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Research on Enhancing Service Competitiveness in Air Transport Industry: Evidence From China Southern Airlines

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Abstract
Improving service competitiveness in air transport industry is closely connected to expand passage throughput of airport which is linked with increasing passenger traffic volume of their major airlines through improving service quality and decreasing passenger complaint. This paper uses the ordinary least square (OLS) model to analyze the correlation between numbers of passenger complaint and passenger traffic volume of airlines based on the data of China Southern Airlines from January 2012 to August 2018. The results show that there is a significant negative correlation between numbers of passenger complaint and passenger traffic volume of airlines, that is, the more the passenger complaint is, the less the passenger traffic volume of airlines will be. The significance of this study is to demonstrate that increase passenger satisfaction through decreasing the numbers of passenger complaint is a sustainable driving force to enhance service competitiveness in air transport industry in the long run.

Key words: Service competitiveness; Passenger throughput of airport; Numbers of passenger complaint; Passenger traffic volume of airlines

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INTRODUCTION
The competitiveness of airport service refers to the ability of airport to provide customers with higher quality products and better services than competitors by integrating internal and external resources in the process of market competition (Liang et al. 2016). Service competitiveness has become an important part of the comprehensive competitiveness of air transport industry and directly impacts on the core competitiveness - passenger throughput of airport. Particularly, when freight throughput only accounts for 10% of the total throughput of airport in general, passenger throughput becomes a key indicator to measure the operational efficiency of airlines and to reflect the volume and scale of operation of airport, and is also the fundamental for the sustainability of airlines' competitiveness (Zhao, 2003).

There is mutualistic relationship between service competitiveness and passenger throughput of airport. Generally, the passenger throughput of airport relies closely on the service competitiveness of airlines. The stronger the service competitiveness of airlines is, the larger the passenger throughput of airport will be. Currently, the passenger throughput of many airports is rapidly expanding in mainland China. It implies that competition among airports and their subordinated airlines would be more intensive. Some airports with powerful position might face challenge of ranking competition.

The main competitive advantages of the top three of passenger throughput (excluding Hong Kong), Baiyun airport in Guangzhou, for example, has been heavily depending on the irreplaceable location, advantages of transportation hub and increasing investment (Cui et al. 2013). To keep and expand the passenger throughput, it is necessary to enhancing service competitiveness of airlines at this airport. Baiyun airport is the base of China Southern airlines which accounts for one-third of the market share of Chinese civil aviation transportation and more than half of passenger volume of this airport with the largest

number of aircraft, the most intensive air network and the largest annual passenger transport volume. Moreover, the transfer capacity of the transport alliance based on China Southern Airlines accounts for more than 90% of the total passengers transfer at Baiyun airport (Wind, 2018). The service quality of China Southern Airlines can typically reflect the service competitiveness both at Baiyun airport and in air transport industry in a large extent.

The aim of this paper is to demonstrate the impact of service quality on passenger throughput by examining the correlation between passenger service quality of China Southern Airlines and their passenger throughput, so that enhancing sustainable service competitiveness for airlines and air transport industry.

1. LITERATURE REVIEW AND HYPOTHESES

There are few studies on the service competitiveness of air transport industry and mainly focus on the definitions and index system of evaluating airport competitiveness.

The existing literature has analyzed the concept of competitiveness of air transport industry from different dimensions. Peng et al. (2011) defined the airport competitiveness as the comprehensive advantages of obtaining, integrating and utilizing internal and external resources in the process of participating in the competition of air transport markets through better adapting to the environment, providing customers with higher service quality and increasing benefits for itself. Cheng et al. (2012) considers airport competitiveness as a comprehensive index which includes attractiveness to scarce resources and influence on the surrounding regions. Liu (2005) sums up the competitiveness of the service industry according to the comparative advantages, competitive situation and impact factors in different regions from the perspective of service industry competitiveness. Peng et al. (2011) points out that service quality of airport means the general ability of the hub airport to meet the specific or implicit needs of consumers. Wang et al. (2007) believes that the service competitiveness of airport involves the core competitiveness of cabin, such as cabin facilities, equipment, service brand, brand characteristics and personalized brand services.

