CENTRALITY ASSESSMENT OF NEIGHBOURHOOD COMMERCIAL AREAS IN ISKANDAR MALAYSIA

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ABSTRACT

Centrality is an indices to evaluate the centralization of the components in a layout plan. Centrality of a component in a neighborhood also has its own influence in residents travel behavior. Centralized component, especially for commercial area also tend to create a center of attraction within the neighborhood. The decentralized commercial area will contribute to extra trip, consequently adding up the travel-induced carbon emission. Thus, this study reveals the current layout design of the selected neighborhood in Iskandar Malaysia in term of the Reach Centrality which is one of centrality measures. This paper aims to identify the distribution pattern of neighborhood commercial areas and assessing their Reach Centrality, R_C condition. Using Urban Network Analysis extension for ArcGis 10.1 to run the analysis, result will be presented in graphical images that locate the location of area that have best R_C value. Although most of the research that studied Centrality using regional scale, this study used neighborhood scale to give clearer view of current condition in neighborhood layout design. This study reveals that those commercial areas are not located in central location in terms of Reach centrality assessment. This situation currently contributes to the increase of travel carbon emission for local residents.

Keywords: Reach Centrality, Neighborhood Metrics, Urban Network Analysis

1. INTRODUCTION

Many network is involved in our daily life to connect us one another. Each of it has its own characteristic that important in their own ways. The urban network is also the network that is widely studied by urban planners to understand the movement and relationship of people who live in the city.

The centrality analysis is not only used in physical planning (e.g. spatial urban network) but also in social network planning as it will determine using the same measure in different approaches. In social network analysis, it is by using the people as nodes and the path as the link. On the other hand, the urban network analysis uses the intersection, which is translated into node and the street portion as the link.

According to World Bank (2008), there are 7.57 metric tons per capita of CO2 released in 1998 in Malaysia and 21% of that emission contributed by transportation sectors. As travelling is an act of moving people or object from one place to another, it is crucial to have a better network to connect them all.

In centrality, there are several measures to evaluate centrality. In this paper, it is evaluating centrality of neighborhood commercial area in Reach centrality, R_C perspective based on current layout obtained.

2. CENTRALITY AND NETWORK ANALYSIS

Every network has its own characteristic that comes with its own indexes of measurement that will differ among them. The urban network is also the network that is widely studied by urban planners to understand the movement and relationship of people who live in the city.

A central place offered ease in access from the neighboring area and more isolated places (S. Porta, 2009). The gained in access will increase the visibility and reputation of a place have a tendency to attract more trading activities and it has a higher possibility to be developed as a main attraction area. This central place will also will have much higher properties values and is o by the high usage of land use activities.

Current situation of centrality is not only influencing how the city works, it is also cooperate in shaping the growth of the city. As we can see from the location of city centre nowadays, it is most likely to extend from the junction of the main road where there are some special attribute of the physical environment at that particular area to make that area are important to certain extend (Porta et el., 2010). They further justify that the city grows up according to some sequences. First, along the major path, then filling the in between area, and at the end is build up the streets.

3. STUDY AREA

The study area is in Iskandar Malaysia where neighborhoods with mixed land uses of residential and commercial area have been selected. This paper however discusses only the results of the Reach centrality, R_C analysis carried out on 5 neighborhoods which are Taman Johor Jaya, Taman Pelangi, Taman Kebun Teh, Taman Skudai Jaya and Taman Bersatu. Those fives are selected for discussion due to their Reach result ranging from highest to the lowest according to their design and location of commercial spaces.

4. REACH CENTRALITY, R_C

Reach Centrality, R_C is basically a measure to evaluate the areal density of an area. Its calculate the total number of the surrounding buildings to the origin building. In simple term, Reach measure how many building can be reached from an origin building bounded by given search radius.

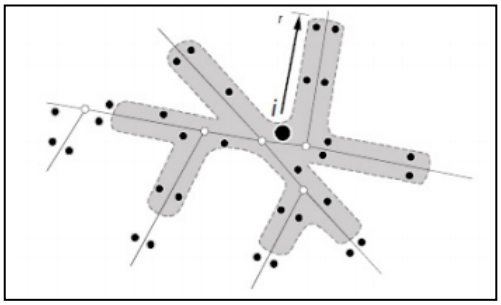
$$R\ (i) = \sum_{j \neq i} O_{ij} \leq r$$

where,

R = Reach,

O_{ij} = No. of Surrounding Buildings from i to j

r = search radius



Source: Urban Network Analysis Manual (2012)

Figure 1 Illustration of Reach

The benchmark of this variable will be marked as good when the higher value is obtained which mean there are much buildings located at the surrounding of the origin building. Whereas, the benchmark will be noted as bad when the lower value of reach is obtained which it show that there are less buildings located surround the origin building. From there, the layout designers will know where to locate the attraction area such as commercial area or the public facilities.

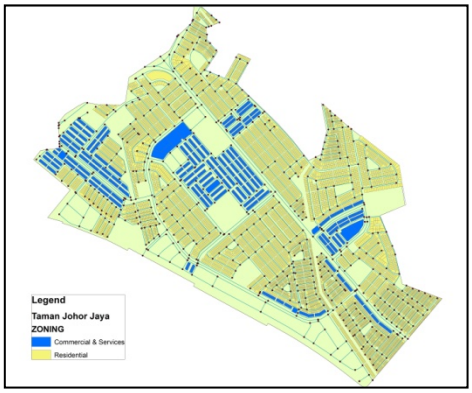
5. FINDINGS

In designing a low carbon emission of mixed land use layout, location of commercial is one of the factors that must be considered as it will influence the future carbon emission and the travel pattern of the local residents. In is because, commercial area will act as goods supply agent for the local resident. From the analysis of the five neighborhoods which are Taman Johor Jaya, Taman Pelangi, Taman Kebun Teh, Taman Skudai Jaya and Taman Bersatu, commercial area are tend to be located at the edge of the neighborhood near the main road. The purpose was to make sure that particular commercial area gets a maximum access either for the goods delivery or for either customers from outside or inside the neighborhood.

