Connecting Croydon: Planning for a 20-minute Neighbourhood

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Introduction

20-minute neighbourhood is a recent planning concept characterised by diverse opportunities located within an 800-metre walking distance (10-minute walk in each direction) (DELWP, 2017). The concept is recently popularised due to the travel restrictions caused by the COVID-19 pandemic and the consequent need to perform daily activities locally (Gower, Grodach, Lukose, Webb & Kamruzzaman, 2020). However, apart from this overarching concept, there is little policy guidance available on how to transition a traditional neighbourhood into a 20-minute neighbourhood. This research addresses this gap in the literature by taking into account the metropolitan context of a neighbourhood and its own socio-spatial characteristics. Having been identified for renewal (DELWP, 2019), Croydon South was selected as the focus for this investigation.

This research aims to explore the dual consideration of amenity and accessibility to facilitate effective place-based planning. By identifying Croydon South as a 'Low-amenity suburb' with high car dependency, a regression analysis revealed that bus stop density and commercial activity were variables that contributed to the increased percentage of walking. While there is a strong bias towards investing in large scale transport infrastructure, this research highlights the need of place-based interventions that provide smaller infrastructure improvements to existing bus services and amenities. Along with finding land-use opportunities to cater for active commercial activity, small infrastructure improvements can deliver a more walkable area, and a consequently better outcome for liveability.

Methodology

This study followed a 3-stage methodology to derive strategies to transition Croydon South as a 20-minute neighbourhood.

First, the current class of Croydon South as a neighbourhood is identified along with other suburbs in Greater Melbourne. The classification was done using a Two-Step Cluster analysis technique and based on six built environment indicators (types of opportunities available, concentration of the opportunities, directional distribution of the opportunities, residential density, intersection density and cul-de-sac density).

Second, given that walking is a key outcome of a 20-minute neighbourhood, the study assessed the walking patterns among the various neighbourhood types as obtained from the cluster analysis. The walking rate (% of commuting trips made on foot) of people living in the suburbs was derived from the Victorian Integrated Survey

of Travel and Activity (VISTA). The walking rate was regressed on the neighbourhood types together with other socio-economic and built environment confounders in a linear regression model.

Third, a scenario planning method was applied to derive 20-minute neighbourhood proposals for Croydon South by taking into account: the availability of existing opportunities; the increase required to transform into a 20-minute neighbourhood; increasing commercial land only; increasing bus stop density only; increasing both commercial land & bus stop density; a site-specific scenario. The effects of the proposals on promoting active transport (walking) were then predicted based on the estimated model in the second stage.

Results

1.Neighbourhood Typologies in Greater Melbourne

The cluster analysis resulted in 6-cluster solutions representing the natural groupings of the 309 suburbs in Greater Melbourne as shown in Table 1 below:

	Cluster	1	2	3	4	5	6
	Label	High-amenity suburbs	Transport hubs	Urban core	Low-amenity suburbs	Emerging growth areas	Outer suburban rings
	Description						
	Size	25.2% (77)	7.5% (23)	4.3% (13)	37.7% (115)	15.7% (48)	9.5% (29)
Inputs	Intersection Density	6.22	8.48	17.21	6.33	2.45	0.95
	Standard Distance	1,174.12	791.8	690.14	985.6	1,788.74	4,762.68
	Types of Opportunity	10.16	8.7	9.31	5.91	8.65	11.72
	Train Density	0.15	0.62	0.38	0.04	0.02	0
	Cul-de-sac Density	1.34	1.33	4.22	1.91	0.75	0.32
	Total Opportunities	60.14	43.7	45.92	30.96	41.85	78.31
	XY Ratio	0.58	0.65	0.54	0.53	0.48	0.56

Table 1 shows distribution and characteristics of the 6 clusters. 4 outliers have been excluded. (Source: Authors)

Among the clusters, Urban Core Suburbs are considered to be similar to a 20-Minute Neighbourhood given its proximity and availability of residential land to commercial land. They are highly accessible by public transport and have the highest percentage of people walking to work. In contrast, Croydon South was identified to be a Low-amenity Suburb, defined as a highly residential suburb with lots of parkland but limited in other land cover associated with jobs. This typology is also highly reliant on motor-vehicles.

