ANLY482 Analytics Practicum

AY2015-16 Term 2
Team WalkThere
Group Project Proposal

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1. Overview

1.1 Our Sponsor

Centre for Liveable Cities (CLC) was set up in 2008 by the Ministry of National Development and the Ministry of the Environment and Water Resources. CLC has as its mission "to distil, create and share knowledge on liveable and sustainable cities". CLC's work spans three main areas – Research, Capability Development & Advisory and Knowledge Platforms. Through these activities, CLC hopes to provide urban leaders and practitioners with the knowledge and support needed to make our cities better.

1.2 Background of Project

The concept of new towns dates back to the late 1800s where the cities in UK became more crowded with poor living conditions. In 1898, Ebenezer Howard provide ideas on how we can improve our quality of life by imagining "garden cities" being surrounded by a "country belt" which was known as the "new towns movement" (Little, 1990)

In Singapore, new town planning is done by the Housing and Development Board (HDB). Queenstown was the first new town to be built when the new town concept was first introduced in Singapore. Currently, there are a total of 22 new towns in Singapore. These new towns have three key features which include high accessibility to public transportation, mixed land use and lots of greenery within the town.

Out of these new towns, Tampines is known to be the most outstanding and well-planned new town in Singapore. Built in the 1970s, Tampines new town has since developed into an institutional, social, recreational and commercial hub of the eastern part of Singapore. Its new town model has even won an award for its outstanding housing design and contribution to human settlement development. Now, it is home to over 200,000 people with a population density of 47,000 people/km.

1.3 Motivation
Recently, the government initiated the "Re-imagining Tampines" project that aims to develop Tampines into an even more people-friendly place to live in, streets that are safer for everyone, and bringing nature closer to our doorstep with more greenery and water bodies. However, assigning this project to planners alone does not help to foster a sense of belonging in the community in Tampines as it is based on how the planners imagine Tampines to be. As such, "Reimagining Tampines" project involves a community effort where individuals from various groups such as the public sector or even students are able to contribute their ideas and expertise for a "Dream" Tampines.

Thus, CLC would like to make a mature town like Tampines a more liveable place for everyone by promoting ideas for liveability and improving current physical infrastructure.

1.4 Objectives
The aim of this project is to analyse the walkability in Tampines East Zone 2 based on connectivity of residential areas to points of interests. As our sponsor might look into implementing a wider research for the whole of Tampines, this project will also provide a feasible research plan that includes: our projected time taken (i.e. man hours) to collect data and conduct research, and the steps taken for analysis

The objectives of our project are:
- To analyse the demographics of the residents at Tampines
- To understand if the current physical infrastructures cater to the needs of the residents (based on demographics)
- To analyse the connectivity of the residential areas to the points of interests
- To highlight the areas in Tampines East Zone 2 that are less accessible and propose recommendations to improve walkability
- To understand the amount of resources required for this research for future expansion of the project

2. Review of Previous Work

We reviewed papers that had relations to walkability in Singapore, as well walkability in overseas countries, to gain a better understanding of how to carry out our project.

2.1 Review of Research Papers in Singapore Context

In the paper *Enhancing the Pedestrian Experience in Singapore: A Closer Look at MRT Transfers and CBD Walkability*, a research was conducted to find out the extent whereby the pedestrian system of Singapore could be improved, given the state of infrastructure assets and the hot and humid tropical climate present. The research was focused on walking as a form of transport in Singapore. A "Walking Experience in Singapore" survey was conducted, and it was discovered that Singaporeans' two biggest complaints of walking were the bad weather conditions and humid climate, and the paths that they chose to walk by depended on weather considerations.

Also, in the paper, a research was conducted with regards to walkability within Residential Estates. The main neighbourhood that was studied was Pasir Ris, and it was concluded that urban planners had to find a balance between traffic priority and residential walkability. The best solution would be to reroute areas with major traffic away from areas with high pedestrian movements, so as to appease both the working population who commute during peak hours as well as the residents who travel intra-neighbourhood for non-work trips during off-peak hours.

Hence, in our paper, we will focus on the needs of residents who travel intra-neighbourhood for non-work trips, and observe the neighbourhood in Tampines to discover if each residential block has a connected sheltered pathway to areas of interests for residents. Through this, we will be able to provide recommendations to enhance walkability in residential estates.