The competitiveness of air transport industry is usually evaluated by the competitiveness index system. Peng et al. (2011), Park (2003) and Ye et al. (2011) constructed the index system, including service quality, demand, airport facilities, operation management, regional space, network connectivity, development environment and so on. Cui et al. (2013) takes passenger throughput as an important indicator of airport competitiveness. Peng et al. (2011) proposes that the indicators of airport service quality involve the satisfaction and safety level of airline, passenger and cargo owner. The index of passenger satisfaction involves satisfaction degree of passengers to airport ticketing, check-in, waiting and other services.

However, these kinds of indicators just focus on the frame and contents but lack relevant subsystem to provide quantitative analysis for specific indicators (as shown in Figure 1). For example, what quantitative indicators are suitable for reflecting passenger satisfaction? Although some studies report passenger satisfaction according to questionnaire investigation, the accuracy may be impacted by surveying numbers of people, specific groups and scheduled time. In addition, the correlation between indicators cannot be clearly shown due to the relatively independent division of the index system. For instance, is there any correlation between passenger throughput of airport and passenger satisfaction? What indicators could be applicable for assessing the correlation between airport passenger throughput and passenger satisfaction?

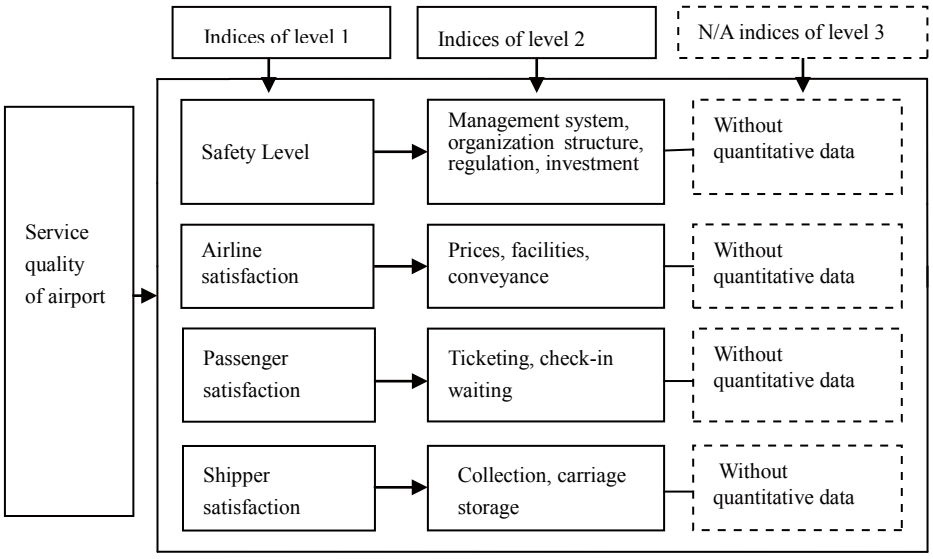

Figure 1
Classification of Index System

To supplement the deficiency of existing literature, this paper takes the total number of passenger complaint as a sub-index to reflect passenger satisfaction based on the statistical data of Civil aviation administration of China about China Southern Airlines and tries to analyze the correlation between passenger throughput of the airlines at base airport and passenger satisfaction by applying the ordinary least square (OLS) model.

Meanwhile, according to current studies, establishing the index system of airport competitiveness is favor of systematically evaluating the airport competitiveness as a whole. Moreover, some studies on airport competitiveness have emphasized that satisfying consumer demand and improving service quality are the fundamental to improve airport competitiveness. In other words, the passenger dissatisfaction will impact on the passenger throughput of airport with decreasing passenger traffic volume of its airlines. Therefore, we take China Southern Airlines as the typical case and analytical focus, and propose the following assumptions:

H1: The passenger traffic volume of China Southern Airlines is negative correlated to the total number of passenger complaint. The more of passenger complain is, the less of airlines' passenger traffic volume will be.

According to the ranking of passenger complaints against airlines, China Southern Airlines have long been around the top three among all large-sized and middle-sized airlines in regarding to problems of flight delay and boarding except for a few months (CAAC, 2018). Thus, we assume that:

H2: The passenger traffic volume of China Southern Airlines is negative correlated to the numbers of passenger complaint about problems of flight delay and boarding.

