Three Tales of One City
Exploring Singapore's Regional Planning

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This is a challenge of planning, plus a pleasure of planning. In a place with limited resources, in a place with unlimited opportunities.

This is an illustration of the kind of day the regional planning of Singapore is.

Singapore is a city-state known for its small size, dense population, economic success, and hostile built environment. It is often related with ideologies such as efficiency, growth, technocracy, meritocracy, and sustainability. Regional planning is vital in making cities sustainable, and Singapore has been at the forefront of this effort. This book is an exploration of the challenges and successes of Singapore's regional planning.

From the population density map on the right, one can immediately notice that population density does not follow a conventional mono-centric pattern. Each planning region seems to have its own population density hotspot. It is a challenge of planning, it is a triumph of planning. This is a narrative of three tales of one city, the regional planning of Singapore.

Singapore is a city-state known for its small size, dense population, economic success, and livable built environment. It is often related with ideologies such as efficiency, growth, technocracy, meritocracy, and sustainability. Prudent planning is what makes Singapore work, and its planning is laid out collectively across multiple statutory boards, involving different topics such as public housing, transit, and parks.

Intrigued by its planning challenges and success, we examine the outcome of Singapore’s regional planning through three lenses: accommodation, accessibility, and nighttime activities, which are quantitatively evaluated by population density, transit centrality, and Venu Index. The comparison part weaves together the three lenses, while also discussing the distribution patterns of the four clusters.

By using the origin-destination data from both the MRT and bus systems, a transit network that shows passenger volumes between each pair of stations is constructed. From the network, transit centrality, which measures how accessible a node is, is calculated for each station and then interpolated with the IDW method to the entire Singapore. The interpolated result is averaged to the planning subzones, and the darker color refers to higher accessibility. It can be seen that the most accessible areas are located in the south of the city, mostly around the downtown area.

Night time light is a powerful tool to describe urban context. However, the original night light data suffer from coarse spatial resolution and blooming effect. Therefore, we normalized and resampled the data, and then adjusted it using vegetation data from LandSat 8, which gives us a compound index named Venu Index. Same as the first two lenses, we averaged the cell values to the subzone level. From this map above, we can observe some patterns of night light intensity in the city, e.g., light spots can be found in the downtown area, airports, and port area.

The K-Means clustering algorithm is applied here to divide the 323 planning subzones in Singapore into 4 groups, each of which has a typical combination of the three measures. The 4 clusters therefore reveal the city's structure, specifically in terms of the distribution of accommodation, transit, and nighttime activities.

Cluster 1 occupies the most area, and is identified with the lowest development density in all 3 dimensions. It includes green areas that are intentionally preserved for ecological purposes or future growth.

Cluster 2 stands out in transit centrality and night light intensity. Most of it is the commercial hub in downtown. The two areas in the north are new centers that are planned to bring jobs closer to residents.

Cluster 3 identifies the industrial areas, including the well-known Jurong industrial district in the southwest. As an entrepot and manufacture hub in Asia, the city-industry integrated model remains a core.

Cluster 4 stands in terms of population density, and night light intensity. This is the most centrally located area, which includes large parks. It echoes the city's planning vision of "a city in a garden."