Easy Access: Pune

Intro

There is growing consensus that public transit is an essential part of sustainable urban development. Public transport is far more efficient than private vehicles and can ease congestion and reduce emissions.

However, many developing countries face strong transportation challenges. The increase in personal income makes private vehicles more affordable. The city gets into a vicious cycle as poor public transport results in more private vehicles and therefore affects the quality of transportation further.

When do people turn to private vehicles? Firstly, when public transport is unavailable. They have to wait or walk too far to find it. Secondly, when public transport is inefficient. In some cases getting somewhere by foot is faster than taking public transport.

Identifying these pain points and fast problem-solving can boost public transit's reputation and improve the quality of life. Habidatum evaluates public transit's accessibility through 3 key statistics - total travel time, number of transfers and time of first-/ last-mile travelled on foot.

Methodology

This research is an origin-destination analysis based on various open data sources.

In the absence of digital zoning by-laws, we define the destinations through the main work, shopping and leisure activity areas.

For the purpose of this research 100 hotspots of activity were picked. They include major employers, educational centers, recreational areas, shopping and office buildings. Information technology and biotechnology segments are believed to be the new drivers of the Pune economy[1]. Therefore the companies from these industries dominate the list of workplaces.

The next step was to identify origin points. As most of the areas in Pune have mixed-use development, all city neighborhoods were taken into consideration. Locations with “building” tags were exported from the open source map project OpenStreetMap.

Finally, public transport routes were calculated between these origins and destinations for 2 time periods during one weekday - 12:00 (off-peak time) and 19:00 (rush hour). Collected routes were further compared.

[1] Source: Housing study for Pune Municipal Corporation 2009 - 2010. Page 68. http://www.punecorporation.org/informpdf/City%20Engineer%20office/Housing%20Report%20Final.pdf).

First-/ Last-Mile Problem

It is assumed that people are more willing to use public transport when a bus stop is within a 15-20 minute walk. We investigated walking distance from home to access public transport and by doing so we identified priority areas to add public transport connections.

The map below shows walking distances to the nearest public transport stop during rush and off-peak hours in Pune. Green areas represent smaller distances, while dark orange areas represent more than 80 min walking time.

