Walkability Indicators regarding the Structures of Street Network

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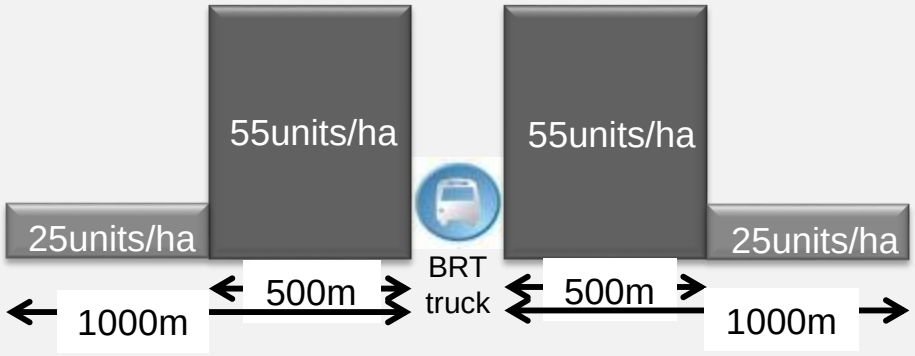
What is idea of TOD?

TOD, which was firstly introduced by Calthorpe, is a strategy to integrate public transit development and good urban design so as to encourage transit uses



TOD in three D's

- Although TOD concept has been described as intangible, i.e., difficult to define and even more difficult to measure, many researchers commonly thought with respect to three D's (Cervero et al)

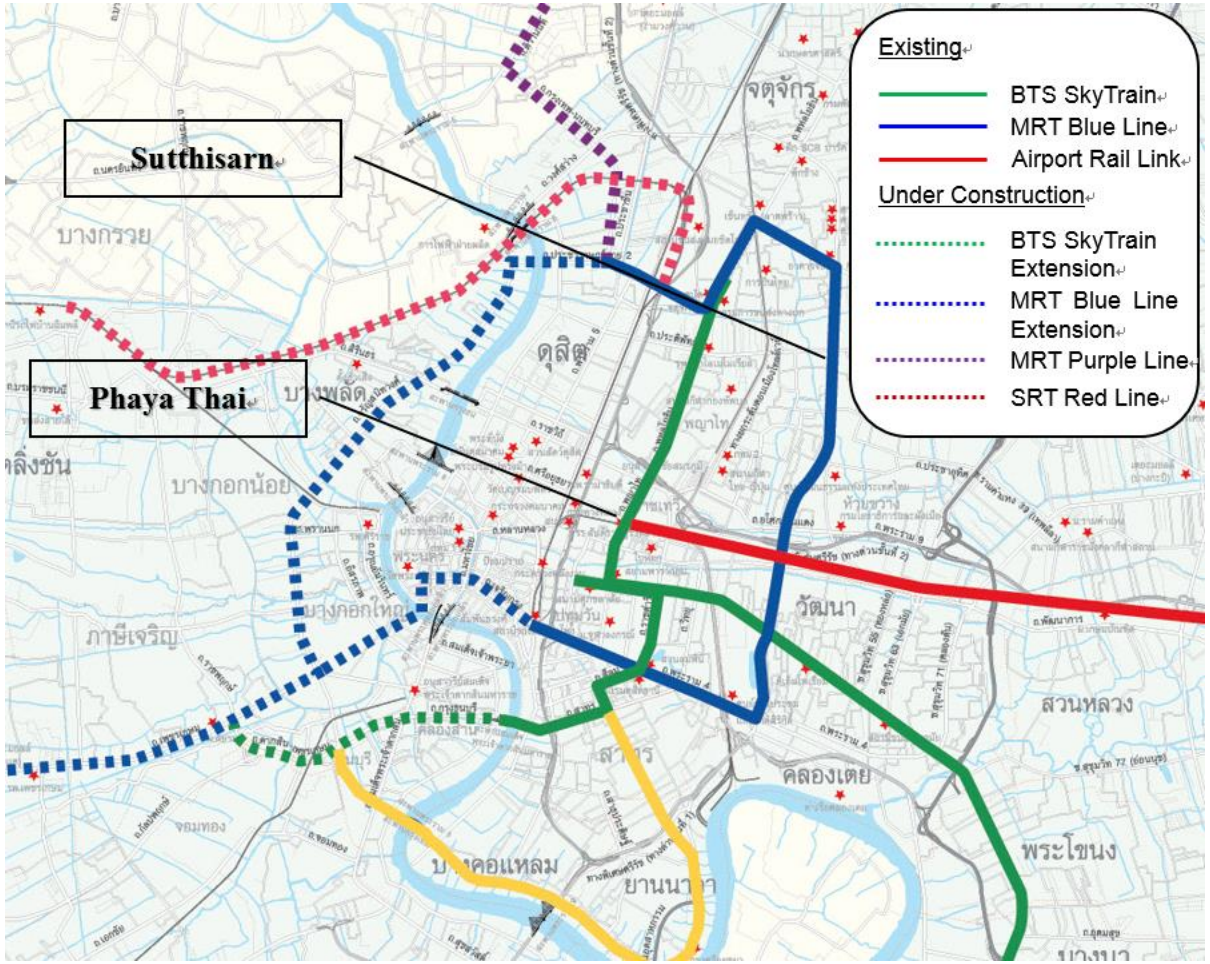
- Density (residential and/or employment)
- Diversity (e.g. mix of uses, ages, income groups)
- Design (pedestrian scale and orientation)

