

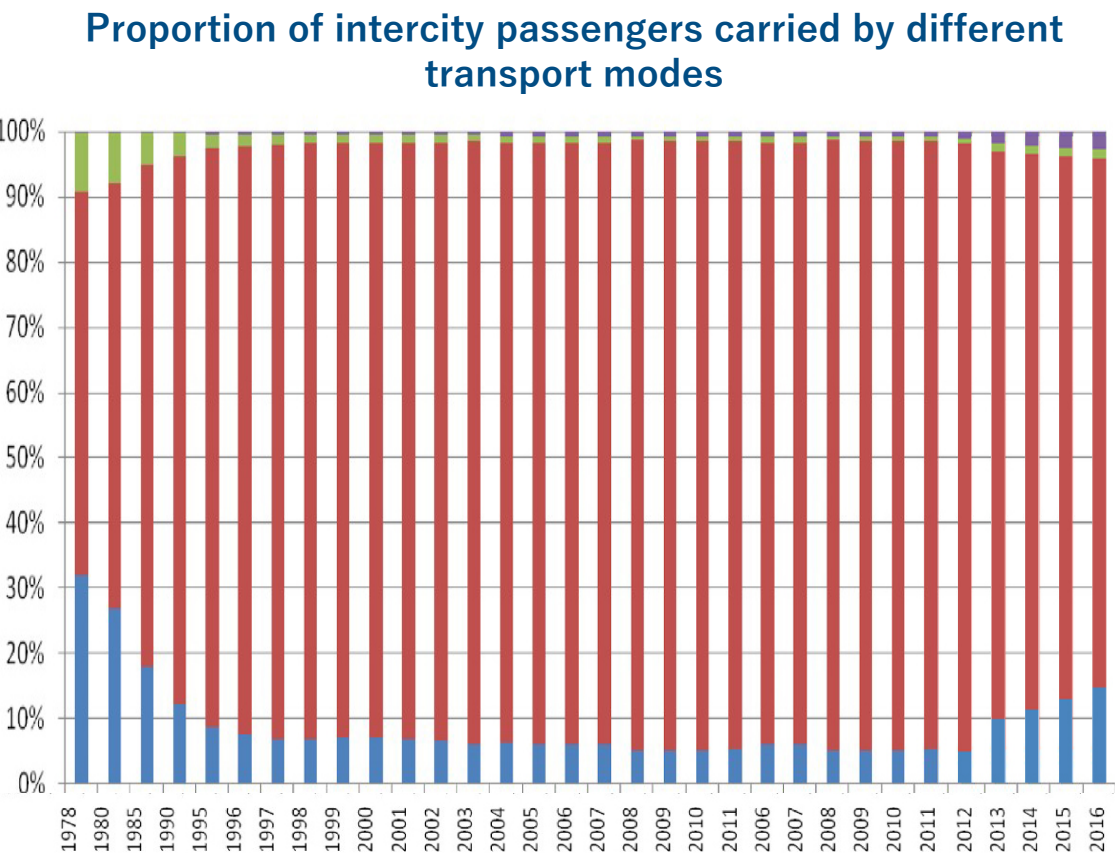
# HSR in China

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Prof. Haixiao PAN, Ya GAO  
Tongji University, 1239 Siping Road  
Shanghai 200092, China  
[hxpank@online.sh.cn](mailto:hxpank@online.sh.cn)

# Multi-modal intercity transport in China



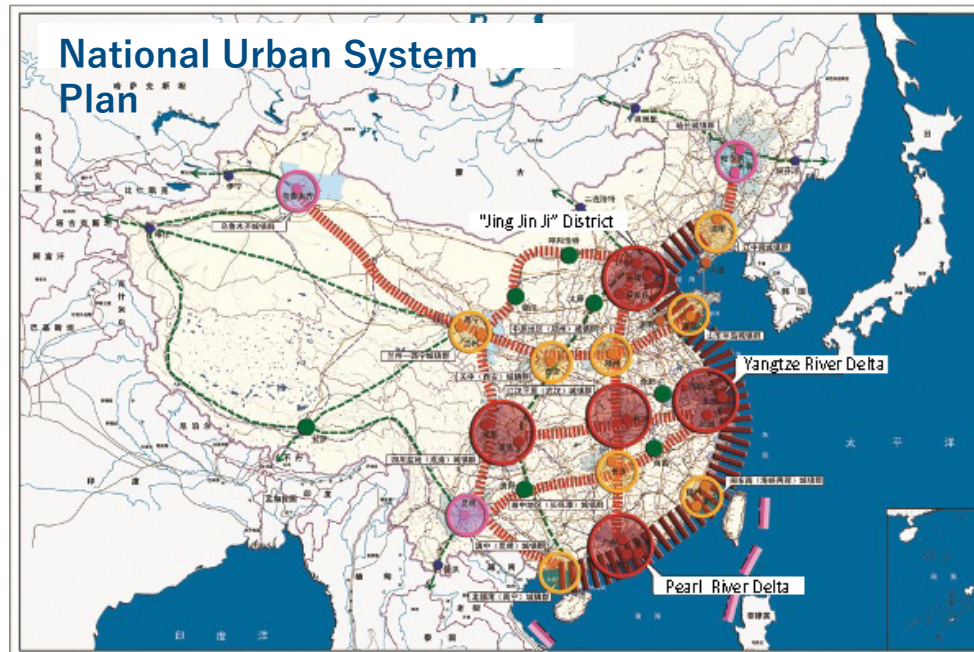
- The growth rate of rail passengers has an annual growth rate of 10% for the last decades
- After 2012 turning point of the share of rail passenger increasing.



