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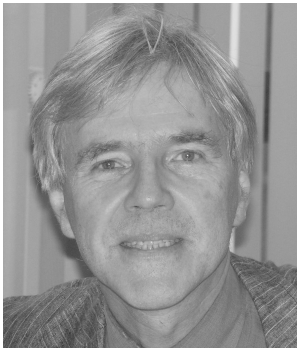

THE CONTRIBUTION OF CITIES TO ECONOMIC DEVELOPMENT: AN EXPLANATION BASED ON CHINESE AND INDIAN CITIES

Meine Pieter van Dijk

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1. Introduction

ISS considers cities sufficiently important for development to nominate an affiliate professor in urban management. During this inaugural address I will prove you right. The contribution of Chinese and Indian city dwellers, people living in cities, to economic development (measured by their contribution to the gross domestic product or GDP) is about three times the contribution of an average Chinese or Indian. I will try to explain that, but let me first give you an overview of this inaugural address and make some preliminary remarks.

The 1990s were a period of structural adjustment in developing countries. Many countries have put order in their finance and rationalized their economic policies. We are currently benefiting from that period, where countries as far apart as China and Ethiopia, or India and Tanzania all had an economic growth of over 6 percent in 2005, much more than the few percent growth we achieved in the Netherlands last year. However, most of this growth came from a limited number of regions and cities in these countries and I will quantify this urban contribution for China and India.[1] Not only do I quantify the contribution of cities, but I also want to explain it by doing regression analysis to find the factors contributing to the attractiveness of Chinese and Indian cities as measured by the amount of Foreign Direct Investment (FDI) received.[2] Subsequently I want to look at the future. Are the Chinese and Indian cities only booming because of cheap labour, or are they gradually developing into high tech economies, able to generate innovative technology to support their competitiveness? The three topics: the contribution of cities, the explanation of their success and their future competitiveness will lead to some considerations about the importance of reform policies at different levels of government and the role of urban and regional managers in this. The spectacular growth of cities is supported by globalization and puts an end to a dogma which influenced me when I started as a development worker in Africa in 1973: Rural development first (Lipton, 1977).[3]

The choice for China and India is made not only because I have been lucky to do extensive research in these two countries since 1996 and 1970 respectively, but also because they represent roughly one third of the global population and one half of the people living in developing countries. I will make some remarks about earlier comparisons between China and India and briefly point to the policies of these countries leading to their current success.

I am not going to dwell on the negative aspects of big cities, which are documented extensively and will be discussed during the lustrum of ISS in October under the title: Cities of hope or cities of despair? We all know to well what is wrong with cities:

a. Their negative impact on the environment (Zhang, 2002), problems of congestion and pollution, covered in the ecological footprint literature, focusing on the much larger area affected by the pollution produced in the city.[4]
b. Urban poverty, slums and the issue of urban security (Van Dijk, Noordhoek and Wegelin, eds, 2002).
c. The consequences for certain groups in Chinese society (Chang, 2002) and the increasing inequality in Third world countries between the rural and the urban areas, which requires active policy interventions to check the phenomenon (Van Dijk, 2006g).

Today I will focus on the positive contribution of cities. I will place the analysis of this contribution within the wider debate on economic globalization (Visser and Van Dijk, 2006) because our foreign students often ask us what does globalization mean for my country? Globalization can be cultural, military, geo-political, etc., but my research focuses only on financial and economic globalization (respectively Van Dijk, 2004a and 2006a). The latter is not so much defined in terms of an increased flow of goods and services between countries but rather as the result of knowledge development, international financial transactions and the imposition of global market discipline.[5]

Comparing China and India is ambitious but not new. As a student I reviewed Gunnar Myrdal's famous study the Asian drama for the Economic Bulletin of the Free University in Amsterdam. Since I have read a number of other authors trying to draw lessons from the developments in both countries (for example Drèze and Sen, 1995 or in the Netherlands Waardenburg, 1988 and earlier Wertheim, 1983). However, these publications did not deal with questions like: how important is the role of major cities, how their contribution can be explained and what the mechanisms are for spreading development in developing countries are. I attended recently in Beijing the launch of the World Bank study "Dancing with giants" (Winters and Yusuf, eds, 2007, on the rise of China and India), but during the presentation the role of cities or urban regions was just not mentioned by these macro economists! Of course I am not the first one pointing to the importance of cities and urban regions for development. My colleagues in Rotterdam in the Applied economics department and at the Institute for Housing and Urban development Studies (IHS) know this already for a long time. Kaplan (1996) said it most pointedly when he argues that the state in the United States (US) is disappearing. Due to globalization "there is no national economy anymore, rather (there is) an economy of urban regions".

When comparing China and India it is a mistake to focus too narrowly on the contrasts between economic systems such as capitalism and communism. Buechler and Buechler (2005: 121) recommend instead examining variations in the position of people and productive units over time within the economic system. This is an anthropological and more institutional perspective that will also be taken in this inaugural address.[6] Looking at the Chinese economy in this way we see that the environment of micro and small entrepreneurs in Chinese cities has changed over time from a situation where these activities were illegal in most cities, to one where they were tolerated.[7]

2. The comparison between China and India

Amartya Sen (2005: 161) reminds us that the comparison between China and India started before Christianity. Hundreds of Indian scholars went to China between the first and the eleventh century. When one Chinese traveller, Yi Jing, returned from India to China in the seventh century he asked the rhetorical question which can still be asked: "Is there anyone in India who does not admire China?". At that time travellers brought Sanskrit manuscripts to China to be translated, not yet bothered by copyrights. Later Buddhism coming from India spread over China and Indian mathematicians and astronomers held high positions in China's scientific establishment.

Sen (2005: 199) continues the comparison during the 1950s. At that time between 23 and 30 million people died in China due to the failure of the Great Leap Forward, while in India democracy played a protective role because in a democracy political incentives exist "to act supportively when disasters threaten and when immediate change in policy is imperative". I will not discuss the role of the political system, although I believe China will have to make the transition to a more democratic and less authoritarian system in the near future, but it doesn't have to be a national level multi party (Westminster) type of democracy.[8] We will show that rapid urbanization is becoming a key driver for socio-economic change in China!

Box 1 summarizes the objectives of the research underlying this inaugural address, which has been carried out partially with partners in Rotterdam, The Hague and Nanjing.

My comparison of China and India (Van Dijk 2006a) starts in 1978, two years after Mao's death, when Deng Xiaoping had consolidated his power and launches the liberalization of agricultural production by allowing farmers to sell their surpluses in the market.[9]

Box 1 Objectives of the research underlying this inaugural address

M.P. van Dijk, 2000-2005, Sail project MSM-IHS-ISS in Nanjing	**With Paul Goes master thesis Erasmus University**	**With Remko van der Drift master thesis Erasmus University**
• Explain differences in competitiveness of cities • Determine competition of ICT sector in Nanjing and Bangalore in global markets (Van Dijk, 2004b and c). • Identify underlying factors like government policies, productivity, labour cost and labour legislation	• Compare Malaysia and China to explain differences in competitiveness in semi-conductor industry (Goes, 2006) • Use indicators knowledge economy (Goes and Van Dijk, 2007).	• Explain differences in competitiveness for different Chinese and Indian cities • Analyze role of mega-cities defined as more than 8 million inhabitants (Van der Drift, 2007).

Economic reforms and their success in China and India

China: becoming the workplace of the world

China's competitiveness is not built on a myth but the result of far-sighted planning. In 1820 China's GDP was ten times that of Japan (Maddison, 2003: 170). A century later it was still 3.5 times bigger. Only in 1961 Japan had a bigger GDP than China. It will now take China at least another ten years before it can catch up again with Japan, the second economy in the world in terms of gross domestic product (GDP; World Bank, 2004). In the meanwhile the country seems to have become the workplace of the world, although it still produces only about 7 percent of all industrial products in the world.

Economic reforms in China started after 1978 and can be described in four stages, the waves of reform caused by Mr. Deng (Economist, China Survey, 1992) to create a market economy (for an overview of the whole period, Yusuf et al., 2006).[10] The first stage runs from the 3rd Plenum of the 11th congress in 1978 to the 3rd Plenum of the 12th congress in 1984. In this phase we see the rapid development of the Township and Village Enterprises (TVEs; Chen, 2000) and the beginning of the State-owned enterprises (SOEs) reform. In the second phase we see a banking sector emerging. A third phase starts in 1992 with Deng Xiaoping's famous southern tour and the emerging stock market. Systematic market reforms are undertaken and Liang (2004) notes a rapid development of joint-stock companies, Foreign Invested Companies (FIEs) and Private-owned Enterprises (POEs). The private sector has become more important in China and is now responsible for three-quarters of economic output and employment.[11] The fourth phase of the reform process starts after joining the World Trade Organization in 2001 (Brahm, 2002). This membership locked in the previous reforms.

Important for our analysis is the emphasis on decentralization of control, on introducing market forces and on the open door policy, which

meant opening up to foreign capital and technology.[12] The southern provinces took up the suggestions made by Deng quickly. The Jiangsu Provincial Committee of the Chinese Communist Party and Provincial institutions for example became responsible for urban development in Nanjing, the capital of the Jiangsu province. Each city has a municipal government but counts a number of districts. These districts have their own layer of government, the district authorities, about ten in Nanjing with each about half a million inhabitants. The reforms in the urban areas, just like in the rural areas, started with introducing the so-called responsibility system giving in this case managers of enterprises more autonomy.[13] Managers would sign a contract with local authorities or the ministries concerning the profits to be made, or the taxes to be paid. They would also sign a contract specifying how profit would be shared. Production above the agreed quotas could be marketed at floating rates between the minimum and maximum fixed by the state. The township and village enterprises would act as independent legal entities with specified rights and obligations. Because production above the quotas could be marketed at floating prices the earnings depended on fulfilling the quotas. Mandatory planning changed into 'guidance planning' and the introduction of market forces.