The second paper we reviewed, *Influence of Space and Time Concepts on Physical Activity Intensity in Singapore*, a research was conducted to understand how the different characteristics of the built environment in communities influence people's physical activity level. Results showed that walkability index of the neighbourhood

have a positive correlation to the residents' physical activity levels. This is also more prominent for men than women. It was also concluded that Bukit Timah, Tanglin and Tengah areas are least conducive for residents to walk for utilitarian or leisure purposes whereas Queenstown, Bukit Merah and Toa Payoh are the most conducive areas

· In the research paper, the author also mentioned about a previous study that was conducted to analyse the relationship between the proximity and mix of neighbourhood destinations and physical activity. He discovered that proximity and mix of destinations appears to have a stronger correlation with walking for utilitarian purposes as compared to walking for leisure purposes. Therefore, increasing the diversity of destinations may encourage adults doing more transport-related walking and achieving recommended levels of physical activity (McCormack, 2008).

Therefore, for our project, adopting the walkability index model will provide a more in-depth analysis on walkability in the Tampines area. Furthermore, we should not only focus on the number of areas of interests in Tampines East Zone 2, but also consider the diversity of these areas of interests in order to provide better recommendations on promoting walkability in the residential estates.

2.2 Review of Research Papers in Overseas Context

In the research paper *The Walkable City: Neighbourhood Design and Preferences, Travel Choices and Health*, a study was conducted in Toronto's neighbourhoods to research on the public's preferences for walkable neighbourhoods. Residents in such neighbourhoods are known to enjoy advantages such as health benefits and a better quality of life. Through a survey conducted, it was found that there was an overwhelming preference for more walkable neighbourhoods. Results also found that neighbourhoods with positive significant air quality, climate, less traffic congestion and higher connectivity to nearby shops and services were associated with high walkability. We can take a few of these neighbourhood features into consideration when developing the walkability index model for our project.

2.3 Previous Analysis on Bus Data

With ez-link data for year 2014, an analysis was conducted to understand the residents' travelling behaviour mainly in Tampines. Data extracted is a week's data 7-13 July 2014. The month, July, was chosen for analysis as this could best represent the travelling pattern amongst the other months where there are minimal holiday plans likely to take place in July. Only a week's data was selected for analysis because there is a similar trend for all four weeks of the month. In addition, bus rides of only 7 minutes were selected as these rides considered short rides.

After identifying the period for analysis, the data is broken down further into 4 categories:

1) morning peak period, 6-9am
2) evening peak period, 5-8pm
3) afternoon period, 1-4pm
4) daily (tuesday - thursday)

And further broken into the profile types of the riders, mainly:

1) adult
2) student
3) elderly

Using QGIS to plot analyse the spatial-temporal pattern of the bus data in morning and evening peak period and by different profile types, there are clear patterns identified in the travelling behaviour. The common places students would travel to during the morning peak period are mainly schools, while adults would travel to schools, Changi hospital and the Tampines MRT which are the likely employment hubs of Tampines. With such findings, we will conduct further analysis on the accessibility of the residential areas where bus stops attract larger amount of riderships as it is assumed that these plots of residential areas are more likely to be less accessible.

3. Data

Data	Provided by/ Method of retrieving
Physical Infrastructure of footpath, Undeveloped Infrastructure, Travelling distance to POI from residential blocks	Doing a site visit to manually collect the data and collate in QGis
Residential blocks, Points of Interest	Onemap
Demographic profile of each residential unit Ez-link card data	Urban Redevelopment Authority

4. Methodology

We will be doing our research on residential areas that are within close proximity to the bus stops that have higher riderships, to identify the connectivity of the given residential blocks to the points of interests.

Objective 1: Identify how accessible the facilities, that are within walking distance and meet the basic needs, to the residents.

1. Using QGIS and residential blocks shapefile, draw a 400 metres buffer radius from each postal codes and identify the facilities that are within the radius. These facilities include schools, bus stops, green space, convenience stores, and places of worship.
2. Conduct site visit at Tampines East Zone 2 where an actual distance will be plotted with use of QGIS mobile application, Map It! While plotting out the actual distance taken to travel to the various facilities identified, areas that are in need of improvements such as areas catered to elderly, uncovered linkways, undeveloped footpath and dimly lighted pathways.
   a. Site visits will be conducted during 5pm - 8pm on weekdays, under sunny and rainy conditions, where majority of the mobility of the residents can be observed.

      b. The actual distances to various facilities will show the real distance of travelling despite having the facilities being located within the 400 metres buffer radius.