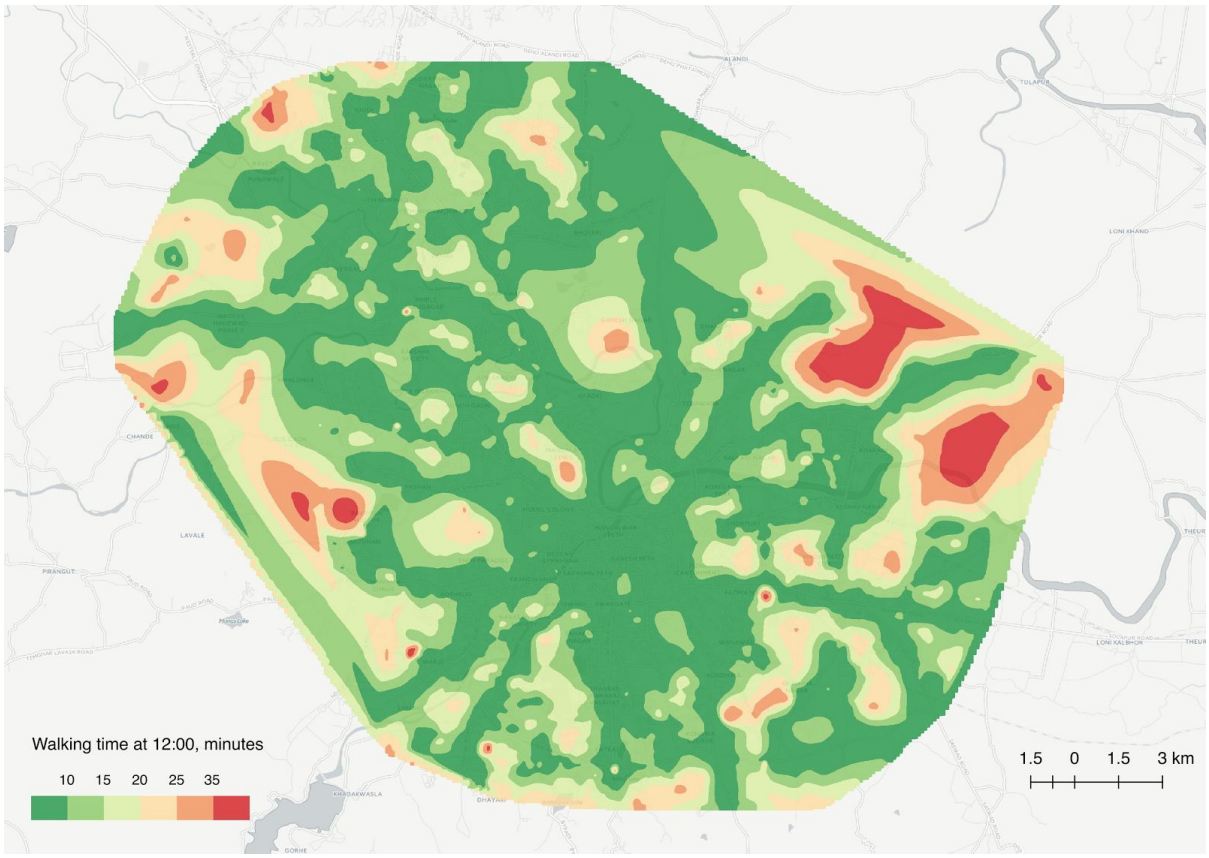

Figure 1. Walking time to transit at 12:00

Our analysis revealed that in most of Pune's neighborhoods it takes less than 20 minutes to get to a bus stop. However, people would spend a tremendous amount of time walking to a bus stop in 2 neighbourhoods - in the Pune airport and in Awhalwadi. Private vehicles or taxis are required to travel from these locations. As the poor cannot afford such commuting costs, these areas become rich ghettos. Modifying existing public transport services or adding new ones is a necessity.

Number of Transfers

The number of transfers is another problem. Changing between different bus routes or even modes of transportation is usually inconvenient and time-consuming. Due to network inefficiency in Pune it is often impossible to get somewhere using only one mode of transportation.

The maps below show the average number of transfers for areas of origin. The city is mostly colored in orange or yellow. It means that Pune residents have to change 2 or more times while using public transport.

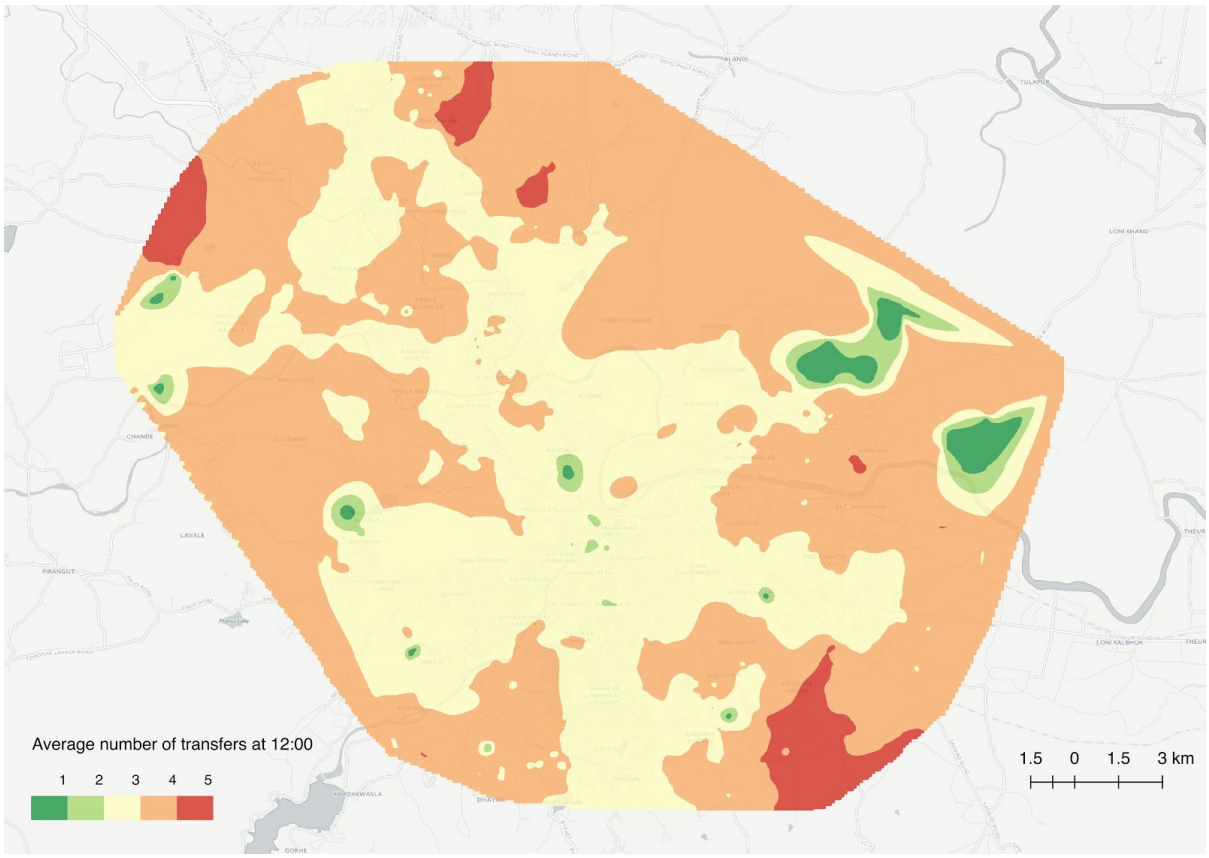

Figure 2. Average number of transfers at 12:00

The green zones are exceptional. Two main spots are around the Pune airport and the Awhalwadi neighborhood. These 2 locations are significant with both indicators mentioned - walking time and number of transfers.