Growth in China is driven by rapid growth in labour productivity, an emphasis on exports, strong domestic demand fed by low prices and a stress by several companies on quality. China's lower prices are not just due to lower wages, but also to a good infrastructure, to lower taxes and the lower cost of capital, and the fact that the productivity of its workers is 10 to 300 percent higher than in India, depending on the sector. Productivity is also one of the factors explaining the rapid growth of the ICT sector in general and in Nanjing in particular. The key factors of the Chinese success with economic reforms are summarized in table 1.

The Chinese authorities consider technology to be the key to becoming the leading economy in the world. Innovation will help the

Table 1 Success factors for Chinese economic reforms and their positive effects

Success factors	Positive effects
Major success factors 1 Clear vision and strategy: foresighted planning and role for private sector 2 Systematic reforms focused on making the economic system function well 3 Export orientation 4 Obtain technology in every way **Other factors:** 5 Investments in infrastructure 6 Enterprise and financial sector reforms 7 Experimenting with reforms on a small scale 8 Good basic health and education policy 9 High saving rate and able to attract FDI	1 Healthy population (high life expectancy) 2 Proper education system (high literacy rate) 3 Substantial poverty reduction, hence big internal market 4 Good infrastructure 5 Cheap services, like water and electricity and low taxes 6 Substantial foreign exchange reserve 7 High labour productivity 8 Rapidly developing and very competitive private sector 9 FDI is coming in and bringing technology, management and markets

Source: Van Dijk (2006d).

Chinese industry to remain competitive, even so when wages will increase further. The authorities use different techniques to acquire the latest technology. For example by inviting foreign investors to bring it with them to China. Secondly, by buying, by copying or even stealing technology and by stimulating Chinese scholars to come back to the mother country (return migration). Finally they achieve it through their own research and development (R&D) expenditures as we will see later on in this address.

There are a number of characteristics of the Chinese reform process. Reforms started in the rural areas to eliminate the shortcomings of the Stalinist model of development. They concerned the economic system, rather than the political structures. In China policy changes take place through experiments. For example the industrial free trade zones in the southern part of the country started as an experiment. Experimenting may be the only way in a big country like China to test ideas and new approaches, which if successful are repeated on a larger scale.[14]

The economic reforms have substantially changed the institutional context.[15] In the first place they diminished the role of the government sector, in particular of the collective agriculture and of the state-owned enterprises. Secondly, the government budget deficit is smaller due to fewer losses of SOEs and the money can be used for other purposes, in particular the development of infrastructure. The Chinese authorities have shown great realism in the sense of really going for the reforms, after trying them out on a small scale.

Reforms in India and the role of the ICT sector

The reform process in India is better known and analyzed more often.[16] It started with Rajiv Ghandi in the early nineties, but has had its ups and down, often two steps forward, followed by one backward. We focus in particular on the ICT sector, which has become the image of a more dynamic India.[17] Of course only a small proportion of the total labour force works in this sector, but the Indian authorities have put considerable effort into its development (Van Dijk, 2005). It is estimated that about 1.3 million people are working in the very urban ICT sector in India (see box 2), with large concentrations in Mumbai, Bangalore, Delhi, Hyderabad and Chennai in that order – if measured in terms of number of headquarters of ICT firms.[18] Bangalore is often called the Indian version of Silicon Valley, referring to the concentration of computer-related enterprises in the city (Van Dijk, 2003b).

Box 2 Importance ICT sector in India

- 1,300,000 people working in ICT sector
- Software sector had demonstration effect for other sectors: export-orientation works!
- India looking for own trade marks and higher value added products
- Need to diversify its markets (too dependent on the US) & develop its internal market
- India fears Chinese competition India could imitate China's approach to reforms
- It could forge alliances with other countries to boost international trade
- It should increase productiveness of the economy

Source: update of Van Dijk (2003b).

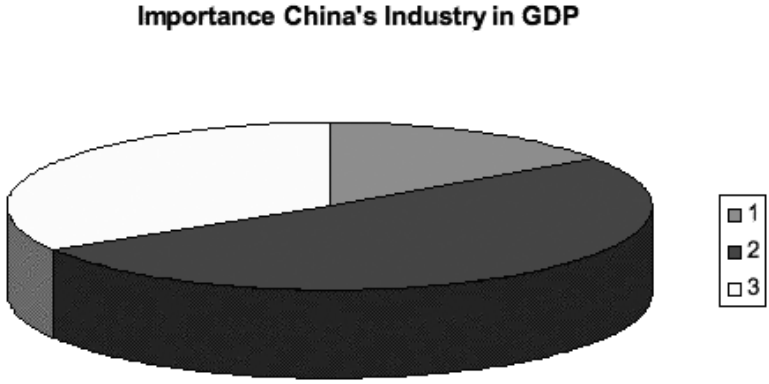
The ICT sector generated 12.4 billion dollar in export revenues in 2003, 15.9 in 2004 and was expected to bring in 19.5 billion dollar in 2005 (Business Line, 7-2-2006). The Indian authorities have put considerable effort into its development (Van Dijk, 2005).

Finally, the government clearly thinks in terms of public–private cooperation projects as a means of developing the ICT sector. More importantly the sector has become an example of what India can achieve. It has shown the advantages of globalization to the country and stimulated the government to reduce the bureaucracy.

China and India compared

We see similar trends in China and India, but much higher growth figures for China than for India. China's industrial output grew 23.4 percent in 2004 according to the National Bureau of Statistics.[19] The economic growth for 2006 is around 10 percent, despite all efforts to limit

the economic growth to avoid overheating of the economy. The dynamic development process that is taking place in Chinese cities strikes every visitor. The rapid expansion of the manufacturing activities in China, which began in the 1990s, is based on increased exports and had very positive effects on the Chinese economy. In fact, during the last decade, Chinese industry has become one of the most competitive in the global market.



Not only is China's per capita GDP at present two times India's, its economy has usually grown two to three times faster than India's since 1990, particularly if measured in per capita terms. Manufacturing grew at 11.5 percent per year (1980-1993), which is almost double the increase in India (6.2%). In 2001 manufacturing contributed 51.1% to the GDP of China and 26% to that of India (World Bank, 2004). In China's case this growth is very much linked to economic liberalizations and its export-orientation.

The growth of manufacturing implied a gradual shift away from agriculture towards industry. This is suggested by the theory of structural transformation (Todaro, 1989), which includes a gradual shift away

from agricultural to non-agricultural activities and at a later stage a move from industry to services, the latter starting in China only in the nineties. The process is also reflected in the different rates of growth of the three sectors (figure 1 and table 2).

Table 2 Different rates of growth of agriculture, industry and services in China and India in the seventies and nineties (%)

Sector growth (percentage)	China 1970-80	China 1980-93	India 1970-80	India 1980-93
Agriculture	2.6	5.3	1.8	3.0
Industry	8.9	11.5	4.5	6.2
Services	5.3	11.1	4.6	6.4

Source: World Bank (2004).

Table 3 shows similar trends in China and India, but much higher growth figures for China than for India, which has resulted in an increase of the role of the services sector in the Chinese economy only at a later stage.[20] China's per capita GDP is 1740 US$ (in 2005; World Bank, 2006). It is at present more than two times India's (720 US$) and its economy has grown faster than India's each year in the 1990s. In terms of purchasing power parity one can buy more than 5 times the equivalent from this per capita GDP in India and about 4 times in China, compared to what a dollar buys in the US.

Foreign capital and export performance played an important role in the rapid economic development. In 20 years China attracted US$ 336 billion in foreign investment compared with India only US$ 18 billion. Foreign direct investments increased more than 100 percent in

Table 3 China and India compared, summary of economic variables

Variable	China	India
Begin of reform process	1978	1991 on/off
Population/internal market	1.281 bill. growing 0.6% p.y.	1.048 bill. growing 1.5% p.y.
Per capita GDP in 2005	1740 $ per cap	720 US$
Purchasing power parity p.c.	6600 US$	3460 US$
Growth GDP 2005	9.2%	7.1%
- per capita GDP growth '04	7.2%	2.8%
- industrial sector 90/02	12.6%	6.0%
- services sector 90/02	8.8%	7.9%
Agricultural productivity	373	382
Savings 2002	44%	22%
Capital formation	39%	30%
External balance	+3%	-2%
FDI inflow 2001 & 2006	53.5 & 63* billion US$	4.3 & 5.3 billion US$
Export growth 1990-2000	$62 to 249 billion	$18 to 42 billion

Source: Mainly World Bank (2004 and 2006). The Indian export figures are mentioned in Business Line (15-11-2002).* China Daily (16-1-2007).

2006 to reach 5.3 billion US dollar in India, but in China FDI increased to 63 billion US$ in 2006. China's export increased fourfold in a decade, while India's export tripled, but from a much lower base. China is now the largest exporter to the US and Japan.

