

# **Criteria for High Speed Railway and Visioning Future HSR Network in India**



**Yosuke TAKADA**

# Today's Topic

- **Benefits brought by the introduction of High Speed Railway(HSR)**
- **Criteria to assess the suitable country or area for HSR taking those benefits into account**
- **Visioning Future HSR Network in India**

# **What are the Benefits Brought by HSR Introduction?**

# Benefits by High speed Rail



**Travel Time Reduction**

**Reliability**

**High Frequency**



**Comfort**

**Mass Transit**

**Safety**

# **What are the Criteria for HSR Introduction?**



**Travel Time Reduction**

**Reliability**

**High Frequency**

**Comfort**



**Close relationship with economic growth (Increasing time value)**

₹



Japan **Shinkansen**



France  
**TGV**



Germany  
**ICE**



Spain  
**AVE**



Korea  
**KTX**



Turkey  
**HT65000**



China  
**Hexie Hao**

# High Speed Railways

Supported by  
**日本財団**  
The Nippon Foundation

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High Speed Rail Seminar in India, Jan. 13, 2012

Approximately **5,000 USD** (1959)



Japan **Shinkansen**



**18,000  
USD  
(1976)**

France  
**TGV**



**17,000  
USD  
(1973)**

Germany  
**ICE**



**17,000  
USD  
(1987)**

Spain  
**AVE**



**13,000  
USD  
(1992)**

Korea  
**KTX**



**9,900  
USD  
(2003)**

Turkey  
**HT65000**



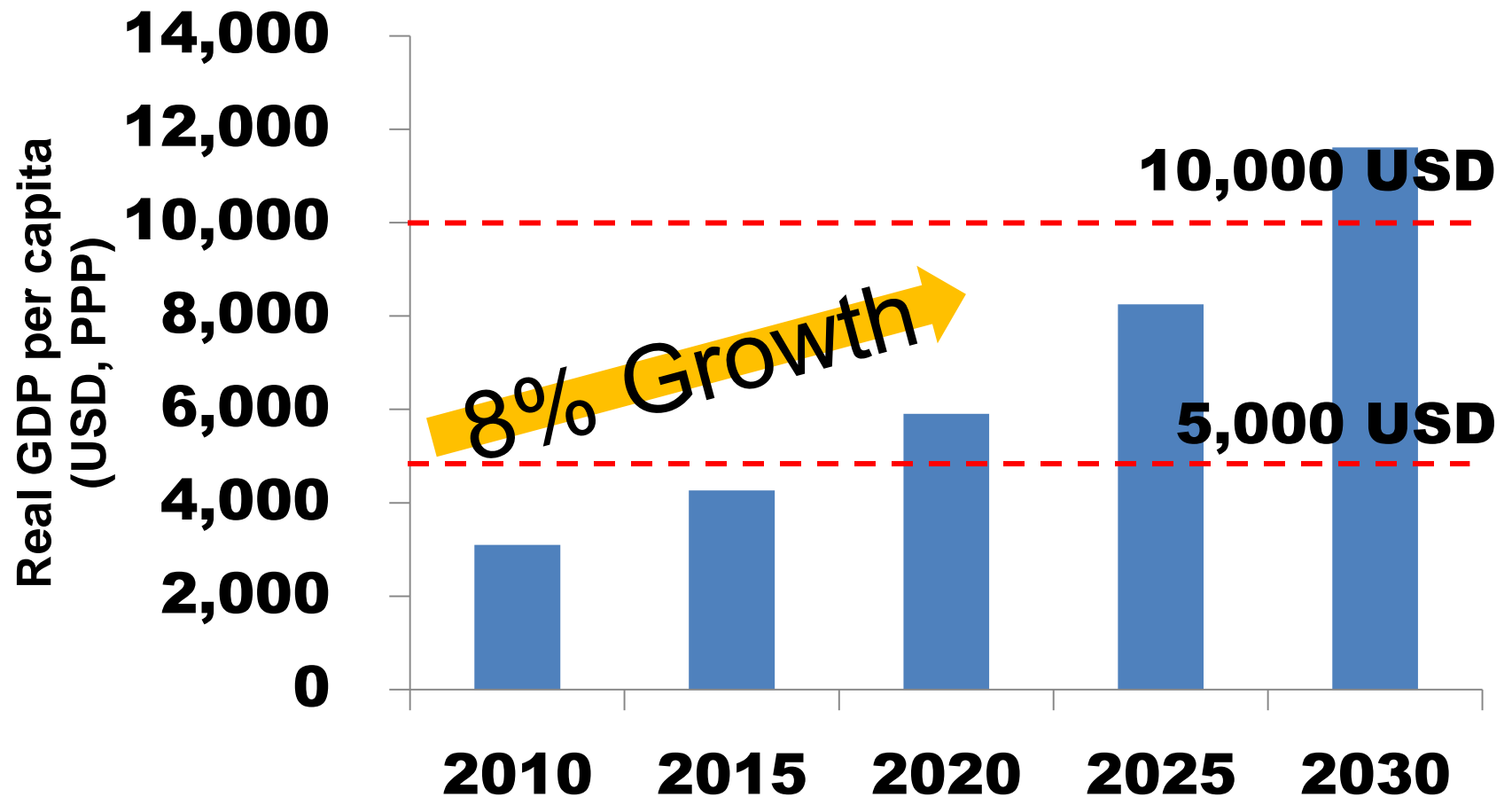
**4,000  
USD  
(2005)**

China  
**Hexie Hao**

**Real GDP per capita (PPP)  
in construction starting year**



# Indian Economic Prospects



Reference : TERI

Unit: INR

	<b>Japan in 1960</b>	<b>India</b>
Starting Salary	10,900 (M) 8,650 (F)	5,000-50,000
University-going Rate	10.3%	11% (2005)
Metro Fare (3km)	13.6	10
Bus Fare	10.2	5-10
Coca-Cola (500 ml)	34.0 (1965)	25
Railway Fare	1,210 (Limited Express, Tokyo-Osaka)	400-600 INR (AC-3 tire, Mumbai-Ahmedabad)

