

Evaluating A City's Regional Competitiveness Through An Airport's Angle

The Yangtze River Delta Cluster Case

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Abstract

In the 21st century, driven by economic globalization and speed economy, airports have become key nodes in global production and enterprise systems offering them speed, agility, and connectivity. They are also powerful engines of local economic development, attracting aviation-linked businesses and multinational companies of all types to airports and their peripheral areas. As the increasing number of cities participate in this competition for the aviation economy, it becomes increasingly necessary to reevaluate the competitiveness of cities from the unique perspective of airports. This paper uses the 'Global Aerotropolis Rating Index' as the research tool to research 27 cities in the Yangtze River Delta identified to develop its comprehensive competitiveness from five dimensions, namely airport operation scale, integrated transport and intercity connections, economic and industrial levels, human and social living standards, and external-oriented economic base. Through the study, we find airport development has a positive impact on a city's regional connectivity, economic development, human and social living standards. This paper aims to re-examine the competitiveness of cities from the perspective of airports, assisting the government in strategic decision making and mechanism innovating, and help enterprises to invest and deploy reasonably.

Keywords

Airport, City's Competitiveness, Global Aerotropolis Rating Index, Yangtze River Delta Cluster

1. Introduction

In this era of globalization, airports and their peripheral areas have become important centers of global producer services and commercial activities, promoting local and regional economic development, and ideal commercial and industrial destinations, propelling economic growth of metropolitan areas in the 21st century. Based on the relevant theoretical research findings on the impact of airports and their peripheral areas on cities, this paper articulates the importance to evaluate a city's competitiveness from the perspective of the airport. 'Global Aerotropolis Rating Index' (henceforth referred to as GARI) is used as the research tool and 27 cities in the Yangtze River Delta are selected as the research objects to discuss how a city's comprehensive competitiveness grows driven by the airport. Furthermore, detailed suggestions on soft and hard infrastructure construction for the selected cities are given as a reference

for the local government regarding strategic decision making, institutional innovation, and investment and business site selection guidance.

2. Research Background

With the studies on the airports' impact on cities deepening, a series of concepts such as 'airport economy', 'airport city' and 'Aerotropolis' have been proposed. The influence of the airport is no longer limited within the airport fence, which gives rise to the aforementioned concepts.

American scholar Conway proposed the concept of 'airport economy' and pointed out that the development plan for future cities and metropolitan areas should focus on the development of the airport economy (Conway, 1980). Conway (1993) clearly defined the concept of 'airport city' in his book 'Airport Cities: The New Global Transport Centers of the 21st Century': an airport city is a development area centered around an international airport and taking air transport service as the main economic pillar to include import-induced, related, and depended industries in general planning, and also a multifunctional composite development area integrating commerce, manufacturing, international exchanges, leisure, shopping, and housing.

Prof. Kasarda (1991) proposed the 'Fifth Wave' of transit-oriented urban development, which served as the basis for his Aerotropolis Theory. After sea transport in the 17th century, river and canal transport in the 18th century, railway transport in the 19th century, and highway transport in the 20th century, air transport, which can meet the requirement for long-distance, wide space and high time efficiency in international trade has become a pivotal force driving the development of global central cities and the rapid rise of modern and international economic central cities in the 21st century. Based on the Fifth Wave theory, Kasarda (2000) formally put forward the Aerotropolis Theory and pointed out that airports and their peripheral areas have become important shopping, entertainment, and meeting destinations, and the central business district of the metropolitan area.

In China, Prof. Cao (1999) translated and proposed the concept of 'airport economic zone', explaining it as the agglomeration of production, technology, capital, trade, and population around the airport promoted by the huge benefits from air transport, which promotes the city development. Major cities, in the world such as the Charles de Gaulle-Le Bourget Development Corridor in Paris, the Dulles Corridor in Washington, the Mainport project at the Schiphol Airport, and the Songdo New Town project in Incheon, are actively promoting urban development by airports, constructing airport-related projects based on relevant theoretical research on Aerotropolis (Kasarda, 2011). By 2021, China has approved the development of 17 national airport economic zones at airports including Shunyi Airport and Daxing Airports in Beijing, Hongqiao Airport in Shanghai, Xinzheng Airport in Zhengzhou, Baiyun Airport in Guangzhou, Shuangliu Airport and Tianfu Airport in Chengdu. As an increasing number of cities participate in this competition for the aviation economy, it becomes increasingly necessary to reevaluate the competitiveness of cities from the perspective of airport and Aerotropolis development.

