Operation and cohesion strategy of hub airport ground based on the background of multi-terminal areas

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Abstract: With the continuous rise of the aviation industry, its business volume increases, about which the problem brought is urgent to solve. For example: traffic pressure around the airport, road congestion and other problems. Based on the analysis of existing problems, this paper analyzed the current problems and explored on the source in view of the hub airport ground operation; Based on the comprehensive transport hub airport cohesion, it optimized guidelines and factors affecting hub airport traffic, built ground operation and cohesion strategy under the background of multi-terminal areas, and put forward the strategy of taking priority of developing highway traffic to solve the problem of airport ground cohesion, aiming at better developing aviation industry.

1. Based on the background of terminal area of the hub airport traffic system development analysis
Hub airport refers to the airport that is in the forefront of international air transport and international route hub business volume. In China, hub airports and three complex hub airports with Beijing, Shanghai and guangzhou as well as hub airports divided by tianjin, chongqing, chengdu, wuhan, shenyang, zhengzhou, xi 'an, kunming, urumqi and other regions[1]. Its traffic characteristic is the passenger throughput huge, urges many airport service industry to derive from this. Transportation mode can also meet a variety of customer needs in which to set up a number of transit lines, and equipped with perfect transit facilities, under the guidance of information can help customers save time, effectively achieve the purpose of transit.

1.1 layout evolution trend analysis
Nowadays due to the increase of throughput, the development of the aviation airport construction background, as well as the terminal area planning is changing gradually, in the aspect of traffic facilities, general layout and functional division, will be held at the end of the three forms of future development, first, the landside traffic facilities WanZhengHua development and land side and air side transit rail development and terminal area function division of professional precision development. First, landside traffic facilities are fully developed. The general construction of the terminal area is independent and single in terms of transportation facilities on the land side. Under the influence of the increase of customer throughput, the transportation facilities are gradually completed. In the transportation system, long-distance buses, airport buses and rail car parking lots are converges into ground transportation centers. To this end, the landside traffic facilities in the ground traffic center and terminal area function into a complete pattern. Second, the land side and air side transfer orbit, developing in today as demand increase number of the terminal area also will increase, transfer to
popularize the airport transit system, due to the impact of shuttle buses in paralysis in the case of large throughput, in order to solve this problem, start automatically the MRT system, able to turn in the efficient and quick. In order to help readers understand more intuitively and clearly, the operation situation of transit track of hub airport is summarized, taking capital international airport as an example, as shown in table 1.

Table 1: BCIA (Beijing Capital International Airport) Operation of transit track in hub airport

| Airdrome             | Track line       | Transit mode         | Site location                      | Applied technology       |
|---------------------|------------------|----------------------|------------------------------------|--------------------------|
| BCIA (Beijing Capital International Airport) | Air side MRT system | Air mode to air mode | CTA: T3C two-layer and T3E two-layer, T3D underground floor West Terminal Area: T2 South Navigation, A380 parking position north side | Plastic core-rubber-tires |

Third, precision terminal area function division of professional development, tourists gathered in the area of the airport now radiation hub airport has more airlines urgently to appeal. The personalized demand, under the influence of passengers to the airport facilities and services have higher requirements, therefore, hub airport launched low-cost terminal area and public terminal area, for the price to for service and comfort. It can also meet the minimum passenger cost of a passenger aircraft by making a terminal available at a low cost. In the official terminal, the airport will provide a special terminal, a terminal area and a terminal area to assist the airport.

2. Analysis of the terminal area of the terminal on the ground

The movement system of the terminal area connecting the terminal area with the ground is composed mainly of roads and tracks, in which buses, ferries and buses are hired to make a road traffic system, while the land and air rapid transit systems and rail transit systems in the terminal area make a rail transit system. Its evaluation standards are mainly based on the above two systems, and will be evaluated from three aspects, including goals, standards and indicators, to determine the most suitable indicators for the efficiency, service and cooperation of the system, so as to better implement. See figure 1 below for details of the terminal area of the hub airport and the ground connection operation evaluation standard.
2.1 Evaluation Index Analysis

In the evaluation standard of the movement of the terminal area connecting to the ground, the evaluation indexes are divided into the degree of network connectivity, the degree of connecting smoothness, the rate of transfer distance, the rate of parking facilities, the distance of departure and so on to measure the system convergence. Among them, the degree of network connectivity refers to the index of passenger flow distribution in the terminal, which is an important index to determine the connectivity in traffic and evaluate the system. Show

\[ X_n = \frac{l_1 + l_2}{m} \]

Connection smoothness refers to the calculation of the average travel time of passenger flow in the connection of its terminal area. Show

\[ X_{12} = \frac{T_b}{T_1} \]

The transfer distance ratio refers to the transfer mode of passenger flow during a trip, which is used to evaluate the connection level of the connecting traffic system between air stations. Show

\[ X_{13} = \frac{M}{L} \]

The rate of parking facilities refers to the level of available terminal area to provide customers with car parking and transfer conditions, show

\[ X_{14} = \frac{M_p}{M_t} \]

The departure distance refers to the departure distance between various public transport connections in multi-terminal intervals, show

\[ X_{15} = \frac{t_1 + t_2 + \ldots + t_n}{n} \]

Several indexes are summarized, and multiple terminals of the measured airport are calculated according to the function, and the operation degree of connection between the area and the ground between the multiple terminals of the airport is calculated. If the index number
approaches 1, it means that the connection degree of the system is good.

3. Analysis of ground connection strategy of China’s hub airports

More terminal surface transportation system at present, in the space and transport as the main system structure of the hub airport, in the aspect of space is divided into the airport to connect with the outside world as cities in and out of the airport system, embodied in the internal space, consisting of ground traffic facilities and cohesion respectively the landside traffic system between different terminal system and empty side cohesion system, including the landside cohesion system into the road and rail cohesion, cohesive relies mainly on the empty side of the empty side MRT and empty side shuttle buses. For a more intuitive and clear display, see figure 2

FIG. 2 ground connection system of multi-terminal hub airport

It can be seen from the above that hub airports adhere to the optimization criteria of traffic connection under comprehensive conditions. As a hub airport with three functions of warehousing connection and traffic access, it should exert the minimum cost to connect and achieve traffic efficiency with great advantages. Ties in with the rest of the hub airport ground to adhere to in the interconnectedness, smooth general characteristic, reliability, convenience for the principle, to set up cluster center in passenger travel in the beginning to the end, according to the travel route is determined by factors based on spatial distribution, in the principle of the smooth general characteristic, with passenger hub airport should be fully considered during the travel, time mobile connectivity issues, solve the smooth general characteristic. Horizontal and vertical thinking should be established to analyze the overall situation of the transport network and fundamentally eliminate the cross-delay caused by traffic aggregation. When the above conditions are met, the service of passengers in travel should be fully considered to ensure the convenience and convenience of passengers. Based on this, under the supervision of the comprehensive system, the traffic control departments should communicate with each other, do a good job in the coordination of multiple departments, and pay more attention to the coordination of multiple interests, so as to ensure the coordinated development of legislation and the market, and build a comprehensive transportation network to ensure its coordination.
4. Conclusion
Through in this paper, the current in the terminal area more under the background of hub airport transit system development in related research, first put forward to solve the traffic and demand relationship, the ground connection from the airport to ensure that in aviation demand situation, there are good road conditions, meet the demand of passengers, the use of information technology, make effective rules to ensure management, public transport as a way to solve traffic congestion. Hope this article can offer help for its future development.

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