



WORKING PAPER

**SEVENTH WORLDWIDE AIR TRANSPORT CONFERENCE
(ATCONF/7)**

Montréal, HQ, 16 to 20 November 2026

Agenda Item 4: Emerging technologies, new business models and other associated aspects
4.3: Leveraging air transport data and the digital ecosystem for seamless, secure and resilient operations

**DIGITALIZATION OF AIRPORT ENHANCES THE VALUE OF
AIRPORT CAPACITY**

(Presented by China)

EXECUTIVE SUMMARY

This paper presents the capacity value of Airport Collaborative Decision-Making (A-CDM) implementation in China. A-CDM does not directly change runway geometry, stand numbers or regulatory separation minima. Its value for capacity enhancement lies in improving the conversion of planned, declared or scheduled capacity into actual operational throughput. This is achieved by improving milestone data quality, Target Off-Block Time (TOBT)/Target Start-up Approval Time (TSAT)/Target Take-off Time (TTOT) accuracy, A-CDM/Air Traffic Flow Management (ATFM) integration, pre-departure sequencing, taxi-time prediction, stand and turnaround predictability, de-icing coordination, abnormal weather recovery and surface safety oversight.

Action: The conference is invited to

- a) note China's experience in applying airport digitalization to enhance capacity value. This value lies in improving the conversion of planned, declared or scheduled capacity into actual operational throughput; and
- b) request ICAO through relevant panels to study the feasibility of establishing a global framework to govern the safe, secure, and accountable integration of artificial intelligence technologies across the aviation ecosystem.

<i>Strategic Goals:</i>	This working paper relates to Strategic Goals: <i>The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All and Every Flight is Safe and Secure.</i>
<i>Financial implications:</i>	No additional financial implications arise from noting the experience. Any follow-on work would be subject to ICAO prioritization and budgeting processes.
<i>References:</i>	Doc 9750 (<i>Global Air Navigation Plan</i>); Doc 9971 (<i>Manual on Collaborative Air Traffic Flow Management</i>); Doc 9981 (<i>Aerodromes</i>); Doc 10039 (<i>Manual on the System-wide Information Management (SWIM) Concept</i>); Annex 19 – <i>Safety Management</i> , Doc 9859

¹ English and Chinese versions provided by China.

	(<i>Safety Management Manual (SMM)</i>) and Doc 10159 (<i>Safety Intelligence Manual</i>); Civil Aviation Administration of China (CAAC) voluntary safety reporting and collaborative operation provisions.
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1. INTRODUCTION

1.1 Airport capacity should be understood not only as the physical maximum of runways, stands or terminal facilities, but also as the level of demand that can be safely and sustainably handled under real operating conditions. In daily operations, the usable capacity of an airport may be constrained by runway throughput, taxiway congestion, stand availability, turnaround performance, de-icing resources, Air Traffic Flow Management (ATFM) slots, passenger readiness, baggage readiness, cargo handling, ground transportation, weather and disruption recovery capability. By increasing the proportion of available capacity that can be converted into delivered operations, capacity gains can be achieved.

1.2 Airport Collaborative Decision-Making (A-CDM) has been promoted by the Civil Aviation Administration of China (CAAC) since 2017 as a core operational infrastructure for airport digitalization. By the end of 2025, 41 large international airports in China had implemented A-CDM deployment.

1.3 A-CDM is directly related to airport capacity because it reduces the gap between planned capacity and delivered capacity. The airport may have a certain declared hourly or daily capacity, but this capacity is only useful if flights, stands, ground handling, taxiway routes, runway sequence and National Traffic Flow Management (NTFM) slots are aligned at the right time.

2. DISCUSSION

2.1 Under the CAAC-led A-CDM framework, airports establish an Operations Management Committee (OMC), normally deployed in or closely connected with the airport operations command centre. The OMC is composed of core stakeholders, including the airport operator, Air Navigation Services Provider (ANSP), airlines and ground handling service providers. It supports consultation and decision-making during daily operations, especially under abnormal operating conditions, and also supports performance review of stakeholders participating in the A-CDM process.

2.2 China's airport A-CDM systems are integrated with the NTFM system. A-CDM provides core milestone information, including high-quality TOBT, to NTFM, while airports and stakeholders obtain Calculated Take-Off Time (CTOT), flow restrictions, route weather impacts, release sequence and other operational constraints from the air traffic flow management environment.

2.3 A-CDM supports dynamic pushback sequencing based on TOBT, TSAT, TTOT, runway configuration, taxiway conditions, stand status and NTFM constraints. This changes the operating logic from "aircraft push back as soon as they are ready" to "aircraft push back when their readiness, taxi route, runway opportunity and flow-management window are aligned". In a single year, Hangzhou Xiaoshan (ZSHC) arranged a total of 1,892 short-time coordinated flights, improving flight punctuality by approximately 4.5 percentage points.

