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# Rethinking Singapore's urban form

Singapore Management University economics professor thinks Singapore's road systems are too much dominated by the cul-de-sac form. A better balance between cul-de-sac and grid forms should be considered

**W**EN-Tai Hsu's latest brainwave was born from a long-remembered frustration.

Years ago, the Singapore Management University (SMU) associate professor of economics, then a visiting assistant professor at the National University of Singapore, was living with his wife in Kent Vale off Clementi Road. Getting to town by public transport was a major pain, he recalled.

"To take a bus to Chinatown, you had to walk a long way to the AYE (Ayer Rajah Expressway). If not, you had to take a bus to the Clementi interchange to take the MRT. Either way, it would take more than one hour."

On the other hand, driving would take just 15 to 20 minutes. But cars were too expensive to buy. Meanwhile, taxi drivers did not want to go to his area. "When it rained there was no chance, despite making numerous calls," he said.

A few months ago, he visited Taipei in his native Taiwan. He was struck by how the issue was not just about public transport, but about urban form.

In Taipei, streets are designed mostly in what urban planners call a "grid" form: a dense system of criss-crossing streets. The MRT subway system is aligned to main roads in the grid.

"I felt there are some good things about the grid form. So I started to think about it," he said.

"If you want to get from one point to another by MRT in Taipei, you don't have to take a circuitous route, because the whole city is a grid, so you often travel in a straight line. Whereas in Singapore, it takes a more circuitous route and perhaps longer time. You can say similar things about the road system and driving."

## More space but trickier traffic

Singapore does have a grid form but only in the Central Business District (CBD) and places like Pioneer and Punggol, Prof Hsu said.

Most of the city-state is laid out in a cul-de-sac form. This describes a road system where main roads lead to enclosed residential areas that do

not connect to other areas.

Bukit Panjang is one example. The Light Rail Transit (LRT) line runs in a loop similar to the Bukit Panjang Ring Road, while roads branch out from the Ring Road into dead-end residential zones.

In many cities around the world, grid-patterned streets eventually branch out to cul-de-sac suburbs. Singapore is similar to London and New York in that respect.

However, other cities like Chicago and Los Angeles are predominantly in a grid form. And Asian cities like Hong Kong and Taipei have a bigger proportion of grid forms than in Singapore.

There is nothing wrong with a cul-de-sac design, but tradeoffs are made, said Prof Hsu.

"Cul-de-sacs allow for more space. In a grid, space is taken up by roads, and there is less space for housing and recreational areas," he said.

While cul-de-sacs are suitable for residential areas, they are not as efficient as grid forms in facilitating transport.

In a cul-de-sac, traffic is one way out of the suburb when people go to work, and back in the other direction in the evening.

"But grid forms are very easy to navigate around and give you a clear sense of direction. They are more prevalent in city centres. This is because centres are where people and firms agglomerate, and you don't know a priori what directions people want to travel and then meet. Hence, allowing all directions of traffic in and near the city centre is the essential benefit of grid form."

## Monocentric problems

The fact that Singapore's city structure is rather monocentric and that its urban landscape is dominated by the cul-de-sac road patterns is like the chicken-and-egg relation. Because the cul-de-sac is too prevalent, there is not much space for the city centre to grow or for its function to spread to other areas, resulting in a

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SMU School of Economics

monocentric structure. And because there is only one "true centre", there is not much need for grids, as you can design most arterial roads in cul-de-sac suburban areas to lead to the CBD. But this has serious implications for transportation, as traffic flows along limited paths into a very small centre.

"Not only the city centre but also the arterial roads leading to it are prone to serious congestion, compared with a more grid-oriented design. In this sense, measures like the Certificate of Entitlement (COE) and Electronic Road Pricing (ERP) to mitigate congestion are not just smart but also necessary," Prof Hsu said. Conversely, in a place like Taipei, there is no obvious dominant city centre. It is basically a polycentric structure, and thus no single centre faces almost the entire traffic strains of the metropolitan.

As the city grows, grid forms are needed to enlarge city centres instead of cul-de-sacs, he said.

"I can imagine turning Orchard, Newton, Novena into a grid, but all the buildings are already there and it is hard to change. The new Greater Southern Waterfront area which will be developed when the existing container port operations are moved to Tuas, however, has potential."

The area can be designed to be an integrated part of the enlarged CBD, especially the area that is currently the City Terminals. The main functions should be for business. For any housing need here, private condominiums should be preferred to HDB flats. The reason is that if this area is designed to be part of the enlarged CBD, when the government auctions off leaseholds to condominium developers, the prices would be high, and the revenue can be used to fund the infrastructure in this area. In contrast, HDB flats are in its nature subsidised, building HDB flats there expends a great deal of potential resources, Prof Hsu observed.

But to make it an efficient CBD, it has to take

a grid form rather than cul-de-sac. An innovative and active city centre should have people meet freely and efficiently. Not only quantitatively you need more road space, but also qualitatively you want to allow all directions of traffic to flow efficiently.

## Implications on MRT design

Having an MRT system designed around a cul-de-sac city can be more inefficient, Prof Hsu said.

In a city that is predominantly in a grid form, any two lines that intersect can be an interchange. This allows for the shortest way to travel between one place and another.

In Singapore, there are examples where commuters are forced to travel to a more distant interchange before going somewhere closer to where they originally were, Prof Hsu said.

To get to the East-West Line's Kallang station from the Circle Line's Stadium station, for example, one has to take the train east to Paya Lebar before going west again.

"It is not efficient to travel between two places that are not the CBD," he said.

## No perfect solution

Ultimately, cities should strike a balance between the two street forms.

Singapore's transport is already reasonably efficient, and it also notably has an extensive system of expressways, Prof Hsu said.

There are also numerous green spaces and parks around.

But when thinking about how to redevelop the Greater Southern Waterfront area, policymakers can consider the economic implications of a cul-de-sac versus a grid design, he added.

In SMU, Prof Hsu is also involved in research projects on land supply in China, and the effects of trade on innovation and growth.

"These questions are all very interesting. You want to be doing something new, like the economics of urban form, which people don't talk about much."

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