Walkability in the basis of the connectivity

- **Walkability** is a measure of how friendly an area is to walking
- **Many factors influence** the degree to which people **walk**
- **In this study,** walkability to the station was measured in the basis of **the connectivity** regarding the **structures of street network**

- Connectivity
  - Network Classification and Pattern
  - intersection density
  - pedestrian catchment area

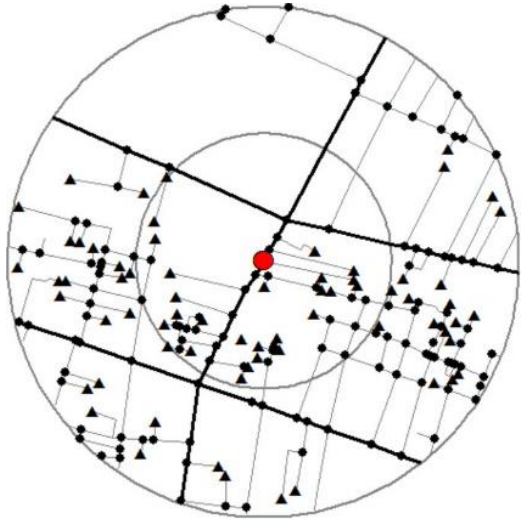
Study Area


Sutthisarn
Phaya Thai
Existing
BTS SkyTrain
MRT Blue Line
Airport Rail Link
Under Construction
BTS SkyTrain Extension
MRT Blue Line Extension
MRT Purple Line
SRT Red Line
จตุจักร
บางกรวย
ดุสิต
บางพลัด
บางกอกน้อย
บางกอกใหญ่
ภาษีเจริญ
วัฒนา
สวนหลวง
คลองเตย
พระโขนง

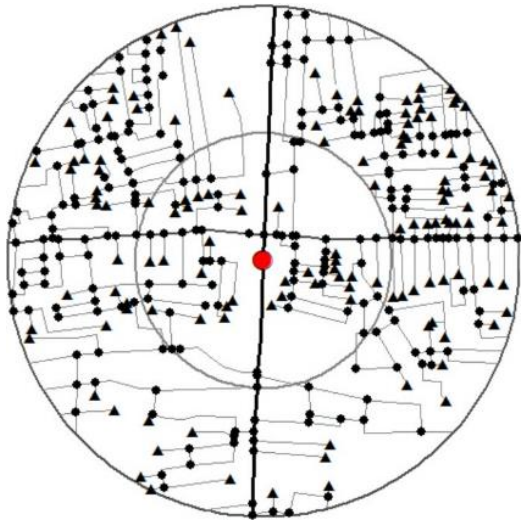
Catchment area

- Generally, TODs are located within a radius of one-quarter to one-half mile (400 to 800 m) from a transit stop, as this is considered to be an appropriate scale for pedestrians
- In Bangkok, past studies related to station accessibility claimed that walking has been the dominant access mode within 1 km.
  - 55% accounted for walking as access mode to station and followed by motorcycle taxi (around 30%).
  - On the other hand, motorcycle taxi (around 34%) has become somewhat significant in the distance of origins and destinations from rail station exceed 1 km.
- Thus, the catchment area of walkability in this study will be within 400 m to 800 m radius of the given stations.