1 Japanese Yen = 0.68 INR



**Mass Transit**



**Close relationship with...**

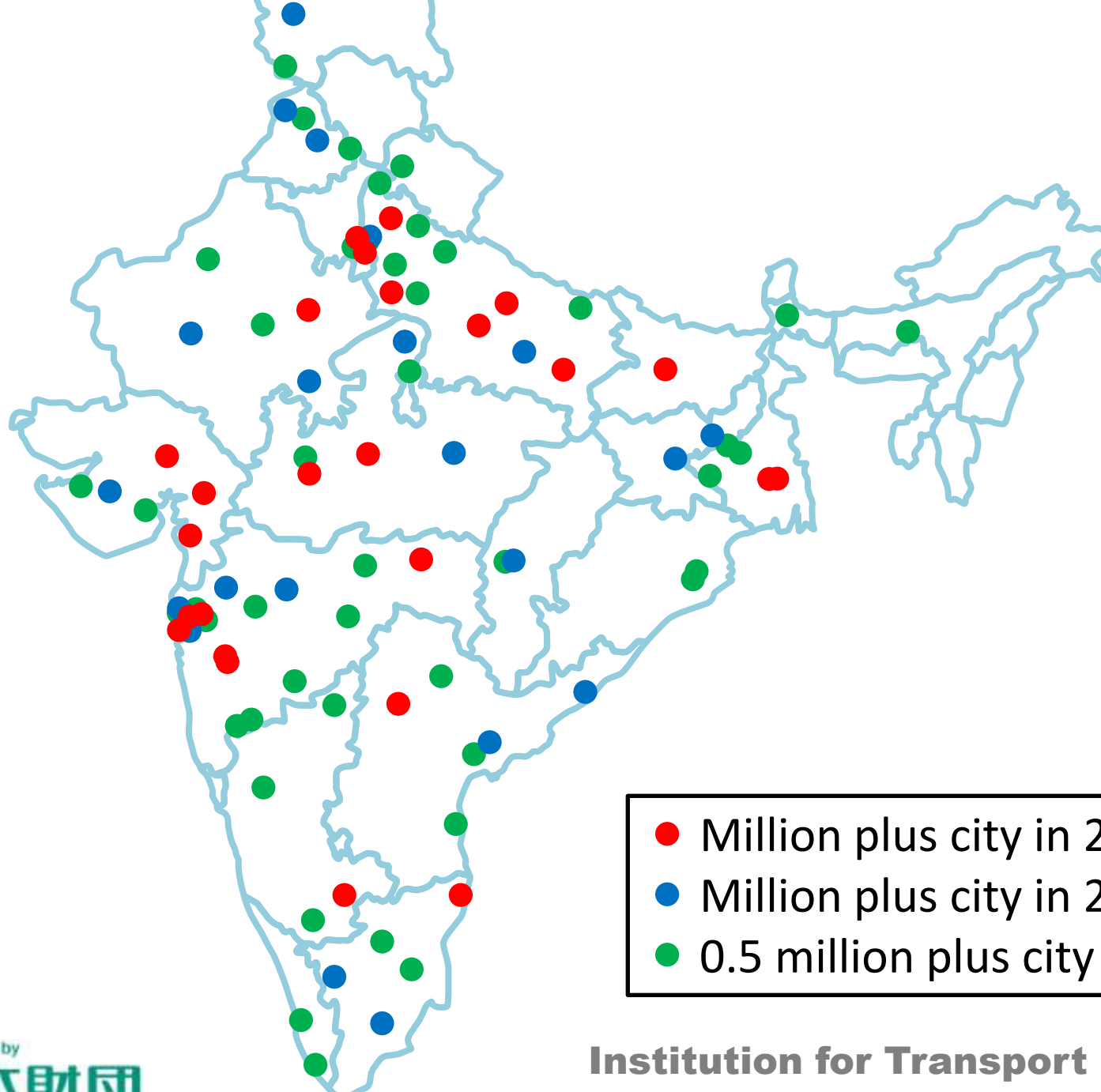
**Population**

**Population  
Density**

**Urbanization**

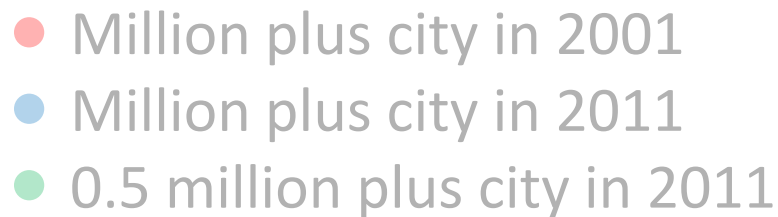
# Population of India

- Population
  - 1,210,193,422 (Census 2011)
  - Population will continue to increase
    - Population of India will exceed China in 2020
- Population Density
  - 366.7/km<sup>2</sup>
    - Higher than Japan (337/km<sup>2</sup>)
    - It is appropriate to introduce mass transport system like railway