(Source: Annual China Transport Statistical Year Book)

# HSR network planning and construction in China

## Regional Development Strategy of China

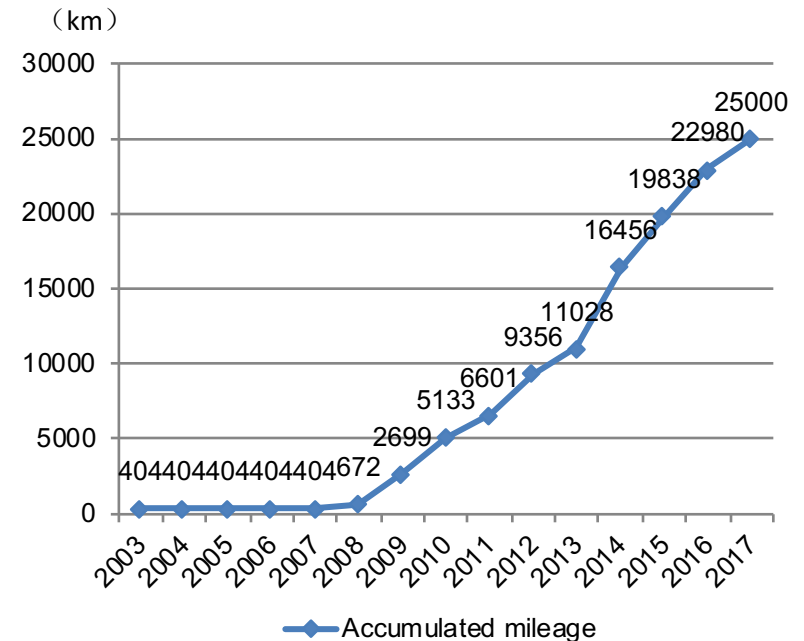


○ Metropolitan group ○ City and Town group ○ Border crossings group

Source: Ministry of Housing and Urban-Rural Development of the People's Republic of China.  
<http://www.mohurd.gov.cn/>

- By Jan 2018, the total mileage of HSR in China has reached 25,000 km.

## Mileage of HSR in China



Source: Annual China Railway Statistical Report  
<http://www.mot.gov.cn/>



# China's Regional HSR Network Plan ( 长三角与珠三角 )

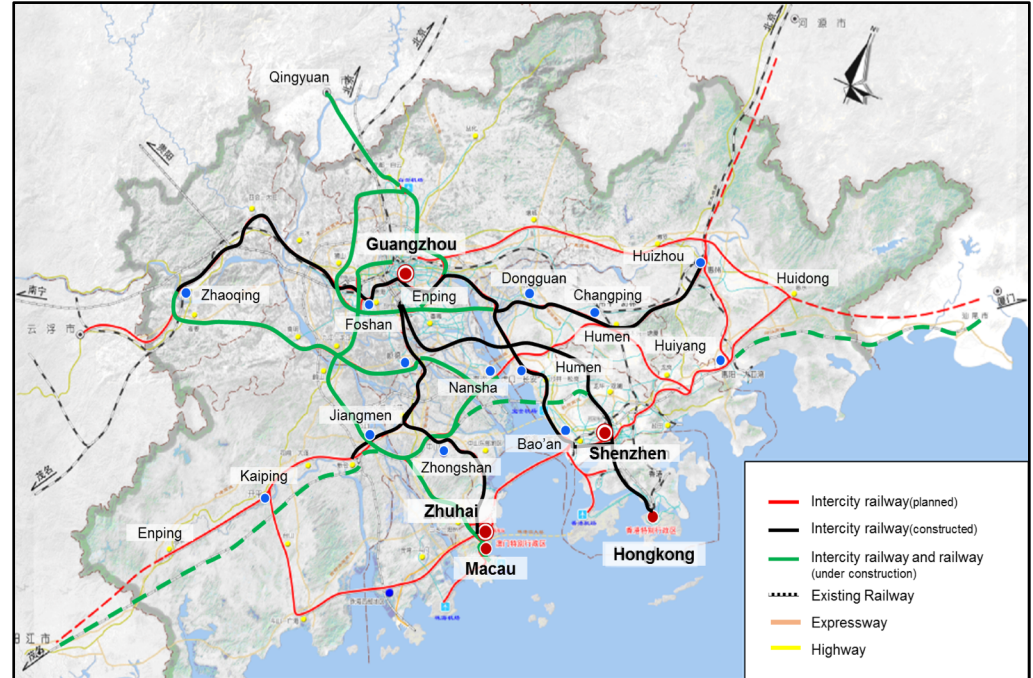
## Railway network plan for the Yangtze River Delta (210 thousand sq.km)



- By the end of 2017, the total railway length has reached 10,000km, among them, 37%(3,668 km) are HSR lines.

Source: NDRC. Yangtze River Delta Intercity Rail Transit Planning (Revision) 2010. Website: <http://www.czdc.gov.cn/gdwz/1820.htm>. (in Chinese).

