China’s City Clusters:
the emergence of the largest urban labor markets in the world or just more congestion and pollution?

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Question

1. Could China create integrated urban labor markets of more than 50 million people with the enormous productivity associated with their size?

2. or would large expanded city clusters create just more congestion and pollution within adjacent but fragmented smaller less productive labor markets?
A. Large labor markets are more productive and creative than smaller ones

1. Scale economies
2. Agglomeration economies
3. Knowledge spillover
Potential vs. effective size of labor markets

• The effective size of a city’s labor market depends on the ability of the transport system to link all households’ residences and jobs’ locations in less than one hour.

• As a city area expands, speed of transport becomes the key parameters to allow effective labor markets to expand.¹

the size of labor markets

• The productivity and the capacity for innovation of cities are increasing with the size of their labor market

• However, the size of a labor market is limited by the capacity of the transport system to link workers and jobs in less than one hour commuting time
Currently, the productivity of existing Chinese large urban clusters is only potential because of the low speed of transport.

The current 11 city clusters identified by the Chinese Government (2015) are:

- covering 10 percent of the country's area,
- including one third of the country's population,
- accounting for two thirds of the entire China’s economic output.
B. **New Chinese urban policy:** focusing new infrastructure investments on clusters of cities rather than on large monocentric cities
Hub and spoke would see China’s 11 networks of cities integrating and growing rapidly

<table>
<thead>
<tr>
<th>Regional hubs</th>
<th>Number of cities in region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beijing/Tianjin</td>
<td>28</td>
</tr>
<tr>
<td>Shenyang/Dalian</td>
<td>22</td>
</tr>
<tr>
<td>Qingdao/Jinan</td>
<td>35</td>
</tr>
<tr>
<td>Xian</td>
<td>8</td>
</tr>
<tr>
<td>Zhengzhou</td>
<td>23</td>
</tr>
<tr>
<td>Shanghai*</td>
<td>58</td>
</tr>
<tr>
<td>Chengdu/Chongqing</td>
<td>31</td>
</tr>
<tr>
<td>Wuhan</td>
<td>27</td>
</tr>
<tr>
<td>Changsha</td>
<td>20</td>
</tr>
<tr>
<td>Xiamen/Fuzhou</td>
<td>14</td>
</tr>
<tr>
<td>Guangzhou/Shenzhen**</td>
<td>23</td>
</tr>
</tbody>
</table>

* Yangtze River Delta Cluster.
** Pearl River Delta Cluster, with strong linkages to Hong Kong.

Source: McKinsey Global Institute analysis
China’s 5 larger clusters

- Chengdu-Chongqing cluster: 61.2 million
- Beijing-Tianjin-Hebei cluster: 110 million
- Yangtze Delta cluster: 90 million
- Yangtze River Middle Reaches clusters: 29 million
- Pearl River Delta cluster: 65 million

Source: People's Daily
Graphics: GT
C. The scale of the new Chinese city clusters make them different from any existing form of urbanization
Pearl River Delta: 64.7 Million people (2010)

<table>
<thead>
<tr>
<th>City</th>
<th>Population (2010)</th>
<th>Area km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guangzhou</td>
<td>12,700,800</td>
<td>7,434</td>
</tr>
<tr>
<td>Shenzhen</td>
<td>10,357,900</td>
<td>1,991</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>7,061,200</td>
<td>1,104</td>
</tr>
<tr>
<td>Macau</td>
<td>544,600</td>
<td>30</td>
</tr>
<tr>
<td>Dongguan</td>
<td>8,220,200</td>
<td>2,465</td>
</tr>
<tr>
<td>Foshan</td>
<td>7,194,300</td>
<td>3,848</td>
</tr>
<tr>
<td>Zhuhai</td>
<td>1,560,200</td>
<td>1,724</td>
</tr>
<tr>
<td>Zhongshan</td>
<td>3,120,900</td>
<td>1,783</td>
</tr>
<tr>
<td>Jiangmen</td>
<td>4,448,900</td>
<td>9,443</td>
</tr>
<tr>
<td>Huizhou</td>
<td>4,597,000</td>
<td>10,922</td>
</tr>
<tr>
<td>Zhaoqing</td>
<td>3,918,100</td>
<td>14,891</td>
</tr>
<tr>
<td>Total</td>
<td>63,724,100</td>
<td>55,635</td>
</tr>
</tbody>
</table>
The built-up area of the Metropolitan Region formed by Shanghai, Suzhou, Changzhou in 2010

