A Sustainability Analytics Platform for Smart Policymaking in India

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Research problem

» Abundance of smart city rankings - private, government-sponsored and university-led

» City rankings has been unable to adequately communicate how the outcomes from such assessments can be used as an instrument for shaping policy frameworks (Rudolf Giffinger & Gudrun, 2010)

» The ranking systems remained relatively closed, with the underlying data, analytical approaches and outputs locked inside the organisations that undertake them (Kitchin, Lauriault, & McArdle, 2015a)

» Fall short in shaping a dialogue around urban conditions
Indicators

- Demographic and Social structure
- Economy and Jobs
- Education and Health
- Physical Infrastructure
- Governance
- Mobility and Transport
- Housing
- Digital Connectivity
- Lifestyle and Behaviour
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Clusters of 100 smart cities

Clusters:
- Cluster 1
- Cluster 2
- Cluster 3
- Cluster 4
## Significant factor loadings

<table>
<thead>
<tr>
<th>Variables</th>
<th>Development Axis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>% of households using mobile phones</td>
<td>.236*</td>
</tr>
<tr>
<td>Tertiary education centres/1000 population</td>
<td>.180*</td>
</tr>
<tr>
<td>Modal share of public transport</td>
<td>.174*</td>
</tr>
<tr>
<td>% of hh availing banking services</td>
<td>.158*</td>
</tr>
<tr>
<td>% of city population living in slums</td>
<td>.122*</td>
</tr>
<tr>
<td>Physicians/1000 population</td>
<td>.110*</td>
</tr>
<tr>
<td>Hospital beds/1000 population</td>
<td>.109*</td>
</tr>
<tr>
<td>Gross enrolment ratio in higher education</td>
<td>.102*</td>
</tr>
<tr>
<td>% of hh with sewerage connection</td>
<td>.037</td>
</tr>
<tr>
<td>% of hh with stormwater drainage connection</td>
<td>.009</td>
</tr>
<tr>
<td>% of hh having latrine within premises</td>
<td>.145</td>
</tr>
<tr>
<td>Average trip length in km</td>
<td>.025</td>
</tr>
<tr>
<td>% of hh connected to Internet</td>
<td>.077</td>
</tr>
<tr>
<td>% of hh having computer/laptop</td>
<td>.123</td>
</tr>
<tr>
<td>Coverage of municipal solid waste (MSW)</td>
<td>.021</td>
</tr>
</tbody>
</table>
Discriminant score plots for each city

Function 1: Social infrastructure

Function 2: Physical and Digital infrastructure

Ward Method

- Group 1: Edge Cities
- Group 2: Leading Cities
- Group 3: Moving Cities
- Group 4: Reluctant Cities

Group centroid
Edge cities

» Leverage gender inclusivity and high level of literacy
» Develop water, waste and public transport infrastructure
» Improve digital connectivity
» Enhance the capacity of ULBs
Reluctant cities

- Key focus on sanitation and solid waste management
- Address issues of slums
- Improve health infrastructure
- Empower local corporations
Moving cities

» Health and knowledge-based development
» Need substantial wired infrastructure
» Must continue the positive momentum
Leading cities

» High-intensity infrastructure and next-generation digital technology frontier cities
» Command and control center for reliability and efficiency
» ICT-led solutions
» Open data and innovation economy
Access to Public Infrastructure

- Road Density (in km/sq km)
- Mode Share of Public Transport in %
- Average trip length in km
- % of households with access to tapwater from treated source
- % of Households with access to drinking water within premises
- % of Households having electricity connection
- % of households having latrine facility within the premises
- % of Households having piped sewer connection with latrine
- % of households with waste water outlet connected to closed drainage
- % of households with waste water drainage connection
- Household level coverage of MSW in %
- Efficiency of collection of MSW in %
- Extent of MSW recycled and recovered in %
- Number of Hospital beds/1000 population
Availability Skills and Creation Pool

- % of Households using solar energy as a source of lighting
- Households using cleaner energy (LPG/PNG/Biogas) for cooking
- % of households using fossil fuels (wood, coal, kerosene) for cooking
- % of households having bicycle
- % of Households practicing open defecation
- % of Households having enclosed bathroom

Graph showing various indicators over time, with specific data points for different locations.
Conclusions

» System science approach – pattern recognition algorithm

» Supports place-based smart city strategies to address the local needs

» Elucidates complex structure, processes of cities amidst the emerging data deluge

» A platform for open sharing of city data for shaping dynamic conversations

» Future research and development opportunities
Publications


Australia-India Knowledge Exchange Whitepaper
Thank you