2.4 A-CDM can support schedule analysis before seasonal schedule changes and pre-tactical adjustment when capacity restrictions are issued. By importing planned schedules into the A-CDM system,

airports can analyse flight volume, distribution structure, wave peaks and potential resource conflicts. Before the flight schedule optimization at Hangzhou Xiaoshan (ZSHC), the departure punctuality rate of that route stood at 61.7 per cent. Following the schedule adjustment, the route's departure punctuality rate increased to 78.57 per cent, while the overall flight departure punctuality rate hit 94.12 per cent.

2.5 In winter or adverse weather conditions, de-icing resources may become the actual capacity bottleneck. A-CDM supports de-icing management by integrating flight information, meteorological data, vehicle positioning, stand information, de-icing pad resources and de-icing fluid availability. It can generate de-icing plans and sequences, monitor de-icing vehicles, digitalize de-icing requests and coordinate pushback timing with ATFM slots. At Kunming Changshui (ZPPP), the aircraft de-icing operation time has been shortened from 20–30 minutes per flight to within 8 minutes. De-icing coordination calls have decreased by 40 per cent, and paper-based records have been cut by 70 per cent. The entire de-icing process has been fully digitalized with full traceability.

2.6 A-CDM-supported same-direction or same-side aircraft parking optimizes the relationship between stand allocation and runway use. Based on destination, route direction, expected runway configuration and airfield layout, aircraft can be assigned to stands on the more operationally efficient side of the airport where appropriate. This reduces cross-field taxiing, surface conflict points and unnecessary long-distance movement. After Kunming Changshui (ZPPP) launched the same-side parking green operation mode in March 2019, the proportion of aircraft crossing vertical taxiways decreased from 42.5 per cent before implementation to 22.4 per cent after implementation, with a daily reduction of about 200 flight movements. The departure punctuality rate of originating flights increased by 0.9 percentage points year-on-year; the overall flight punctuality rate rose by 2.70 percentage points year-on-year; the average flight delay time was 10.75 minutes, a reduction of 1.48 minutes year-on-year.

2.7 Currently, there are more than 30 international airports equipped with positioning devices in China. Vehicle positioning covers the entire airport area, including aprons, taxiways, runway access roads, service roads, de-icing areas and off-airport crew vehicle driving areas. The A-CDM vehicle management system of Kunming Changshui (ZPPP) monitors about 1,900 vehicles, accounting for 95 per cent of the total number of vehicles. Device positioning accuracy is meter-level; data refresh rate is once per second; end-to-end latency is no more than 1 second. The monthly number of regional safety alerts reaches 18,652, with a true alert rate of 65 per cent. The alert response time is within 1 second. The system interfaces with the runway incursion prevention system, SURF, Advanced Surface Movement Guidance and Control System (A-SMGCS), Automatic Dependent Surveillance–Broadcast (ADS-B) and ADSEX via message queue and API interfaces.

2.8 The performance on how A-CDM can improve actual operation is as follows.

2.8.1 At major airports with annual passenger throughput over 10 million, the national average flight delivery rate increased by 5 to 10 percentage points after A-CDM deployment. TOBT prediction accuracy reached over 95 per cent.

2.8.2 Kunming Changshui (ZPPP) reduced overall aircraft ground handling time by 20.5 per cent. Its same-direction regional parking reduced average taxi time from 28 minutes to 21.5 minutes and reduced cross-field taxi crossing rate from 41 per cent to 26 per cent.

2.8.3 Guangzhou Baiyun (ZGGG) improved flight release normality by 5.97 percentage points, departure off-block normality by 7.26 percentage points, and reduced average taxi-out time by 1 minute.

2.8.4 Hangzhou Xiaoshan (ZSHC) coordinated 1,892 short-term flight adjustments in one year; adjusted flights achieved nearly 10 percentage points higher regularity than non-adjusted flights; overall regularity improved by about 4.5 percentage points.

2.8.5 CAAC assessment of six major airports showed Chinese yuan (CNY) 141 million comprehensive benefits in 2019 after deducting A-CDM construction costs.

3. **RECOMMENDATION**

3.1 With support of airport digitalization, the level of collaboration at the airport can be effectively enhanced to improve operational efficiency, thereby increasing the value of airport capacity.

3.2 The application of artificial intelligence (AI) technology in airport digitalization can undoubtedly improve the effectiveness of airport operations. But it is necessary to establish a global framework to govern the safe, secure, and accountable integration of AI technologies across the aviation ecosystem.

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