Economic growth is the most important determinant of poverty reduction. A comparison between China and India on a number of social variables is made in table 4. Poverty is much lower in China than in India, if only because the average income is twice as high. In China's case poverty reduction is very clearly linked to economic liberalization and the country's export-oriented policies. The effect of high economic growth on the income distribution is less clear. It depends on the social and investment policies of the government and its ability to stimulate the development of different parts of the country through

Table 4 Social indicators China and India 2005

Variable	China	India
Human development index*	# 81	#126
Life expectancy at birth M/F	70/73	63/64
Mortality per 1000 <5 years	37	90
Adult literacy %	91	61
Percentage below 1 US$/day	18.5	44.2
Percentage below 2 US$/day	21.0	86.2
Coefficient for inequality**	0.496	0.33

Source: World Bank (2004, 2006). * Human development report UNDP (2006).** Gini coefficients in 2006, quoted in the Financial Times (27-12-2006).

income transfers or additional incentives for economic activities. However, even the European Union with high amounts spent on backward regions has not been very successful in spreading development equally. Like in Europe we see in India and China that the poor tend to migrate to the more developed regions and cities.

To be a successful exporter a country has to be internationally competitive. Measures of competitiveness can be used as well at the national, the regional, city, the sector or the cluster, as at the enterprise level (Van Dijk, 2006a).[21] Table 3 and 4 clearly show that China outperforms India on every variable, except for the income distribution indicator, which shows a bigger inequality in China. This is in particular due to the concentration of manufacturing development in the eastern part of the country, while many of the western provinces are still very much underdeveloped. To what extent can the faster development of China be explained, as the theory suggests, by lower wages level? We compared wages for the ICT sector for both countries. The data are presented in table 5.

Table 5 Estimated wages in $US in the ICT sector in China and India

Type	China	India
Unskilled dollar per month in the manufacturing sector	65	42
Skilled workers	125	60.5
Supervisors	800	300
Middle management 5 years experience in this position	2500	1400

Source: Shastri (2001).

I conclude that labour cost in the ICT sector in China is about twice the cost of labour in India. However, this is still one fifth of what such experts cost in the USA. But wages do not tell the whole story. Despite higher wages China is still more competitive, because labour productivity is much higher in China and also growing faster (Financial Times, 23-1-2007). So, China outperforms India. However, in both countries cities are the motor of development. Hence the interesting question is: how can we explain the success of these cities?

3. The explanation of success: the role of cities in the development of both countries

Cities make an important contribution to economic development. Data for Chinese and Indian cities will now be used to show that the per capita urban GDP is at the average three times higher than for the average Chinese or Indian.[22] By the way an analysis at the city or regional level, or in general below the national level, is not easy, because in India most data are collected at the state or the local government level, while in China many people doubt the quality of data that are presented on the previous year almost the day after December 31.[23] It is not easy to get reliable figures at the city level. Some figures used below refer to the state level in India and the provincial level in China. However, big cities benefit very much from the policies and investments made by the provincial or state authorities and hence data on that level, for example about the innovative milieu, can be very relevant to analyze urban developments.

FDI attracted by a city is a good indicator of the city's competitiveness. Jacobs (1970) already in 1970 suggested that there were cities before there were agricultural communities. She argues that the cities have a huge impact on the surrounding areas. The development of cities is considered to be examples of moving from an import substitution policy to eventually developing an export orientation. This creates employment and wealth. Such a city has indeed a big impact on

the neighbouring rural areas and will eventually stimulate these areas to develop their export again to cities, which originally provided the ideas, technology and necessary inputs. What are the mechanisms to transmit the positive effects of urban growth? We do not fully understand these mechanisms, but research for the World Bank in Tanzania suggests that the informal sector plays an important role in the rural-urban relations (Van Dijk, 2006g). In Tanzania you find informal flows of people, goods, ideas, money and services (Goods-Ideas-Money-People-Services or GIMPS), which spread development over the country. If a more positive approach to these informal activities is taken, attention can also be given to the issue of raising the productivity and increasing the competitiveness of the cities and regions. The quality of governance, labour, entrepreneurship and existing financial mechanisms can be developed further in the rural areas. Incorporating informality in the development strategy becomes a big challenge (Van Dijk, 2006c).

I would now like to discuss briefly the history of urban development in India and China and the differences between big (mega) and smaller cities in these countries. Already 43 percent of China's population lived in cities in 2005 (559 million, CSP, 2006).[24] In the some provinces this percentage is much higher: city states like Shanghai (89%), Beijing (84%) and Tianjin (75%) are leading, while other provinces count more than 70 percent rural population, for example Guizhou, Tibet and Yunnan. The 13 biggest or mega cities count together 114 million inhabitants. About 113 cities have more than one million inhabitants and this number is increasing rapidly. Currently 108 cities are between half and one million inhabitants and 65 between 200,000 and 500,000 inhabitants.

I will not bother you with the details of urbanization in China because like me you probably have no idea where all these cities are located and what it means that in the city state Chongqing the total urban population is not 30 million, but only 45 percent of the total (the urban part of this city state).

Table 6 Key data in 2005 for 5 important Chinese cities

City	Population (million)	Contribution to GDP (%)	GDP per cap Yuan	Growth rate (%)	FDI per cap in $
Beijing	15.38	3.12	44,774	11.8	230
Shanghai[25]	13.6	5.33	67,310	11.1	504
Chongqing	12.06	1.92	25,460	11.5	43
Guangzhou	7.51	2.93	68,631	13.0	378
Wuhan	8.01	1.42	27,940	14.7	217
Total 5 cities	56.56 (4.4%)	14.72	n.a.	n.a.	n.a.
China	1.300	100	13,920	9.2	42

Source: annex Chinese cities, where the sources are indicated. One dollar equals around 8 yuan and one euro is about 10 yuan or RMB. The figures for China are from table 3.

How important is the role of the major cities in the development process of China and India? Data for 23 major Chinese and the 13 biggest Indian cities were collected (see the annexes). To illustrate my findings table 6 summarizes the information on population, contribution to GDP, per capita GDP, growth rates and per capita FDI for five Chinese cities: Beijing, Shanghai, Chongqing, Guangzhou, and Wuhan. The China Daily recently suggested (16-1-2007) under the title don't look only at the per capita GDP that Beijing is already at 6000 US$ and that Shanghai would be soon at 10,000 US$ per capita (in 2009). For Nanjing I collected some more detailed figures. The city per capita GDP reached US $ 2,229 in the year 2000 (China

Daily, 15 February 2002) and US $ 3000 in the year 2003, meaning that it grew almost 10 percent per year. It turns out the economic growth rate has recently increased to 15 percent bringing the per capita GDP to 5000 US$ in 2007 and the city receives even more FDI per inhabitant than Beijing. This is partially because it is part of the dynamic Yangtze River delta of which Shanghai is the entry point.

According to table 6 these five major Chinese cities with about 5 percent of the total population contributed in 2005 roughly 15 percent of GDP, which implies that the average urban inhabitant in China contributes almost three times more to GDP than the average Chinese. Combining this information with what we know for the agricultural sector, where 741 (57%) million rural Chinese also contribute 15 percent of GDP it can be concluded that the other 500 million non rural Chinese contribute 70 percent, or about two times what could be expected on the basis of their number. If the ones living in mega cities contribute 3 times the average, the in between 1.5 times the average, the rural people contribute only a quarter of the average! A lot of the future potential of China is probably in the group in-between. That impression is confirmed if Chinese mega cities and smaller size cities are compared.

From table 7 some conclusions can be drawn about the role of mega cities in China. Mega cities in China received significantly more investments than smaller cities and have a higher GDP; but from the point of view of economic growth mega-cities don't grow as fast any more and receive less FDI in per capita terms (although both are not statistically significant). It is remarkable that mega cities have a higher number of R&D workers and count more registered patents (both significant at 10%). The analysis of variance suggests that after a certain size of a city environmental and governance issues slow down economic growth and that is why these mega cities become less attractive for FDI.

Table 7 Comparison between mega and smaller cities in China (ANOVA)

Variable	Mega cities >8 m.	Smaller cities	Significance
	N=13	N=23	%
GDP bil. Yuan	360 (13)	182 (23)	.067 at 10%
GDP growth %	13.3 (11)	13.8 (12)	.565 not sign.
FDI bil. Dollar	2,806 (11)	4,220 (12)	.654 not sign.
Total investment bY	150,892 (13)	75,708 (23)	.005 at 10%
Number R&D staff	12,068 (11)	4,275 (11)	.087 at 10%
Number of patents	10,211 (13)	4567 (23)	.069 at 10%

Source: Annex Chinese cities. CSP (2006) provides data on GDP, total investment and number of patents for another 13 cities.

In 2001 only 27.8 percent of the Indian population lived in cities (HUDCO, 2001). However this percentage fluctuates strongly from 93 percent in the National Capital Territory (New Delhi or NCT) to only 9.8 percent for the hill state of Himachal Pradesh, which is the least urbanized state. India has three levels of cities, according to their size:

1. Metropolitan cities with more than one million in habitants: 35 cities
2. Big cities with more than 5 million inhabitants: 6 cities (Chennai, Bangalore and Hyderabad each around 6 million inhabitants; besides the three mentioned below)
3. Mega cities with more than 8 million inhabitants (Greater Mumbai 16.4, Kolkata 13.2 and New Delhi 12.8 million)

In India more than 35 cities had more than a million inhabitants in 2001, which is much less than China. Like in China the 5 biggest or mega cities currently count around 55 million inhabitants (also 5% of the total population and around 11 million inhabitants each). Among these cities a number are not yet booming, often because of a lack of infrastructure and the small amounts of money received for investment purposes.[26] The historical dimension of this development is summarized in table 8, showing a rapid increase of the number of cities having a million plus inhabitants and of the percentage of the urban population living in such cities.

