Seamless urbanisation and knotted city growth: Delhi Metropolitan Region

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Characteristics of Indian urbanisation

- Rural to urban migration
- Natural population growth
- Rapid population growth
- Direct shift from agriculture to service sector
- Slums
- Population pressure with colonial regulations
- Horizontal expansion
- Agglomeration of economies
- Infrastructure investment by gov.
- Mega City Region

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban population (million)</td>
<td>230</td>
<td>590</td>
</tr>
<tr>
<td>Million plus Cities</td>
<td>42</td>
<td>68</td>
</tr>
</tbody>
</table>

(Source: Sankhe, et al. 2010)

Problems with mega cities
- Acute shortage of infrastructure
- Dualism
- IT industries vs Low literacy rate
- Condominium vs Slums

Delhi one of the five largest cities in the world by 2030
## National Capital Region of Delhi - Some Facts

### Composition of NCR

<table>
<thead>
<tr>
<th>State</th>
<th>Area (Sq Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>1,483</td>
</tr>
<tr>
<td>Haryana</td>
<td>13,413</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>10,853</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>4,493</td>
</tr>
</tbody>
</table>

(Source: NCRPB 1988)

### Population

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi-1951</td>
<td>1.7</td>
</tr>
<tr>
<td>Delhi-2001</td>
<td>13</td>
</tr>
<tr>
<td>Satellites-2001</td>
<td>18.2</td>
</tr>
<tr>
<td>Satellites-2021</td>
<td>36.7</td>
</tr>
<tr>
<td>Delhi-2030</td>
<td>26</td>
</tr>
</tbody>
</table>

(Source: Sankhe, et al. 2010 and NCRPB 1988)
Objectives

Despite long history of GM strategies still problems….

Need to evaluate effectivity of GM strategies…..
For better allocation of resources and population

- Identify urban development stages for NCR-Delhi
- Identify character of development
- Identify policies and forces impacting UD in DMA
Urban development stages of NCR-Delhi

Model of the study area

Total population-employment growth rates

<table>
<thead>
<tr>
<th>Year</th>
<th>Core</th>
<th>Ring 1</th>
<th>Ring 2</th>
<th>Ring 3</th>
<th>Agglomeration</th>
<th>Ring 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971-81</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>1981-91</td>
<td>-</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>1991-2001</td>
<td>--</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

Total population and employment growth rates
## Demographic and Socio-eco indicator based analysis

### Result of core to suburbs ratios in DMR from 1971 to 2001

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>2.73</td>
<td>1.41</td>
<td>2.63</td>
<td>2.80</td>
<td>3.04</td>
<td>3.35</td>
<td>3.20</td>
</tr>
<tr>
<td>1981</td>
<td>1.53</td>
<td>1.39</td>
<td>1.62</td>
<td>1.56</td>
<td>1.72</td>
<td>1.84</td>
<td>1.86</td>
</tr>
<tr>
<td>1991</td>
<td>0.99</td>
<td>1.48</td>
<td>0.90</td>
<td>0.95</td>
<td>1.09</td>
<td>1.09</td>
<td>1.16</td>
</tr>
<tr>
<td>2001</td>
<td>0.47</td>
<td>1.71</td>
<td>0.43</td>
<td>0.47</td>
<td>0.58</td>
<td>0.49</td>
<td>0.59</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Indicator</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight from Blight</td>
<td>Higher ratio of SC-ST</td>
<td>Suburbanisation of HH</td>
</tr>
<tr>
<td></td>
<td>Higher ratio of unemployment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower literacy rates</td>
<td></td>
</tr>
<tr>
<td>Decreasing gradient of HH</td>
<td>Decreasing ratio of HH</td>
<td>Suburbanisation of HH</td>
</tr>
<tr>
<td>Jobs follow people</td>
<td>Higher ratio of HH</td>
<td>Suburbanisation of HH and employment</td>
</tr>
<tr>
<td></td>
<td>Higher ratio of employment</td>
<td></td>
</tr>
<tr>
<td>Skilled jobs and literacy</td>
<td>Higher ratio of literacy</td>
<td>Concentration of skilled jobs</td>
</tr>
<tr>
<td></td>
<td>Higher ratio of other employment</td>
<td></td>
</tr>
</tbody>
</table>
Spatial indicator based analysis-1