## Railway network planning of the Pearl River Delta (56 thousand sq.km)

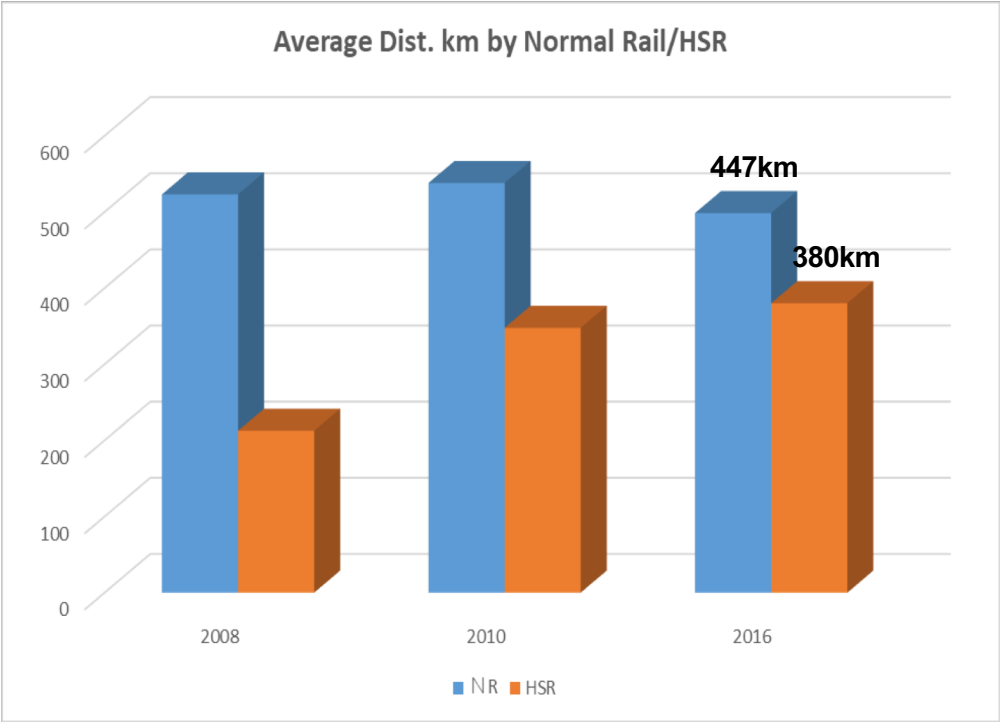


- By Feb 2018, the total railway length has reached 4,510km, among them, 34%(1,542 km) could allow HSR with the speed of 200km/h and higher.

Source: NDRC. Inter-city Rail Transportation Network Planning of the Pearl River Delta Region (Revision) 2009, Website: [http://www.sdpc.gov.cn/xmsphz/t20100813\\_366086.htm](http://www.sdpc.gov.cn/xmsphz/t20100813_366086.htm). (in Chinese).

# HSR and Other Intercity Mode —Traditional Rail

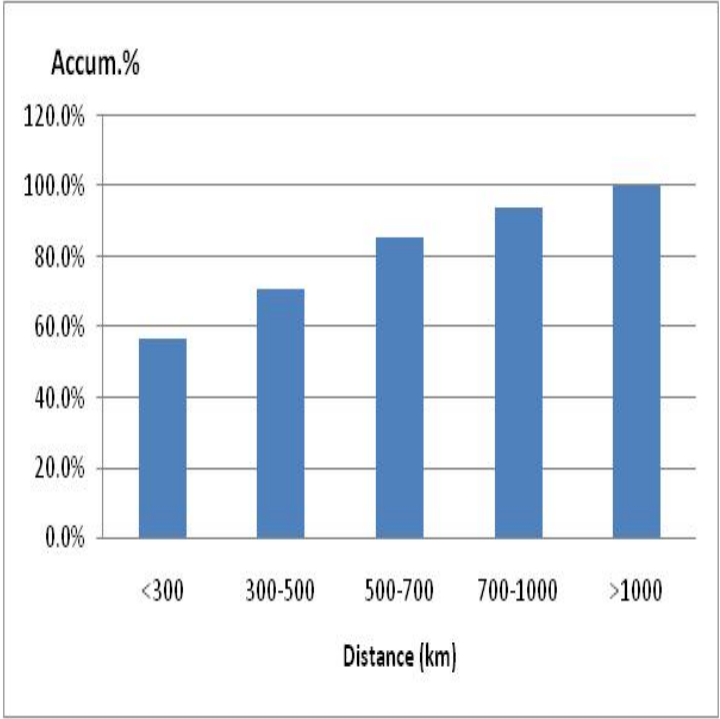
Average Travel Distance by Normal Railway and HSR  
(普通铁路与高铁的比较)



Source: China Statistical Year Book 2016

Average Travel Distance of Pax from  
Hongqiao Station  
(上海虹桥高铁乘客调查)

Average Dist=377.4km



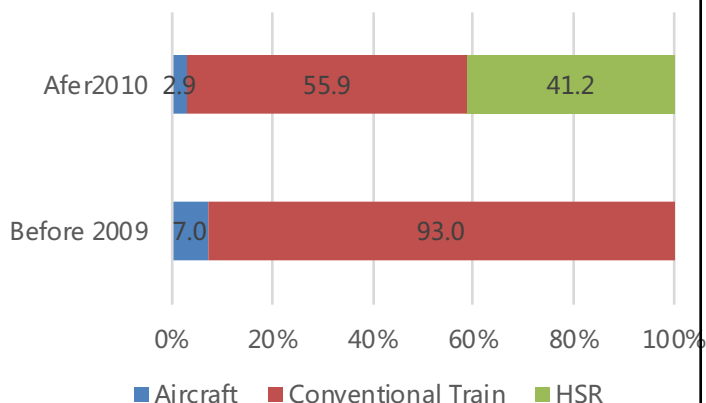
Source: By author

# HSR and Other Intercity Mode—Aviation and motorized transport

## HSR VS Aviation (武广线案例)

- A significant shift from normal rail and aircraft to HSR in Wuhan-Guangzhou Corridor

