A Comparative Analysis of the Intra-City Distribution of Commercial Utilities of "Smart Cities" vis-à-vis Metropolises in India

I. Introduction

Urban spaces, across the globe, have been engines of social, cultural & economics activity. Understanding the nature of urban spaces, and the identification of intra-city disparities found therein, is a subject of continuous study. Such studies provide critical inputs for determining public policy.

From the 25th of June, 2015, the Union Ministry of Housing & Urban Affairs, Government of India, launched the "Smart Cities" project, with the objective of promoting sustainable & inclusive cities that provide a decent quality of life to its citizens.[1]

Under this project, urban spaces in India were analysed on a variety of quantitative & qualitative parameters such as transportation conditions, solid waste management systems, safety conditions, housing conditions, etc.[2]. **It is pertinent to note that the selection criteria consisted of aggregating factors across the entire city – microtrends, such as neighbourhood or locality based trends – have not been factored into the selection process; consequentially, intra-city similarities or dissimilarities have not formed a part of the analysis.**

Based on this selection process, 20 smart cities were selected in January. **One unique observation in this selection is that none of the metropolis cities in India form a part of the top-10 cities selected in the first round [3].**

This study aims to provide a comparative analysis of the top 3 cities selected in the smart cities project [Bhubaneshwar, Pune & Jaipur], vis-à-vis the two biggest metropolitan regions in India – Mumbai & New Delhi – in terms of the intra-city regional distribution of commercial utilities & facilities.

Therefore, the aim of this study is to determine whether or not the "Smart Cities" have a more equitable distribution of urban amenities, as compared to metropolitan cities.

II. Assumptions & Limitations

A fundamental assumption underlying this study is that the nature of commercial utilities available in a particular locality of a city is a function of the nature of amenities available in that particular micro-geography. By extension, it is expected that the nature of the distribution of commercial utilities in

these cities is analogous to & maps onto intra-city disparities & inequalities in terms of provision of necessary infrastructure. The mapping of commercial utilities is provided by Four Square - therefore, the analysis of the distribution of commercial utilities provided herein is limited by the data provided by Four Square.

III. Client Base

As stated above, the aim of this study is to determine the nature of intra-city distribution of urban amenities, by studying the pattern of the location of commercial entities. Therefore, this study aims at identifying intra-city disparities & inequalities in urban amenities.

Therefore, this study will be of prime importance to urban planners. It is projected that local & state governments, including the concerned Municipal Corporations, would find this study to be of use. It is further projected that public policy experts, urban planners & architects, NGO's and civic groups would find this study to be of use. These shall form the bulk of the clientele who would benefit from this study.

IV. Methodology

The methodology of this study follows the following steps –

1. Obtain the list of cities from [http://smartcities.gov.in/content/innerpage/cities-profile-of-20-smart-cities.php].
2. Using the Beautiful Soup package, scrape the website [https://www.mapofindia.com/pincode/india] to obtain the list of pin codes for the cities.
3. Using the *pgeocode* library, obtain the latitude & longitude for each pin code.
4. Use the *Four Square* API to obtain the list of top-100 venues at each latitude & longitude.
5. Segregate the venue categories per latitude & longitude.
6. Find the most frequent top-5 venue categories per latitude & longitude.
7. Use the KMM Algorithm to cluster localities using the top-5 most frequent venues.
8. Map the localities onto the cityscape using the *Folium* library.
9. Compare maps of the top – 3 cities with that of the metropolitan cities to derive learnings.

V. Data Description

The data used for the study & the sources are as enumerated in the following table:

Sl.	Data Item	Source	Description
01.	List of Smart Cities	http://smartcities.gov.in/content/innerpage/cities-profile-of-20-smart-cities.php	Obtain the list of cities that shall be analysed as part of this study.
02.	Pin-Codes of localities	https://www.mapofindia.com/pincode/india	Obtain the list of pin-codes within that city.
03.	Latitude & Longitude of localities	PGeoCode Library	Mapping the pin-codes to the latitude & longitude
04.	List of Venues	Foursquare API	Obtain the Venue Data

Annexure A - References

[1] – Smart Cities Program, Ministry of Housing & Urban Affairs, Government of India. (http://mohua.gov.in/cms/smart-cities.php)

[2] – Parameters of Scoring, Smart Cities Program, Smart Cities Program, Ministry of Housing & Urban Affairs, Government of India. (http://smartcities.gov.in/content/innerpage/parameters-of-scoring.php)

[3] – Cities Profile of Round 1 Smart Cities, Smart Cities Program, Ministry of Housing & Urban Affairs, Government of India. (http://smartcities.gov.in/content/innerpage/cities-profile-of-20-smart-cities.php)