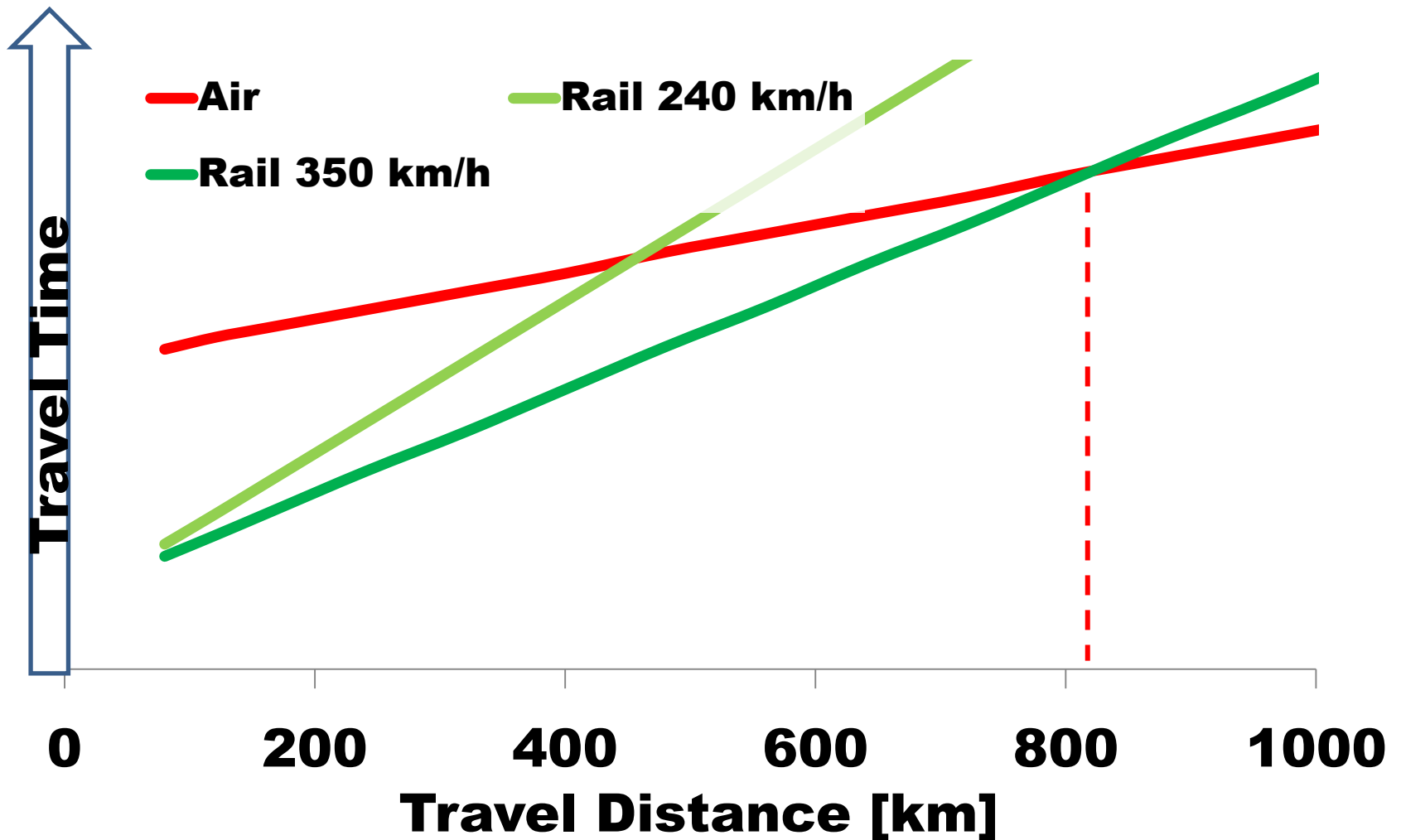
- Million plus city in 2001
- Million plus city in 2011
- 0.5 million plus city in 2011

- Many Indian cities are distributed along belt-like networks
  - Such areas are appropriate for HSR introduction
- In addition, million plus cities will increase due to "rapid urbanization"



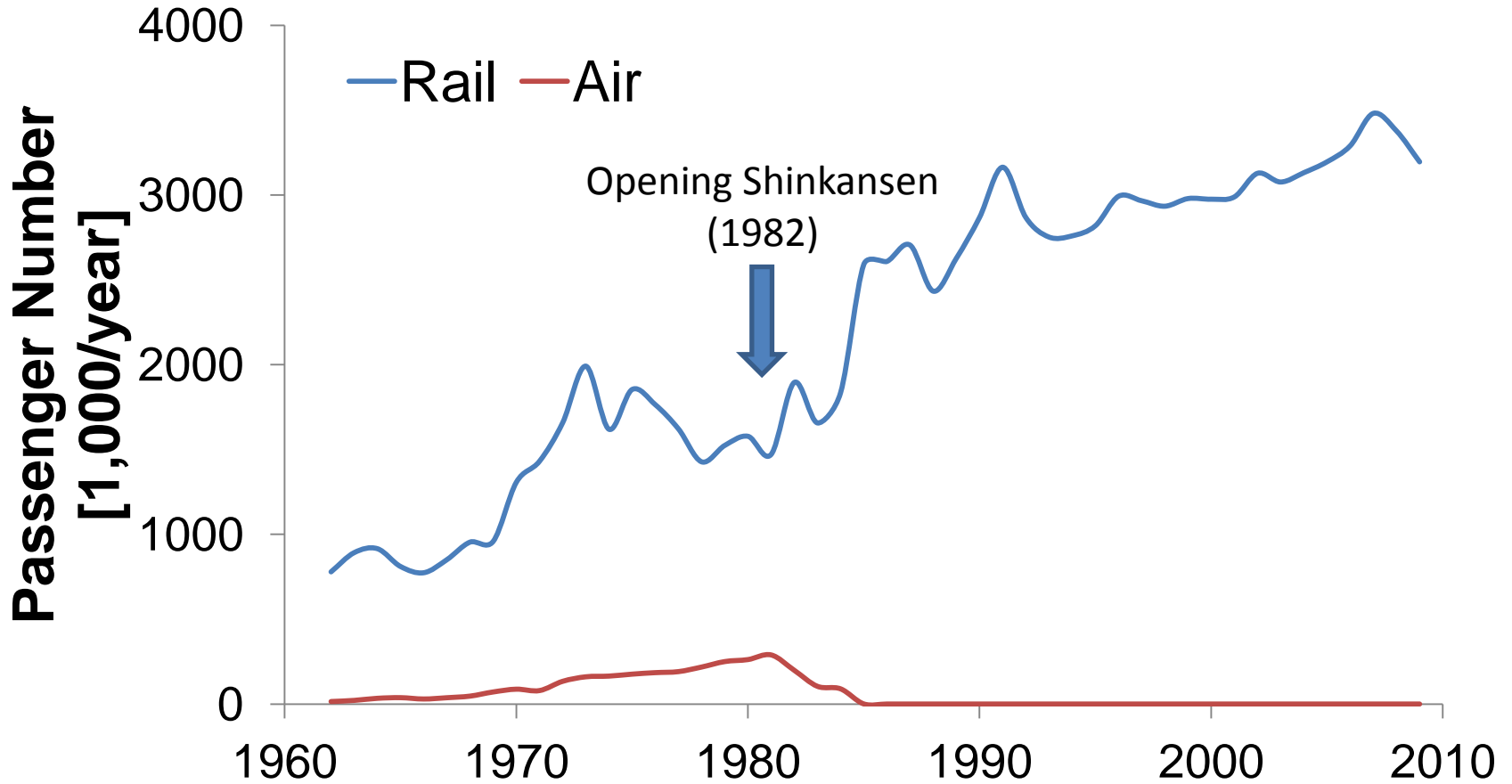
# **What will be the Criteria to Assess which Corridors are Suitable for High Speed Rail?**