Rail and Air Share in Wuhan-Guangzhou Transport Corridor

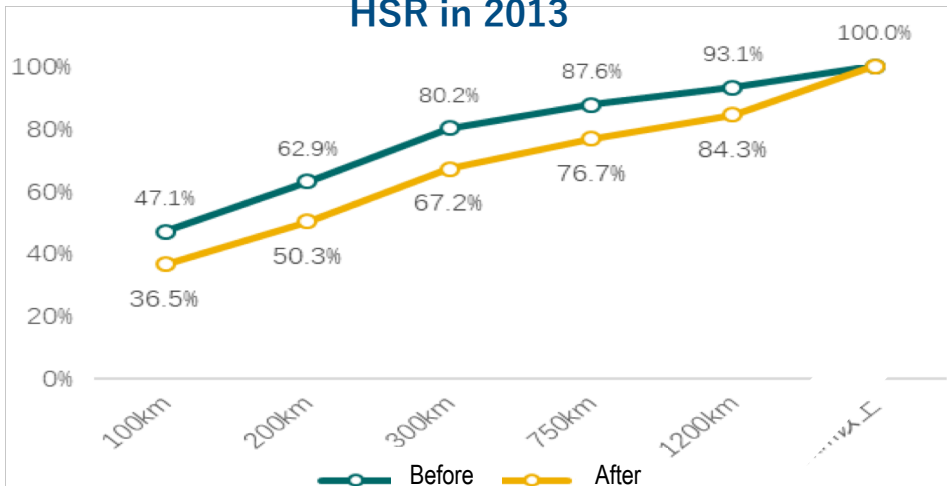


Source: Wu J, et al., 2014

## Mode Choice and Catchment Area Change in Shaoxing (绍兴案例研究)

- More larger catchment area after the opening of HSR
- HSR is found to substitute intercity buses and cars for leisure travel

Change of Catchment Area after the Operation of  
HSR in 2013



Source: By author

# HSR Station Site Location

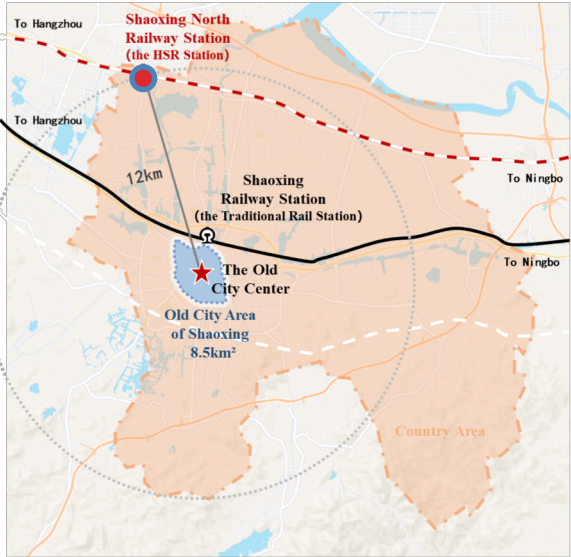
- In mega cities most HSR sites are located in suburbs, while in most medium and small cities the new stations are located in the exurban fringe

| Names of HSR way stations | Distance from the city center |
|---------------------------|-------------------------------|
| North Xi 'an Station      | 13km                          |
| East Zhengzhou Station    | 8km                           |
| East Hangzhou Station     | 13km                          |
| Shanghai Hongqiao Station | 15km                          |
| South Guangzhou Station   | 18km                          |
| South Nanjing Station     | 10km                          |
| South Beijing Station     | 5km                           |
| West Jinan Station        | 12.5km                        |
| Wuhan Station             | 12km                          |
| South Changsha Station    | 9.5                           |

Location of Hongqiao Station, Shanghai



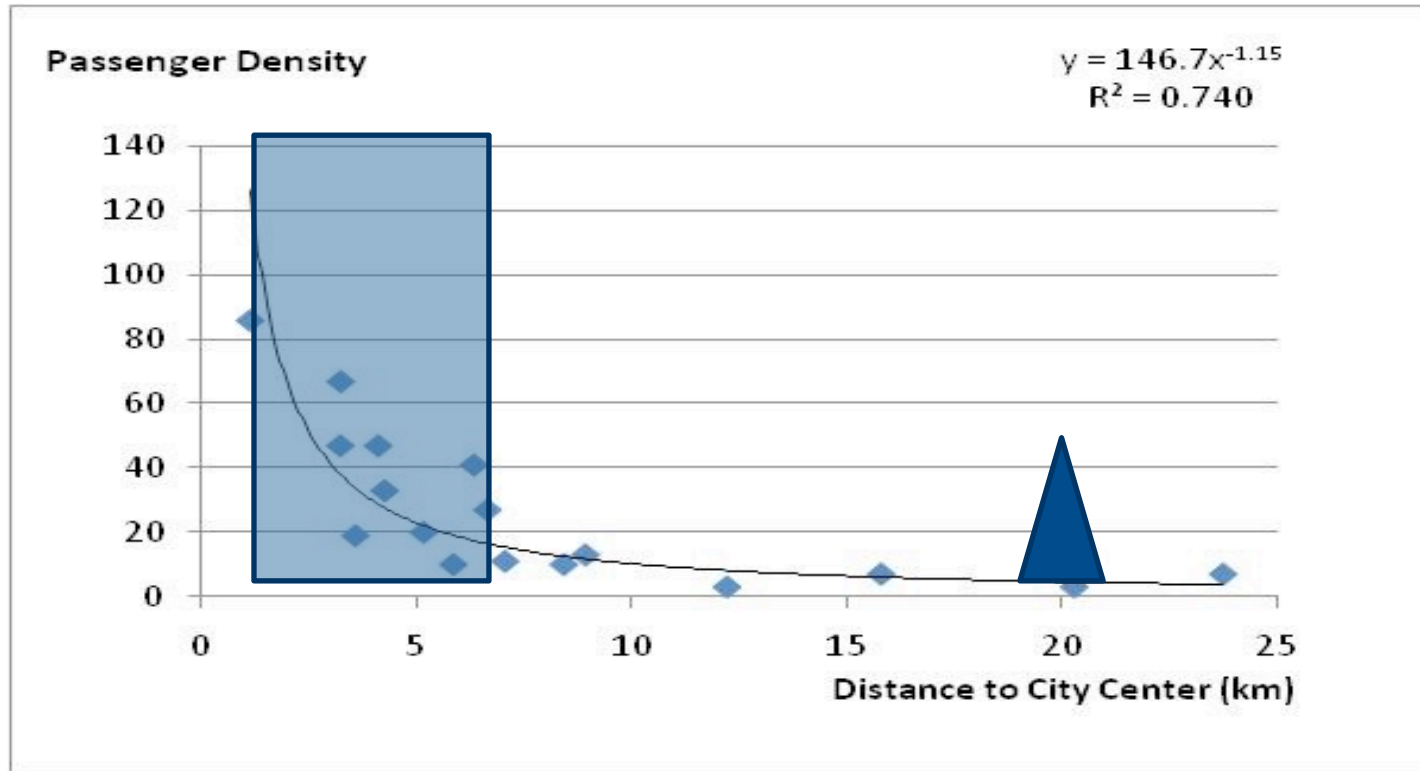
Location of Shaoxing North Railway Station, Shaoxing