Table 8 Number of Indian cities having million plus inhabitants 1951-2001

Year	Cities having more than one million inhabitants	Percentage of urban out of the total population
1951	5	19
1981	12	n.a.
1991	23	33
2001	35	37.8

Source: HUDCO (2001).

In the 1990s the growth of some of the smaller cities has been incredible. According to HUDCO (2001) cities like Surat (now 2.81 million inhabitants) grew 85 percent in that decade, while Faridabad grew 71 percent and reached 1.05 inhabitants in 2001. This is less than the big cities grew. The champions of the category over 2 million inhabitants are Jaipur (53% population growth in a decade), Delhi (53%) and Patna (55%). This suggests there is a tremendous potential there, but let us first look at the Indian mega-cities.

Table 9 Three mega cities in India versus 10 big cities (ANOVA)

Variable	Mega cities >8 m.	Smaller cities	Significance
	n=3	n=10	At 0.06%
FDI per capita	11,480	2758	.057
GDP per capita	28,306	16,337	.053
GDP growth 91-99	8,350	5,954	.054

Source: Annex Indian cities.

In India only three variables showed significant differences between mega and smaller cities. The attractiveness of these mega cities is shown by the significantly higher GDP and GDP growth and the per capita higher FDI. However, the poverty ratios are also higher in Indian mega cities, suggesting that cheap labour is available, which makes them still attractive. This overall picture differs from the picture for China, where the biggest cities became less attractive. This difference may be related to the fact that foreign investors play a more important role in China and move away from the biggest cities when pollution and congestion, just like wages start increasing (Van Dijk, 2006d).

For Indian cities no ready-made statistics for the share in GDP of the major cities were available. At the National Institute of Public Finance and Policy in New Delhi colleagues estimated that the five major cities in India in 2006 would contribute roughly 15 percent of GDP. The figures for these cities are summarized in table 10.[27] Population wise they are good for 5 percent of the population, which implies that the average urban inhabitant in India also contributes almost three times more to GDP than the average Indian. The 72 per-

cent rural population contributes 31 percent to GDP or 43 percent of the average. The remaining 23 percent urban, the smaller cities, contribute 54 percent of GDP, or about 2.5 times what would be expected on the basis of their population.

Besides showing that indeed 5 percent of the Indian population living in the five biggest cities (together 54.49 million people) generates 15% of the Indian GDP, table 10 also shows that most of the FDI goes

Table 10 Five major Indian cities compared: population, income, investment & FDI

State/ major city (State % urbanized)	Population of capital millions	State level per capita GDP* 2001-2002	Contribution to India's GDP	State level % of approved FDI (1991-2004)
Karnataka Bangalore (34.0%)	5.69	16,343	1.5%	8.24
Maharastra Mumbai (42.4%)	16.37	23,398	5.0%	17.62
Tamil Nadu Chennai (43.9%)	6.42	19,141	2.5%	8.56
West Bengal Calcutta (28.0%)	13.22	15,569	2.5%	3.18
National Capital Region New Delhi (93.0%)	12.79	47,441**	3.5%	12.05
Five cities	54.49 or 5% of the total popul.	n.a.	15% GDP	49.65% FDI
Total India	107.88	14,359	100	100

Source Population is HUDCO (2001), GDP is net state development product (NSDP in Rs.; Rao and Singh, 2006), %GDP own research (see text), share of FDI (Planning Commission, 2003).** Maitra (2006).[28]

to Maharastra, New Delhi and Tamil Nadu in that order. Karnataka, Gujarat and Andra Pradesh occupy place 4, 5 and 6. At the bottom one finds states like Uttar Pradesh, Haryana and Rajasthan, which received only about one percent of FDI in the period 1991-2004.

Table 11 goes deeper into the growth of the per capita income in the 5 major cities between 1993 and 1999. The National Capital Region (New Delhi or the NCR) has shown the highest economic growth in the 1990s in income per capita (10.1 percent). However, the problem is that the area is not well defined. We have New Delhi, but also satellite towns which are partially located in neighbouring states. Neighbouring Faridabad (1.05 million) is the most important town in Haryana (besides the shared capital Chandigarh), but Gurgaon[29], Noida[30] and Greater Noida (Uttar Pradesh at a much greater distance from New Delhi) are also important satellite cities. According to Maitra (2006) satellite towns like Noida are linked to Delhi and the agricultural belt around it extends over western Uttar Pradesh and Haryana: "many prospering middle-order cities, growing with strong industrial base also surround it". There is no end to urbanization and its impact on the surrounding rural areas. The draft plan 2021 for the National Capital Region estimates that by 2011 Delhi will have 19.3 million inhabitants, Noida 600,000 and Gurgaon 450,000 inhabitants.

The growth of the GDP of the Indian cities is lower than in China, but at least in New Delhi it is also roughly about 1.5 times the national average economic growth, as is clear for table 11, while the current per capita urban gross domestic product is also between two and three times the national per capita GDP in India! We seem to have discovered the law of Van Dijk that the 5 biggest cities in the two biggest countries of the world contribute 15% to GDP, or three times what could have been expected on the basis of their population figure. They also tend to grow 1.5 times faster than the whole economy. The conclusion is that China's and India's high economic growth depends largely on a limited number of cities and regions.

Table 11 Per capita city GDP in five selected Indian cities 1993 and 1998

State capital (% urbanized)	1993	1998	Growth period 1991/2 -98/9*
Bangalore (34.0%)	13,986	27,640	5.87% per year
Mumbai (42.4%)	8,624	27,976	8.01
Chennai (43.9%)	14,520	36,138	6.02
Jaipur (%)	7,746	16,113	5.85
New Delhi 2002/3 (93%)	n.a.	47,441**	10.07** (1990s)
All India	7,902	15,019	6.5

Source: Columns 1-3 Hudco (2001) and * Rao and Singh (2006).** Maitra (2006).

4. How can their contribution be explained at the city level?

Hoping I have convinced you of the important role of cities in the development process the question remains: how can their contribution be explained at the city level? Cities must compete in a global economy. As I explained before FDI is a good indicator of global competitiveness.

Regression analysis based on figures for the biggest 23 Chinese cities shows that the urban GDP can be explained by three variables: FDI, total investments and infrastructure investments (table 12), but the indicator of multi-collinearity is too high. Hence we selected FDI as the dependent variable and provide the results in table 13. A problem for the regressions was whether to include Hong Kong, given its spe-

cific history, and we also had to estimate the figures for infrastructure investments for a limited number of cities.[31] Table 13 shows that the level of FDI is mainly explained by the investments made by the authorities in that particular city. FDI is also positively related to the level of exports. The first indicator reflects the local policy priorities and the second the path dependency of success: if you have been successful in the past, you attract more investments.).

Table 12 China: Urban GDP as dependent variable, including Hong Kong

Explanatory variable	**Unstandardised coefficient**	**Statistically significant at 0.5%**	**Other indicators**
Constant	-63.89	.069 Not significant	
FDI	21.548	.000	N=23
Total investments	1.236	.001	R square=0.963
Infrastructure investments	3.972	.002	Durbin Watson = 2.506

Source: Annex Chinese cities.

No indicator of innovativeness (R&D expenditures or personnel, number of graduates, or patents per province) was significant in the regression equations suggesting most investments still go to China for the cheap labour. Originally I was disappointed that no indicator of the knowledge economy would be significant, given all the statements of the Chinese authorities that innovation matters and the financial

efforts made to increase China's innovative capacity. The conclusion is that at the current stage of development China and India are not yet chosen for their innovative capacity. It doesn't mean that these countries are not making a lot of effort to develop their innovative capacity as will be shown below.

Table 13 China: Urban competitiveness (FDI) as dependent variable, including HK

Explanatory variable	**Unstandardised Coefficient**	**Statistically significant at 0.5%**	**Other indicators**
Constant	.153	.813 Not significant	N=23
Total investments	.012	.000	R square = 0.965
Exports	.011	.011	Durbin Watson = 2.057
Knowledge economy		Not significant	

Source: Annex Chinese cities.

Also for India the regression results explaining FDI at the state level showed the statistical significance of investments to explain the attractiveness of that region or city for foreign investors. No data for export by cities were available in India. Variables like poverty or the human development index (at the state level) were not significant, but the sample was also smaller in India.

5. How will Chinese and Indian cities compete in the future?

For China and India to remain competitive in the future it is important to develop an innovative milieu. Competitiveness only based on cheap labour will not last. The ICT sector is an example of non-traditional modern technology for which it was important to find out whether Nanjing and Bangalore provided an innovative milieu .[32] The factors underlying the current success of the Chinese and Indian cities with ICT can be explored by using a scorecard for the knowledge economy at the national level developed by the World Bank complemented by some variables based on Porter (1990)'s theory of competition. To complement the analysis at the national level data for the innovative system at the city level will be provided for Nanjing and Bangalore.

The National Innovation Systems (NIS)

The technological learning mechanisms of a country, region or city can be understood by analyzing different ways of acquiring technological capabilities. This requires studying the National Innovation Systems (NIS) and public policies at the national level are important, just like the regional innovation system (RIS) and local policies. Innovation is the result of an interactive learning process, which can take place in regional clusters. Small and medium enterprises (SMEs) usually have more contact within their regions than large firms. They may depend more on tacit knowledge, transferred in personnel contacts or on learning by doing and other forms of interaction.