From this data we can draw the conclusion that passengers do not need to change from one bus to another, but need to walk a lot. To improve the accessibility of this area small interventions are suggested. These areas need a connection with the closest bus stop, not the city center. Inner shuttles would improve accessibility and would be cheaper than an express bus.

Travel Time

Finally, people walk farther to faster services. They generally seek to minimise travel time. Habidatum detects anomaly zones for transit accessibility.

Mapping average travel times for Pune resulted in concentric circles. They signal a lack of infrastructure - this spatial distribution of accessibility would look similar in a city without any public transport connections at all.

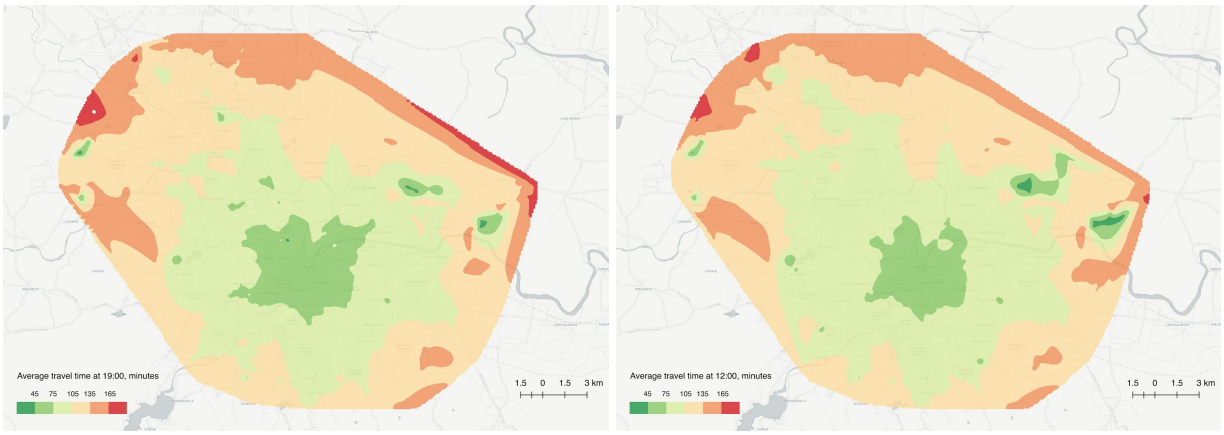

Figure 3. Average travel time at 12:00 and 19:00

Several “islands” of accessibility showed up including Hinjawadi, Pimpri Chinchward, Viman Nagar, Fatima Nagar, Lulla Nagar, Bavdhan and the notorious Pune Airport.

It should be noted that walking to transit and the number of transfers are almost stable at various times, while travel time changes significantly. By comparing 12:00 and 19:00 we identified areas where travel time increases by 30 minutes or more including Pimpri Chinchward Mohammed Wadi and Shiv Nagar. During peak hours these areas are becoming disconnected due to congestion.