3. Global Aerotropolis Rating Index, a Method for Evaluating City's Competitiveness Impacted by Airport

3.1. Global City Evaluation System

In the academic field, there are various index systems and approaches to evaluate a city's competitiveness. Some focus on the sustainability and livability of cities and human living standards, such as the 'Asian Green City Index' proposed by Siemens and the Economist Intelligence Unit to evaluate the

environmental performance of major Asian cities, and the 'Urban Indexes Program' of the UN-Habitat (Yu, 2015), mainly to monitor and evaluate the implementation of the 'Habitat Agenda' and the 'Millennium Development Goals' among global cities. Some consider the comprehensive strength or development potential of cities, such as the 'Global City Index' jointly released by Kearney and the Chicago City Council (Kearney and Policy, 2006), and the 'Global City Competitiveness Index' developed and released by the Economist Intelligence Unit, which covers eight fields to evaluate a city by its capacity to attract capital, businesses, talents and tourists.

A city's competitiveness demonstrates its integrated capacity. In today's aviation-driven era, this paper uses GARI to measure city competitiveness from the perspective of airports.

The core variables and elements of GARI are obtained by refining and summarizing the above-mentioned mainstream global city systems and indexes, focus on efficiency, connectivity, and internationalization (Sun and Ma, 2020). The GARI reevaluates the global cities' performance and competitive advantages using dynamic factors such as the impact of airports and aviation activities on city competitiveness, airport and airport peripheral economic factors and 'speed economy' factors.

3.2. Global Aerotropolis Rating Index (GARI)

GARI is divided into five dimensions, namely airport operation scale, integrated transport and intercity connections, economic and industrial levels, human and social living standards, and external-oriented economic base, which are the first-level indexes of GARI. The second and third-level indexes are selected under the five dimensions. The second-level indexes have no weights and are only used to interpret the first-level indexes. The score for each third-level index is calculated by principal components analysis (PCA), and finally the score for the first-level index is obtained by summarizing the analysis and evaluation on the index contribution through PCA based on the dimension reduction method.

Dimension	Element Layer
A Airport operation scale	A1 Airport operation scale A2 Intercity transportation
B Urban integrated transportation and Intercity connections	B1 connectivity B2 Types of traffic operation scales B3 transportation infrastructure
C The level of city economic and industry	C1 City economic scale C2 Economic structure C3 International economic influence
D Human and social living standards	D1 Human living standards D2 Social and cultural standards
E External-oriented economic base	E1 External-oriented economic base

Table 1. A Sample of the GARI System (First and Second-Level Indexes). Source: Author

The evaluation method is demonstrated in the case study below.

4. Research Objects: 27 Cities over the Yangtze River Delta Cluster

The Yangtze River Delta region is one of the three major metropolitan areas in China and one of the six major urban agglomerations in the world. The region plays a significant role in China's comprehensive modernization and all-around opening-up strategy. As the core of the Yangtze River Delta, Shanghai has been driving the growth of neighbor central cities and influencing their peripheral cities, forming a hierarchical development of urban agglomeration (Wei, 2017). It is a typical case of regional urbanization (Soja, 2014), characterized by regional economic integration (Guo and Deng, 2019), population agglomeration, efficient cross-regional employment (Elsner, 2013), efficient transport (Liu and Wu, 2017), centralization of nine major international airports, and efficient connection to global cities.

The Yangtze River Delta region is an important region in China both economically and politically, but cities in this region are at different development stages. For exploring the impact of the airport on city competitiveness, this paper selects 27 cities in the Yangtze River Delta as the research objects, discusses the development of each city from the GARI perspectives, and assesses how the airport influences the city's development. The distribution of airports in the extensive Yangtze River Delta region is complex, and most major cities in this region have airports. Shanghai has dual-hub airports, while ten cities including Suzhou, Jiaxing, and Huzhou have no airports. The following map shows the distribution of the airports.