Based on passengers' keeping complain about the problems of baggage damage and loss of China Southern Airlines, this paper proposes hypothesis 3：

H3: The passenger traffic volume of China Southern Airlines is negative correlated to the numbers of passenger complaint about problems of baggage.

2. DATA SOURCES AND VARIABLE DESCRIPTION

2.1 Data Sources

The data of passenger traffic volume, domestic seat rate, available seat kilometers and abnormal flight of China Southern Airlines are obtained from the Wind database. We collect the data of number of passenger complaint to China Southern Airlines from the published official database: Civil aviation administration of China. The above collected date is on the monthly based with a total of 80 samples from January 2012 to August 2018. This paper eliminated the data before 2011 so that accurately reflect the real situation from the research samples. We analyzed data by STATA 12.0.

2.2 Variable Description

Dependent variable: Passenger Traffic Volume (PTV). This paper selects the passenger traffic volume (PTV) of China Southern Airlines as the dependent variable. Passenger Traffic volume of airlines constitutes an important part of passenger throughput of airport and shows the service competitiveness of the latter.

Independent variables: Total Complaint of Passengers (TCP). Passenger satisfaction is an index to be used to measure the competitiveness of airport services in the existing literature. To quantify passenger satisfaction, this paper chooses the total complaint of passengers (TCP) as an independent variable. The TCP includes all kinds of passengers' complain, in particular, flight delaying and boarding (CFDB) and luggage (CL). Because the complaint categories of CFDB and the CL are continuous and more than others.

Control variables: To control the factors that may impact on the volumes of passenger transport and passenger complaint of Southern Airlines, we introduce the following control variables: domestic available seat kilometer (DASK), domestic guest seat rate (DGSR) and abnormal flight (AF).

Table 1 shows the descriptive statistics for main variables. After all of variables are taken by logarithm, the mean value of the dependent variable, passenger transport volume (Ln*PTV*) of Southern Airlines, is 6.491. Among the independent variables, the mean value of total passenger complaints (Ln*TCP*) is 3.835, the values of minimum and the maximum are 2.197 and 6.028, respectively. The mean value of passengers' complaints about flight delay and boarding (Ln*CFDB*) is 3.305, the values of minimum and the maximum are 0.693 and 5.660 separately. The mean value of complaints about baggage problems (Ln*CL*) is 1.699. These messages indicate that the number of complaints about flight delay and boarding is higher than the others.

Table 1
Descriptive Statistics of Main Variables

Variable	Mean	SD	Minimum	Median	Maximum
Ln(*PTV*) (Thousands of people)	6.502	0.127	6.221	6.528	6.802
Ln(*TCP*) (Number of times)	3.835	1.091	2.197	3.383	6.028
Ln(*CFDB*) (Number of times)	3.305	1.161	0.693	3.020	5.660
Ln(*CL*) (Number of times)	1.699	0.943	0	1.609	3.871
Ln(*AS*) (Kilometers of million passenger)	9.539	0.162	9.224	9.548	9.884
Ln*(DGSR*) (%)	4.389	0.027	4.320	4.388	4.464
Ln*(AF)* (Number of times)	9.418	0.310	8.739	9.402	10.150

3. MODELS AND RESULTS

3.1 Models

This study applies the ordinary least squares (OLS) regression model to test hypotheses. We establish the model (1) to examine H1.

$$PTV = \beta_0 + \beta_1 TCP + \beta_2 X + \mu \quad (1)$$

Where PTV is a dependent variable and presents the passenger traffic volume; TCP is an independent variable and means the total complaint of passengers; X is the control variable in which includes domestic available seat kilometer (DASK), domestic guest seat rate (DGSR) and abnormal flight (AF); and μ is random error term.

To test H2, the model (2) is introduced.

$$PTV = \beta_0 + \beta_1 CFDB + \beta_2 X + \mu \quad (2)$$

Where PTV is a dependent variable and presents the passenger traffic volume; CFDB is an independent variable and indicates passengers' complaining about flight delaying and boarding; X is the control variable in which includes DASK, DGSR and AF.