# Competitiveness of HSR

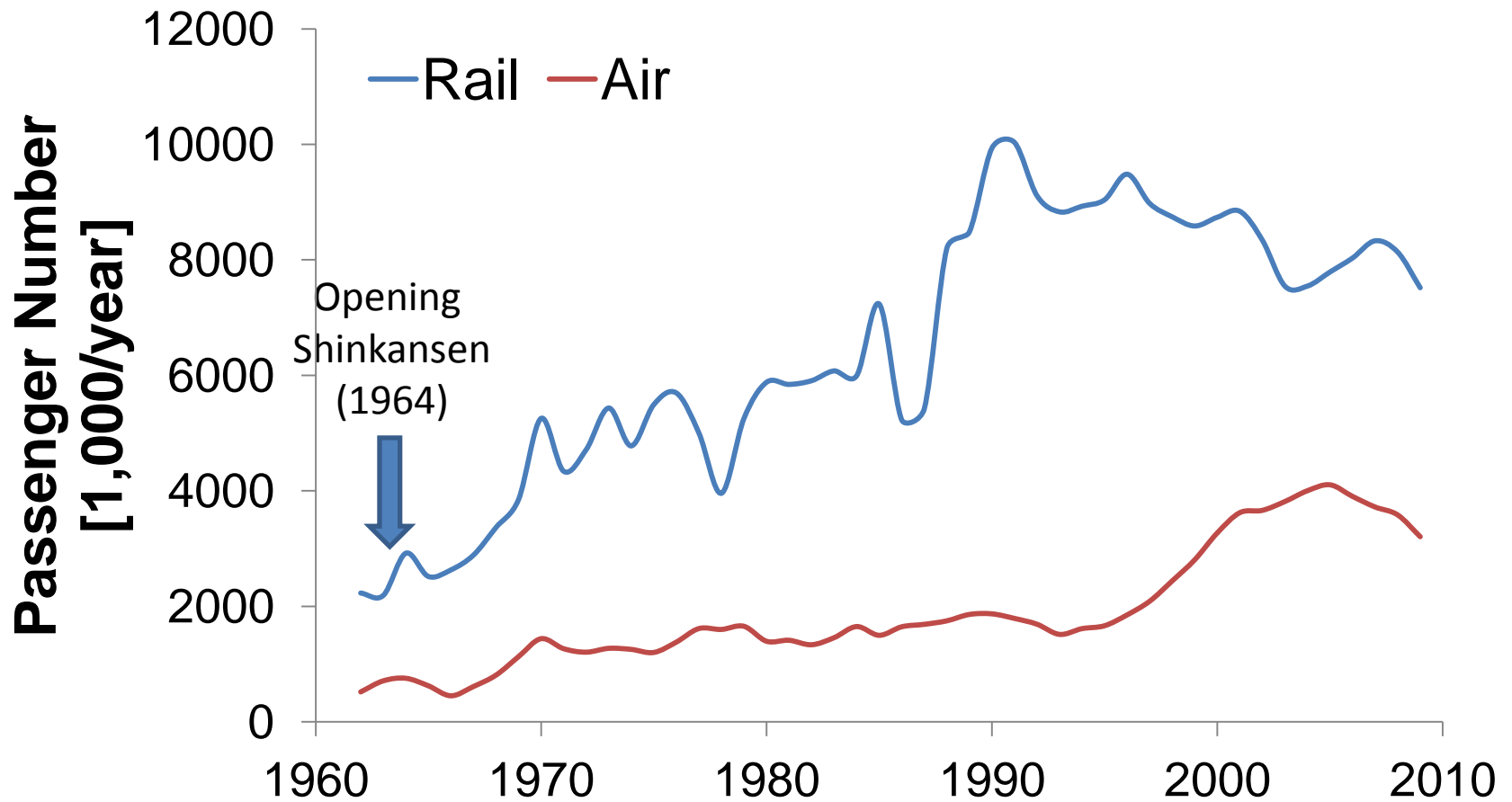




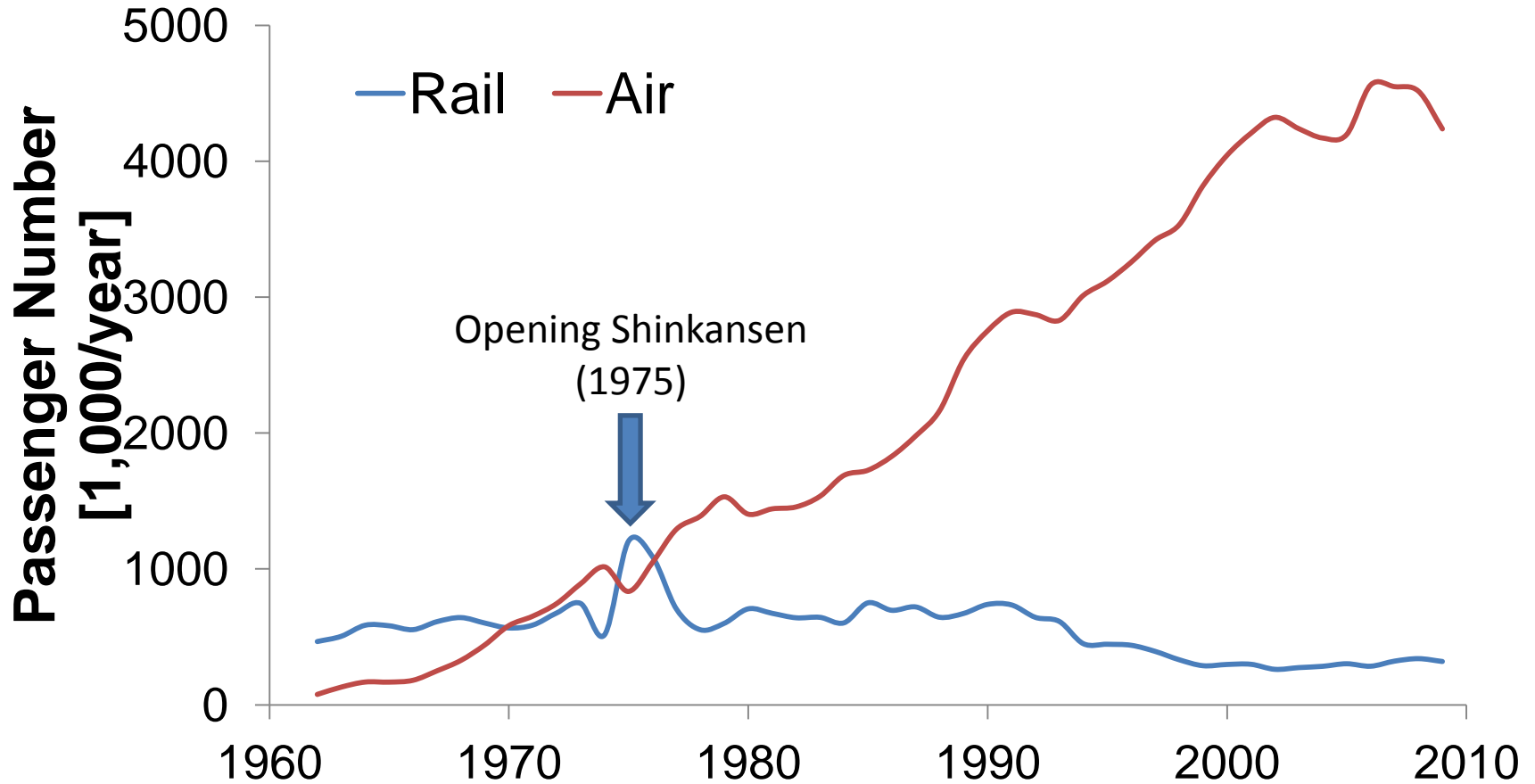
# Tokyo-Sendai (325.4km)