National policies can create the conditions for technological development and stimulate inter-firm and institutional linkages.[33] China announces new technology projects, usually at the national or provincial level about every other day. Tax incentives are the major instrument used, but also inviting foreign investment, planning the devel-

opment of the ICT sector and subsidies on loans, investments in infrastructure and High Tech Industrial Development Zones are provided.

At the national level several initiatives are taken to develop the ICT sector in China and India. Shulin Gu (1999) gives an overview of the science and technology (S&T) system and the role of research and development (R&D) institutes in China. Although her focus is on the machinery industry she clearly describes the efforts to transform R&D institutes to get them focused on the commercial development of manufacturing systems in China. A similar development is currently taking place in the ICT sector at the local level where for example the Gulou District authorities in Nanjing want the universities to supply ideas directly to the ICT firms in the Gulou District Science Park.

Table 14 Resources for and type of research China, the USA, India and Japan, 2001

Variable	**China**	**United States**	**Japan**	**India**
R&D % of GDP	1.09	2.76	2.82	0.87
R&D personnel	742,700	1,261,200	675,900	n.a.
% per type of res. 1 Fundamental 2 Applied 3 Experimental development	 5.0 16.9 78.1	 18.1 20.8 61.1	 12.3 21.6 66.1	 n.a.
Growth in 2006*	20%	4%	n.a.	n.a.

Source: National Bureau of Statistics (2003)* OECD figures in Financial Times (15-1-7).

Table 14 gives an international comparison in terms of number of available funds (and its recent growth), human resources used for

R&D activities and by type of research between China, the US, Japan and India. It shows that the US not only has the highest number of R&D personnel, it also spends a high percentage of its GPD on research. With 2.82 percent of GDP only Japan spends slightly more. China's expenditures have increased to over 1 percent of GDP. The US also spends more on fundamental research, while Japan spends the highest percentage on applied research and China spends most of its resources on experimental development. This is certainly better than India, which according to the same source has only spent 0.87 percent of its GDP on research in 1999. According to UNCTAD (2005: 105) China is among the 10 leading economies in R&D spending in the period 1996- 2002. The total value of R&D spending increased from US$ 4.9 billion to 15.6 billion in these six years. The country now ranks sixth, after the US, Japan, Germany, France and the UK. India was only spending 3.7 billion in 2001 on R&D. According to the OECD the growth of expenditures was 20% in China and only 4% in the US in 2006 (Financial Times, 15-1-2007; see table 14).

The growing importance of innovation and R&D is stressed in new economic growth models. Where traditional growth models focus on providing physical infrastructure to attract firms from outside, the new economic growth models put the emphasis on the development of technology and (regional) innovation. The World Bank developed a scorecard for the knowledge economy (Dahlman and Utz, 2005), called the Knowledge economy method (KAM). The World Bank has put data for the most important countries on www.worldbank.org/kam.[34]

We selected a number of indicators to assess the competitiveness of the semi- conductor industry in China and India (table 15, number 2, 11 and 12; Goes and Van Dijk, 2007; the other data were taken from the World Bank website). The Innovation Capability Index (ICI) measures at the country level the innovative capabilities. The ICI combines a 'Technological Activity Index' and a 'Human Capital index', both are weighed equally.[35] The World Bank and our data are presented in table 16 for China and India.

Table 15 Operationalisation of knowledge economy

Innovation indicators are measured by: 1. Number of patents. 2. Innovation Capability Index (ICI) 3. Presence of National Innovation System	Economic environment to attract foreign investments in the semiconductor industry: 7. Adequacy of legal environment 8. Effective Intellectual Property protection 9. Promotion of free and fair trade policies 10. Quality of human resources
How interesting are China and India to invest in: 4. R&D spending capability 5. Legal environment and human rights 6. Level of literacy and health	Competitiveness of the market is measured by: 11. Strength of internal market 12. Proximity to local customer base

Source: Goes and Van Dijk (2007).

Competitiveness is related to having an innovative milieu. To compare the two countries a web is drawn in figure 1. In the group 'Innovation', the most important difference between China and India is the higher number of R&D workers in China. India is outperforming China only on two scores: the rule of law and intellectual property protection. The first one may be related to the political system, while the second has to do with India's efforts to protect intellectual property once it realized the importance of this legal protection for the software it produces. China beats India in terms of number of researchers and total expenditures for R&D. Also gross tertiary enrol-

Table 16 World Bank data for China and India

Group of variables	Variables (Normalized scores)	China	India
Innovation	1. Patents granted by USPTO/million people, average 2001-05	5.15	4.92
	2. Innovation Capability Index (ICI)	0.358	0.287
	3. Researchers in R&D/ million people 2004	4.47	2.02
Investment potential	4. Total expenditure for R&D as % of GDP 2004	7.63	6.24
	5. Rule of law 2005	4.02	5.83
	6. Human development index 2003	4.46	2.31
Economic environment	7. Regulatory quality 2005	4.02	3.48
	8. Intellectual property protection 2006	4.12	6.40
	9. Tariff & non tariff barriers 2006	4.26	0.00
	10.Gross tertiary enrollment 2004	3.84	2.64
Market potential	11.Strength of internal market	8.58	3.46
	12.Proximity to local customer base	10	1.08

Source World Bank website, except for #2 UNCTAD (2005) and #11 and #12 (own calculations compare Goes and Van Dijk, 2007).

ment is higher in China and on the Porter factors proximity to local customer base and strength of internal market China scores better.

In India in the years after independence the national government established some of the country's biggest public sector factories in Bangalore. At the national level several other initiatives were taken to develop the NIS and hence the ICT sector. Renu (2000) remarks that until 1977 the regulatory framework proved inadequate for the establishment of technological capabilities for new firms. The industrial policies restricted the access of these firms to technological resources from abroad, slowed down the innovation diffusion process and impeded quality competition. ICT was, however, successful in building the human capital stock necessary for the rapid growth of an indigenous computer industry. Hence, the emerging private computer industry looked outside the country to replenish its stock of technological know-how. Presently, English-language newspapers in India

Figure 1: Competitive dimensions China versus India

Source: Based on table 16.

announce new technology projects, usually at the national or state level, approximately every other day.

What is the evidence? On the one hand the innovation capability is developing, on the other hand, the indicators of the knowledge economy were not significant in the regression equations? Hence we need to move from the NIS to the regional and city level innovative system.

The Regional Innovation System (RIS)

In big countries like China and India the main actors for rapid regional and urban development can be found at the local level. A regional innovation system (RIS) can be described as a constellation of industrial clusters surrounded by innovative supporting research and development organizations. This description links the importance of innovation at the firm level to competitiveness of the ICT cluster. The role of different actors, such as enterprises and relevant institutions, is critical for stimulating innovation synergies (see box 5).

Box 5 Key elements of a Regional Innovation System (RIS)
The presence of innovation supporting organizations An increase in the qualifications of human resources The role of social capital The existence of collaboration and collective arrangements between firms Policies to achieve this, including finance

Source: Cooke (1995).

A Regional Innovation System (RIS) stimulates interactive learning through an institutional milieu characterized by embeddedness (Fornahls and Brenner, eds, 2003). If a RIS is a regional cluster with

supporting knowledge organizations, its governance structure is important. It is made up by private and public institutions. Examples of the private sector institutions are Chambers of Commerce and Industry Associations. The public actors are different levels of government and the specialized R&D and education institutions, which can help to build knowledge-based competitive advantages. A systematic analysis of the RIS would focus on the points summarized in box 5.

What are the advantages of the RIS approach? It emphasizes the unique characteristics of a certain region. Secondly, the RIS approach distinguishes the importance of knowledge generating and knowledge using activities. It stresses the importance of a relation between the two subsystems. Cooke (1995) also emphasizes the importance of complicit knowledge. This is the bridge between tacit and explicit knowledge. The combination of knowledge from the different subsystems may lead to innovation. It requires making tacit knowledge explicit. Finally the RIS approach can help to explain why certain regions are more successful than others.

The knowledge economy at the urban level: the example of Nanjing

The Chinese want to develop the necessary innovations themselves. Hence China has recently substantially increased its expenditures on R&D and develops its own NIS and RIS. So far the Chinese received most technology through FDI. Or they bought it, or copied it and only recently China has become more active in developing its own technology. Its increased R&D expenditures are heavily concentrated in a limited number of Chinese cities in the eastern part of the country (table 17).

In bigger countries the RIS are at least as important as the NIS for economic development of cities. For the enterprises the interaction within the city or the region, with each other and with knowledge

institutions is important. Let us have a closer look at the emerging RIS in Nanjing and Bangalore. There are for example some 300 research institutes in Nanjing, employing over 320,000 people. According to the brochure of the Nanjing High Technology Industrial Development Zone, among them there are over 130 first level research centres and labs, 10 national level technical research centres and 13 national level labs. There are also 37 universities with over 300,000 students in Nanjing. The brochure calculated that the number of university students per 10,000 inhabitants is 2.7 times higher than in Beijing and 3.8 times the number in Shanghai.

Universities and R&D institutions are important, but also skilled manpower plays a major role in an innovation system. The Chinese government has tried to match supply and demand for skilled labour at the national level. However, at the regional level the shortages of labour can be matched more easily by stimulating selective immigration into the region. In China the approach to developing a RIS is very much based on the construction of Software Parks and High-Tech Industrial Development Zones. Table 17 below gives the number of science and technology (S&T) institutions, the number of employees working in the S&T sector, total expenditures for S&T and for higher learning, the number of S&T projects and the number of patent applications for four important cities in China.