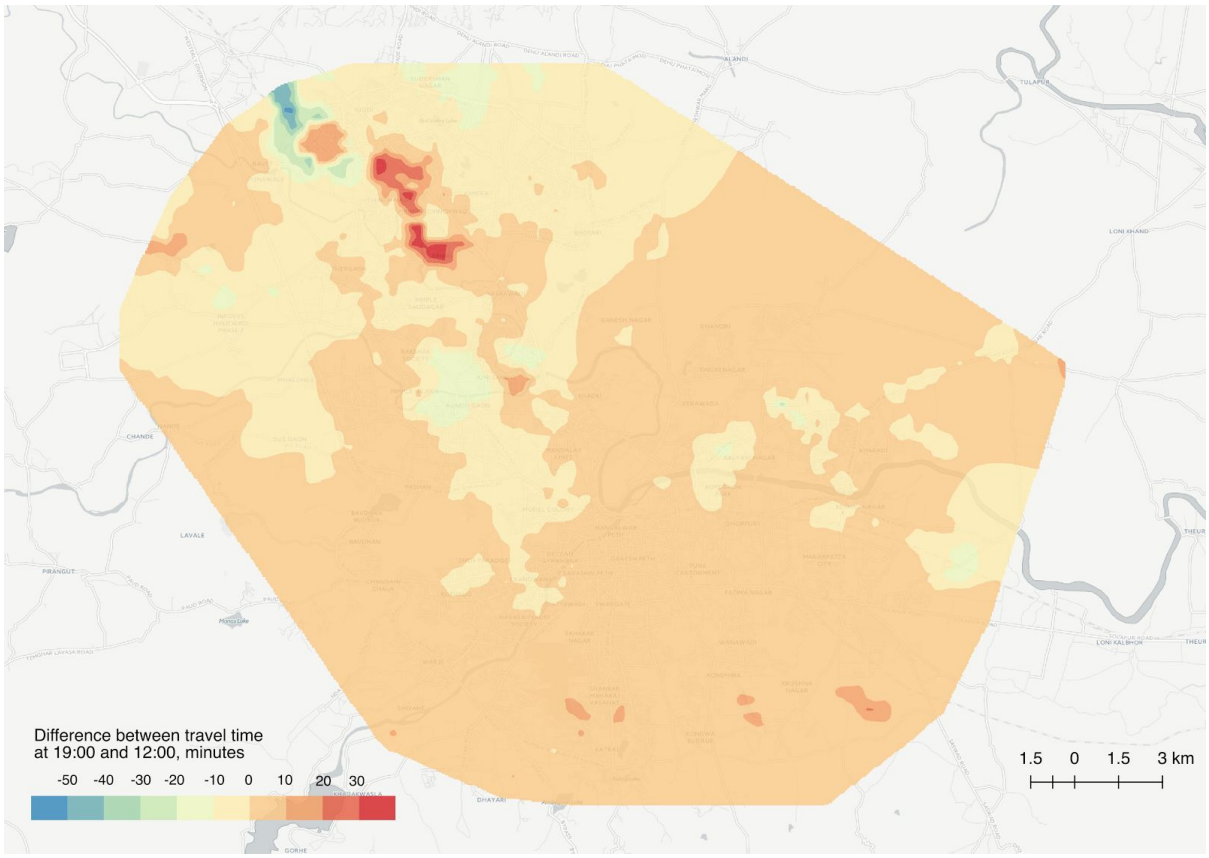

Figure 4. Difference between travel time at 19:00 and 12:00

While some areas are hard to leave, others are hard to reach. We discovered that there

were no routes to 15 of 100 hotspots of activity at midday. By 7 p.m. this number increased to 48. Most of these hotspots were in the city center which became 3 times less accessible by public transport during evening rush hour.

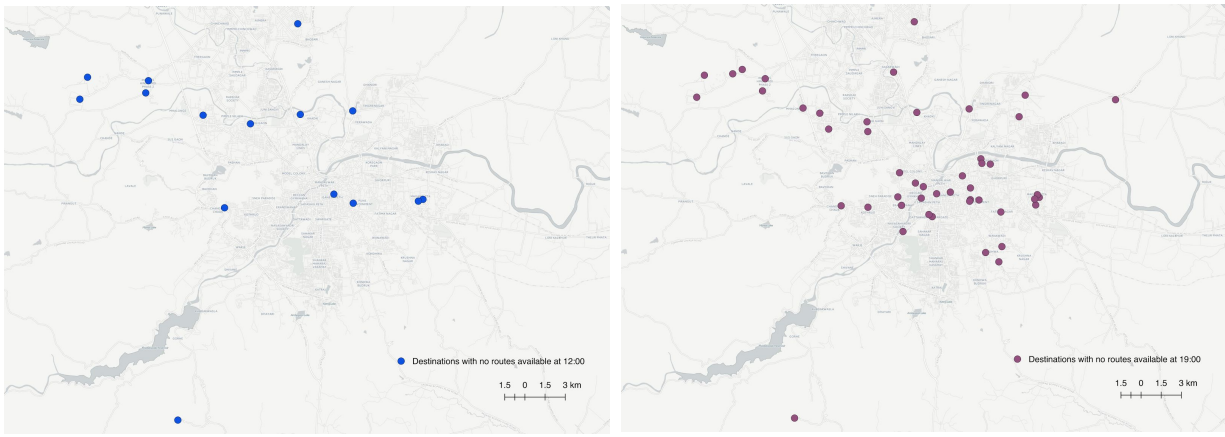

Figure 5. Destinations with no routes available at 12:00 and 19:00

Summary

Walking to transit, the number of transfers and the total travel time are believed to be some of the key factors in attracting people to public transport. Understanding these pain points, their reasons and possible solutions is key to efficient transport network optimisation.

Habidatum can measure accessibility with great accuracy. We work with different scales - from the entire city to a single neighborhood. By using the Habidatum platform we can explore dynamic changes in traffic situations for certain periods - from days to minutes - and identify over-crowded areas and periods of time.

Origin-destination analysis is part of Habidatum's transportation analytics. For more information visit habidatum.com