The model (3) is used to test H3.

$$PTV = \beta_0 + \beta_1 CL + \beta_2 X + \mu \quad (3)$$

Where PTV is a dependent variable and presents the passenger traffic volume; CL is an independent variable and means passengers' complaining about luggage; X is the control variable in which includes DASK, DGSR and AF.

If the coefficients β_1 of TCP, CFDB and CL are negative, they imply that passenger complaint has a reduction effect on passenger traffic volume of airlines.

3.2 Regression Results

Table 2 shows that the passenger traffic volume of Southern Airlines is significantly affected by complaint of passengers when variables of seat kilometers, passenger seat rate and abnormal flights are controlled. Obviously, all of the independent variables are negative and statistically significant at the level of $P < 0.001$. The total passenger complaints are negatively correlated with the passenger traffic volume of Southern Airlines. The coefficient of TCP is -0.122 and statistically significant at the 1 % level. It means that, with other variables holding constant, a 1% increase of total complaint of passengers will lead to a 0.122 % decrease of passenger transport volume of airlines. Therefore, H1is confirmed. Furthermore, a 1% increase in passengers' complaint about problems of flights and boarding will drop passenger transport volume of airlines by 0.156%. There is a significant negative correlation between the PTV and CFDB (coefficient = -0.156; $p < 0.001$) and thus verifies hypothesis 2. Moreover, there is a significant negative correlation between passenger complaints about baggage problems and passenger throughput of airlines (coefficient = -0.887; $p < 0.001$). It implies that a 1% increase in passenger complaint about baggage problems may lead to decrease 0.887% of passenger transport volume. Thus, assumption 3 is supported.

The empirical results illustrate that the numbers of passenger complaints has a deterrent impact on passenger traffic volume of airlines due to the coefficients of TCP, CFDB and CL are negative.

Table 2
Regression Results for the Correlation Between Numbers of Passenger Complaint and Passenger Traffic Volume of Airlines

Variables	Model (1)	Model (2)	Model (3)
Constant	-424.1** (-3.19)	-410.0** (-3.02)	-440.1** (-3.30)
Control variables			
AS	0.033***(11.19)	0.033*** (11.10)	0.032*** (11.62)
DGSR	7.654*** (3.54)	7.558*** (3.46)	8.163***(3.83)
AF	0.002** (3.04)	0.002** (3.02)	0.001 (1.99)
Independent variables			
TCP	-0.122***(-4.34)		
CFDB		- 0.156*** (-3.65)	
CL			-0.887*** (-3.90)
Observations	79	79	79
F	529.5	503.5	508.8
R^2	0.928	0.926	0.924

Note. Values in brackets expresst-statistic.
***,** and * indicate that the coefficient is significant at the levels 1%, 5% and 10%, respectively.

CONCLUSION

This paper confirms that there is a significant negative correlation between passenger transport volume of airlines and the number of passenger complaint. The findings of this empirical results indicate that the amount of passenger complaint reflects the necessity to improve service quality and to increase passenger satisfaction. If Airlines account for a major share of the airport, the overall passenger throughput of the airport will be impacted.

In order to improve passenger satisfaction and to enhance service competitiveness at airport, some marketing strategies of airlines may need to be shifted from traditional increase investment alone or lower price competition with other airlines to meet passenger

various needs and to provide better services. In addition, it is important to improving the index system of airport services competitiveness. For example, taking the total of passenger complaint as a sub-index can supplement the index system of service competitiveness. Based on current literature, the index system of airport service competitiveness is divided into two levels. To reach the goal of improving the overall service competitiveness, it is necessary to take passenger complaint as the level three indicator so that provide quantitative data of passenger satisfaction for the indicators of level one and level two.

The significance of this study is to demonstrate that increase passenger satisfaction is a sustainable driving force to enhance service competitiveness in air transport industry in the long run. The limitation of this article is associated with taking China Southern Airlines as a unique analytical case. In fact, there are a lot of factors and index that may influence on passenger traffic volume of airlines. Further research may be engaged in exploring the multiple factors and index system which may impact on passenger throughput of airport and passenger traffic volume of airlines, so that provide a strategical package for improving service competitiveness in air transport industry.

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