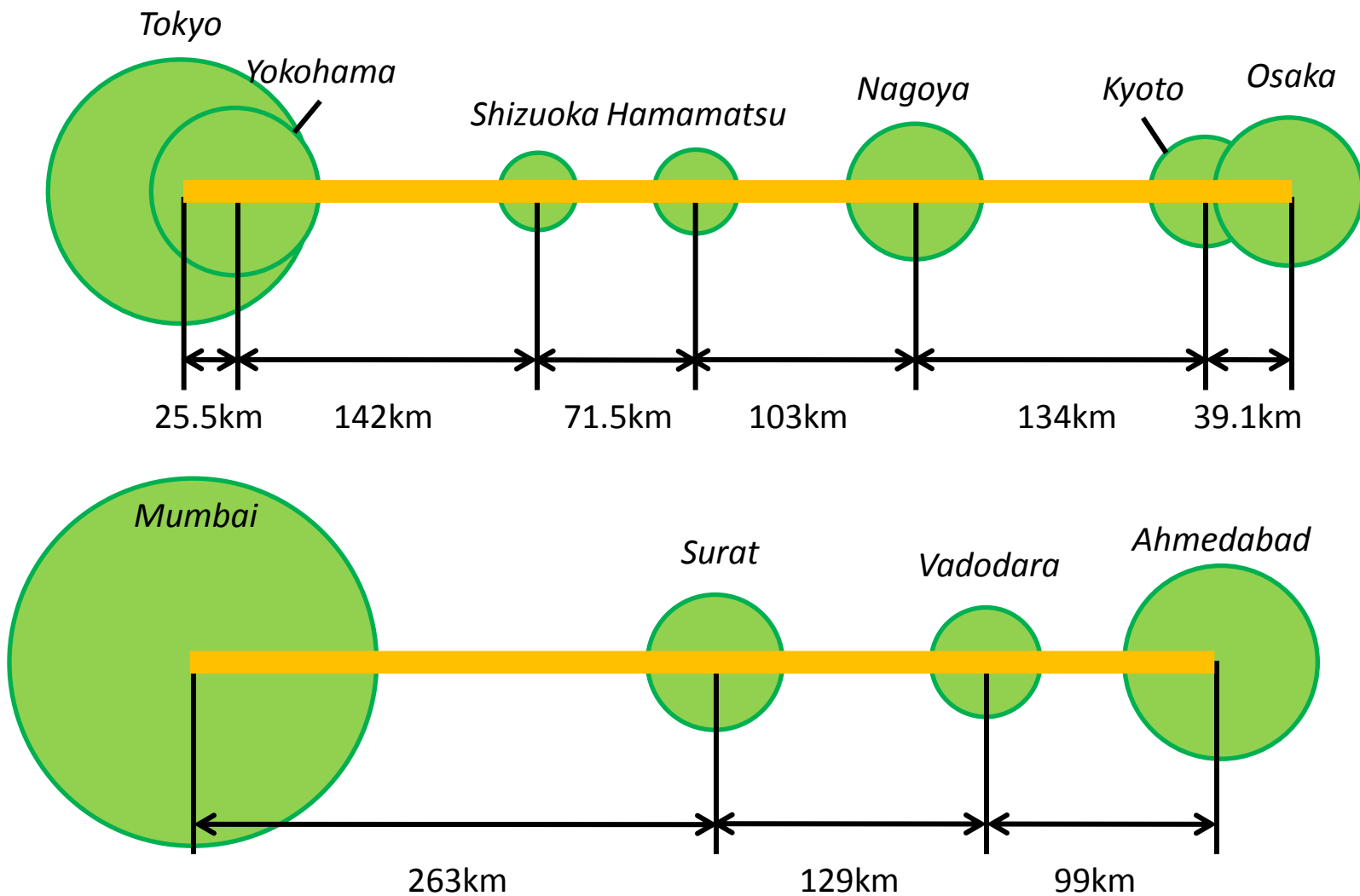


# Tokyo-Osaka (515.4km)

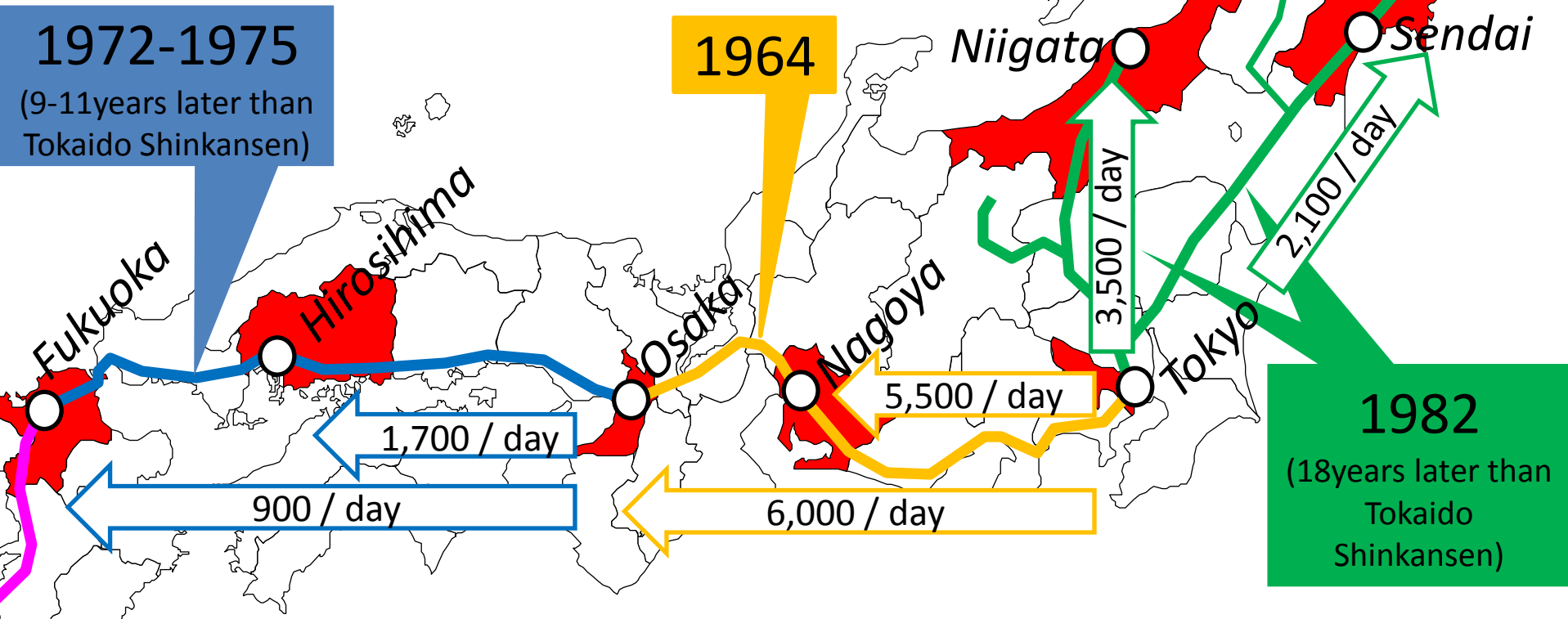


# Tokyo-Fukuoka (1069.1km)

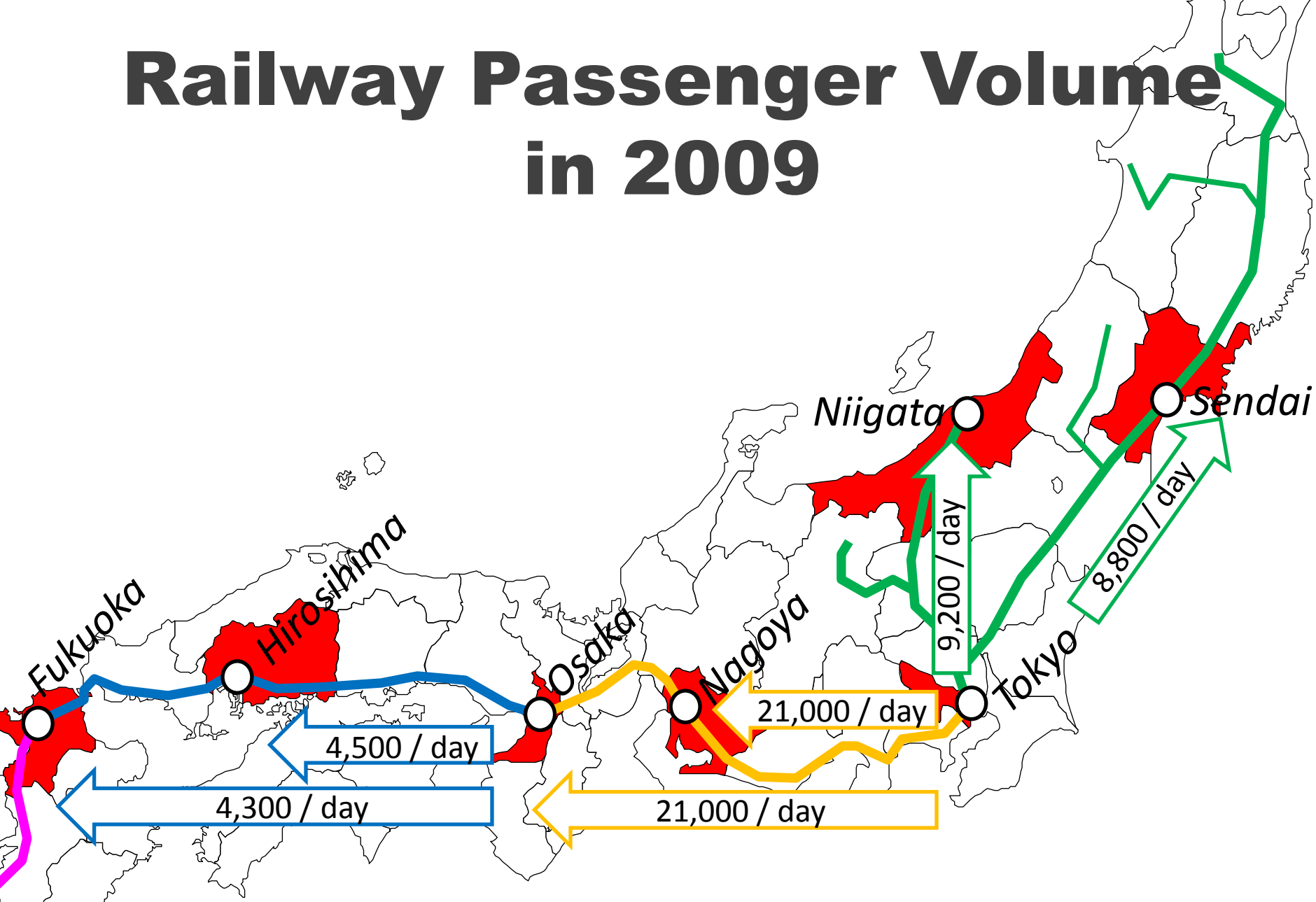




# Railway Passenger Volume in 1962 and the year of HSR opening



# Railway Passenger Volume in 2009



# Methodology (tentative)

- Select the suitable corridor by the criteria below
  - Distance: **Under 1,000 km**
  - There are some over 0.5 million cities on the corridor
  - Rail Traffic volume: Over **2,000 / day** in 2015(the year when GDP per capita will be over 4,000 USD)
  - Volume of other transport mode

# Rating Matrix (Examples)

OD-pare	Distance	0.5M+ Cities on Corridor	Rail Traffic Volume	No. of Airline	No. of Bus Service
Delhi-Lucknow	++	++	+++	++	+
Delhi-Chandigarh	+++	+	++	+	+++
Mumbai-Ahmedabad	++	++	+++	++	++
Chennai-Bangalore	+++	-	+++	++	++
Kolkata-Puri	+	+	+++	+	+
Chennai-Madurai	++	+	++	+	++
Hyderabad-Vishakhapatnam	+	+	+++	+	++

