

**For Discussion
on 24 June 2019**

Legislative Council Panel on Economic Development

Smart Airport Development at Hong Kong International Airport

Purpose

This paper briefs Members on the initiatives of “smart airport development” at Hong Kong International Airport (“HKIA”).

Background

2. The objectives of the smart airport development envisioned by Airport Authority Hong Kong (“AAHK”) are to deliver a unique passenger experience and to further enhance operational efficiency by making effective and innovative use of technology.

3. AAHK works closely with its business partners at HKIA and technology companies in realising its smart airport vision. In 2015, AAHK established the Airport Technology Advisory Council to engage experts from research & development institutions and universities to provide guidance on introducing advanced technologies at HKIA. In the same year, AAHK also inaugurated its annual HKIA Technovation Conference & Exhibition to facilitate discussion and collaborations among AAHK, its business partners and technology companies.

4. Since the establishment of the HKIA Technovation Board in 2015, different universities and technology companies including local startups have conducted various trials of technological solutions at HKIA. In 2016, AAHK has started partnership with Hong Kong Science Park (“HKSTP”) and Hong Kong Applied Science and Technology Research Institute (“ASTRI”) in developing technological applications for HKIA. In the course of developing HKIA into a smart airport, HKIA itself will continue to serve as an incubating platform, facilitating Hong Kong’s technology industry in exploring new ideas and innovative solutions in aviation.

5. HKIA's smart airport development strategy covers five key aspects:

- (a) Building and enabling a smart infrastructure;
- (b) Enhancing efficiency with robotics and automation;
- (c) Self-services and smoother passenger journey enabled by technology;
- (d) Connecting passengers with personalised and intelligent touch; and
- (e) Gaining insight for optimising airport operations via data analytics.

In relation to these five key aspects, AAHK has implemented or planned for various smart initiatives at the HKIA, as outlined in the paragraphs below.

(a) Building and enabling a smart infrastructure

6. To support the smart airport development, AAHK identified a set of core platforms for building a technology infrastructure for creating fast, agile and reliable connectivity among people, devices and facilities at HKIA, including:

- (i) High speed Wi-Fi: Wi-Fi speed in terminals have been further upgraded; the number of high speed Wi-Fi zones with a speed of up to 400 megabits per second or more will be increased from 15 to 30 by the end of June 2019;
- (ii) 5G network: Preparing for the application of 5G technologies in airport operations;
- (iii) Private Mobile Network dedicated for HKIA's operation: Independent and reliable wireless network for use by airport operators; and
- (iv) Internet-of-Things Network: Through the Network, the data collected by the massive amount of devices and facilities at HKIA will be interconnected for data analysis for airport operation.

7. With the above platforms, AAHK is able to apply advanced technologies in airport operations, including big data analytics, digital twin and Virtual Reality (“VR”) applications, for the purpose of managing passenger flow, among others. A platform is also being created to analyse big data generated from airport operations, so as to develop new measures and applications for enhancing passenger experience. A “digital twin” of the airport, which is a digital replica of the physical structure and facilities, provides a 3D airport model for scenic VR simulation, which can be used for operational drills or training, such as driving test on apron or preview of new facilities.

(b) Enhancing efficiency with robotics and automation

8. Increasing automation and use of robotics not only enhance efficiency but also improve occupational health. As one of the most automated airports in the world, HKIA has over the years introduced many major automated systems, such as the Automated People Mover, Baggage Handling System equipped with Radio Frequency Identification (“RFID”) technology, to enhance efficiency as well as passenger experience.

9. More new applications on robotics and automation, integrated with the use of artificial intelligence, have been adopted or in the process of being tried out at HKIA. For example, a high-speed baggage transport system is under construction to automate the delivery of arrival baggage from the Midfield Concourse. Robotics technology is being used for some cleaning work and ambience monitoring in the terminals; and, in collaboration with a local research institution, an automatic system has been developed for the detection of foreign objects on runways in real-time to enhance runway safety and operational efficiency.

10. HKIA is pioneering the application of autonomous driving technology in apron operations. AAHK is conducting a feasibility study to adapt autonomous driving technology onto electric tractors to transport baggage or cargo on the apron. Field tests of a driverless electric cargo/baggage tractor on a selected route have been conducted on the apron, to ensure the application is safe and efficient in a busy operational environment. The use of proven driverless tractors is expected to enhance the efficiency in cargo and baggage delivery.

(c) Self-services and smoother passenger journey enabled by technology

11. Self-service is introduced at HKIA not only as a means to suit the new generation of passengers, but also to enhance efficiency. Since early 2016, AAHK has started to introduce various automated and self-serviced processes in phases, from check-in to departure security, and from transfer to boarding.