Expansion in 22 years 10 km, in next 11 years 10 Km than in next 5 years 10 Km

<table>
<thead>
<tr>
<th></th>
<th>1977</th>
<th>1999</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>Bus</td>
<td>Bus + Automobiles</td>
<td>Buses + Automobiles + Metro</td>
</tr>
<tr>
<td>Economic reforms</td>
<td>Slow growth (Industrialisation)</td>
<td>Moderate economic growth (Pub sector)</td>
<td>Rapid economic growth (Prt sector)</td>
</tr>
<tr>
<td>Expansion</td>
<td>15 Km</td>
<td>25 Km</td>
<td>35 Km</td>
</tr>
<tr>
<td>Form</td>
<td>Core+Diffusion</td>
<td>Multi-nuclei</td>
<td>Coalescence</td>
</tr>
</tbody>
</table>

(Source: German Remote Sensing Data Center)
Spatial indicator based analysis-2

Patch Density Increases during expansion decreases during coalescence
BUA Density Ratio of BUA to non-BUA gives LU character
% of BUA growth Gives overall BUA growth and extent
Net Pop Density Tidal wave phenomena
Rate of BUA change Land consumption faster than population growth=Sprawling
% of BUA along transport network Strip linear commercial development

(Source: Census of India and German Remote Sensing Data Center)
### Components of Urban Growth-Delhi

**Natural growth and In-migration**
(Migration from other states)

<table>
<thead>
<tr>
<th></th>
<th>Natural growth</th>
<th>Net migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971-81</td>
<td>2.11</td>
<td>2.23</td>
</tr>
<tr>
<td>1981-91</td>
<td>2.13</td>
<td>2.11</td>
</tr>
<tr>
<td>1991-2001</td>
<td>1.7</td>
<td>2.18</td>
</tr>
</tbody>
</table>

Average annual rate of natural growth and net migration for Delhi
(Source: Dupont 2001)

<table>
<thead>
<tr>
<th>Name of the UA</th>
<th>2001 Population</th>
<th>From within the state</th>
<th>From other states</th>
<th>From other countries</th>
<th>Total in-migrants</th>
<th>Per cent of in-migrants to total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDIA (Urban)</td>
<td>286,119,689</td>
<td>24,974,372</td>
<td>11,157,574</td>
<td>348,060</td>
<td>34,480,006</td>
<td>12.7</td>
</tr>
<tr>
<td>Greater Mumbai UA</td>
<td>16,434,386</td>
<td>892,706</td>
<td>1,571,181</td>
<td>25,665</td>
<td>2,489,552</td>
<td>15.1</td>
</tr>
<tr>
<td>Delhi UA</td>
<td>12,877,470</td>
<td>77,663</td>
<td>1,988,314</td>
<td>46,386</td>
<td>2,112,363</td>
<td>16.4</td>
</tr>
<tr>
<td>Chennai UA</td>
<td>6,560,242</td>
<td>334,972</td>
<td>94,964</td>
<td>5684</td>
<td>435,620</td>
<td>6.6</td>
</tr>
<tr>
<td>Kolkata UA</td>
<td>13,205,697</td>
<td>470,601</td>
<td>297,279</td>
<td>54,509</td>
<td>822,389</td>
<td>6.2</td>
</tr>
<tr>
<td>Hyderabad UA</td>
<td>5,742,036</td>
<td>407,861</td>
<td>88,216</td>
<td>2406</td>
<td>498,483</td>
<td>8.7</td>
</tr>
<tr>
<td>Bangalore UA</td>
<td>5,701,446</td>
<td>401,932</td>
<td>353,156</td>
<td>6397</td>
<td>761,485</td>
<td>13.4</td>
</tr>
</tbody>
</table>

