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AGENDA ITEM 6: ECONOMIC DEVELOPMENT OF AIR TRANSPORT

COMMERCIAL SERVICE APPLICATION OF LOGISTICS WITH UNMANNED AERIAL VEHICLE

Presented by the People's Republic of China

SUMMARY

Logistics with unmanned aerial vehicle (UAV) plays an important role in boosting rural economic growth, improving people's wellbeing in the underdeveloped regions, and realizing rural revitalization. Since 2017, the Civil Aviation Administration of China (CAAC) has launched pilot projects of UAV logistics in rural and underdeveloped regions nationwide to facilitate the transportation of local agricultural specialties (especially fresh food). UAV has helped to bring agricultural products to cities and industrial products to rural areas, and promoted the integrated rural and urban development, which are of great significance to eliminating poverty, promoting regional development, and connecting rural and urban areas.

COMMERCIAL SERVICE APPLICATION OF LOGISTICS WITH UNMANNED AERIAL VEHICLE

1. INTRODUCTION

1.1 As the economy grows rapidly, logistics has become an important driver for economic development, playing an indispensable role. However, the logistics is still a labor-intensive industry, and the high cost has become a problem that inhibits the development. There lacks proper subsidies in rural and urban areas. With the development of driverless technology, unmanned distribution represented by drones has become an important direction to solve problems in urban logistics. Compared with traditional human distribution, UAV delivery features intelligent, information-based, unmanned with high frequency, small scales, higher efficiency and lower cost. The CAAC has been exploring the application of drone logistics in urban scenarios since 2019. In 2019, it issued the first "Approval Letter for Trial Operation of Special Type of UAV" in urban scenarios and "UAV Logistics Operation License" to Antwork, which got the first pilot operation project of UAV logistics in urban scenarios worldwide. In 2020, the CAAC approved Jiangxi Fengyu Shuntu Technology Co., Ltd., a subsidiary of SF Express, to carry out a pilot program of "low-altitude drone logistics distribution system" in the Guangdong-Hong Kong-Macao Greater Bay Area, which is also the world's first drone logistics pilot project in a world-class city cluster. The application of UAV logistics has largely cut costs, improved efficiency and quality, promoting the transformation and upgrading of logistics industry to smart logistics.

2. DISCUSSION

2.1 UAV logistics expand the rural logistics network. Rural logistics usually adopts a three-level network system of "transfer in city-level hubs, distribution in county-level hubs, and delivery from town-level outlets", with a low time-effectiveness. In addition, rural areas are vast and sparsely populated, the villages are scattered, transportation is inconvenient with long distance, low concentration, and small scales. Hence, most township outlets typically call people to come to the outlets to pick up on their own, instead of directly delivering the packages to rural consumers. As a result, rural residents cannot enjoy the convenience of express delivery in urban areas. In 2017, the CAAC approved Jiangxi Fengyu Shuntu Technology Co., Ltd., a subsidiary of SF Express, to carry out pilot projects of drone logistics and distribution in Nankang District, Ganzhou City, Jiangxi Province. To solve the difficulties in the "first mile" of agricultural products and the "last mile" of express delivery, SF Express has built take-off and landing points for drone logistics in each village in Nankang District, and chartered nearly 100 routes to facilitate extremely fast delivery between towns and villages via drones, serving more than 30,000 local villagers. Originally, the land delivery took one hour. After using drones, it has been shortened to about 20 minutes, increasing by more than 50%. As of the end of February 2022, SF's drones have operated for 288,800 flight times, with a flight duration of 31,300 hours, a flight mileage of 1,468,900 kilometers, and 405,700 pieces of cargo in Ganzhou. Moreover, in mountain scenarios represented by Yajiang county in Sichuan province, SF Express has deployed 100 plus small drones to transport Tricholoma matsutake, solving the problems in the "first mile". Drones carrying the fresh Tricholoma matsutake fly from mountain camps to the drone base, and then cold transport vehicles send the products to the pretreatment center for screening and pretreatment, and then deliver them after packaging to the whole country.