Source: By author

## HSR and Access Mode

Passenger Density with Dist. To City Center  
旅客密度与距离

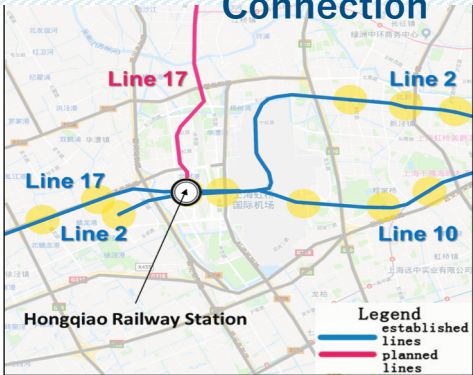


Source: By author

# HSR and Access Mode

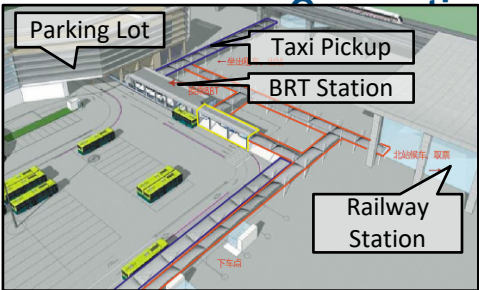
- To improve the connection between the station and the city center, multi-mode transport services has been provided simultaneously

## Hongqiao HSR Station and Metro Connection



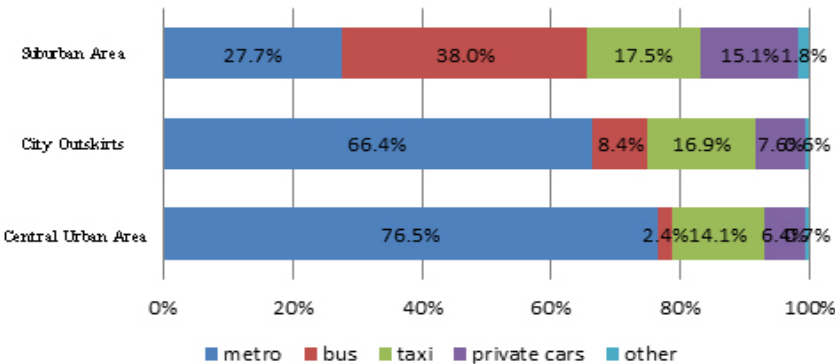
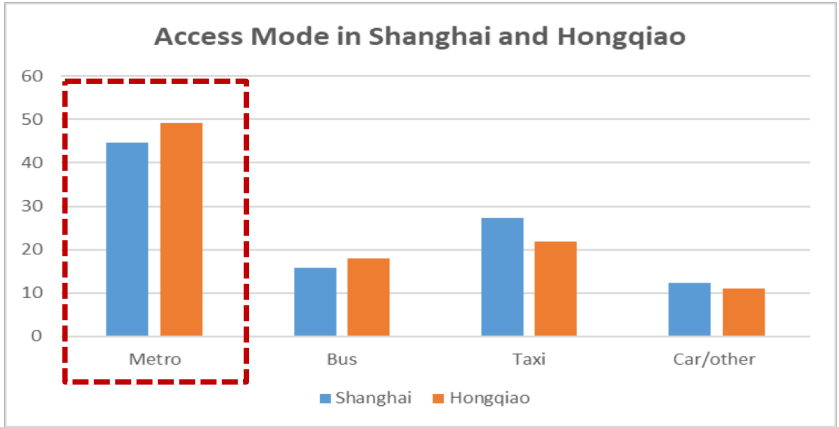
Three Metro Lines  
 Bus  
 Express Bus  
 Taxi  
 Car/Other