Using 400 meters search radius which taken from the average walking distance that justified by Ontario Ministry of Transportation (1992), the result is as shown in Figure 2 to Figure 6. In order to ease the comparison between the current practice and the result obtained, current layouts are attached together.

It can be seen that most of the commercial areas are located beyond the walking distance from the compact area of the residential zones in the neighborhood. The commercial areas tend to be located near the low density residential area. This situation should not happen as the low density residents usually occupied by high income owners which basically have small intention to shop at the commercial area. Vice versa, the people with low income usually have higher intention to shop at that area and they should be placed closer to the commercial area.

(a)



(b)

Figure 2 Taman Johor Jaya (a) Land Use; (b) Reach Centrality

(a)

(b)

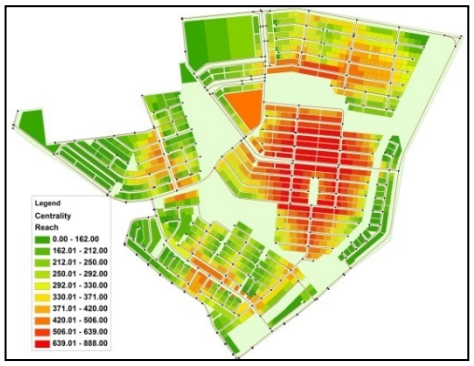
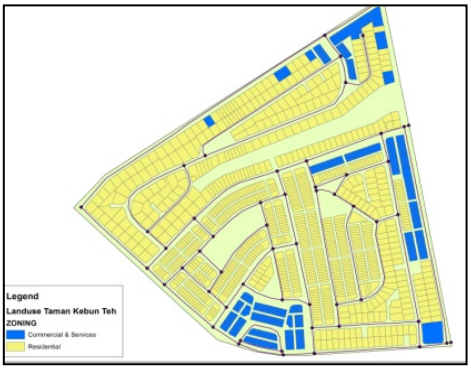


Figure 3 Taman Pelangi (a) Land Use; (b) Reach Centrality

(a)



(b)

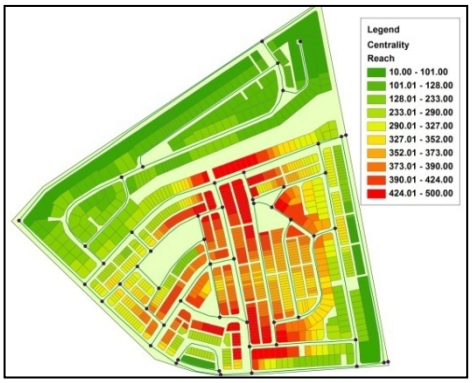


Figure 4 Taman Kebun Teh (a) Land Use; (b) Reach Centrality

(a)

(b)

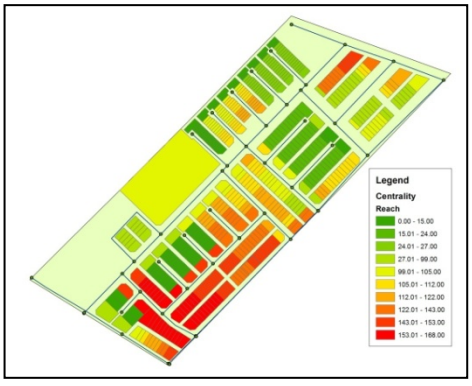
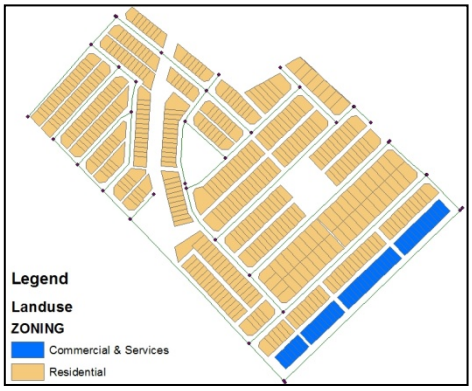


Figure 5 Taman Skudai Jaya (a) Land Use; (b) Reach Centrality

(a)



(b)

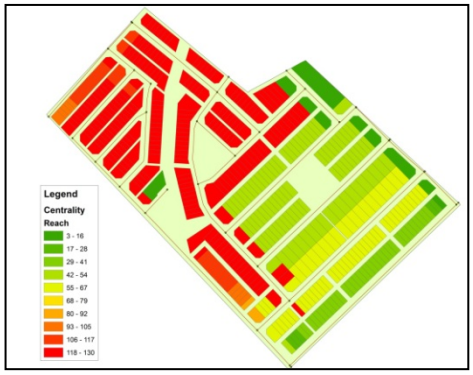


Figure 6 Taman Bersatu (a) Land Use; (b) Reach Centrality

6. CONCLUSION

Reach Centrality can become one of tools to measure centrality of the placement of commercial area or other components in designing residential area. Applying the measures in designing a neighborhood will guarantee allocation of commercial areas that are so reachable by the residents that it can reduce motorized travel and increase walkability. Situations such as those in the five neighborhoods studied, where commercial areas have very low centrality measure, can certainly be avoided.

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