2.2 UAVs shorten the time used in logistics in urban city clusters. As the mobile Internet and e-commerce flourish, the volume of express delivery business in China has surged. The traditional "ground transportation + manual delivery" model needs to be upgraded and accelerated due to the huge number of express delivery, intensive delivery tasks, and increasingly congested urban ground transportation. UAV logistics emerged as the times require. They are not affected by urban ground traffic conditions, and can choose shorter air routes. In addition, UAVs fly faster, which can save a large sum of time. In 2020, the Civil Aviation Administration of China approved SF Express to launch a pilot program of "low-altitude drone logistics and distribution system" in the Guangdong-Hong Kong-Macao Greater Bay Area. Based on its practice in carrying out drone logistics in Shenzhen, the main operation mode of drone logistics is B to B transportation. Drones replace traditional express

delivery outlets and regional distribution transit but couriers are still responsible for the delivery at both ends. Some companies also adopt the B to C mode. UAV logistics reduces the transfer sections and saves the time, improving the time efficiency. By setting up an urban low-altitude UAV logistics network centered in Shenzhen and covering the Guangdong-Hong Kong-Macao Greater Bay Area, and properly deploying UAV logistics and distribution sites, SF Express has created a two-hour efficient urban logistics circle, increasing more than 50% of the time. From 2020 to the end of February 2022, SF's drones have operated about 97,200 flight times in the Greater Bay Area, with 1,833 hours, a flight mileage of about 367,500 kilometers and 102,000 pieces of cargo.

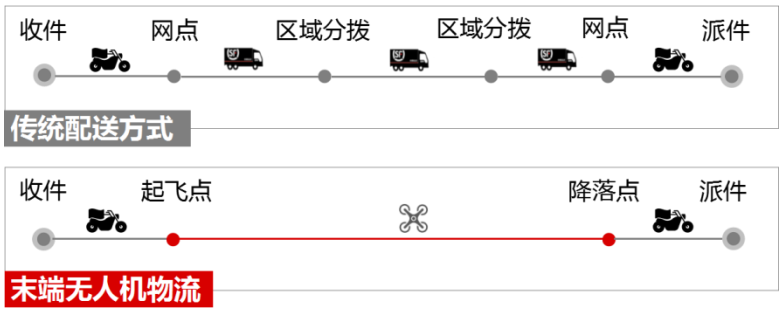

Figure 1 Comparison of traditional distribution and terminal drone logistics

2.3 Drones meet the demand for emergency logistics during the COVID-19 pandemic. During the pandemic, drone logistics exhibits great potential in the transportation of medical samples and emergency medical supplies. Some Chinese logistics companies has provided contactless logistics services for epidemic-hit areas through smart logistics equipment such as drones and driverless vehicles, improving efficiency, easing the burden of poor logistics caused by road blockades, and reducing cross-infection, which have contributed a lot to the prevention and control of the pandemic through scientific and technological means. At present, drones have become the main means to transport medical test samples in some cities in eastern China, which have the following three advantages: First, saving time. Originally, ground transportation took 1 hour, but it can be cut to 13 minutes by drones, and is free from traffic congestion. Second, achieving high-frequency transportation. The drones can transport 800 samples at a time, which improves efficiency. Third, realizing contactless delivery. The drones are safer because it reduces the risk of cross-infection by flying automatically and delivering without contact. As of March 2022, the drones of the SF Express Group have carries out 2,027 flight times of operation in Shenzhen, with 535.19 hours of flight, 21,000 kilometers of flight mileage, and 425,600 samples.