Street Pattern



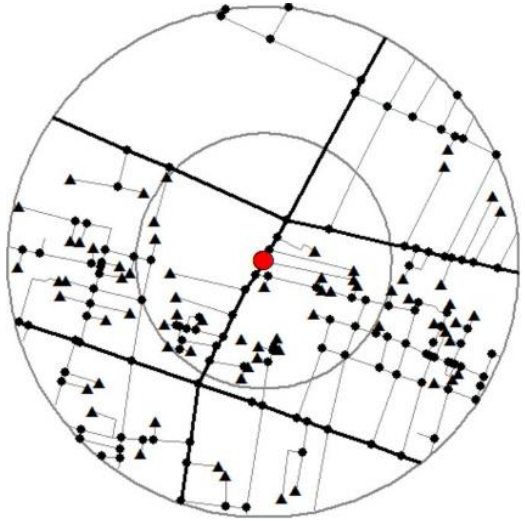
Phaya Thai



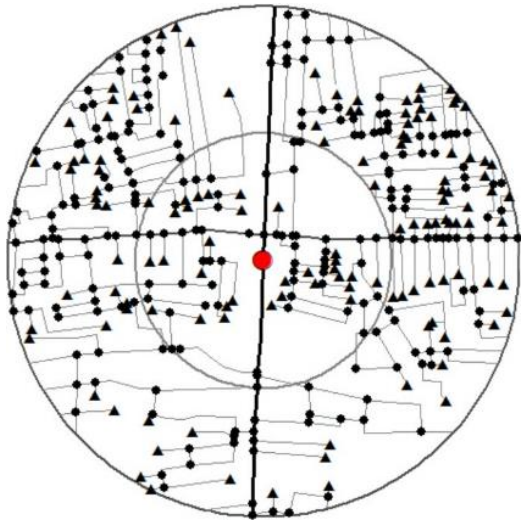
Sutthisarn

- Major streets of Phaya Thai tends to lay out as rough grid
- However, at the lower order level of hierarchy, it can be seen that street patterns of all stations were laid out as cul-de-sacs, etc in both stations.
- According with design concept, cul-de-sacs offer greater privacy, quiet, and safer environment for residents by banning or controlling through traffic.
- Unfortunately, cul-de-sacs have been pointed out that they discourage pedestrians for public transportation because these streets are not inter-connected which in turn to have few route choices with long distances that subsequently encourage people to use automobile.

Intersection and Dead End Density



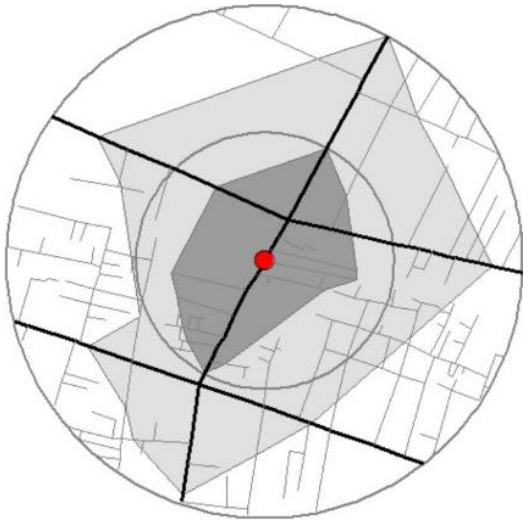
Phaya Thai



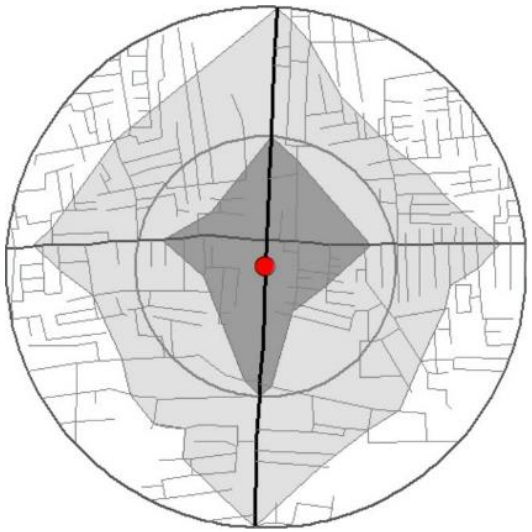
Sutthisarn

- Sutthisarn has a relatively high density of intersections at the both 400 m and 800 m ranges.
- Phaya Thai, in contrast, has the lowest 3-way and 4-way intersection densities.
- In term of dead-end densities, within 800 m of transit station, Phaya Thai has 228.8 per square kilometer of dead-end intersections and Sutthisarn has 447.2 per square kilometer.