Figure 1. Airport Locations. Source: Author

City	The Airport	City	The Airport
Shanghai	Hongqiao International Airport Pudong International Airport	Wuxi	Wuxi International Airport
Hangzhou	Xiaoshan International Airport	Nantong	Xingdong International Airport
Jiaxing	N/A	Taizhou	N/A
Huzhou	N/A	Yancheng	Nanyang International Airport
Shaoxing	N/A	Hefei	Xinqiao International Airport
Ningbo	Lishe International Airport	Wuhu	Xuanzhou Airport
Zhoushan	Mount Putuo Airport	Chuzhou	N/A
Jinhua	Yiwu Airport	Ma'anshan	N/A
Taizhou	Luqiao Airport	Tongling	N/A
Wenzhou	Longwan International Airport	Chizhou	Jiuhuashan Airport
Nanjing	Lukou Airport	Anqing	Tianzhushan Airport
Zhenjiang	N/A	Xuancheng	N/A
Suzhou	N/A	Changzhou	Benniu Airport
Yangzhou	Yangzhou Taizhou International Airport		

Table 2. Cities and airports in the Yangtze River Delta Cluster. Source: Author

5. City's Competitiveness Evaluation

The 5 first-level indexes of 27 cities in the Yangtze River Delta are weighted and calculated by GARI. The scores of the five dimensions are summed and weighted to acquire the final score and comprehensive ranking of each city, and the result is as follows:

Ranking	City	All	Airport Operation Scale	Transportation and Connection	City Economic and Industry	Human and Social Living Standards	External-oriented Economic Base
First Echelon							
1	Shanghai	6.51	7.00	6.61	5.43	7.00	7.00
Second Echelon							
2	Hangzhou	4.06	4.29	6.18	2.44	5.07	1.14
3	Ningbo	3.32	2.59	5.41	1.56	4.49	3.50
4	Nanjing	3.08	3.19	4.10	2.08	4.75	0.98
5	Wuxi	2.77	2.85	3.72	1.84	4.09	1.13
6	Nantong	2.68	2.64	4.25	1.30	4.52	0.51
7	Suzhou	2.59	1.78	3.01	2.76	3.28	2.84
8	Wenzhou	2.55	2.62	4.45	0.90	3.87	0.38
9	Hefei	2.51	2.13	4.98	1.62	1.84	0.39
Third Echelon							
10	Jinhua	1.96	2.06	2.82	0.68	3.62	1.08
11	Changzhou	1.96	1.84	2.80	1.09	3.85	0.49
12	Taizhou	1.95	1.71	3.38	0.88	3.73	0.01
13	Shaoxing	1.89	2.09	2.24	0.89	4.29	0.50
14	Jiaxing	1.88	1.91	2.92	0.76	2.96	0.98
15	Huzhou	1.75	2.08	2.77	0.49	2.94	0.17

16	Yancheng	1.73	2.09	3.10	0.93	0.86	0.11
17	Zhenjiang	1.63	2.20	2.22	0.58	2.69	0.01
18	Ma'an shan	1.55	2.62	1.87	0.31	2.18	0.05
19	Yangzhou	1.47	1.54	2.45	0.81	1.77	0.13
20	Zhoushan	1.40	1.96	1.23	0.35	3.93	0.27
21	Anqing	1.39	2.00	2.63	0.48	0.17	0.01
22	Taizhou	1.30	1.72	1.77	0.50	2.01	0.17
23	Chuzhou	1.27	1.75	2.47	0.46	0.09	0.04
24	Chizhou	1.04	1.79	1.82	0.14	0.08	<0.01
25	Wuhu	1.03	0.84	2.01	0.58	1.26	0.08
26	Xuancheng	0.99	1.24	1.86	0.27	0.94	0.01
27	Tongling	0.65	1.25	0.56	0.20	0.80	0.08

Table 3. City Ranking of the Yangtze River Delta Cluster under GARI. Source: Author

In the Yangtze River Delta, Shanghai ranks first with 6.51 points, which is 2.45 points higher than that of the second-ranked Hangzhou. Shanghai is the most competitive city as it is far ahead of other cities in both competitiveness under each dimension and overall competitiveness, demonstrating its overwhelming superiority in the Yangtze River Delta region.

Hangzhou, Ningbo, Nanjing, Wuxi, Nantong, Suzhou, Wenzhou and Hefei in the second echelon, are also highly competitive cities but not much developed in human and social living standards and external-oriented economic base. Suzhou has no airport but is conveniently linked with Wuxi International Airport and Shanghai Hongqiao International Airport, so it stands high on the list depending on its location advantages and economic and industrial foundations.