12. Invented by AAHK, a new generation of smart mobile check-in kiosk has been launched, with a total of 120 kiosks in service at various locations in the terminal as well as off-airport locations. These mobile smart kiosks can be turned into mobile check-in desks manned by staff, making it possible for airlines to provide check-in services anywhere, not only within the terminal but also outside the airport. For example, the kiosks are deployed at the HKIA Check-in Service Centre set up in the High Speed Rail West Kowloon Station and the Hong Kong Boundary Crossing Facilities of the Hong Kong-Zhuhai-Macao Bridge.

13. AAHK has been working closely with airlines to encourage passengers to check-in online before they arrive at the airport. To allow more flexible use of counter space and improve efficiency, self-bag drop facilities have been installed at 120 check-in counters, reducing bag drop time to 60 seconds as compared to 2-3 minutes at manual counters. HKIA is the first airport in the world deploying self-bag drop service in such scale.

14. To provide passenger a seamless experience, a total of 48 self-service e-security gates have been launched at Terminal 1. Other e-facilities including self-boarding gates and e-transfer gates are being planned for installation in phases.

(d) Connecting passengers with personalised and intelligent touch

15. Since its launch in 2013, HKIA's mobile app "HKG My Flight" has already evolved to become an integral part of the passengers' airport journey. A wide range of functions and information is available to travellers at their fingertips covering the pre- and post-airport parts of their journey. For example, passengers can make use of the airport map on "HKG My Flight" to self-navigate to boarding gates or shops/locations.

16. With the location-based boarding alert in the App, passengers will be reminded to set off to the boarding gates. When paired with HKIA's smart baggage tag, MyTAG, arrival passengers will receive notifications on their mobile phones when their bags are ready for pick-up from the carousels. HKIA is the first airport in the world introducing such service. Over 10,000 pieces of MyTAG have been sold so far.

(e) Gaining information for optimising airport operations via data analytics

17. Data analytics is a key element in the airport's digital transformation to enrich passenger engagement and drive operational excellence. With plenty of data available from various aspects of airport operations, big data analysis will enable predictive decisions and timely enhancements in, for example, queue management and deployment of manpower or other resources for serving flights and passengers. For example, AAHK has worked with researchers at the Chinese University of Hong Kong ("CUHK") and a local technology company in developing the "IoT-Augmented Airfield Service System", a cloud-based service-oriented system which utilises and integrates a multitude of disparate data sources to provide real-time and predictive AI-enabled analytics for the HKIA community to better manage aircraft arrival and departure, baggage handling and catering service. The system won the Grand Smart Mobility Award in the Hong Kong ICT Awards 2019. In 2017, AAHK partnered with the Logistics and Supply Chain MultiTech R&D Centre ("LSCM") and CUHK in developing a new baggage trolley tracking system. This system uses video analytics to enhance the efficiency of manpower and equipment deployment for retrieving and providing trolleys for passengers, which helps improve service in the terminals.

18. To enhance real-time data sharing and assessment of aircraft operation at HKIA, AAHK has launched the Airport Collaborative Decision Making ("A-CDM"), a strategic tool enabling common situation awareness among key players operating at the airport, including Air Traffic Control, the Hong Kong Observatory, airlines and ground handling agents. Since its implementation, it has enhanced flight punctuality, reduced waiting time on the runway for departure, lowered fuel consumption and carbon emission, and improved airport capacity utilisation. Riding on the same concept, a Terminal CDM is also being implemented in phases to enable predictions on passenger flow and identify service bottlenecks.

Way Forward

19. The smart airport initiatives at HKIA have received recognitions from both local and international institutions in the past two years. In addition to the Best Airport Award received from Future Travel Experience Asia in 2017, some 10 other awards were also received recognising the digital innovations at HKIA, including awards from International Airport Review, Geneva Inventions Award, Asia Pacific ICT Alliance Awards, Hong Kong ICT Awards, Smart City Award, Digital Brand Award and Mob-Ex Award.

20. Three patents have been obtained for innovations at HKIA including the mobile check-in kiosk, self-bag drop system, and the automatic runway lights inspection system. Applications for more patents are continuing. Multiple research projects are also proceeding in collaboration with home-grown talent from the local innovation and technology sector and universities.

21. HKIA is one of the early movers in the international aviation industry in applying technology to airport services. To further strengthen HKIA's international leadership in this strategic area, AAHK will continue to work closely with international aviation organisations including International Air Transport Association ("IATA") and Airport Council International ("ACI") to lead the technology development and drive new standards for the industry.

Advice Sought

22. Members are invited to note and comment on the issues presented in this paper.

**Airport Authority Hong Kong
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