## Shaoxing HSR Station and Connecting Mode



Three BRT lines  
 (Express Bus)  
 Taxi  
 Car/Other

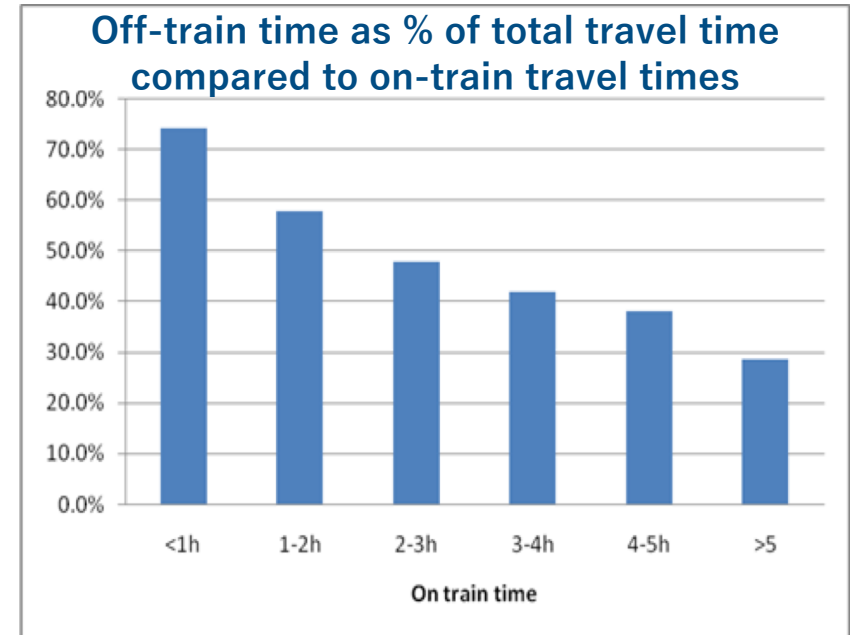
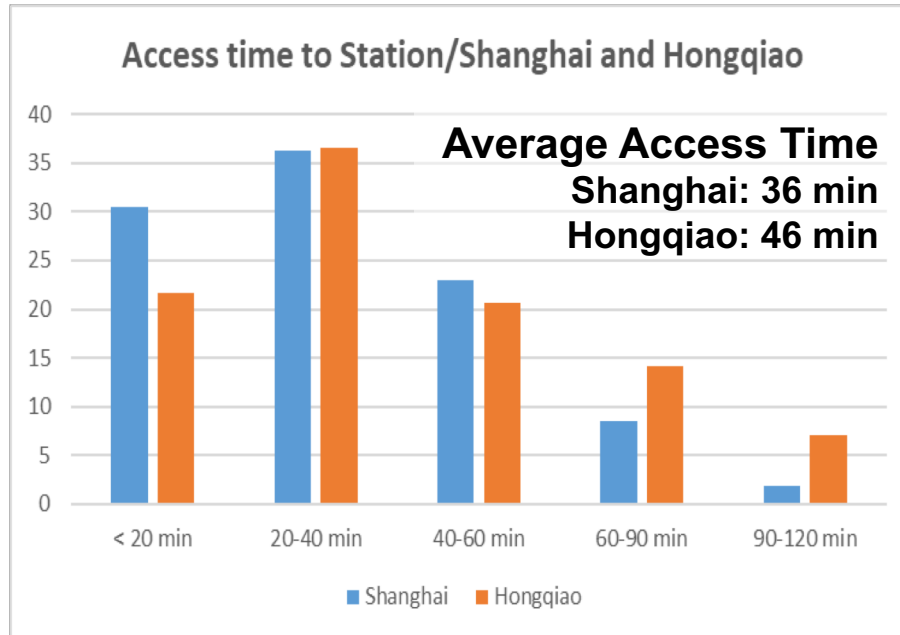
- People will use more taxi in City center, if we do not have a high quality connecting modes, Metro, BRT, Bus Way



## HSR and Access Mode

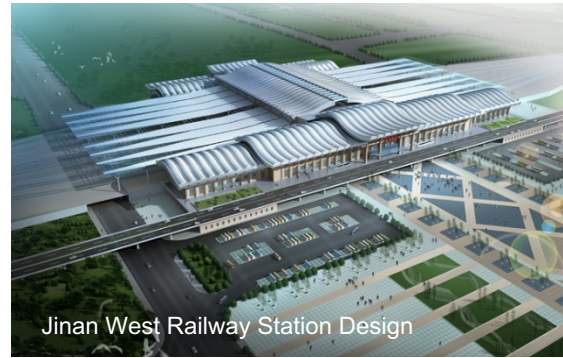
- 17,000 hours wasted for Hongqiao on daily passenger of 100,000
- RMB 300,000 /day

- For shorter trips under 300 km, on-board travel time for HSR only accounts for 25% of total travel time

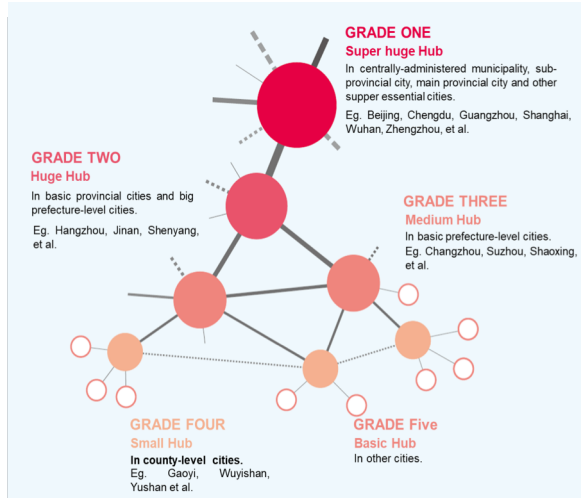


# HSR Station Design

- For hubs with different grade and role, the facilities and service can be different