Other cities are in the third echelon, as their city competitiveness is far lagged by cities in the first and second echelons, particularly in terms of comprehensive urban transport, intercity connections and urban economic and industrial levels.

5.1. Airport Operation Scale

Airport operation scale and connectivity are the core driver of the airport-related economy (Lu, 2008) (Liu, 2009). With great passenger and cargo transport capacities, the hub function of the airport and its surrounding area will be strengthened. In addition, airports with a large airline network will bring much more resources and better boost the airport economy and urban development of the region than those with limited airline connections. **The operation scale of an airport relates to two second-level indexes, its operation scale and intercity transportation**, and 10 third-level indexes including the passenger throughput, the cargo throughput, the international passenger throughput, the total number of international cities with direct flights, the population covered by a one-hour flight circle.

As there are no airports in some cities, the rating index of the airport operation scale is fixed in different considerations. (1) For cities without airports such as Suzhou, Zhenjiang, and Ma'an shan, the operation scale is measured with data of the nearest airport and the weights will be adjusted based on the travel time and distance. For example, data of Xiaoshan International Airport is used for Huzhou and data of Lukou International Airport is used for Zhenjiang; (2) for a city with more than one airport nearby, the sum of data of all airports in the city's half-hour economic circle will be counted in. For example, the data of Shanghai Hongqiao International Airport and Wuxi International Airport are summed up to calculate the score of Suzhou under this index.

The result shows that the exclusive and absolute advantage of dual-hub airports pushes Shanghai to be the topmost, followed by Hangzhou. In recent years, speaking of passenger throughput, Hangzhou Xiaoshan International Airport has been growing and is now only second to Pudong International Airport

and Hongqiao International Airport in the Yangtze River Delta region. The two airports in Shanghai are nearly saturated, and the third airport is still unscheduled. Thus, Xiaoshan Airport takes over some of its air traffic. Behind Hangzhou are Nanjing, Wuxi, Nantong, Wenzhou, Ma'anshan and Ningbo. To execute the strategy of building a world-class airport cluster in the Yangtze River Delta, Nanjing, Ningbo, Nantong, and Wuxi are given more opportunities. To be specific, the construction of the 'third airport in Shanghai', as well as the continuous improvement of the comprehensive transportation system, is a good opportunity for Nantong to develop the airport economy and better integrate with the coordinated development of the Yangtze River Delta region. Suzhou, Huzhou, and Jiaxing have no airports, but they are also high on the list because there are airports within their half-hour economic circles. For example, Suzhou is near Wuxi International Airport and Shanghai Hongqiao International Airport, so the city is more competitive than other cities at the bottom of the list.

5.2. Urban Integrated Transportation and Intercity Connections

Efficiency is the core component of a city's competitiveness. The connection speed among the airport and other transportation facilities and urban areas is the basis for efficient economic development, directly related to the cost friction of space and time, and determining the efficiency of cooperation among enterprises. Speed, agility, and connectivity that aviation offers translate into connective advantages to boost globally network and time-critical environment. With time not only a cost, but also currency for modern globally-oriented firms, speedy physical connectivity to distant suppliers, customers, and enterprise partners becomes essential to the success of the global business and the investment (Kasarda, 2019).

The integrated transportation and intercity connections of a city relate to three second-level indexes namely airport-city connectivity, transport scale and transport infrastructure, and ten third-level indexes including air-rail connectivity, passenger and cargo transport volumes in different models, rail transit density, urban transport infrastructure investment, etc.

The result shows that Shanghai ranks first in urban integrated transport and intercity connections, followed by Hangzhou, which is outstanding in the total passenger and cargo transport volumes. Ningbo, Hefei, Wenzhou, Nantong, and Nanjing stay top on the list because their score in the airport transport convenience index is relatively high. Chizhou, Taizhou, Zhoushan, and Tongling are at the bottom of the list due to extremely low highway density.

5.3. Urban Economic and Industrial Levels

The airport and its surrounding area attract high-value industries, high-value business people, and high-level talents, which contributes to GDP growth and employment assets of the city and matters for the city's competitiveness. (Sun, Jin and Cao, 2006) (Cao and Shen, 2013). The city's economic and industrial levels are analyzed and evaluated by three second-level indexes namely 'scale of the economy', 'economic structure' and 'talent and employment level', and third-level indexes such as GDP, GDP per capita, the proportion of the tertiary industry, the number of Fortune 500 companies, the number of high-level talents and other third-level indexes.