Population 2010 : 90 million

Source: Map prepared by the University of Wisconsin-Madison, May 2013.
The size of China’s urban clusters is unprecedented (Beijing Tianjin Hebei cluster will eventually include about 100 million people)
In urban clusters, the spatial pattern of population densities and job distribution is already very different than in more traditional forms of urbanization.
Tokyo Metropolitan employment area is the only urban labor market that would be comparable to the planned Chinese urban clusters but it has only 1/3 of the population of the largest Chinese cluster.
Beijing and Tianjin built up area (2013)
Total population on area shown on map: 36.5 million (2010 census)

Tokyo Metropolitan Area as shown on map: 31.7 million

Legend
- MAJOR ROAD
- RAILWAY (Beijing to Tianjin 120km)
- Built-up area
- AGRIC. & OPEN SPACE
- WATER

Tokyo historical area
23 wards
8.95 million people

Tokyo Metropolitan Employment Area *
31.7 million people

* All municipalities that have at least 10% of their population commuting to the 23 central wards
Beijing & Tianjin built-up area (2013) - total population of the area shown on map: 36.5 million (about 1/3 of Jing Jin Li cluster). The Randstad shown at the same scale has 7.1 million people.
China’s urban clusters are dwarfing traditional existing megacities.

Beijing-Tianjin shown at the same scale as Seoul and Paris metropolitan areas.
In China, the development of current urban clusters, outside the extension of monocentric cities, has been demand driven, not planned, largely driven by collectively owned Town and Village Enterprises (TVEs), which have replaced many of the original privately owned TVEs created in the 80s.

The spatial development of cities had so far consisted of:

• Large supply driven development with large industrial areas built by local government on land adjacent to the concentric ring roads that characterize the large monocentric cities.

• Spatially fragmented small enterprises developed originally by village collectives, which form the backbone of flexible supply chain made of small enterprises.
D. Departure from past policies motivated by pollution and congestion generated by current urbanization model
Until 2015 Chinese cities expanded around concentric ring roads

Schematic model of Chinese cities under communist party guidelines (1983)

Beijing Built-up area 2012
Congestion in Beijing subway at peak hour (2015) a reason for abandoning the radio-concentric model?

- More than 6.5 passengers per m²
- From 5 to 6.5

Beijing metro length in 2015: 528 km
Lines under construction: 340 km
Total in 2020: 868 km
Passengers/day 2014: 9,278,600

New York metro length in 2015: 376 km
Passengers/day 2010: 5,597,551
E. Current transport modes will be unable to provide the mobility necessary to integrate the large potential labor markets created by Chinese city clusters
The dispersion of trips origin and destination will increase in China’s large urban clusters.

- Typical trips pattern in a metropolitan area
- Expected trips pattern in an urban cluster

Population densities:
- Low
- High
Transit provides high capacity but slow door to door speed. Current cars have higher speed but low road capacity.