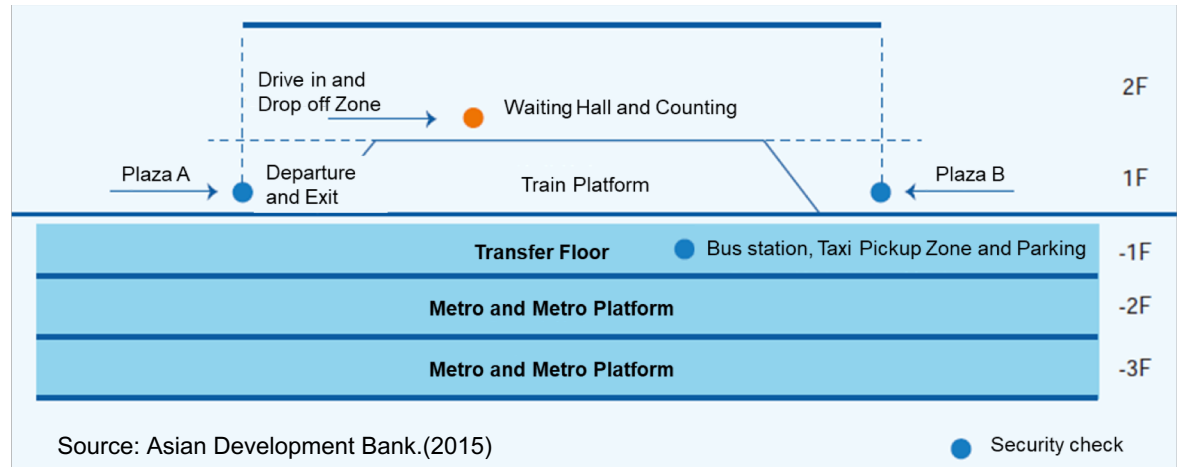


## The hierarchical HSR station in China



Source: Asian Development Bank.(2015)

- Complicated Security Process, Huge Waiting Hall and Integrated transport system



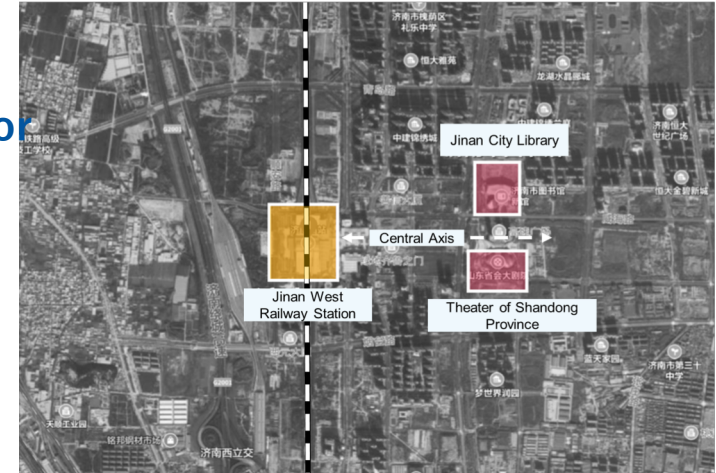
Source: Asian Development Bank, (2015). Improving Interchanges: Toward Better Multimodal Railway Hubs in the People's Republic of China. (in Chinese).

## The Development of HSR New Town

- the area surrounding a HSR station is planned to be a sub city center or even a new town (HSR new town)
- HSR stations surrounded by high-rise buildings for business and public facilities (museum, exhibition center)



Satellite image of Jinan West City around HSR station



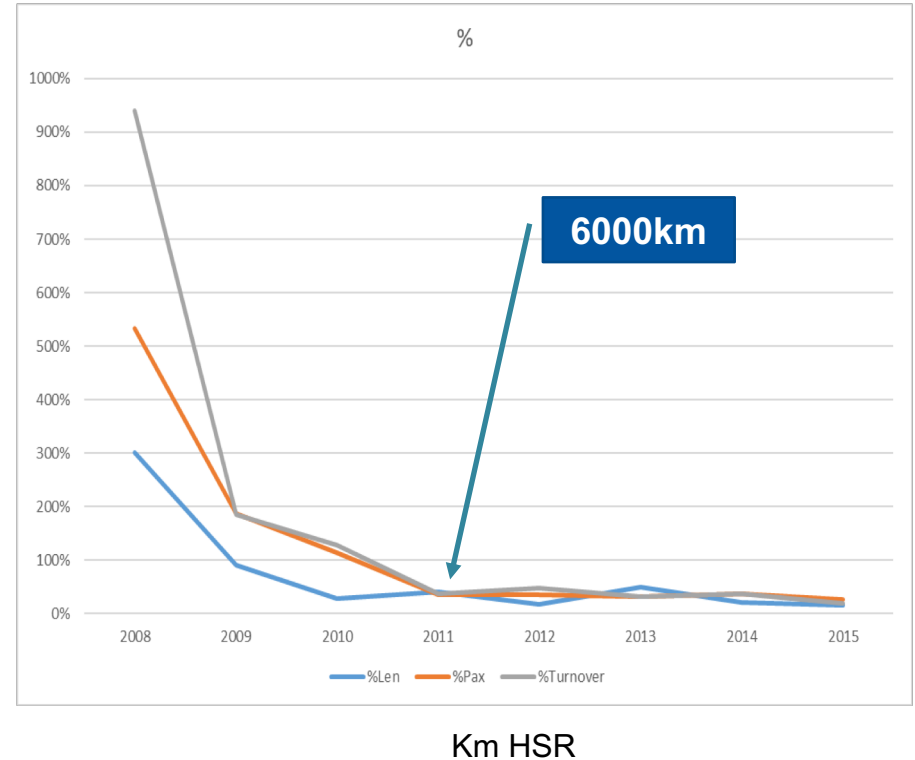
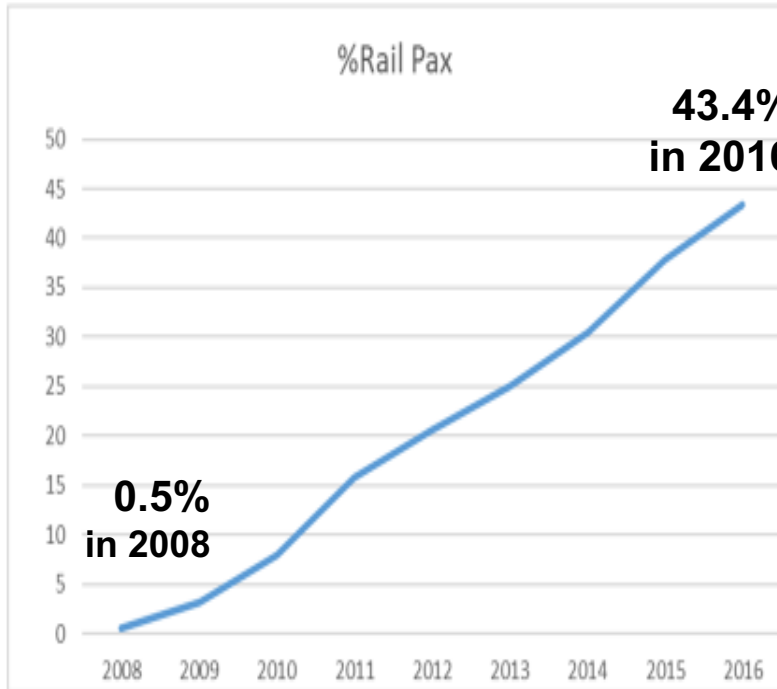
12km away from the city center

