INTERNATIONAL CIVIL AVIATION ORGANIZATION

TWENTY EIGHTH MEETING OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG/28)

Bangkok, Thailand, 11 to 14 September 2017

Agenda Item 3: **Performance Framework for Regional Air Navigation Planning and Implementation**

3.0: **Regional and National Performance Framework**

ADOPTING THE ICAO GANP KPI FRAMEWORK FOR ASIA PACIFIC

(Presented by Singapore, United States and EUROCONTROL)

SUMMARY

In July 2015, the Civil Aviation Authority of Singapore, the European Organization for the Safety of Air Navigation and the Federal Aviation Administration initiated a joint project to develop harmonised measurement procedures for selected Key Performance Indicators (KPIs) for air traffic management performance benchmarking purpose. This paper provides an update on the Phase One results and demonstrates the benefits of performance benchmarking which includes an awareness of Air Navigation Services Providers' (ANSPs) performance and ability to identify areas of improvement. It also aims to promote and encourage States to adopt the KPI framework described in the ICAO Global Air Navigation Plan.

1. INTRODUCTION

1.1 In July 2015, the Civil Aviation Authority of Singapore (CAAS), the European Organization for the Safety of Air Navigation (EUROCONTROL) and the United States Federal Aviation Administration (FAA) identified the merits of performance-driven Air Navigation Services Providers (ANSPs) and embarked on a joint project to develop harmonised measurement procedures for selected Key Performance Indicators (KPIs) for Air Traffic Management (ATM) performance benchmarking purposes. Two KPIs were chosen viz. Taxi-out Additional Time and Additional Time in the Terminal Airspace. The two KPIs were selected to provide the tradeoff between departure and arrival performance. This performance measurement approach will also give a balanced view on strategic investments against operational effectiveness when read in context with other relevant KPIs, such as cost and safety-related KPIs.

1.2 In August 2015, a regional Performance Measurement Framework was established at the Third Meeting of the Air Traffic Management Sub Group (ATM SG 3), and the Regional ATM performance Measurement Framework Small Working Group (RAPMF/SWG). China offered to lead the work and had since hosted the first RAPMF/SWG meeting in July 2017. The progress of work was presented at the ATM SG 5 meeting in July/August 2017.

1.3 In late 2016, the Fifth Edition of the ICAO Global Air Navigation Plan (GANP) identified 16 KPIs to measure the operational performance of ANSPs. The two KPIs identified in the performance benchmarking effort between CAAS, EUROCONTROL and FAA formed part of the 16 KPIs, namely KPI02 (Additional Taxi-Out Time) and KPI08 (Additional Time in Terminal Airspace).

1.4 ICAO has identified that the aviation system today is complex with performance determined by a diverse group of stakeholders including ANSPs, airspace users and airports. In maintaining high levels of safety and efficiency, all stakeholders will need to make significant investments. To strategise future investments and to improve system efficiency, adoption of a performance-based approach is required, in which a carefully chosen set of KPIs will allow for the monitoring of operations. Over time, the collection and analysis of information will improve and the maturity of the performance-based approach will increase. Cooperation between all stakeholders is key in this matter and exchange of information and benchmarking will lead to a better understanding of the potential gaps between current and desirable performance. The ICAO GANP proposes a phased development approach, linked to the problems perceived and benefits expected from the implementation of the Airspace System Block Upgrade (ASBU) Modules which will reflect the progress of level of maturity of States and regions.

1.5 There is a need for our region to embark on benchmarking early. The progress of the benchmarking measurement between EUROCONTROL, Singapore and United States was presented in IP14 at APANPIRG/27. This paper provides an update on the Phase One results of the joint project and demonstrates the benefits of performance benchmarking which include an awareness of ANSP performance and ability to identify areas of improvement. The collaboration will expand to include other KPIs listed in the ICAO GANP in Phase Two of the project.

2. DISCUSSION

Results and Demonstrated Benefits of Joint Performance Benchmarking

2.1 Two KPIs were chosen, i.e. “Taxi-Out Additional Time” (ICAO GANP KPI02) and “Additional Time in Terminal Airspace” (ICAO GANP KPI08). Additional times were determined by comparing the actual travel times with respect to unimpeded reference times for flights sharing the same operational characteristics. For KPI02 the actual travel time was determined by the actual off-block and take-off time, whereas for KPI08 this was based on the time entering into terminal airspace and actual landing time. Reference times were determined based on a data analytical process.