The Jiangsu province clearly stands out as the Chinese province with the largest number of R&D institutions. Ten percent of all Chinese institutions are located in that province with a heavy concentration in its capital Nanjing. The same picture emerges if figures for total technical personnel are compared. However, in terms of number of S&T projects Nanjing comes behind Guangdong and Shanghai. Similarly, in terms of number of patent applications Guangdong, Shanghai and even Beijing are more important than Nanjing.

The figures in the statistical yearbooks on High Tech Industry in 2003 (NBS, 2003a) and in the one on Science and technology in China

Table 17 Expenditure on and number of employees in the S&T sector of Beijing, Nanjing an Shanghai (numbers and national ranking)

Indicator	Beijing	Nanjing (Jiangsu)	Shanghai	Guangzhou (Guangdong)	Total for China
Number of S&T institutes	57 (19th)	293 (first)	62 (16th)	138 (second)	2930
S&T personnel	257,326 (3rd)	328,585 (first)	178,875 (6th)	267,376 (second)	3,221,822
Total funds for S&T*	4,452,87 8 (first)	3,024,79 4 (3rd)	2,783,230 (4th)	3,050,147 (second)	29,379,898
Expenditure for higher learning*	307,211 (first)	206,659 (3rd)	212,783 (second)	100,767 (7th)	2,041,666
Projects for S&T activities	289	1562	1696	4767	12,910
Patent applications	610	220	1134	1560	5477

Source: National Bureau of Statistics (2003). * in 10,000 yuan

Note: Personnel engaged is total technical personnel including scientific researchers and teaching staff by region. Projects and patents for S&T activities in large and medium industrial enterprises (LMIE, joint ventures) by region.

(NBS, 2003) prove the advantages of the Jiangsu province in general and of Nanjing in particular. Nanjing is one of the four biggest R&D and education centres in China, measured in terms of number of S&T institutions and S&T personnel. The strength of its science and technology (S&T) activities measured in available funds is ranked third which contributes to its RIS. Further development requires a development strategy at the city and regional level and systematic efforts to implement such strategies. The ability to formulate such a strategy requires some autonomy at the regional and city level.

Table 18 gives an overview of the importance of High-Technology Industrial Development Zones (HTIDZ). These are examples of State (national) level development initiatives. Besides the number of enterprises and employees in four selected cities, their revenue, tax income and exports are given. Together the figures give an impression of the importance of the Chinese High Tech sector and its distribution over the country.

Table 18 China: High-Technology Industrial Development Zones: number of enterprises, employment, revenue, tax and exports revenues in 4 cities in 2002

City	Number of enterprises	Employees	Revenue in 10000 RMB	Tax in 10000 RMB	Exports in US$ 10,000
Beijing	9567	403842	23,947,958	987,819	287,679
Nanjing	170	65,830	5,469,557	365,807	74,255
Shanghai	536	109,338	10,358,384	571,343	300,963
Tianjin	1835	142,012	4,983,868	204,323	129,067
Total	28,338	3486686	153,263,685	7,663,529	3,292,207

Source: National Bureau of Statistics (2003).

This table excludes Guangzhou, but I used data for Tianjin, in the north, which comes second to Beijing in terms of number of enterprises and employees. Only Shanghai is more important in terms of revenue than Tianjin and in terms of exports than Beijing. Nanjing is scoring low in terms of number of enterprises and employees in HTIDZ, but this maybe because the ICT companies in Nanjing tend to be located in the locally initiated Science and Software Parks closer to the centre of the city.

It is a long march to become a centre of technological innovation (Financial Times, 19-10-2005): if it would not be so easy to buy or copy technology and when the expenditures on R&D are still so low. Although cooperation between research institutions and ICT companies is encouraged, this doesn't happen over night. The cooperation between the R&D institutions and the ICT sector has not yet been achieved in Nanjing, despite the great efforts made to develop a RIS. However, it is certainly clear from the data on the regional innovation system why Nanjing has become an important ICT city (Van Dijk, 2006d).

An innovative milieu in Bangalore?

The southern states in India have developed a strong reputation as a source of software development services. Bangalore has the strongest reputation. Many computer firms have set up labs in Bangalore.[36] During the Second World War India's first aircraft factory was founded in Bangalore: 'Thus at the threshold of India's independence in 1947 Bangalore had one of the most technologically advanced industries and work force of the time in India' (Srinavas, 1998). In the years after independence the national government established some of the country's biggest public sector factories in Bangalore, notably Indian Telephone Industries, Hindustan Machine Tools, and Bharat Electronics and Bharat Earth Movers (Renu, 2000). They have been drivers of Bangalore's fast growth. Bangalore is now known as a cen-

tre for outsourcing the development of software, a practice that was established up in the 1970s. Renu (2000) notes that overstaffing in the traditional government owned industries resulted in skill supply for other enterprises. Many specialists became entrepreneurs on their own account. The private sector took advantage of the large number of engineers and skilled workers trained in the public sector companies. Contributing to the growth of this was the establishment of the Peenya industrial area, later called 'Electronic City' (Bordia and Martin, 1998). Wipro is located there. It is one of India's largest listed software services company, earning about a third of its global ICT revenues by providing R&D services in areas such as broadband to equipment makers such as Nortel (Financial Times, 8-5-2001).

With currently around 1,500 software companies employing over 100,000 ICT professionals, Bangalore is the ICT Capital of India.[37] According to the Indian journal Hindu (28-2-2002) at least one company with 100 per cent foreign equity participation has set up shop in this city every week since 2001. Apart from ICT majors like Infosys, Wipro, Tata Consultancy Services and Microland, the world's leading

Box 6 Centres for science and technology and of higher education in Bangalore

- Science and Technology Centres of Higher Education
- Indian Institute of Science (IISC) Indian Institute of Management
- Indian Space Research Organization National Law School
- Regional Remote Sensing Services Centre National Institute of Advanced Studies
- National Aerospace Laboratory University of Agricultural Science
- Defence Research and Development Organization
- Indian Institute for Astrophysics

Source: BMRDA (2002).

ICT companies like GE, Texas Instruments, CISCO, Digital, IBM, HP, Compaq, Motorola, Lucent Technologies, Microsoft, Sun Micro Systems, Oracle, Novell and several others have made Bangalore their home.[38] Smaller firms often operate from residencies and many of them are recent start-ups. The result is a concentration of ICT companies in a limited number of suburban locations, which may eventually be pulled together in an ICT corridor.

Bangalore has a history of proactive planning and policy-making. Bangalore Municipality was established in 1862, and the city has a long history of urban planning (Heitzman, 1999). The Bangalore City Corporation (BCC) was founded in 1949, which became the Bangalore Development Authority (BDA) in 1976. In 1985 the Bangalore Metropolitan Region Development Authority (BMRDA) was created with the authority to plan for a metropolitan region including the Bangalore urban district, the Bangalore rural district and one taluka in the Kolar district. In 1995 a plan was presented for the whole region. The Bangalore municipal government then started to formulate positive economic policies, both generally and with respect to small and medium ICT enterprises in the city. Local government developed for example its own ICT policy and looks for public–private partnerships (PPP) for infrastructure development (see box 6).

In 2002 thousands of Indian software returned to India because of the slowdown in the economy of the US (Financial Times, 8 May 2001). In many cases it meant ‘back to Bangalore’. In fact the concentration of software companies in this city has benefited from the 2001/2 burst of the IT bubble because American firms are now more tempted to subcontract to a low-income countries. Bigger companies, such as Wipro and Satyam, were originally somewhat hit, but also better placed to search for new markets – the European market, for example. Moreover, new activities have developed, such as call centres or managing back-office tasks for foreign customers (such as paying bills; Economic Times, 22-2-2002).[39] 2001 was the first ICT sector recession that Bangalore has faced. However, the industry weathered the

recession quite well and even achieved some growth of its production. Although most companies have tried to diversify their production, two-thirds of the orders still come from the US.

Renu (2006) studied why companies choose Bangalore city. The city is known for its favourable climate, which is slightly better than in many other Indian cities due to its altitude and cosmopolitan character. Its population has grown rapidly due to migration. It has been the state of Karnataka's capital since the early twentieth century and had one of the first polytechnics in India. The availability of the Internet has facilitated this development and is now used to identify excellent Indian companies that have registered for outsourcing. Many ICT companies selected Bangalore for setting up a plant because of the availability of cheap specialized labour and because Karnataka was the first state to develop its own ICT policy. The presence of a number of good research and training institutes is often mentioned. Sachs et al. (2002) add that high-tech services such as ICT almost always rely on a network of universities and urban labour markets. Finally, a high quality of life at the location in question is also important.

By now almost every Indian city is trying to build up an ICT centre in the city or the region means it may be more interesting for new start-ups to eschew Bangalore as a location and benefit from the incentives provided elsewhere in the country. Some state or local governments certainly provide substantial benefits to make investments in this sector attractive. For example, the central government and the state concerned promote new investments in ICT companies very seriously.

Table 19 gives an overview of support policies for ICT clusters in India and China. Factors such as the climate and quality of life seem to be the most important factors for locating in Bangalore.[40] Bangalore's fame and success is certainly related to the fact that the city has become an important centre of R&D in fields related to ICT.

