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

**SUSTAINABLE AVIATION WORKFORCE
FOR SAFE AND EFFICIENT
TECHNOLOGY-DRIVEN AVIATION**

(Presented by Thailand)

INFORMATION PAPER

SUMMARY

The aviation industry is facing workforce challenges driven by rapid post-pandemic traffic recovery, shifting demographic, and accelerated technological transformation. Thailand has developed a comprehensive aviation workforce framework focused on institutional synergy, competency upskilling, and human capital sustainability. As emerging technologies redefine traditional roles, preparing professionals to work alongside advanced automation is a critical economic and operational imperative to ensure a safe, secure, sustainable, and efficient aviation ecosystem.

SUSTAINABLE AVIATION WORKFORCE FOR SAFE AND EFFICIENT TECHNOLOGY-DRIVEN AVIATION

1. INTRODUCTION

1.1 Following the unprecedented global disruptions caused by the COVID-19 pandemic, the Thai aviation industry has experienced an accelerated recovery phase. Before the crisis, air transport served as a primary economic catalyst for the state, generating over 4.3 million jobs. Based on 2025 benchmarks, flight movements rebounded 87.59% compared to pre-pandemic levels. This rapid resurgence in passenger demand has placed severe strain on the aviation ecosystem, culminating in a critical labour deficit. Financial pressures during the crisis forced massive industry downsizings and early retirements; consequently, the re-mobilization of qualified aviation professionals has failed to keep pace with the market's rapid acceleration. This structural lag in human resource redeployment has created acute operational capacity constraints, directly capped air transport growth and compromised regional service efficiency.

1.2 This operational bottleneck is further exacerbated by macro-demographic shifts, as Thailand and several member states within the Asia-Pacific region are rapidly transitioning into aged societies. Data from the National Statistical Office of Thailand indicates a continuous decline in the country's crude birth rate, dropping from 10.7 live births per 1,000 population in 2018 to a historic low of 6.7 in 2024. This contraction is coupled with an accelerating old age dependency ratio¹. This demographic shift severely diminishes the long-term pipeline of young talent entering the aviation sector. In the context of aviation economics, this reality dictates that the current talent shortage is not a temporary post-pandemic disruption, but a permanent structural deficit that fundamentally limits the human capital available to sustain long-term aviation growth.

1.3 This contraction in the younger labour supply has triggered intense, cross-industry competition for high-skilled talent, as new professionals increasingly leverage diverse career opportunities in less volatile sectors. This widening talent attrition risks leaving the civil aviation ecosystem understaffed, threatening regional competitiveness and operational resilience. To counteract this structural deficit, integrating emerging technologies such as Artificial Intelligence (AI) and advanced automation is no longer optional; it has become an absolute economic imperative. By deploying these systems to augment human capabilities and optimize operational workflows, the aviation sector can significantly maximize worker productivity, successfully bridge the demographic skills gap and secure an efficient, sustainable future for regional flight operations.

2. Thailand Workforce Initiative

a) Driven by these challenges, Thailand has adopted a systematic approach to aviation workforce development by aligning domestic policy with vital global frameworks. This includes the United Nations Sustainable Development Goals (SDGs) regarding equitable opportunity, and ICAO's Next Generation of Aviation Professionals (NGAP) initiative. Domestically, these objectives are anchored within Thailand's 20-Year National Strategy (2018–2037) for human capital development and are operationalized via the Air Transport Development Plan (2023–2037). This alignment ensures a resilient aviation workforce ecosystem capable of adapting to rapid technological transformation and long-term traffic growth.

¹ World Bank Group, 2024

b) To effectively operationalize the ICAO NGAP guidelines, Thailand has pioneered institutional synergies through comprehensive Memorandums of Understanding (MOUs) linking regulators, commercial operators, and accredited training academies. Furthermore, A key milestone is the "Aviation X" initiative, which drives workforce innovation and accelerates competency pathways for Critical Aviation Professions including pilots, air traffic controllers, and aircraft maintenance engineers. By establishing direct talent pipelines, this framework minimizes the transitional friction between academic graduation and high-tech operational readiness, significantly reducing the financial and temporal costs of airline-specific type rating and onboard training during a period of acute labour deficits.

c) To systematically mitigate personnel deficits and manage industry volatility, Thailand continuously utilizes data-driven workforce demand forecasting and structural competency analyses. Recent industry-wide surveys, *“the Civil Aviation Authority of Thailand’s comprehensive study, ‘An Exploration and Analysis of the Demand for Manpower in Thailand’s Aviation Industry’”*, have pinpointed high-priority upskilling and reskilling targets. These focus heavily on digital literacy, advanced technical systems, and professional linguistic skills enabling stakeholders to integrate these modern requirements directly into upcoming training frameworks.