2.2 The year 2015 was set as reference year to calculate the unimpeded reference time used for both KPIs to determine the additional times for 2015 and 2016. The results provided a means for the three ANSPs to assess the overall effectiveness of their initiatives implemented over the year and study the impact of these changes in terms of local performance. Furthermore, it allowed for the comparison of the local performance in relation to other regions. The latter supported the identification of best practices and provided a means to understand the impact of differences in operational or technical implementation.

2.3 Looking at Figure 1, the US airports performed better in in terms of Additional Time in Terminal Airspace than Changi Airport; whereas Changi Airport did better in the KPI on Taxi-out Additional Time than the US airports. Additional taxi-out time in Changi Airport was slightly higher than the better performing airports in Europe. The majority of the European airports showed an average taxi-out performance between 3.5 and 4 minutes of additional time per flight. Generally, the European airports performed less efficiently than the US airports in terms of the additional time in arrival phase.

2.4 There was an obvious tradeoff between the two KPIs. The US prioritised arrivals over departures and allowed departure queues to grow at the expense of managing arrivals. In Europe, environmental considerations are aimed at reducing the additional time for taxi operations. Note that airports in the US and Europe handle mainly aircraft of medium wake turbulence while Changi Airport has an almost equal distribution of heavy and medium aircraft. Also, while air traffic flow management (ATFM) was widely implemented in Europe and the US, Singapore started operational trials in April 2017.

2.5 Even though the benchmarking started with two KPIs, it soon became apparent that other KPIs and airport characterisations have to be considered to understand the constraints of each airfield and airspace. Thus, capacity-related KPIs were studied which included Airport Peak Arrival Capacity (KPI09); Airport Peak Arrival Throughput (KPI10); and Airport Arrival Capacity Utilization (KPI11). Airport characteristics taken into consideration include number of runways and distribution of aircraft by its wake turbulence category.

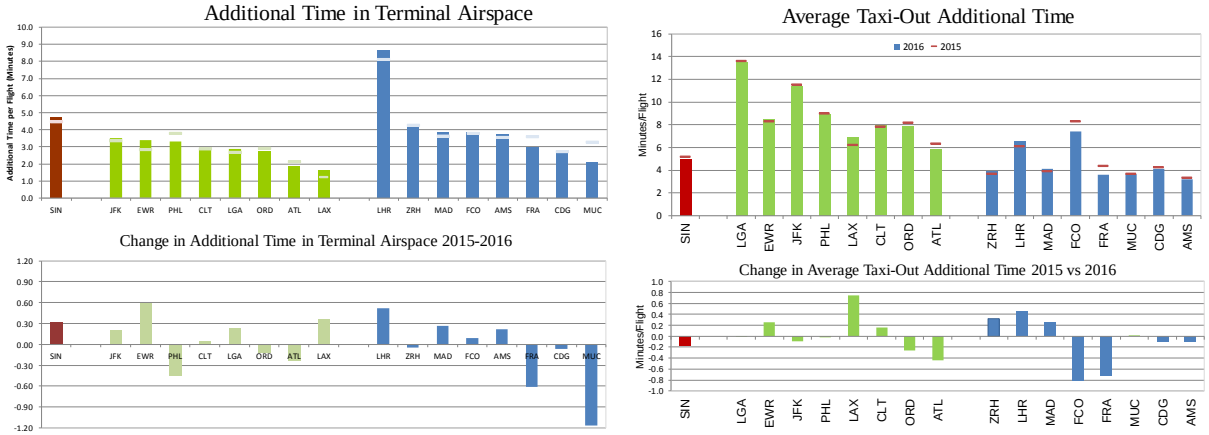

Figure 1 Results of Changi Airport and Selected US and European Airports for the two KPIs

2.6 Singapore used the two KPIs to monitor the effectiveness of some new initiatives at Changi Airport. Some of the initiatives include the implementation of independent simultaneous parallel approaches during peak arrival periods; review of height restrictions due to tall vessels and conducting operational trials for ATFM with the region to reduce airborne delay.

2.7 EUROCONTROL engaged actively in international benchmarking activities as this offers the possibility to study operational concepts and technical implementations different from the European context. The project delivered insights into the operations of a completely different fleet mix. In particular, the expansion of the scope to include capacity utilisation measures was extremely informative.

2.8 For FAA, this project has offered several important focus areas that were unique from other benchmarking work. The group developed throughput measures that provided a common procedure of measuring how “stressed” or near capacity a facility is operating. Delay measures are a product of demand/capacity imbalances and the opportunity to develop these measures utilizing US and non-US airports will lead to improvements domestically. Throughput is a distribution and the project examined ways of characterizing a distribution with a single or small number of values.

