

# Based on a Two-Stage Network DEA Study, Non-Aeronautical Efficiency of Chinese Listed Airports

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## Introduction

In recent years, people's demand for transportation has grown in tandem with the rapid growth of China's economy. Air travel has been widely embraced as a faster mode of transportation in the modern transportation system. Airports hold a monopoly on air travel and are in short supply. China's airport industry has developed significantly. The scale of China's air passenger transportation has continued to expand rapidly in recent years in tandem with the growth of the country's aviation industry.

From 2013 to 2019, China's airports' main production indicators showed steady growth. In 2018, the public common aeronautics transport air terminals finished traveler throughput of 1265 million travelers, 10.2% more than earlier year. Domestic routes carried 1138 million passengers, up 9.9% from the previous year (including 28.73 million passengers on routes from the mainland to Hong Kong, Macau, and Taiwan, up 6.0% from the previous year); According to CAAC (2019), international flights carried 126.26 million passengers, an increase of 13.0% from the previous year. With the exception of Hong Kong, Macau, and Taiwan, there are 238 transport airports in China in 2019, with 237 airports serving scheduled flights and 234 cities serving scheduled flights. China's airports handled 1352 million passengers in 2019, an increase of 6.9% over the previous year, as their annual passenger throughput exceeded 1.3 billion [1].

**Phase I:** Limit advancement period, or at least, when new runways or terminal structures are placed into utilization, the bottleneck of airplane developments and traveler throughput is broken, creation limit is step by step delivered, and income begins to increment, yet deterioration because of the transformation of a lot of development in progress one-time sharp leap in costs and an expansion in the expense of work costs brought about by the extension of the volume of working resources, and execution might drop in one time.

**Phase II:** Capacity is rising, new production capacity is being used up slowly, business volume is still rising, costs like depreciation are mostly fixed, revenue growth is faster than cost growth, and performance is slowly getting better.

**Phase III:** During the capacity bottleneck period, the airport's take-off and landing times as well as the terminal's passenger throughput are either approaching or exceeding the capacity limit due to the continuous consumption of new production capacity in the early stages. To get ready for the next production cycle, capital expenditure has increased, the capacity expansion plan has been put on the agenda, and the volume growth rate has decreased.

## Description

In China, numerous airport projects are currently under construction, and the majority of airports are in the capacity expansion release period. The annual growth rate of the number of newly opened airports has remained stable. In

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**Received:** 02 January, 2023, Manuscript No. jaat-23-91194; **Editor Assigned:** 03 January, 2022, Pre QC No. P-91194; **Reviewed:** 16 January, 2023, QC No. Q-91194; **Revised:** 21 January, 2023, Manuscript No. R-91194; **Published:** 27 January, 2023, DOI:10.37421/2329-6542.2023.11.247

order to offset the significant cost of depreciation, operators of new airports must immediately increase capacity utilization and operating margins. An airport's main business can be broken down into two categories: non-aeronautical business and aeronautical business. Take-off and landing fees, parking fees, passenger service fees, and security inspection fees are all examples of aviation revenue. The official civil aviation administration (the Civil Aviation Department in Hong Kong of China and the Civil Aviation Administration of China (CAAC) on the mainland of China) sets all of these fees.

China's airports are currently largely funded and built by the government. Additionally, the airport is involved in passenger and cargo movement. Its operation is comparable to that of public welfare projects and plays a significant role in economic growth. Aeronautical revenue is roughly equal to expenditures and does not contribute significantly to profits. There was no excessive fluctuation in the stock prices of listed airports, indicating that the adjustment of aviation income prices is not caused by the trend of airport stocks. The point is that investors rarely base their investment decisions on the cost of public welfare initiatives. Advertising, rent, retail deductions, etc. are examples of non-aeronautical revenue. The fact that Beijing Capital Airport, Shanghai Pudong Airport, and Guangzhou Baiyun Airport have operating income growth rates that are nearly ten percent higher than the growth rates of passenger throughput suggests that these airports are fully releasing the value of the passengers they serve [2].