The result shows that Shanghai tops the list with its absolute advantages in 'GDP', 'employment' and 'the number of high-level talents', catalyzing the economic and industrial development of the Yangtze River Delta region. Suzhou, Hangzhou, Nanjing, Wuxi, Hefei, and Ningbo have sound economic and industrial foundations, showing relatively advanced economic and industrial development. Other cities do not show many edges in urban economic and industrial development.

5.4. Human and Social Living Standards

A prosperous airport catalyzes employment growth, international exchanges and industrial cooperation, and further promotes the enhancement of livability and the social environment of the surrounding area. The airport is designed as a hub for passenger and cargo transport, and it will become the center of information flow. Chinese scholar Wang pointed out that the increase in the volume of information will inevitably be synchronized with the increase in material flow and business opportunities, and will further inevitably promote the upgrade of cultural or artistic assets as well as the image of the region and the city where the airport is located (Wang, 2003). **Human and social living standards relate to two second-level indexes, namely human living standards and social-cultural level**, and three third-level indexes covering median per capita income, number of the star hotels, and exhibition economy development.

The result shows that Shanghai peaks over other cities and scored far higher under different indexes. Hangzhou, Nanjing, Nantong, Ningbo, Shaoxing, and Wuxi are ranked second to seventh on the list with many close scores between each other. Anqing, Chuzhou, and Chizhou are on the bottom. Under these indexes, provincial capital cities and tourism cities have relatively high ranks because of their advantages in the exhibition industry and the star hotel industry.

5.5. External-oriented Economic Base

In the integrated world today, regions around major airports are usually given many preferential opening-up policies, and the regional economy is simulated in all industrial branches. Leveraging the gateway function of an international airport, the export and import of the region will be promoted. The customs special supervision area will be developed. The region and the city where the airport is located will benefit more from an external-oriented economy (Wang, 2019). GARI selects the city import and export volume, development of customs special supervision area and governmental performance, to summarize the potential of the external-oriented economy.

The result shows that as an international financial center, Shanghai has an absolute advantage in this regard. Suzhou and Ningbo, closely following Shanghai, are also advantageous in the external-oriented economy based on higher 'port import and export volume'. As a city without an airport, Suzhou's high export and import volume and favorable government performance contribute a lot to its improvement of trade scale, which fundamentally undertakes more airport-related economic functions than other cities. Hangzhou, Wuxi, Jinhua, Jiaying, and Nanjing are also competitive on the list, ranking fourth to eighth respectively.

6. Conclusion

The competitiveness of cities in the Yangtze River Delta region impacted by airports is concluded as follows:

- (1) The 27 cities in the Yangtze River Delta are divided into three echelons as per their overall development. Shanghai is the only city in the first echelon, performing well in all dimensions. Cities in the second echelon are Hangzhou, Ningbo, Nanjing, Wuxi, Nantong, Suzhou, Wenzhou and Hefei, which are less developed in human and social living standards and open economic foundation. Other cities are in the third echelon, developing relatively slowly and with a large gap from the first and second-echelon cities.
- (2) Promoted by airports, cities with large airports are more competitive, for example, Shanghai by two airports, Hangzhou by Xiaoshan International Airport, Nanjing by Lukou International Airport, Ningbo by Lishe International Airport and Hefei by Xinqiao International Airport.

(3) Cities with small airports are less competitive in all the aforementioned four dimensions, and they are mostly in the third echelon, including Changzhou, Anqing, Chizhou, Wuhu, Jinhua, Zhoushan, Taizhou, et al. The airport scale, to some degree, determines the performance of a city under two indexes, the integrated transport and intercity connections, and the external-oriented economic base, so the overall competitiveness will be weakened as a result of the low scores in these two indexes.

(4) In the perspective of GARI, cities without airports, include Suzhou, Jiaxing, Huzhou, Shaoxing, Zhenjiang, Chuzhou, Ma'anshan, Tongling, and Xuancheng, are not competitive enough. Suzhou keeps competitive in the second echelon because of the geographical advantage of closing to Shanghai Hongqiao International Airport and Wuxi International Airport, and the advantages of the city's economic and industrial levels and external-oriented economic base.

