International Civil Aviation Organization

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WORKING PAPER

ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety and Air Navigation Standardization

UAS OPERATION AND REGULATION FOR URBAN LOGISTICS

(Presented by China)

EXECUTIVE SUMMARY

With the rapid development of civil UAS, civil aviation regulatory authorities of the countries in the world are faced with similar needs and problems to different extent in the field of safety regulation of UAS operation in ultra-low-altitude airspace. Since the application scenarios, task profiles and operational risks of UAS in urban ultra-low-altitude airspace are quite different from those of traditional manned aircraft, and considering the substantial development potential of UAS in cities at present and in the future, this paper presents the issues of safety and regulation of UAS logistics operation in the urban scenario.

ICAO is playing a leading role in the field of aviation, promoting development of UAS. In order to implement the initiative of "*No Country Left Behind* (NCLB)", ICAO should issue relevant specifications and recommended practices in the field of UAS logistics operation and regulation in the urban scenario to guide the safe operation of UAS in this scenario. China's civil aviation will also share the relevant accumulated experience to help the countries in the world to work hand in hand on this issue. This will help improve the level of aviation services and promote economic recovery against the global pandemic. In addition, by providing standards and guidance material for the new aviation operation scenario to the countries and the industry, ICAO will oversight the operational safety of UAS in the urban scenario, thus reducing safety risks due to inadequate oversight of such operation.

[1] English and Chinese versions provided by China.

Action: The Assembly is invited to:

a) note the information contained in this paper;

b) recommend that ICAO should establish a study group, develop a work plan and make research on feasibility of inclusion of relevant rules for unmanned aircraft systems (UAS) logistics operation in the urban scenario in the ICAO document system; advance establishment of a safety oversight mechanism, formulate relevant standards and specifications and reduce operational risks caused by the lack of Standards and specifications for UAS in the urban scenario; add a special chapter or a special clause to consider such regulation of UAS on the basis of the original structure and enrich Standards and Recommended Practices (SARPs) or guidance material, including adjusting and revising Annexes and related Procedures for Air Navigation Services (PANS); and

c) consider economic regulation and design an economic regulation system synchronously. It is recommended to include more countries in the Working Group on UAS Economic Regulation; clarify that the working group will speed up building of the framework for the law and policy system related to UAS logistics; clarify that the working group will strengthen focus on the aspect of economic regulation in UAS logistics service and develop guidance material.

Strategic Objectives:	This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives
Financial implications:	Costs related to the development of new standards and guidance material.
References:	None.

1. INTRODUCTION

1.1 Application of unmanned aircraft systems (UAS) logistics distribution is constantly increasing in the urban scenario which is characterized by dense population and traffic jam. It is believed that in the future, the role of UAS in the urban logistics will be further highlighted, bringing new economic growth points and promoting employment.

1.2 Regulation of UAS is a common and difficult problem faced by the civil aviation authorities of the countries all over the world. From the perspective of ICAO, it is necessary to consider the issue of global civil aviation regulation brought about by UAS in a coordinated way: first, UAS operation in the urban scenario involves cross-border application of management and technological modules related to UAS, operation, personnel qualifications, helipads and ATM as well as their combinations; second, the mutual recognition of airworthiness and type certificates of UAS in the urban scenario between different countries; third, the framework for international operation regulation system in the future.

1.3 The Civil Aviation Administration of China (CAAC) submitted to the 57th Conference of Directors General of Civil Aviation in Asia and Pacific Regions the documents covering relevant standards, regulation experience and results on UAS logistics operation in the urban scenario, which were discussed at the conference and gained wide recognition.

1.4 CAAC has continued to carry out the trial operation of UAS in the urban scenario, accumulating a lot of experience and ensuring the safe and efficient operation of UAS of specific types in complex urban environments, and it is mature enough to be popularized, which will offer universal reference for countries to regulate the operation of UAS in the urban scenario. Therefore, China has proposed solutions for the Member States' reference and hopes that ICAO will discuss, adopt and promote them. At the same time, China is willing to participate in ICAO's relevant work, providing appropriate human and technological resources and sharing work experience....