2. Impacts of Neighbourhood Typologies on Walking Outcomes

Table 2 shows that people living in urban core (cluster 3) neighbourhoods are more likely to walk whereas people in low-amenity suburbs and emerging growth areas (cluster 4 & 5) are highly reliant on motor vehicles. Table 3 outlines the results obtained from the linear regression model. The regression analysis revealed that Bus Stop Density and Commercial Land Cover Percentage are significant factors that contribute to promoting walking trips across Melbourne. Among them, Bus Stop Density and Commercial Land Cover Percentage factors were determined to be most relatable to 20-minute neighbourhood principles that could be applied to transform a Low-amenity Suburb into an Urban Core Suburb.

Report

PercentWalk

Two Step Cluster Number	Mean	N	Std. Deviation
0	16.7765	3	14.55808
1	2.5565	77	2.34036
2	5.9551	23	6.81876
3	15.6285	13	12.46543
4	1.6686	114	2.62733
5	1.1043	48	0.060149
6	2.051	29	1.41293
Total	2.8991	307	5.06067

Table 2: shows the mean of percentage walk is high in cluster 3 (Urban core cluster). 2 cases have been excluded with "0" being outliers. (Source: Authors)

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-3.860	0.469		-8.226	0.000					
	Average number persons per bedroom	2.594	0.438	0.266	5.927	0.000	0.387	0.325	0.229	0.744	1.345
	Median mortgage repayment monthly	0.001	0.000	0.277	6.785	0.000	0.300	0.366	0.263	0.897	1.115
	Percentage Commercial	0.033	0.003	0.402	9.742	0.000	0.511	0.492	0.377	0.880	1.136
	Percentage Hospital	0.264	0.043	0.245	6.199	0.000	0.316	0.338	0.240	0.962	1.040
	Bus Stop Density	0.019	0.008	0.103	2.233	0.026	0.212	0.128	0.086	0.708	1.413
	Cluster6G=3.0	0.648	0.193	0.144	3.367	0.001	0.391	0.192	0.130	0.820	1.220
	Cluster6G=6.0	0.886	0.138	0.285	6.416	0.000	0.029	0.349	0.248	0.757	1.321

a. Dependent Variable: LnPercetWalk

Table 3: shows the significant factors from the linear regression analysis (Source: Authors)

3.Design proposals for Croydon South and their impacts on walking

There are 14 existing bus stops, with a bus stop density of 4.9 per km2 in Croydon South. Also, 1.5% of its land cover is utilised for commercial spaces in Croydon

South. Under these existing conditions, 0.86% of the people in Croydon South made a commuting trip on foot.

This study proposed to increase bus stop density to 7 per Km2. This requires the provision of additional 6 bus stops. The study also proposes to increase commercial land area to 3.7% in Croydon South. With these proposed changes and using the logit model derived in Section 3.2, the study predicted that the walking rate would increase to 1.3% (from the current rate of 0.86%).

	Bus stop density	Number of Bus Stop	Percentage of commercial land	Percentage Increase of Commercial Land	Percentage of walkability	Percentage increase of walkability	Increase of people walking
Existing Scenario	4.9	14	1.5%	-	0.86%	-	-
As a "20-Minute Neighbourhood" Cluster	21.7	31	21.8%	20.6%	2.4%	1.6%	78
High Commercial Percentage	4.9	14	53.6%	52.1%	6.2%	5.3%	263
High Bus Stop Density	18	51	1.5%	0%	1.4%	0.6%	27
High Commercial Percentage & Bus Stop Density	18	51	53.6%	52.1%	7.9%	7.1%	349
Site Specific Scenario	7	20	5.2%	3.7%	1.3	0.4%	22

Table 4: Planning scenarios for Croydon South (Source: Authors)

Conclusion

To the knowledge of the authors, this is the first study that attempted to propose a design-based solution to transform a traditional suburb (Croydon South) into a 20-minute neighbourhood. The study proposes incremental changes in its built environment including an increase of bus stop density and commercial land uses by 2% and 2.2% respectively. With these changes, the study estimated that people living in Croydon South would increase their rate of walking by 0.5%. While a 0.5% change is relatively small for Croydon South, when applied to all the identified Low-amenity Suburbs, the findings show an increase of approximately 6816 people choosing to walk as a means of transport. This result may potentially contribute to a significant reduction in car dependency and emissions created from private vehicle use.

References

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