3. Display a heatmap of the travelled lines where the colour of the lines show the time taken to travel by 2 categories of pedestrians - young and old.
    a. Young individual: 5.4 km/hour
    b. Old individual: 4.6 km/hour

Objective 2: Fine-tune the design of the residential areas to ensure that the points of interests are connected and are well-served to the needs of the residents (based on demographics - elderly and children)

1. Retrieve data of demographics of each residential block
2. Determine if pathways to points of interests catering to the basic needs of each profile groups based on the destinations of the bus arrivals of the people, i.e. elderly, adult and child.
3. Identify lamp posts, sources of light to determine if any area of the residential blocks are dimly lighted, that might affect the walkability of residents at night

5. Scope of Work

5.1 Literature Study
To understand previous studies on walkability in Singapore and in other countries and to understand the types of infrastructures that can be introduced so as to be able to make recommendations to improve the connectivity between residential estates and points of interest.

5.2 Software Learning
Learn how to use the QGis software, both on the laptop as well as on the mobile phone (to aid data collection)

5.3 Data Collection
We will be collecting data through 2 methods:

1) Going to Tampines to manually collate data with regards to:

- Physical infrastructure:
    - Walkways (Both covered and not covered), Traffic lights, Pedestrian Crossings, Overhead Bridges, School Zones, Street Lights, Staircases, wheelchair-friendly slopes
- Other types of data: Undeveloped footpaths

2) Collecting Data from URA with regards to the demographics of each residential block to help us better understand the distribution of people in the area of Tampines that we are analysing on

3) Onemap
- Points of interests:
    - Elderly care, Tampines North Primary School Primary school, Dunman Secondary School, Market and Grocery Stores, Community Centres, Parks, Bus Stops, Playground, Fitness Corner, Sport facilities
- Residential blocks:
    - To be identified

5.4 Data Exploration
Gaining insight from the data collected to understand how walkable residential areas are from the nearby facilities, cleaning and sieving out outliers, anomalies or wrong inputs.

5.5 Geospatial Analysis
Using QGIS, for the following:
- Map out paths that residents may take from their houses to identified points of interest
- Identify points of interest within 400 metres buffer radius from each residential block
- Understand the coverage of street lamps to analyse the safety of walking paths at night. Through measuring the radius of coverage and the height of the lamp post, we can understand how the distribution of the lamp post should be placed.

6. Proposed Timeline

Task	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14
Research														
Proposal development	All													
Research on project	All													
Proposal Submission														
Proposal document	All													
Wiki page	Jac													
Milestone: Proposal Submission (10 January 2016)														
Data Collection														
Tools exploration		All												
Site Visit			All											
Data exploration				All										
Gather insights from data - 1st area				All										
Documentation for research paper				All										
Finalise initial findings					All									
Project Revision Iteration														
Review findings client					All									
Revise project						All								
Mid-term Presentation Preparation														
Prepare mid-term presentation slides							Jea							
Update research paper							All							
Update wiki							Jac, HT							
Milestone: Mid-term Presentation														
Mid-term Presentation Follow-up														
Revise project								All						
Development														
Gather insights from data - 2nd area									Jac, Jea	Jac, Jea				
Gather insights from data - 3rd area									HT, Jea	HT, Jea				
Project Revision Iteration														
Review findings client											All			
Revise project												All		
Buffer Week (Wk 13)														
Final Presentation Preparation														
Prepare final presentation slides														Jea
Finalise research paper														All
Update wiki														Jac, HT
Milestone: Final Presentation														
Poster														
Create poster														Jea
Milestone: Project Day and Submission														

7. The Team and Roles

Name	Year	School	Job Title	Job Description
Jaclyn Lim Hui Ting	4	Accountancy	Data Engineer	· Develop product using geospatial tool, such as QGIS
Lim Hui Ting	4	Accountancy	Data Analyst	Conduct data exploration and cleaning using various analytics and geospatial tools · Gather insights on given data
Sim Peh Wuen Jeanne	4	Information Systems	Project Manager	· Manage wiki page and project schedule · Liaise and update with sponsor and supervisor on future meetings and project development · Plan and lead meetings with sponsor and supervisor

8. Stakeholders

- Sponsor: Zhou Yimin, Center for Liveable Cities
- Supervisor: Prof Kam Tin Seong

9. References

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