Center for the new city of an area of 450 km<sup>2</sup>

Will open by the end of 2018

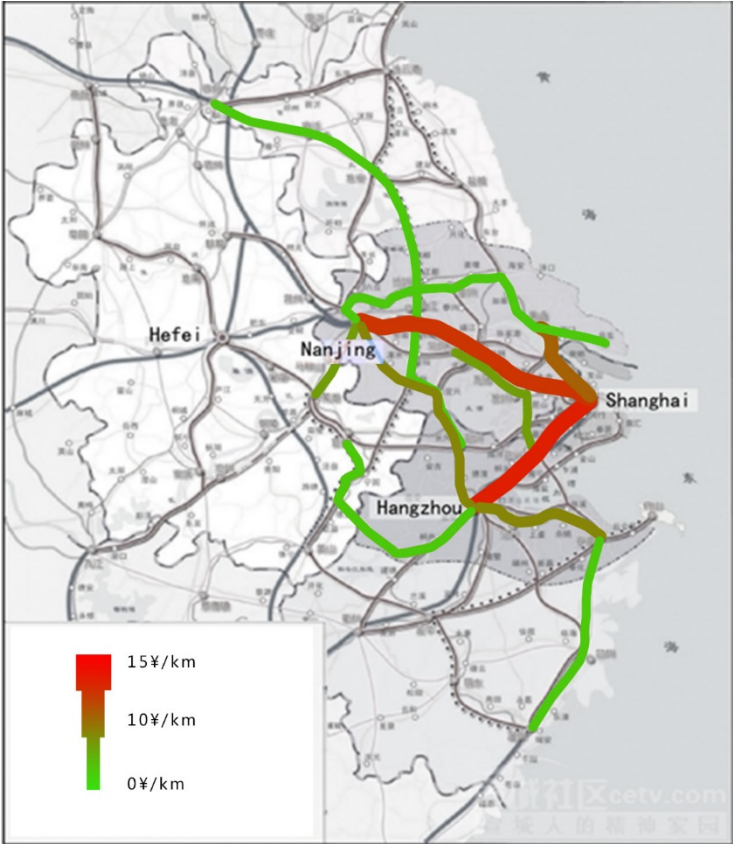
## HSR Passenger and Economic Impact – Passenger Volume

- In 2008 the passenger by HSR is only 0.5% of the total railway passenger in China. To the year of 2016, 43.4% of railway passenger was carried by HSR.



# HSR Passenger and Economic Impact -Intensity of spatial economic relationship

Economic density of HSR Lines  
in Yangtze River Delta



| HSR Line               | Economic Strength<br>(2009 GDP in Billions) | Line Length | Economic Density<br>(2009 GDP in Billions/km) |
|------------------------|---------------------------------------------|-------------|-----------------------------------------------|
| Shanghai-Hangzhou      | ¥2, 191. 80                                 | 172 km      | ¥12. 74/km                                    |
| Shanghai-Nanjing       | ¥3, 605. 40                                 | 301 km      | ¥11. 98/km                                    |
| Shanghai-Nantong       | ¥2, 551. 40                                 | 249 km      | ¥10. 25/km                                    |
| Xiaoshan-Ningbo        | ¥1, 168. 90                                 | 147 km      | ¥7. 95/km                                     |
| Nanjing-Hangzhou       | ¥1, 795. 20                                 | 251 km      | ¥7. 15/km                                     |
| Nanjing-Wuhu           | ¥579. 80                                    | 92 km       | ¥6. 30/km                                     |
| Changzhou-Suzhou       | ¥1, 217. 70                                 | 202 km      | ¥6. 03/km                                     |
| Ningbo-Taizhou-Wenzhou | ¥876. 80                                    | 268 km      | ¥3. 27/km                                     |
| Nanjing-Qidong         | ¥1, 061                                     | 351 km      | ¥3. 02/km                                     |
| Xinyi-Changxing        | ¥1, 688. 40                                 | 561 km      | ¥3. 01/km                                     |
| Xuancheng-Hangzhou     | ¥664. 40                                    | 224 km      | ¥2. 97/km                                     |

Source: Prof. Xueming Chen, Haixiao Pan et al

## **Reflections and Suggestions for HSR Planning**

1. We need the HSR to support intercity travel demand with high capacity and less land occupied
2. HSR station as a landmark has changed the poor image of traditional train travel
3. High punctuality rate, Improvement of online booking and intelligent information greatly upgrade rail services, modal shifting from normal rail and auto is evident
4. The location and design of HSR station will have great influence on the overall efficiency of travel, station area development, as well as the operation cost
6. Improvement in urban transport with high quality public transport should be simultaneously with HSR
7. For less-developed area, how to operate the HSR is a key issue to balance political and economic pressure, the improvement of normal rail is also important from social and economic point of view

**THANK YOU FOR YOUR ATTENTION!**