The new terminal building's commissioning will boost non-aeronautical revenue by expanding the commercial area and passenger flow. The recent commercial bidding, which has served as the foundation for the airport stock market for the past two years, has resulted in a significant increase in the duty-free shop deduction rate. The most recent tax-exempt business contract appears as assurance + commission, which is like the long choice given to the air terminal to return abroad utilization. Income from obligation free shops has been one of the problem areas in the market as of late. In recent years, China has, on the one hand, continuously implemented policies to encourage overseas consumption to return. On the other hand, the market is able to see the value of huge airport passenger throughput because the deduction rate of winning bids for duty-free shops has increased significantly. In a nutshell, the proportion of non-aeronautical revenue has increased and the number of civil aviation airports in China continues to rise. China's airport revenue will rise as a result of new growth opportunities provided by non-aeronautical businesses [3].

To investigate new development space and increment air terminal income, the air terminal industry has started to move from conventional aeronautical business to non-aeronautical business, and give increasingly more consideration to non-aeronautical business. According to Zhang and Zhang, the proportion of commercial or non-aeronautical components in total airport revenue continues to rise. Best-in-class practices in the industry, according to Jarach, have tended to shift away from the traditional mono-modal approach, in which airports compete with other modes of transportation to increase the weight of their secondary demand, in favor of a new strategic management model. Operational, traffic-handling, and commercial services make up the majority of the airport's activities. According to Kratzsch & Sieg, the issue of the relevance of the non-aviation component to airport revenues and their regulation is well-established in the literature. The non-aeronautical business income and the performance score were used as factors in Yang's corresponding model [4].

As a result, airports ought to place a high priority on the growth of non-aeronautical businesses and increase the proportion of non-aeronautical income to overall airport income. Fasone and Zapata-Aguirre conducted an in-depth review of approximately 60 peer-reviewed papers on business performance measurement using DEA applications in the airport industry. They discovered that, despite the widespread popularity of the DEA methodological framework,

it can be enhanced through additional research in order to further refine and exploit the fundamental DEA scores. Yoo, Jie, and Lim found that the airports differ statistically significantly across regions, and they also identified some statistically significant factors affecting airport performance. According to Liu, Wan, and Zhang's research from 2021, the development of high-speed railways (HSRs) is linked to a decrease in airport efficiency; airports in cities with better connectivity or accessibility to the HSR network experience a greater efficiency loss than other airports [5].

## Conclusion

Airport efficiency is positively correlated with airport airside level, so an airport with a high level can promote its operation. However, in order to avoid a mismatch between passenger and cargo demand and airport level, the construction level of the airport ought to be in line with the level of the airport that is required by air passenger flow. Enhance the quality of airport services. There is a positive correlation between the efficiency of an airport's operation and its service quality; in other words, an airport with excellent service can boost its operations. Work hard to keep up with world-class airports, work hard to improve the quality of airport service, and try to get more airports to be at the top of Skytrax's airport service quality list. Increase the level of airport economic development. There is a positive connection between's air terminal financial improvement level and air terminal activity effectiveness, or at least, the air terminal with high air terminal monetary advancement level can advance its activity.

Airport administrators and operators can work together with the civil aviation management department, follow the general international trend, gradually reduce and cancel flight circuit breaker measures, resume flights as soon as possible, particularly international flights, focus on improving airport service quality and restoring the airport's bustling atmosphere (increasing airport non-aeronautical revenues), allow the airport to return to its original function as the node connecting the world and the station of aviation economy, and ultimately achieve the goal of improving airport operation efficiency.

## Acknowledgement

None.

## Conflict of Interest

None.

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**How to cite this article:** Wang, Zhanwei. "Based on a Two-Stage Network DEA Study, Non-Aeronautical Efficiency of Chinese Listed Airports." *J Astrophys Aerospace Technol* 11 (2023): 247.