Airport impacts a city's competitiveness from various perspectives. Cities with large airports are suggested to further boost the airport economy, upgrade their urban infrastructure and expand the opening-up initiatives. Cities with small airports are recommended to expand the old airports or built new ones, optimize the opening-up policies, and improve the local business environment and economic foundation. Cities with no airports may construct express rail and highway links to nearby airports to enhance their competitiveness.

This paper evaluates the competitiveness of 27 cities in the Yangtze River Delta region with GARI and finds that the airport development has a positive impact on the connectivity, economic development, human livability and opening-up policies of a city. By evaluating a city's competitiveness from the five dimensions of GARI, cities and regions may find their short slabs, and make more targeted policies and guidance. GARI, by evaluating the city competitiveness from the perspective of airports and Aerotropolis development, can help the government with their strategic decision and policymaking, and assist enterprises with their investment site selection and sustainable development.

References

- Cao Yunchun, & Shen Danyang. (2013). 'Research on the key elements of building an aviation metropolis with the airport as the core'. *Port Economy*, (1), p42-47.
- Cao Yunchun, and Zong Jiafeng. (1999). On the establishment and development of airport economic zone. *Journal of Civil Aviation University of China*, (03), p62-65.
- Conway, H. M. (1980). 'The airport city: development concepts for the 21st century'. *Conway Data*, p25-28.
- Conway, H. M. (1993). *The airport cities 21: the new global transport centers of the 21st century*. Norcross, GA: Conway Data.
- Elsner, B. (2013). 'Does emigration benefit the stayers? Evidence from EU enlargement'. *Journal of Population Economics*, 26(2), p531-553.
- Guo Hubin, and Deng Zhituan. (2019). 'Research on the high-quality development of regional economic integration in the Yangtze River Delta under the new normal. *Economics and Management*', 33(04), p22-30.
- Kasarda, J. D. (1991). 'The Fifth Wave: The Air Cargo Industrial Complex In Portfolio'. *A Quarterly Review of Trade and Transportation*, 4(1), p2-10.
- Kasarda, J. D. (2000). 'Logistics & the rise of aerotropolis'. *Real Estate Issues*, 25(4), p43-43.

- Kasarda, J. D. (2019). *Aerotropolis*. Wiley-Blackwell Encyclopedia of Urban and Regional Studies. [online]. Available at: http://Aerotropolis.com/airportcity/wpcontent/uploads/2019/07/UrbanRegionalStudies_2019 (Accessed: 01 February 2020)
- Kasarda, J. D., and Lindsay, G. (2011). *Aerotropolis: the way we'll live next*. Farrar, Straus and Giroux.
- Kearney, A. T., and Policy, F. (2006). Globalization index. *Foreign Policy*, 157, 74-81.
- Liu Naiquan, and Wu You. (2017). 'Can the expansion of the Yangtze River Delta promote the common growth of the regional economy'. *China Industrial Economy*, (06), p79-97.
- Liu Xueni. (2009). 'Research on the Impact of Airport Economy on Regional Economy: Taking Capital Airport Airport Economy as an Example'. *Economic Survey*, (03), p55-57.
- Lu-ying, S. H. E. N. (2008). 'Study on the development patterns of world airport economy'. *World Regional Studies*,17(3), p19-25.
- Soja, E. W. (2015). *My Los Angeles*. Berkeley: University of California Press.
- Sun Bo, Jin Liguu, and Cao Yunchun. (2006). 'Research on the mechanism of airport economy: Taking Capital International Airport as an example'. *Theoretical Discussion*, (06), p93-95.
- Sun, T., and Ma, S. (2020). 'The Global Aerotropolis Rating Index (GARI): Rethink a City's Global Competitive Advantages through the Aerotropolis Perspective'. *13th Asia Pacific Transportation Development Conference*, p228-236.
- Wang Wei. (2019). 'Analysis of the impact of opening the fifth navigation right on Xi'an's export-oriented economy'. *Journal of Xi'an Aviation Technology College*, 037 (002), 25-31,92
- Wang Xiaochuan. (2003). 'Analysis and Reference on the Development of International Airport Neighboring Areas'. *Urban Planning Transactions*, (3), p65-68.
- Wei Lihua. (2017). 'Comparison of internal factors of coordinated development of urban agglomerations: Beijing-Tianjin-Hebei and Yangtze River Delta'. *Reform* (07), p86-96.
- Yu Hongyuan. (2015). The eight index systems and function definitions of the world's comprehensive strength rankings. *Shanghai Urban Management*, 24(5), p4-5.