Table 19 ICT cluster promotion activities in Bangalore and Nanjing

Type of policy	Bangalore India	Nanjing China
1.Policy-related incentives:		
1.1 Fiscal incentives	Important tax advantages	Important at different levels
1.2 Education and Training	Large number of education institutions in the city	Large number of education institutions in the city
1.3 Cluster Marketing	State government active	Provincial, municipal and district authorities active
1.4 Industrial Policies	Efforts to disperse activities by providing incentives	ICT on Electronic road and Parks in the centre of town
2. Prices and Subsidies		
2.1 Land	In vicinity of high roads, outside the city	Electronic road, Software and Science Parks in centre
2.2 Electricity and Water	Good quality infrastructure provided	Good quality infrastructure provided
2.3 Enterprise Buildings	No	Many enterprise buildings
3. Innovation Promotion		
3.1 Research Centres	Many R&D centres	Many R&D centres
3.2 Incubator Centres	No incubator centres	Several incubator centres
3.3 Promoting linkages with training/R&D institutions	No policy of linking them to ICT sector	Not successful yet in linking and creating an innovative milieu
4. Physical Support		
4.1 Space	Creation 16 industrial estates in B. district. Interest subsidy on loans for choosing certain locations	Also some High-Tech Ind. Development Zones and an industrial base further away from centre
4.2 Electronic Infrastructure	Better than elsewhere	Excellent
5. Stimulating Co-operation		Created Nanjing Software Producers Association
5.1 Group Formation and Consultation of the groups	No evidence, but for social activities such sporting	Joint execution of big jobs
5.2 Promotion of Inter-Firm Relations	Peaceful industrial relations	Regular consultation ICT companies and government
6. Other relevant Factors and Initiatives	Better living environment Citizen's initiative for a better Bangalore	Government orders for software companies

Source: Van Dijk (2006d).

Conclusions: the importance of the urban and regional level

Globalization does not just mean an increased flow of goods and services between countries. It is the result of knowledge development (as analyzed), international financial transactions (the capital and aid flows) and the imposition of global market discipline, which we have seen for example in the ICT sector in China and India. It is happening and it results in global cities, which provide an important contribution to the economy of their country.[41]

It is expected that the geography of R&D is changing from regional clusters in the developed world to global networks with large outsourced operations in countries like China and India which have large pools of highly skilled workers at a quarter or half the cost of their counterparts in Europe, the US and Japan. Developing countries will benefit from these developments.

No real effort has been made to assess what this urban-based development of globally linked cities implies for the rural areas (Van Dijk, 2006g). Jacobs (1970) concludes that the relation between the city and its hinterland can be very fruitful, if properly managed with the urban manager as the key actor. These cities provide ideas, technology, products and markets to the rural areas and in this way can contribute to their development. It would not be wise to isolate the two systems too much.

From the previous analysis we conclude that the regional and urban managers have an important role to play in the development process. Development studies have to shift from the national to the regional and urban level. At that level more can be gained from urban development than from rural development as was shown for India and China.

Countries, cities and companies try to create sustainable competitive advantages, meaning that they focus on what they do best, given that

no city or company can be good at everything. We have shown the important contribution of cities to economic growth. In policy terms the analysis implies that governments have to understand the strong sides of regions and cities and stimulate them to develop these. The relevant policies and actions for regional and urban managers at different levels of government in order to benefit from the urban potential will now be summarized. These policies may help regions and cities to overcome some of their weaker points.

State or provincial level policies could be:
1. Provision of incentives and the facilitation of exports by state-level authorities;
2. Provide space and appropriate infrastructure for companies, to the extent that this goes beyond the border of the cities;
3. Contribute to the development of a Regional Innovation System.

At the City level the managers can:
1. Develop a vision and strategy for the further development of the industrial and services sector, answering the question 'what is the best strategy to develop the sector further?'
2. Develop city development strategies to integrate the contribution of different stakeholders in the city's future (Van Dijk, 2006b)
3. Provide co-ordination between the different levels of government, such as between the different plans of different districts and between the municipal, the regional and the national level;
4. Stimulate entrepreneurs to organize their own networks and accept them as the major private-sector partners for the government.

At the local government or district level it is necessary to:
1. Consider the entrepreneurs or their organizations as partners for a dialogue
2. Stimulate PPP projects;
3. Provide space and infrastructure;
4. Supply buildings and business support services;
5. Provide other incentives;

6. Attract foreign investors;
7. Provide information to entrepreneurs about your city;
8. Set up an enterprise network;
9. Promote linkages with local knowledge centres.

We have made a long way in development from Rural first (Lipton, 1977) to the idea of cities as engines of growth, although that idea was formulated earlier (Jacobs, 1970). The facts showed the important role of cities in China and India. The explanation is more difficult, but we have pointed at the relevant factors at four different levels:

1. The importance of an appropriate macro economic context and a NIS;
2. The more important role of the city and region in a decentralized mode of government with its own RIS;
3. The role of the urban and regional managers at the lower level to initiate and to coordinate;
4. They create a competitive environment and local entrepreneurs need to take up the challenges.

In box 7 some suggestions for developing countries are summarized to help them to compete in the global economy. However, a lot of research remains to be done in this field and with the Maastricht

Box 7 Implications for developing countries
• Look for the sector where you can be competitive (tourism, leather, etc.); • Notice the importance of coordinated policies at different level of government; • Use successful examples for the demonstration effect! • Promote the presence of skilled labour and innovation systems; • Create the right environment for the development of the private sector, but • You can never be sure of your success, • At a global scale a constant restructuring process is taking place!

School of Management (MSM) I have developed some proposals for further research. I also particularly enjoy contributing to the EU funded research project at UNESCO-IHE in Delft on ecological cities of the future.

Cities make an important contribution to development. Good policies, high investments and an export orientation help to explain the competitiveness of cities. The differences between mega and big cities suggest however that there may be a maximum size for a city, beyond which coordination problems, the environment and traffic become problems that are hard to solve. However, there is a great potential in what we called the in-between cities, good for about 70 percent of GDP in China and 54 percent in India with the potential to increase their contribution to GDP from the present two to 2.5 times the average to three times the average, just like the mega-cities in China and India!

Vote of thanks

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Notes

1 The research concerning the Yangtze River Delta is based on a research project financed by the Netherlands government and carried out by the Sino-Dutch International Business Center (SD-IBC) of the Nanjing University Business School and a consortium of IHS, ISS and MSM, the leading partner. Data were collected after July 2000 partly with Wang Quansheng of the Business School. See Van Dijk (2003a and 2004b). Research considering the Pearl River Delta has been undertaken with Philip W. Koppels (EUR). Research in India was undertaken for IHS (Sail, the Asian Development Bank and DFID financed) and for UNESCO-IHE (UN Habitat and IDPAD financed; see Van Dijk, 2003b, 2005, 2006a and b and Sijbesma and Van Dijk, eds, 2006).

2 World Bank (2002) calculated that a significant part of GDP in many countries is contributed by the urban sector. For middle-income countries the percentage is 73 and in low-income countries 55 of GDP.

3 Sometimes phrased as: mega-urbanization is the result of failed rural development.

4 Urban environmental problems have become more and more serious and research focusing on rural urban linkages can help to identify the 'foot prints' of the city (Rees, 1992).

5 According to Friedman (2005) creating connections has multiplier effects on creativity.

6 In my HOVO lectures in Rotterdam I have dealt with the issue of the role of institutions (including the norms and values) in China's and India's development. For China the question became: is Confucianism important? (Van Dijk, 2006e).

7 The Chinese government now starts to recognize the importance of these activities. In the meanwhile ownership of these productive assets has changed, just like the labor relations and the opportunities to sell products and services (discussed in detail in Van Dijk, 2006e and 2006b chapter 10).

8 This issue is central in interesting series of lectures organized by the Society for International Development (SID) during 2006/7.
9 For the details concerning the economic policies of China and India I refer to other papers (Van Dijk, 2006f) and books on India's liberalization policies mentioned in the text.
10 Already in 1962 Deng Xiaoping offers grassroots wisdom after the economic impasse of the Great Leap Forward: "We must make the illegal legal. To quote an old saying from Sichuan ... it doesn't matter if the cat is yellow or black as long as it catches mouse" (Koolhaas et al., 2001).
11 According to the Financial Times (13-9-2005). One should be careful with the classification private or public in China, other sources suggest that many enterprises are still under public control. Chinese sources suggest that 28,000 foreign funded enterprises produce 27% of China's total industrial output and 57% of its exports (China Daily, 16-1-2007).
12 The open door Policy was inaugurated by the establishment of four Special Economic Zones (SEZ) in Guangdong Province. These zones are designated as territories for accelerated economic development and the controlled import of foreign technology and capital.
13 A number of cities became city states, for example Shanghai and Chongqing. In 1997 Chongqing, the largest city of the Sichuan province became 'independent'. According to the Financial Times (21-11-1996) "an amalgamation of Chongqing and surrounding areas into an inland 'city state' of 30 million people out of Sichuan's population of 113 million is one of Beijing's boldest administrative moves, and reflects leadership concern about the need to boost activity in the depressed interior". The city and the three surrounding counties account for about 27 percent of Sichuan province's economy.
14 Bankruptcy of a limited number of state-owned enterprises was also first considered an experiment and later used more often (Van Dijk, 1998).