Pedestrian catchment area



Phaya Thai

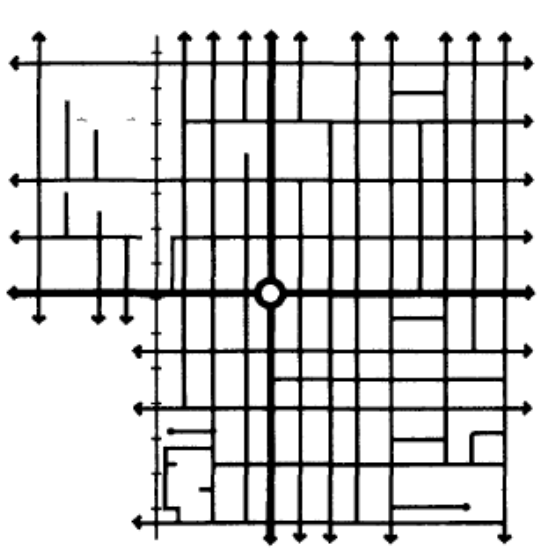


Sutthisarn

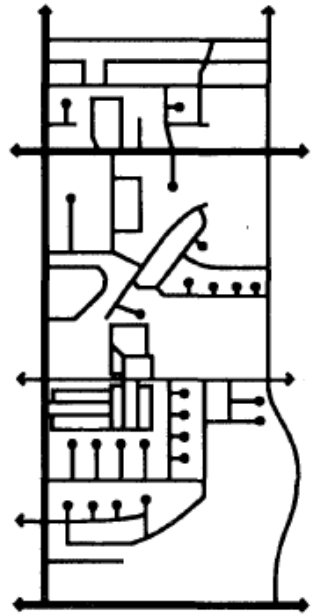
- Pedestrian catchment area (PCA) or so-called ped-shed ratios, which commonly use to compare the Euclidean walking distance to the actual walking distance based on street network
- Sutthisarn's PCA at 800 m range, there are somewhat different at 400 m (0.54 vs 0.44). In contrast, Phaya Thai's PCA are noticeably small coverage within close proximity of the transit station due to the lack of connections.

Conclusion

- The results clearly indicate that neighborhood areas of all given stations are auto-oriented development because over 50 percent of intersections either 3-way, T-intersections, or cul-de-sacs were found.
- Although PCA values in present study are similar to other TOD sites



ORANGE

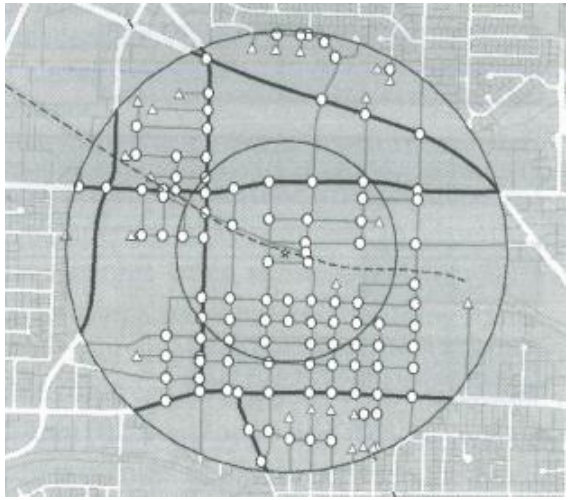


GARDEN GROVE

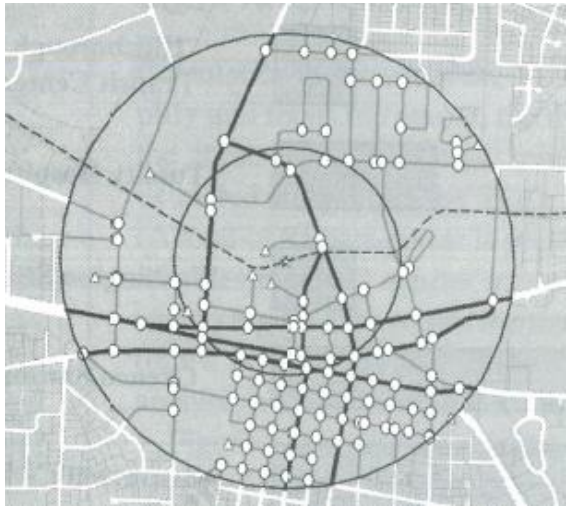
Cervero, R., and R. Gorham. Commuting in Transit versus Automobile Neighborhoods. *Journal of the American Planning Association,* Vol. 61, No. 2, 1995.

Conclusion (cont.)

- Comparing with other neighborhood areas in different studies, the densities of intersections are relatively similar, for example, 390.52 and 347.36 per square kilometer have been found in Beaverton transit center and Gresham central transit, respectively. However, the amount of dead-end densities are remarkably high (e.g. 107.64 dead-end density per square kilometer of Pilot Butte).



Gresham central transit



Beaverton transit center

Thank you for your attention