**Analysis of Mainland China’s International Air Cargo Network: Status Quo and Challenges**

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**Abstract**

Based on air cargo import and export statistics of China Customs, the international air cargo network structure and its flow characteristics in mainland China were studied in this paper. Overall development trends and flow distribution of international air cargo in mainland China were analysed. The major air cargo import and export countries (regions), the main categories of commodities, and the major customs and hub airports were identified. Through our study, a relatively complete view of international air cargo network in mainland China was constructed, in which the major flight routes linking destinations and sources of international air cargo as well as the categories and amounts of air cargo could be revealed. This paper also includes challenges to the further development of mainland China's international air cargo, and proposals to meet these challenges.

**Keywords:** Air Cargo, Logistics, Air Freight, Import and Export

**Introduction**

Air transport has become a major driving force for sustained economic growth due to the advantages of high-speed and being able to save the total transportation costs of supply chains. It is considered as the fastest and reliable way of efficiently linking national and global supply chains as well as long-distance markets. In this new era of rapid turnover in logistics, those countries with sound air cargo connectivity will gain more competitive advantage than others in trade and production [1]. China has the second largest air cargo market only surpassed by United States. China’s robust economic growth has provided the largest and best platform for the development of air transport industry.

With rapid growth of China’s air cargo, our study has more attention and attraction for researchers and reviewers. Existing studies addressed issues such as China's major aviation hubs and the overall pattern and composition of international air cargo [2], the network structure and flow characteristics of international air cargo [3], the development status and market barriers [4], etc. Though during past several years, the studies on China’s air cargo market have been gradually increasing, but they are lacking in deep analysis of China's international air cargo network. For this reason, we exploited the statistical data on air cargo import and export of the year 2006 obtained from China Customs so as to delineate the network structure and flow distribution of China's international air cargo with special focus on statistical analysis on route alignments of main sources and destinations of international air cargo along with cargo categories and amounts.

Traditionally, China Customs treats imports and exports between mainland China with Hong Kong, Taiwan and Macao as international trade, so we define the scope of study within mainland China's international air cargo. The objectives of our study are to build a relatively complete view of mainland China’s international air cargo network and grasp its status and characteristics. We also discussed the future challenges anticipated in the development of China's international air cargo and available relevant proposals.

**Overall Development and Flow Distribution of International Air Cargo**

Air cargo accounts for a very small share of total volume of national cargo. However, the commodities transported by air are generally high-value-added, so the ratio of the value of air cargo to total value of national cargo is still large. Statistics on national imports and exports of 2006 provided by China Customs, it can be seen that total value of air cargo reached nearly 1/5 of the total value of national imports and exports with a very small freight volume. From 2001 to 2006, the total value of air cargo imports and exports increased with an average annual rate of 39%, which was considered as significant but swift increase than other transport modes (see Table 1).

Table 2 shows the distribution of 2006 air cargo imports and exports amount among several continents. Table 2 shows the geographic distribution of both export destinations and import sources revealing a marked concentricity in Asia, Europe and North America. Asia is the foremost origin of imports and destination of exports for mainland China’s international air cargo, followed by Europe and North America. In particular, the total value of imports from Asia is accounted for more than 80% of the total value of all imports. Although China has air cargo business with more than 200 countries/regions around the world, however, the business shares with other continents are still very small.

**Table 1** Total value of Customs import and export vs total value of international air cargo

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| --- | --- | --- | --- | --- | --- |
| Year | Total value of imports and exports  (thousands of dollars) | Total value of air cargo imports and exports  (thousands of dollars) | Percentage of air cargo | Growth rate of air cargo | Growth rate of imports and exports |
| 2001 | 509,651,090 | 66,636,409 | 13.1% | --- | ---- |
| 2002 | 620,766,074 | 87,727,676 | 14.1% | 31.7% | 21.8% |
| 2003 | 850,987,563 | 138,770,605 | 16.3% | 58.2% | 37.1% |
| 2004 | 1,154,554,329 | 208,638,268 | 18.1% | 50.3% | 35.7% |
| 2005 | 1,421,906,172 | 270,781,944 | 19.0% | 29.8% | 23.2% |
| 2006 | 1,760,686,452 | 339,029,738 | 19.3% | 25.2 | 23.8% |
| Average annual growth rate | | | | 39.0% | 28.3% |

Source: Import and export statistics of China Customs

**Challenges to International Air Cargo and Proposals**

**The Expansion of International Air Cargo Market**

The biggest impetus of sustained and rapid development of China's civil aviation comes from the continuous growth of Chinese economy. It will be very difficult for China to maintain a double-digit GDP annual growth rate in future as the base number of GDP increases. However, China’s airlines still have a strong desire to expand. Moreover, the role as an important bargaining chip in balancing international trade by purchasing aircraft will remain unchanged in the short term. To break the deadlock, China's airlines should improve their international competitiveness; meanwhile, look for new growth points from the broad market of sixth freedom rights, so as to be able to exploit invisible trade to replace visible trade featured with ever-increasing frictions. Since internationalization is in fact a double-edged sword, with the opening of international air traffic rights, the controversies over decline in international freight market share possessed by China’s airlines have been increasing [7].

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**Obsession with Unidirectional International Air Cargo**

The structural imbalance of China's imports and exports is relatively obvious. Large trade surplus of China means export goods are more than import goods, coupled with weak marketing capabilities of domestic airlines in international market, all these factors render China’s airlines to operate with low international cargo and mail load factor of less than 60% in recent years.

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**Conclusions**

The rapid growth of China’s economy along with unceasing expansion of China’s foreign trade, have greatly promoted China's air cargo industry, especially the international air cargo industry. Based on the statistical data of 2006 air cargo imports and exports obtained from China Customs, this paper describes the basic structure and flow distribution of mainland China’s international air cargo network. The study shows that the ratio of total amount of imports and exports by air to that of all imports and exports has been increasing. The origin and destination countries (regions) of mainland China’s air cargo imports and exports are concentrated in Asia, North America and Europe, while Asia is the foremost origin and destination. Electronic, mechanical and high value-added products are main commodities of mainland China’s air cargo imports and exports. The top ten hub airports of air cargo imports and exports in mainland China are located in three economic zones, where Shanghai, Nanjing and Hangzhou airports belonging to Yangtze River Delta economic zone own nearly 75% of the total amount of air cargo imports and exports. Shanghai is the biggest hub in mainland China, accounting for almost half of the total amount of national air cargo imports and exports. The further development of mainland China’s international air cargo has to deal with following challenges: expansion of international air cargo market, obsession with unidirectionality of international air cargo for a long time, inadequate cargo capacity and imperfect infrastructure, as well as lack of international competitiveness of domestic airlines.

**References**

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