15 An institutional analysis helps to better understand what has happened in the economic reform process.
16 For example Arora (2002), Bhaduri and Nayyar (1996), Drèze and Sen (1995), Rao and Singh (2006) and Ray (2003).
17 Personally that new impression emerged after my visits to Gujarat for an IHS Sail project in 1995 and the reading of Naipaul's 'A million mutinies now', which describes the changes of a system, often described as Hindu economics", if enough people say no.
18 560,000 people have lost their jobs in the ICT sector in the US since the ICT bubble burst in 2001 ('US high-tech job market plunges', International Herald Tribune, 20 March 2003).
19 According to the China Daily (March, 2004) electronics and telecommunication equipment, as well as metals are the major force behind this rapid growth.
20 It should be noted that the distinction between industry and services is not always unambiguous. If a manufacturing company does outsource its accounting services, industrial production is less, while services would have grown.
21 However, competitiveness has a slightly different meaning at these different levels and other factors may contribute to its explanation. The implication is that competitiveness needs to be stimulated in very different ways at the different levels.
22 One argument against this formulation that I have used myself is that the poor in the cities have to pay for everything (Van Dijk, 1997).
23 Indian cities may be described as the sum of a number of local governments, the area covered by the urban development authority and some parts of rural districts with a nominated (not elected) metropolitan planning board for coordination purposes.
24 Urban refers to "all people residing in cities and towns" (CSP, 2006).
25 It is not difficult to find for Shanghai population a figure of 20 million inhabitants. Much depends where the borders of the city are

drawn and whether registered or actual population figures are used. We have used the figure for registered residents.

26 By 2021 it is expected (HUDCO, 2001) that India will have the greatest concentration of mega cities in the Asian region using their definition of mega is more than 7 million inhabitants.

27 I thank Kalaa Seethraman Sridhar in particular for her assistance.

28 The rate of exchange was 45 rupees to the dollar during 2002.

29 In my old travel guide Gurgaon had only 131,000 inhabitants. Now it is the most developed satellite town of Delhi, being located just outside Delhi near a well developed national and state highway. Residential complexes and industrial estates are developed rapidly in this satellite town. In the newspapers Gurgaon is projected as the most preferred destination for North India (Maitra, 2006).

30 Noida is close to Delhi and one of the fastest developing satellite townships of the NCR. It is even better connected than Gurgaon. According to Maitra (2006: 362): it "was constituted under the Industrial Area Development act 1976 to emerge as a well planned, integrated modern industrial city." It counts an Export Promotion Zone and a Software Technology Park.

31 The four missing values were calculated using the percentage of total investments for the majority of the cities where these data were provided.

32 My research focused on the role of innovation for an emerging ICT cluster in the Jiangsu province capital Nanjing and in the ICT capital Bangalore in Karnataka state in India. Would China and India remain competitive in a non-traditional export sector like ICT services? That requires that competitiveness will not only be based on cheap labor, but also on a regional innovative milieu.

33 Halbert (2006) distinguishes dirigiste from interactive innovation systems. In the first case the emphasis is on the role of the authorities through public policies and investments in infrastructure. In the second case the interactions between the public funded research and the private sector innovations are emphasized. He

argues that in France a shift has taken place from dirigiste to more interactive innovation systems.

34 Four pillars of the knowledge economy (each measured by three variables in the case of the KAM) are used to show the difference between countries: 1. Economic and institutional regime; 2. Education and human resources; 3. Innovation system; and the 4. Information infrastructure.

35 China is in 2001 on the 74th place among the list of medium scoring countries. It was at the 72nd place in 1995 and hence has not really improved its comparative performance.

36 These labs will provide the kind of support Stanford University has provided to Silicon Valley (Financial Times, 28 Feb. 2001).

37 In 1996 Philips of the Netherlands opened a software development centre in the city, where, by 2000, 750 people were already working only four years after the centre opened. The company grew 60 per cent per year in the early years (Flying Dutchman, 2002).

38 TCS, Infosys, Wipro, Satyam and HCL are considered the big five in ICT in India (Economic Times, 21 12 2002).

39 Surviving the recession depended to a large extent on whether the Indian software makers managed to find other markets outside the major contracting markets of the US and Japan. Indeed Europe has become a more important market since. The crisis forced companies to become more practical and focus on solving real-world problems (Financial Times, 13-2-2002).

40 No efforts were made to assess the quality of life in an objective way, but entrepreneurs interviewed often referred to the attractiveness of Bangalore as a city to live in.

41 I disagree with Sassen (1998) about her narrow definition of the term, bringing her to limit this label to New York, London and Tokyo (last chapter in Van Dijk, 2006a).

Annex 1

Indian Cities, different years (biggest 12 plus Faridabad)

City/State	Popul.state	Pop.cities	FDI per cap.	Per cap inv.	Share FDI %	Per cap SDP r	Poverty %pop	Spending pc	SDP % 91-9	Infrstruct.ind.	Hum.Dev.Ind.
Hyderabad AP	75728	5.53	1875	21447	4.71	14878	15.77	3320.2	5.2	93.1	0.416
Ahmedabad G	50597	4.52	4080	33875	6.43	18685	14.07	5167.6	8.15	121.8	0.479
Surat Gujarat	50597	2.81	4080	33875	6.43	18685	14.07	5167.6	8.15	121.8	0.479
Banaglaore Ka	52734	5.69	4628	24775	8.42	16654	20.44	3580.9	5.87	94.3	0.478
Mumbai Mah.	96752	16.37	5780	17556	17.62	22604	25.02	3852.6	8.01	111.3	0.523
Pune Maharastra	96752	3.75	5780	17556	17.62	22604	25.02	3852.6	8.01	111.3	0.523
Chennai TN	62111	6.42	3989	26292	8.56	18623	21.12	3594.3	6.02	138.9	0.531
Calcuatta WB	80221	13.22	1237	7113	3.18	14874	27.02	3092.7	6.97	90.8	0.472
Delhi NCR	13946	12.79	27423	47441	12.05	na	na	na	10.07	na	na
Faridabad Harya	21083	1.05	1940	9201	1.33	21551	8.74	4107.9	5.13	137.2	0.509
Jaipur Rajastha	56473	2.32	589	6763	1.03	13046	15.28	2864.2	5.85	83.9	0.424
Lucknow UP	166053	2.27	311	3304	1.68	9323	31.15	2135.6	3.58	103.8	0.388
Kanpur UP	166053	2.69	311	3304	1.68	9323	31.15	2135.6	3.58	103.8	0.388
Capital bold	in 000 inhab	in m. people	Rs.	Rs.	% all India	Rs.	Percentage	Rs.	Percentage	Index	Index
Source:	Rao & Singh06	Hudco 2001	Rao & Singh06	Plan commission	Plan commission	Rao & Singh06	Rao & Singh06	Rao & Singh06	Rao & Singh06	Rao & Singh06	Rao & Singh06
Year	2001	2001	2004	2005	2005	2004	2004	2004	1999	2004	2004

Annex 2

Chinese Cities 2005 Statistics

City	Population	GDP (bil yuan)	GDP Growth Rate	FDI(bil dollar)	Import(bil dollar)	Export (bil dollar)	Infrastructure Inv. bil yuan	Tota l Inv. bil yuan	R&D Persons
Beijing	15.38	688.63	11.80%	3.53	94.7	30.87	61.07	282.72	48,359
Shanghai	13.6	915.42	11.10%	6.85	138.25	212.43	88.57	354.26	14,688
Guangzhou	7.51	511.58	12.98%	2.84	26.81	26.67	78.2	151.92	2,113
Xian	7.41	127.01	13.10%	0.57	1.27	2.63	10	83.51	21,638
Chongqing	12.06	306.91	11.50%	0.52	1.77	2.52	23.4	200.63	2,106
Dalian	5.65	215	14.20%	1	11.09	12.44	28.44	100	3,833
Xiamen	1.53	102.96	16%	0.71	11.31	17.27	17.25	40.16	1,797
Qingdao	7.41	269.55	16.90%	3.66	29.73	39.6	41.43	145.66	2,543
Hangzhou	6.6	294.27	13%	1.71	10	19.8	37.18	138.67	1,534
Tianjin	10.43	366.39	14.50%	7.32	25.97	27.42	43.14	151.68	3,261
Wuhan	8.58	223.8	14.70%	1.74	3.65	2.54	25.87	105.52	12,225
Nanjing	5.96	241.3	15.20%	1.42	12.84	14.25	39.89	140.27	10,714
Shenzhen	8.28	492.69	15.00%	2.97	101.5	81.36	59.98	117.61	2,330
Shenyang	6.99	208.41	16.00%	2.12	2.22	2.37	38.77	136.32	4,741
Hongkong	6.97	1456.12	7.00%	35.9	2454.08	2370.54	86.14	302.87	
Changsha	6.02	152	14.90%	1.57	2.7	1.6	13.72	88.14	3,710
Chengdu	10.82	237.1	10.14%	0.5	1.86	2.68	41.45	145.74	18,312
Zhengzhou	7	165	15.80%	0.63	0.55	1.39	23.32	82	9,984
Kunming	3.7	106.23	11.10%	0.08	1.7	1.74	14.85	52.2	3,657
Ningbo	5.57	244.64	12.50%	4.21	11.26	22.23	41.6	137.04	1,294
Taiyuan	3.43	89.55	14.70%	0.17	12.55	21.17	12.47	43.85	3,713
Jinan	5.97	187.65	15.60%	1.12	1.98	1.78	24.37	85.69	2,049
Harbin	4.64	183.04	14.10%	0.37	1.48	1.23	18.17	63.9	5,175

Source: CSP (2006); R&D personnel NBS (2003). Exports,imports, infrastructure investment, FDI and GDP growth from city website by Xiao Liang