3. Sustainable Aviation Workforce Framework

a) To support long-term readiness, sustainable workforce development must address the entire civil aviation ecosystem. This requires a systematic approach built upon five core pillars: attracting the next generation of aviation professionals, aligning academic curricula with operational realities, delivering continuous upskilling and reskilling, projecting future workforce demands, and implementing robust retention strategies.

b) Operationalizing this approach, Thailand has established “the National Aviation Personnel Development Working Group”, integrated national collaborative mechanism that bridges civil aviation regulators, industry operators, educational institutions, and training organizations. This framework aligns workforce supply with market demand while creating a formalized platform for exchanging technical expertise, best practices and resources.

c) A primary function of this mechanism is to close the gap between educational output and industry expectations by promoting cross-stakeholder resource optimization. This includes transferring modern competency assessment tools, advanced training curricula, and real-world operational insights from active operators directly into academic environments. As a result, the next generation of aviation professionals enters the market thoroughly acclimated to contemporary international standards.

d) Crucially, achieving a sustainable aviation workforce extends beyond merely securing raw headcounts; it is fundamentally about evolving human competencies to match rapid industrial disruption. CAAT’s survey highlights that traditional human resource pipelines face severe structural bottlenecks, specifically localized as statutory training constraints and high workforce turnover driven by escalating workloads from rising flight volumes. Because legal and regulatory training processes inherently slow down the onboarding of new professionals, integrating advanced automation becomes an essential economic bridge to sustain operations during these systemic

4. Emerging Technologies Impact and “Smart Skies” Alignment

a) The rapid acceleration of emerging technologies and digital transformation has fundamentally reshaped the aviation landscape. Crucially, the adoption of these technologies is not designed to displace the human workforce, but rather to optimize operational capabilities and redefine human roles. Traditional positions centered on manual task execution are actively evolving toward system supervision,

complex data analysis, and tech-supported decision-making. Consequently, professionals in critical aviation roles must develop cross-functional competencies that merge traditional aviation expertise with advanced digital literacy.

b) In Air Traffic Management (ATM), emerging systems are leveraging Artificial Intelligence (AI) and predictive analytics for traffic forecasting and proactive conflict detection. This is essential for managing increasingly dense and complex airspace. Aligned with this trend, Thailand is systematically integrating digital solutions to strengthen its ATM infrastructure, safeguarding safety while expanding capacity for future traffic growth.

c) In Airport and Ground Operations, the deployment of automation and biometric interfaces has streamlined passenger processing and identity verification. Implementing these technologies is an operational priority, as CAAT's forecasting models project a net increase of 4,000 ground service staff and 4,000 ground support equipment personnel required by 2029. By mitigating these massive volume spikes through the reduction of repetitive, manual workflows, digital solutions allow ground personnel to reallocate their time toward higher-value activities such as complex problem-solving and critical decision-making. This capital-technology investment directly maximizes operational throughput while simultaneously reducing the physical strain on workers, thereby checking the high industry turnover rates highlighted in national surveys.

d) At the Regulatory Level, big data analytics has emerged as a cornerstone for strategic oversight. By capturing and analysing systemic aviation data, authorities like the Civil Aviation Authority of Thailand can dynamically monitor market trends, isolate latent safety risks, and pivot toward highly effective, data-driven regulatory oversight approaches.

e) Ultimately, the successful deployment of "Smart Skies" depends less on the technological systems themselves and more on the human capital capability of navigating them. Preparing the workforce for advanced human-machine collaboration is the definitive critical success factor for the industry's digital evolution. Synthesizing technological deployment with continuous human capability development ensures that regional investments yield their full economic potential sustaining peak safety standards while unlocking unprecedented operational efficiency.

5. ACTIONS BY THE CONFERENCE

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

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