Percentage share of in-migrants in urban agglomeration
(Source: Human development report 2006)
Components of Urban Growth-Delhi

Reclassification of urban boundaries

Delhi administrative boundary 1971
(Source: Census 1971)

Delhi administrative boundary 1991
(Source: Census 1991)
Growth of per capita net state domestic product
(source: Human development report 2006)

Growth of small scale industrial units
(Source: Human development report 2006)

Growth of employment in industrial sector
(Source: Human development report 2006)
Push factors in Delhi

Increasing commercial and residential land rates in DMA towns

<table>
<thead>
<tr>
<th>Residential market</th>
<th>Delhi</th>
<th>Gurgaon</th>
<th>Faridabad</th>
<th>NOIDA</th>
<th>Gr.NOIDA</th>
<th>Ghaziabad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. capital value (in Rs /Sq. Ft)</td>
<td>10,000</td>
<td>4,100</td>
<td>2,125</td>
<td>4,500</td>
<td>2,800</td>
<td>2,500</td>
</tr>
<tr>
<td>Avg. apartment size (in Sq. Ft.)</td>
<td>1,900</td>
<td>2,000</td>
<td>1,700</td>
<td>1,800</td>
<td>1,800</td>
<td>1,600</td>
</tr>
</tbody>
</table>

Residential market values for Delhi and surrounding satellite towns as on 2009
(Source: Services Ip 2009).

Higher land values in Delhi push HH towards lower land values in suburbs

Increased automobile ownership

Growth (in numbers) in motor vehicles in four Metropolitan cities of India 1991-1996
(Source: Maiti S and Agrawal P 2005)

Increased automobile ownership increases spatial expansion with preference for residential suburbs
Jurisdiction-Institutional-Administrative complexities

Overlapping jurisdiction, lack of coordination & communication
Municipality and development authority **under federal control**
Many planning agencies in Delhi compared to only 1 for Region
**Interstate** transport problems
Development Plan vs Master Plan

Urban planning unable to manage growth
**Shifting relationship** b/w authorised and unauthorised
**Violation** of planning and building norms
**No prescribed laws** for legal or illegal
Akshardham temple, IT Park and Metro depot- only Slums demolished

Planning is reactive rather than proactive
**Hours of traffic jam** - Toll highway to Gurgaon
**Coordination failure** – BRT corridor
**Overcrowded and lack of frequency**- Delhi Metro
Policy and Regulations

Policy shift from balanced regional growth to city centric growth

**Master Plan 1962**-Promoted decentralisation
**74th CAA of 1992**- Empowerment of local bodies
**JNNURM in 2005**-To encourage reforms and fast track development

But

Delhi government leapfrogged ULB’s to reach residents
Laggard in implementing JNNURM reforms

Result

Increased regional imbalance by increased migration to UA
Policy and Regulations

Urban land policy of large scale acquisition and disposal-1961
Aim
Nationalise and create land bank for urban development
Result
high prices
Lack of developable land for Master Plan
Biased towards HIG and MIG
Entitlement of profit by DDA employee
Slow land acquisition

Urban land ceiling and regulation act-1976
Aim
To increase land supply
To facilitate availability and affordability of urban land
Result
high prices
Due to large scale freezing
Slow development and supply of land
Infrastructure Investment Policy

Infrastructure provision and transport connectivity

**Aim**

To maximise benefits of close proximity to Delhi

**Result**

Delhi experienced **negative population growth** b/w 1999 to 2000

*Satellite* towns registered **higher growth rates** b/w 3% to 6%

**Land values** and **land uses** impacted within 1 km Metro corridor

22% increase in **land values**

Increased **densities**

**Slums replaced** by commercial and middle class residential area

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**Delhi –Mumbai Industrial Corridor (DFC)**

