates multi-source Big Data to centralize data analytics and support policy decisions. This integrated platform should consolidate data across aviation sectors in accordance with ICAO's classifications, including passenger traffic, flight movements, aviation and commercial revenues, tourism indicators, macroeconomic trends, fuel prices, and exogenous risks affecting air travel. Such multidimensional data integration ensures a comprehensive and accurate overview of the entire industry ecosystem.

2.3.2 Risk Indicators and Vulnerability Assessment

a) The Aviation Industry Monitoring and Assessment System leverages integrated Big Data analytics and real-time data streams to support the development of dynamic risk indicators and predictive vulnerability assessment criteria. By consolidating multidimensional data spanning operational, financial, and market metrics—the system enables policymakers to proactively identify sectors, operators, and activities highly sensitive to aviation crises. These Big Data-driven indicators are developed directly based on the key structural policy considerations outlined in section 2.3.3.

b) To support consistent assessments, benchmark indicators and risk thresholds could be established to monitor changes in industry conditions and identify emerging risks. The assessment framework may also classify risks by severity, enabling regulators to determine when policy intervention may be required.

c) The results of these assessments could serve as an early-warning mechanism and provide the analytical foundation for the Policy Selection Framework, enabling policymakers to identify and implement appropriate measures under the Aviation Policy Toolkit.

d) Consequently, the framework translates complex data into actionable insights that support evidence-based decision making and help policymakers identify and implement appropriate response measures, as discussed in the following section.

2.3.3 Strategic Measures for Aviation Sector Crisis Resilience

Developing policies to mitigate aviation crises requires a multidimensional approach that balances impacts on operators, labor, consumers, and the broader economy. Key considerations include:

a) **Regulatory Relief:** Given that temporary regulatory relief is essential to alleviate financial pressures and enhance operational agility during downturns, any adjustments must strictly uphold safety, security, and service quality standards. Relief should focus on expediting approvals, reducing administrative burdens, extending permit validity, and reviewing non-essential fees.

b) **Financial Resilience:** This focuses on the fact that aviation business requires high investment and has fixed costs, making companies vulnerable to sudden revenue losses. To help, governments and regulators should provide financial support, such as low-interest loans, loan guarantees, and delayed government fees. Additionally, an industry dashboard should be used as an early-warning tool to monitor financial health.

c) **Employment Protection:** This addresses the aviation sector as a major employment multiplier, relying heavily on a highly specialized workforce across airlines, airports, and MRO sectors. During crises, governments should prioritize job retention and talent preservation to prevent the loss of skilled personnel essential for recovery. Recommended measures include personnel cost subsidies, targeted reskilling programs, and employment maintenance schemes.

d) **Fair Competition and Market Mechanisms:** While state aid is crucial during crises, policy interventions must not distort market mechanisms or create unfair advantages. Support frameworks must be transparent, non-discriminatory, and allocated based on objective impact metrics. Utilizing Big Data enables regulators to monitor market dynamics, prevent monopolies, and maintain efficient competition.

2.4 Aviation Policy Toolkit

2.4.1 The Toolkit helps Thailand's aviation industry assess its readiness during aviation

crises, maintain alignment with ICAO's strategic objectives, and formulate policy in response. The Monitoring and evaluating the aviation industry, described in section 2.3, would support the selection and implementation of Policy Toolkit measures.

2.4.2 The Policy Toolkit is structured along the 7 policy dimensions, covering key policy areas and supporting a coordinated and balanced approach to aviation crisis mitigation.

a) Safety: focuses on maintaining an acceptable level of aviation safety and regulatory oversight during crises, including appropriate flexibility in personnel licensing and the use of alternative oversight mechanisms where necessary, *e.g. temporary licensing flexibility and remote oversight/audits*.

b) Air Navigation Capacity & Efficiency involves ensuring adequate air traffic capacity and slot allocation to maintain route connectivity and operational efficiency during disruptions, *e.g. Slot allocation flexibility*.

c) Security & Facilitation aims to maintain effective aviation security measures while facilitating the efficient movement of passengers and cargo during crises, including appropriate flexibility in aviation security personnel licensing and certification requirements where necessary, *e.g. temporary licensing extensions and streamlined facilitation procedures*.

d) Economics: focuses on supporting the continuity and recovery of aviation activities while minimising economic disruption and maintaining service connectivity, *e.g. Fee reductions/waivers, route incentives*.

e) Financial: focuses on strengthening the financial resilience and liquidity of aviation stakeholders, *e.g. Credit term extensions*.

f) Environmental: focuses on supporting ICAO's environmental and sustainability objectives during crisis response, *e.g. Policy Measures to Support Net Zero Emission*.

g) Passenger Rights Protection: aims to protect passengers' rights and minimise the burden on passengers, *e.g. Passenger compensation, refund and assistance*.

2.4.3 Measures under the Policy Toolkit will be selected based on the severity and duration of a crisis, as well as the specific needs of affected aviation sectors. However, effective implementation of the Policy Toolkit would require coordination among relevant government regulators, aviation stakeholders and industry partners.

2.5 Policy Selection Framework

a) During crises, CAAT would first identify the aviation sectors most affected and assess the potential impacts on Thailand's aviation industry. Attention should be given to sectors that are highly vulnerable or critical to the continuity of aviation services.

b) Based on this assessment, CAAT may select the most appropriate policy dimensions and corresponding measures under the Policy Toolkit according to the characteristics, severity and duration of the crisis. The selected measures should address the specific needs of affected aviation sectors, minimise adverse impacts on passengers and aviation stakeholders, maintain essential aviation services, and support industry resilience and recovery. This selection process enables CAAT to implement timely and targeted interventions while ensuring that policy responses remain proportionate to the nature and severity of the crisis. The Policy Selection Framework supports responsive, evidence-based decision-making and improves coordination among relevant stakeholders throughout crisis response and recovery efforts. It can also enhance Thailand's aviation industry's resilience and support the sustainable development of the aviation sector.

c) Effective implementation of the proposed framework would require an appropriate governance structure and close collaboration among relevant authorities and aviation stakeholders. CAAT could serve as the lead coordinating authority, working in close partnership with government, airlines, airport operators and other stakeholders across the aviation ecosystem to ensure a coordinated and effective crisis response. Furthermore, the establishment of data sharing mechanisms, interoperable digital systems, and common assessment criteria would enhance situational awareness, strengthen policy coordination and support timely, evidence based and risk informed decision-making during

periods of crisis. These institutional and technological arrangements would also improve information exchange across the aviation ecosystem and enable more agile and effective responses to emerging risks and future disruptions.

3. ACTIONS BY THE CONFERENCE

3.1 The Conference is invited to:

- a) invite States and relevant aviation stakeholders to recognize the importance of strengthening aviation crisis preparedness through data-driven monitoring, risk assessment, and evidence-based policy decision-making to enhance the resilience and economic sustainability of the aviation sector; and
- b) request ICAO to study the feasibility of developing a global framework for aviation crisis preparedness and response, including common principles for risk monitoring, data sharing, and policy intervention during periods of significant disruption.

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