2. DISCUSSION

2.1 Concerning the UAS logistics operation and regulation in the urban scenario, China's civil aviation and international peer experts have conducted long-term and full communication and exchange under the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) platform. Based on the specific operations risk assessment (SORA) risk assessment framework and considering the actual operation in China, China's civil aviation jointly conducted systematic risk assessment with the operators. For scenarios with different operational risks, we have taken the assessment results as an important reference for issuing a trial operation approval letter in accordance with SORA's control strategy and safety objectives. Under the framework of SORA risk assessment, we have formed a hierarchical and classified management strategy that is for operational scenarios and based on operational risks.

2.2 The UAS logistics operation in the urban scenario mentioned in this document refers to the use of light and small rotor UAS in densely populated areas to carry out Beyond Visual Line-of-Sight (BVLOS) automatic flight, and the route below the true height of 120 meters (400 ft) is established to separate operation of UAS from that of the manned aircraft. Operators effectively reduce operational risks by adopting risk mitigation and control measures on the ground and in the sky.

2.3 Route design is an important measure to avoid and control risks to the ground. It is suggested that the air route, the arrival and departure route, the helipad, and the alternative landing field should be considered in the design of the logistics routes of light and small UAS in the urban scenario. Through the process of program design, verification optimization, route generation and implementation, the operational safety, operational reliability and public acceptability are evaluated, and the optimization is carried out through site survey, simulation and test flight verification, and the route design and route generation are completed to minimize the risks to the ground.

2.4 The safety and the reliability of UAS are the basis and guarantee for mitigating and controlling operational risks. Light and small UAS is less risky in the same operating environment, but its iteration speed is very fast, so traditional airworthiness management is not suitable to UAS. Therefore, for the urban scenario, CAAC has compiled the Technical Requirements for Logistics of Electric Multi-Rotor UAS (Light and Small) in the Urban Scenario according to the operation practice. The weight, flight performance, design and equipment of UAS for logistics purposes in the urban scenario are required accordingly. In the systematic safety risk assessment, the specification provides a basis for relevant inspection and test and gives strong support to operators and regulators.

2.5 Distributed operation has become a notable feature of the UAS operation. Especially in the UAS logistics operation in the urban scenario, it is basically an operation team with the distributed function who monitors the operation of a group of aircraft. It is proposed that a distributed operation permit be issued for UAS, and the person responsible for safe operation will approve it through the operating specifications.

2.6 Based on the basic characteristics of the current UAS logistics operation in the urban scenario, it is recommended that the requirements in terms of take-off and landing site/port operation, infrastructure, operation management, UAS departure & arrival procedures be standardized to improve operational efficiency and safety.

2.7 While the laws relating to the operation of light and small UAS are made by the different states, ICAO’s leadership is essential to ensure the implementation of standards and best practices. ICAO’s involvement will also ensure that stakeholders are not only aware of these issues, but also clearly develop policies and best practices, including how to manage and apply standards.

3. CONCLUSION

3.1 From the perspective of safety and efficiency, as more and more UAS are used in the urban scenario for logistics distribution, medical emergencies and pandemic prevention and control, it is necessary to ensure the safe and efficient operation of UAS in the urban scenario through effective standards and recommended practices. ICAO should provide the necessary standards and guidance, putting forward relevant technical requirements for establishment of routes for the urban scenario, UAS airworthiness, distributed operation, take-off and landing site/port, etc., so as to support the safe and efficient operation of UAS in the urban scenario.

3.2 In the process of managing UAS logistics operation in the urban scenario, although it does not involve cross-border operation for the time being, management policies for UAS in different countries will have a significant influence on operators whose operation involves different countries. It is hoped that ICAO will work with stakeholders to develop various standards or recommended practices for logistics operation of light and small UAS in the urban scenario. During this process, unified standards

and regulatory measures will be established to facilitate rapid promotions and use of UAS in the world and help operators in operating in different countries.

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