3. CHINA'S EXPERIENCE IN DRONE LOGISTICS DEVELOPMENT

3.1 Launching pilot programs. Since 2017, the Civil Aviation Administration of China has successively launched pilot drone logistics in China based on different operation scenarios. Suning, Zhongtong, Cainiao, China Post, etc have accelerated their efforts in drone logistics. In March 2018, the CAAC issued the operation license to SF Express, making it the first domestic drone logistics enterprise. In October 2018, JD.com was approved to carry out the terminal drone distribution in the entire province of Shaanxi. In 2019, the CAAC issued the drone logistics operation license to Antwork, which got the first pilot operation project of UAV logistics in urban scenarios worldwide, marking a milestone in the commercial operation of UAV logistics. In 2020, the CAAC approved Jiangxi Fengyu Shuntu Technology Co., Ltd., a subsidiary of SF Express, to carry out a pilot program of "low-altitude drone logistics distribution system" in the Guangdong-Hong Kong-Macao Greater Bay Area, which is also the world's first drone logistics pilot project in a world-class city cluster.

3.2 Gaining management experience. China explores both economic and operation management for UAV logistics. On economic management, we will continue to gain experience in UAV logistics in terms of access conditions, safe operation, service guarantee, dangerous materials management and personnel training based on pilot projects. On operation management, based on trial scenarios such as islands, mountains and cities, China has carried out relevant trial operation

evaluation, accumulated operation practices, judged operation risks, and determined the risk level, clarifying the operation management requirements for the system.

3.3 Exploring business models. In terms of integrating drone logistics into rural logistics, based on pilot enterprises and the agricultural supply chain, we have applied the extremely fast mode for the circulation of agricultural products through technologies and logistics, which has improved the time efficiency of transportation of agricultural products and increased the coverage and depth of logistics services. It has also provided air routes for bringing out products in the mountains, further improving the quality yield rate of agricultural products as well as the income of farmers. In addition, we have set up back-feeding training funds to provide pre-job training for local farmers, helping them participate in work related to drone logistics. This has promoted the employment of farmers and achieved a win-win result for enterprises in both business operation and social responsibility. In terms of integrating UAV logistics into urban logistics, the main operation mode of UAV urban logistics is to realize point-to-point transportation in the intermediate links in the transportation chain, and let UAVs replace traditional express outlets and regional distribution transits with couriers at both ends still responsible for the collection and delivery. This has greatly reduced costs and improved the circulation efficiency without compromising users' satisfaction.

3.4 Promoting economic growth. Through efficient and convenient services, the UAV logistics has facilitated the "first mile" and the "last mile" of transportation. It has helped bring agricultural products to cities and industrial products to rural areas, which promotes the integrated rural and urban development, and transformed urban areas from two-dimensional space to three-dimensional space. Drone logistics has also taken the advantage of the value of low-altitude economy. Take the drone transportation of the Tricholoma matsutake in Sichuan as an example. It only takes 24 hours to ship it from the mountains to the table, cutting the time from the previous 54 hours to 24 hours, and improving the efficiency by 55%. With cold chain transportation in the whole transportation, the quality rate has increased from 50% to 80%, which has directly increased the income of local farmers by more than 3 million yuan per year. As the labor cost increases, UAV logistics has obvious advantages because it requires less labor compared to traditional transportation. China's working-age population (16-59 years old) peaked in 2013 and fell by 16 million in the six-year period from 2014 to 2019. With the continuous decline of the working-age labor force, the labor cost of the logistics industry, including express delivery, continues to rise. Through intelligent means such as automated flight and unmanned loading and unloading, UAV logistics in urban areas can largely reduce human input and the need for manual operations while improving time efficiency, cutting labor costs in logistics. The application of big data and AI in UAV logistics has accelerated the transformation and upgrading of traditional aviation services, and contributed to the regional economic growth.

4. ACTION BY THE CONFERENCE

4.1 The Conference is invited to encourage States/Administrations to:

a) Pay attention to the role of the commercial service application of logistics with Unmanned Aerial Vehicle;

b) Actively collect and share good practices and experience in UAV logistics in terms of economic regulation; and

c) Facilitate the work of ICAO in establishing the framework of regulations and policies related to UAV logistics.

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