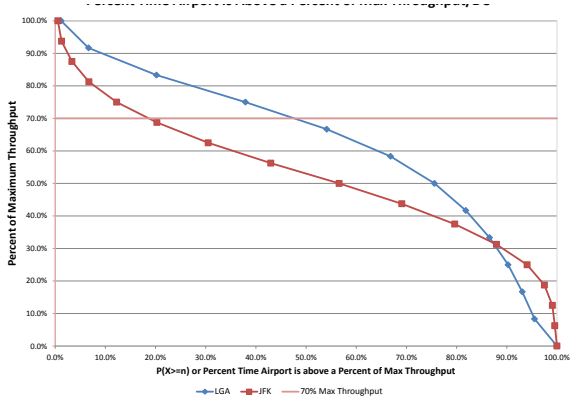

Figure 2a – Percentage of Time Airport is above *x*% of Max Throughput

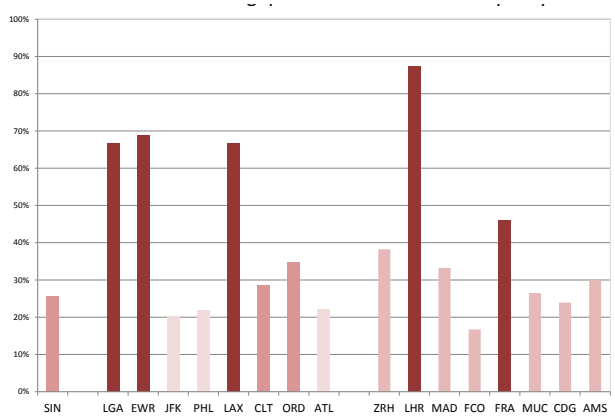

Figure 2b – Percent of Time Throughput is above 70% of Peak Capacity

2.9 Figure 2a shows the 2016 throughput distributions for LGA and JFK as a percent of maximum capacity on the y-axis and the amount of time this occurs on the x-axis. Values of above 70% to 80% of peak capacity are indicative of conditions where ATM delay can accumulate especially if peak capacity is reduced due to weather. Figure 2b shows the time at or above 70% capacity for the study airports for 2016. The study identified that 4 airports show shares of above 60% of the core operating hours (06:00 – 15:00hrs). This group includes in the US: LGA, EWR, and LAX ranging between 66.6% and 68.9%, and in Europe: LHR 87.4%. SIN operates at or above the 70% capacity threshold 25.5% of the time.

2.10 The methodologies jointly developed between CAAS, EUROCONTROL and FAA benefitted each party in their quest to improve performance through indicators that identify constraints where mitigation is actionable. The collaborators will continue to develop new and meaningful methodologies to determine the performance at each airport.

Gap in the Performance Framework Development in the Region v.v. the GANP

2.11 In the GANP, ICAO has empowered the PIRGs to develop and adopt the phased implementation approach to performance management such that each ANSP can adopt or continue its performance-based approach. A set of core and additional KPIs are recommended in the GANP aimed at allowing States to make meaningful assessment of the efficiency of their ATM system while keeping data processing and data archiving requirements to a minimum. The KPIs have also demonstrated benefits for the ANSPs.

2.12 The GANP calls for the PIRGs to identify a set of KPIs and develop initial guidance material for States. The APAC region will need to identify the KPIs and develop guidance material that is aligned to the GANP, and the global efforts in performance-based approach. By identifying the gap and supporting the RAPMF/SWG in the development of the performance measurement framework, it will help States close the gap between the APAC region and other regions or ANSPs in the active measurement and monitoring of performance.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to:

a) Note how harmonised measurement procedures developed as part of this multi-region benchmarking study can potentially assist States to utilise the recommended KPIs in the ICAO GANP;

b) Note the highlights of joint benchmarking and take into consideration the harmonised metrics developed by EUROCONTROL, Singapore and the United States in the definition and production of ATM performance framework;

c) Develop recommendations for adapting or modifying these procedures to better support benchmarking within the Asia Pacific region while keeping the workload on metrics practical and ensuring cost of extracting such KPIs are kept to a minimal and aligned with the ICAO GANP; and

d) Support the RAPMF/SWG work in the development of the performance measurement framework that is aligned to the KPI framework in the ICAO GANP.

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