**Aim**

**High speed connectivity** for High Axle Load Wagons

Lined with **industrial estates** and **hubs** and **top of the line infrastructure**

**Result**

Will Spawn **27 new cities**
LU Regulations (Zoning and building regulations)

Aim
Segregate incompatible land uses
Maintaining the aesthetic-low FAR

Result
Dependence on vehicles, increase commuting time, congestion and pollution
Lower FAR generate artificial shortage of office and residential space leading to higher land prices and outward expansion
## Policy and Regulations

### Comparative analysis of the FAR’S

<table>
<thead>
<tr>
<th>Name</th>
<th>CBD FAR/FSI</th>
<th>Suburbs FAR/FSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Portland, Oregon</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>10 (8-25)</td>
<td>1.5-4 (Res.)</td>
</tr>
<tr>
<td>Jakarta</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Washington DC.</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Seoul</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>New York</td>
<td>15 (10 along trans. lines)</td>
<td>0.6 (Res.)</td>
</tr>
<tr>
<td>Bangkok</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Japanese cities</td>
<td></td>
<td>0.5-20</td>
</tr>
<tr>
<td>Indian cities</td>
<td>1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Non-residential</th>
<th>Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyderabad UA</td>
<td>1</td>
<td>2.275</td>
</tr>
<tr>
<td>Greater Bombay UA</td>
<td>1.33</td>
<td>1.33</td>
</tr>
<tr>
<td>Bangalore UA</td>
<td>1.75</td>
<td>2.5</td>
</tr>
<tr>
<td>Chennai UA</td>
<td>4.125</td>
<td>2.5</td>
</tr>
<tr>
<td>Kolkata UA</td>
<td>2.75</td>
<td>3</td>
</tr>
<tr>
<td><strong>Delhi UA</strong></td>
<td><strong>2</strong></td>
<td><strong>3.5</strong></td>
</tr>
<tr>
<td>Meerut UA</td>
<td>2.66</td>
<td>1.995</td>
</tr>
<tr>
<td>Ghaziabad UA</td>
<td>2.66</td>
<td>1.995</td>
</tr>
</tbody>
</table>
Policy and Regulations

Low Property Tax

Aim
Source of revenue for local bodies

Result
Contributes only 18% in 2006-07

Low registration (absence of formal count)
Assessment 30% lower than market value

Lower collection rates

Rent Control Act

Aim
To counter scarcity of rental housing

Result
Housing shortage due to biasness in favour of tenants
Tenants have no obligation to maintain property or pay tax
Rent much lower than market values

Low rate of return
Policy and Regulations

Policies biased towards tertiary education and service sector

Result
- Increases informal sector
- Slum proliferation
- 76% in 1993-94
- 80% in 1999-2000

Increase inner city land prices push slums outwards leading to spatial expansion of the city.

Legend
- Slum Location Since 1990
- Slum Location Before 1990

Slum location in Delhi (Dupont V 2008)
Impact of Economic Reforms

Economic reforms since 1991
Boomed economic development, real estate and infrastructure projects
Fuelled demand for BPO‘s KPO‘s and IT parks

Result
Restructuring of central districts from residential to commercial
High land and housing prices

Special Economic Zones 2000
Preferred location for large spaces and world class infrastructure
Peripheral decentralisation of jobs and services

Result
Periphery-High quality residences and office spaces, IT Parks and Golf clubs
Enclaves of rich surrounded by slums
Impact of Economic Reforms

Segregation of CBD
1- Local-old CBD overlapping the old native town houses domestic companies
2- Colonial CBD houses the main foreign and domestic companies
3- Newly developed CBD’s of the NCT-Delhi and satellite towns house the foreign MNC’s

Industries, offices and business location in DMA (Bhandari K, et al. 2008)
Both *Market* driven and *Policy* driven forces shape Delhi Metropolitan Area.
Thank you for your attention