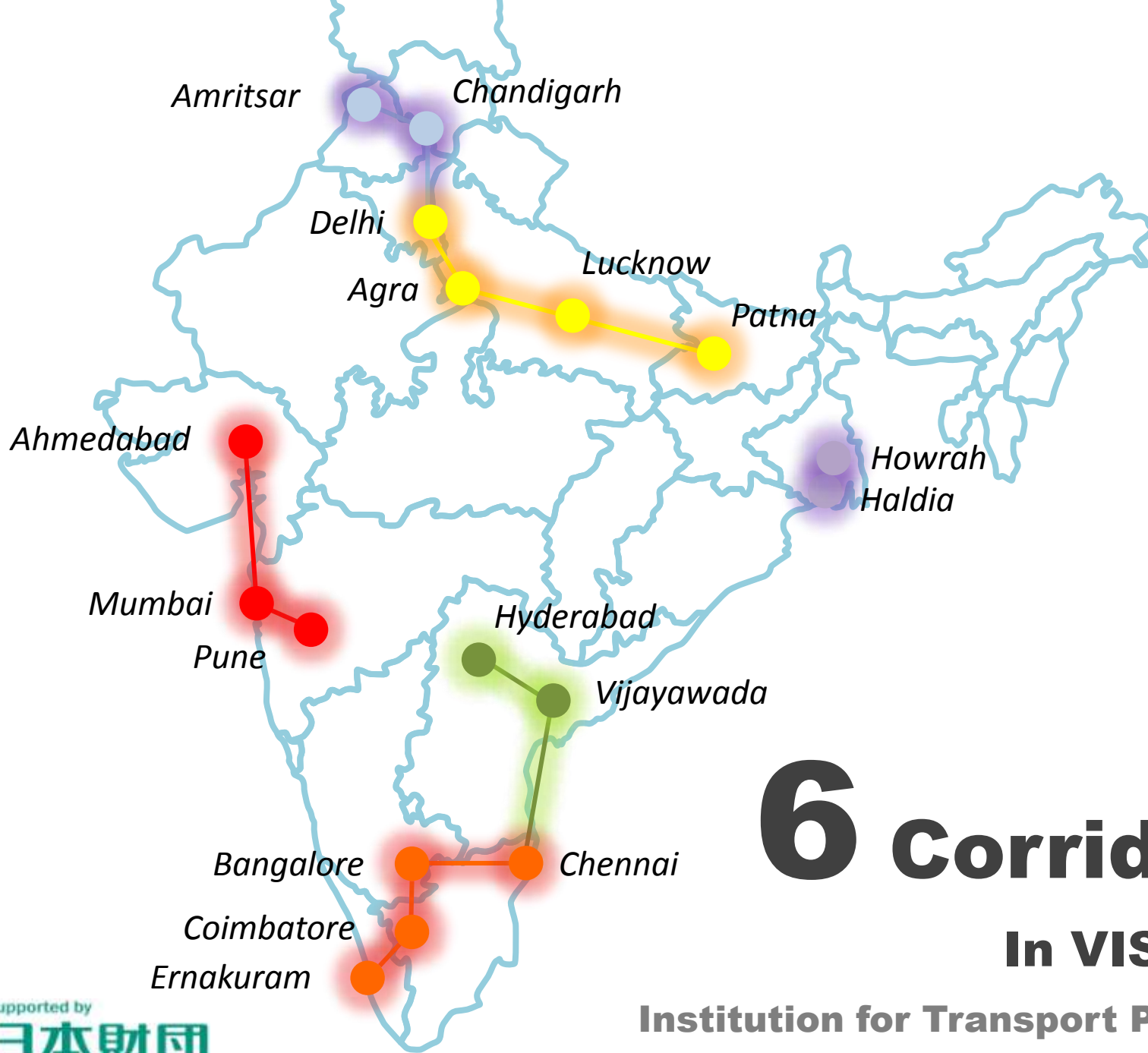


# Results of Evaluation

- Among top 100 OD city pairs, more than 70 city pairs meet the criteria
- Those include many city pairs not on the 6 corridors indicated in VISION 2020



- This indicates that India has many corridors suitable for HSR, not only 6 corridors in mid/long term



# 6 Corridors

**In VISION 2020**

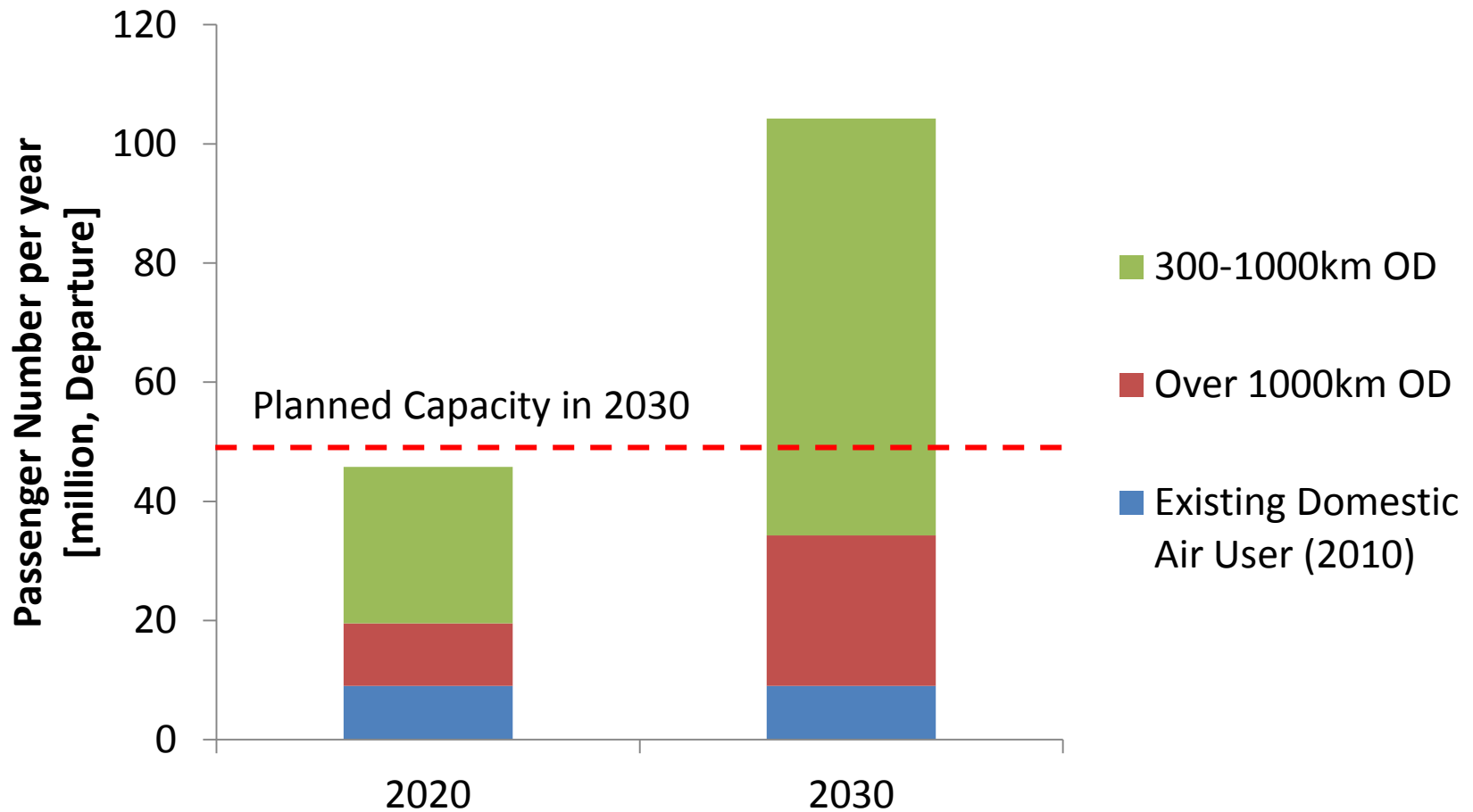
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# If HSR introduction is late in India...

- According to economic development, time value will increase and people will require less travel time
  - Competitiveness of existing railways will decrease
  - Shift to air and car will be accelerated
- As a result, congestion of airports and roads will become worse
  - Is it possible to meet future transport demand by only Air and Road?

# Capacity Shortage Case of Delhi Airport



# Demand for high speed move may skyrocket

The increase of traffic volume of Shinkansen and air in Japan

	1965(A) (thousand passengers)	1995(B) (thousand passengers)	(B)/(A)
Shinkansen	30,967	275,900	8.9
Air(domestic)	5,222	78,100	15.0
Total	36,189	354,000	9.8

Source:MLIT

# Future Task

- Update and examination of criteria by using experience of other HSR introduced countries
  - France, Germany, China, Turkey, ...
- Incorporation of criteria which are characteristic of India
  - New city development, pilgrimage hub, ...
- Development of “**advanced criteria**”
  - Development of rough assessment methodology using “advanced criteria”

**Thank you for your  
kind attention!**

**Yosuke TAKADA,  
y-takada@jterc.or.jp**