**Average commuting travel time by transport modes**

<table>
<thead>
<tr>
<th>Transport Mode</th>
<th>Door to door travel time in minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car - US-MSA</td>
<td>23</td>
</tr>
<tr>
<td>Car - Singapore</td>
<td>25</td>
</tr>
<tr>
<td>Cars - Hong Kong</td>
<td>26</td>
</tr>
<tr>
<td>Cars - Dallas Fort Worth</td>
<td>27</td>
</tr>
<tr>
<td>Car - Paris</td>
<td>30</td>
</tr>
<tr>
<td>Car - New York</td>
<td>31</td>
</tr>
<tr>
<td>Bus - Singapore</td>
<td>43</td>
</tr>
<tr>
<td>Transit - Hong Kong</td>
<td>47</td>
</tr>
<tr>
<td>Transit - New York</td>
<td>48</td>
</tr>
<tr>
<td>Subway - Singapore</td>
<td>52</td>
</tr>
<tr>
<td>Transit - Paris</td>
<td>53</td>
</tr>
<tr>
<td>Transit - US-MSA</td>
<td>53</td>
</tr>
</tbody>
</table>

Population 2014:
- Singapore: 5.5 M
- Dallas F. Worth: 6.4 M
- Hong Kong: 7.1 M

Sources:
- US: Commuting in America 2013 US DOT Census Transportation Planning Products Program
- Paris: Deplacements des Franciliens - DREIF 2004
- New York City census 2010 - CTPP Profile
The faster transit systems seem to have difficulties breaching the 50km/h speed barrier.
In Singapore, in spite of the excellent design for the bus-subway connection, the average commuting time for transit commuter is 52 minutes (similar to US MSA 53 minutes)
Transport modes adapt to changing urban structures and household incomes, the expansion of urban clusters is likely to trigger more changes in transport modes.
The combination of transport modes currently used in large metropolis seems to have reached its limits to maintain large integrated labor markets:

• transit is too slow to accommodate commuting trips of more than 30km,
• cars consume too much valuable real estate for circulation and parking
F. Possible approach to transform large potential labor markets into effective ones:

1) Creation of land markets, reform of land development practices,
2) New transport technology: fast rail combined with low footprint individual transport
3) Investment in an urban highway system with a grid like structure away from concentric ring roads
Current land development practices in China are inconsistent with the development of urban clusters.
Development of southern extension of Mianyang (Sichuan) supply driven large industrial areas few areas for services
A real urban land market will have to be created

- Village collectives should be able to develop and sell land, rather than just rent it
- Land use should be more demand driven and less “master plan” driven
Residential area in Northern suburb of Beijing: large scale development with only one use: consequence of government monopoly on land development
Development of a village collective between Beijing and Tianjin around which many TVEs are located
New modes of transport combining rapid transit with low impact individual modes of transport
Very fast mode of rail transport should be used to move workers on commuting distance as long as 80 km

(The Maglev train linking Pudong Airport to Shanghai city center, fast but not necessarily the solution!)
Individual modes of urban transport providing door to station and station to door trips will have to be invented to allow door to door commuting speed compatible with the long distance travelled
Fast trains linking high density clusters would have to be associated with fleets of shared small individual vehicles for trips covering the first 5 km from trip origin to stations and the 5 km from station to final destination.

This fleet of vehicles already exists in a primitive form around some suburban Beijing subway stations.
Small footprint shared electric vehicles fleets already operate on an experimental basis next to some suburban rail stations in Japan and Europe.

The Lumeneo Smera is available now in Paris.

Toyota's i-ROAD is a fully-enclosed, two-seater, three-wheeled, fully-electric, Personal Mobility Vehicle (PMV).
Self driving cars, when fully operational, would be perfect for the first and last 5 km to and from stations in very large urban clusters.
China’s unprecedented large urban clusters have already the potential to open a new era of high urban productivity and creativity.

However, to avoid the fragmentation of those potentially very large labor markets, the following changes will be necessary:

A. Transport
   • Introduce networks of fast rails with few stops across the clusters
   • Allow fleets of small non-polluting vehicles around stations to go the last 5 km to destination
   • Create a grid shaped highway network away from the current radio-concentric one
   • Price major road space through congestion tolls

B. Land use regulations
   • allow faster land conversion from agricultural to urban
   • Let markets set floor area ratio and densities (the mantra “compact cities” will not apply)

C. Land development practices
   • Allow farmers to sell and develop land
   • Fragment properties in small lots
   • Finance trunk infrastructure through land taxation and tolls rather than through the direct sale of land