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The Use of Geographical Information System in the Assessment of Level of Service of Transit Systems in Kuala Lumpur

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Abstract

Due to heavy traffic and congested roads, it is crucial that public transport services are continuously monitored and improved to fulfill rider's needs and report updated information to transit agencies. This paper attempts to evaluate the level of service of public transportation provided by Rapid Kuala Lumpur using Geographical Information System (GIS). Using the customized GIS software, the transit supportive area is calculated with employment density at ten jobs per hectare or household density at 7.5 unit per hectare. The Level of Service is identified based on a percentage of the Transit Supportive Area covered by transit. This study shows that GIS can map the status of Transit-Supportive Area and identify the level of service provided by Rapid Kuala Lumpur.

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Keywords: Geographical Information System (GIS); service coverage; transit supportive area; transit system

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1. Introduction

Transit services such as the Putra LRT, Star LRT, KTM Commuter, KL Monorail and rapid bus is one of the main public transport services in Kuala Lumpur. Riders in Kuala Lumpur rely on this public transport to travel from one destination to another destination within the city due to heavy traffic and congested road in Kuala Lumpur. Although the public transport in Kuala Lumpur has improved and developed, yet there are some tourist attraction places such as the Titiwangsa Lake and Lake Garden that has no availability of public transport. Therefore, the public transport should always be monitored and improved to fulfill the rider's requirement and be kept updated by the transit agencies.

Public transit should be encouraged because it can accommodate greater travel demand than cars. Increasing the share of public transit will reduce traffic congestion, improve air quality, reduce the number of accidents, reduce energy consumption, increase the number of viable transportation options and help improve the quality of life and create new economic opportunities. Transit agencies are always struggling with the attraction of riders in a highly competitive transportation market. One of the problems encountered by the transit agency is the presentation of the information and transit planning. Transit planning is defined as a purpose to plan, design, deliver, manage and review transit, balancing the needs of society, the economy and the environment.

Therefore, measuring the transit performance easily and accurately is very important for public transit agencies in transit planning. Transit performance measures have generated considerable components in a transit planning analysis. However, there is a need to investigate the underlying components of transit quality as this can reflect passengers' perceptions of transit performance while performance measures can reflect a wider range of perceptions, mainly on behalf of the transit agencies. Transit service coverage is one of the key components of quality of service.

The transit supportive area is the portion of the transit agency's service area that provides sufficient population or employment density to require service at least once per hour. Transit supportive area is areas determined to be having a good potential for significant transit ridership (O'Neill, W., D. Ramsey, and J. Chou., 1995). The transit level of service is based solely on the percentage of the transit-supportive area covered by transit (TCQSM 2nd Edition).

GIS-based transit system modeling is a computer-integrated tool for evaluating transit system model and performing various transit analysis methods for transit planning. The GIS applications for transit system modeling include transit service area analysis, data attribution and network representation, transit demand, transit distribution, linking transportation system and others. GIS can be employed to perform the transit supportive area analysis and calculate the level of service (LOS) based on the transit supportive area. The aim of this paper is to evaluate the level of service of public transportation provided by Rapid Kuala Lumpur using Geographical Information System (GIS).

2. Background of study

2.1. *Quality of service measures and transit planning*

Transit quality of service is the appraisal of transit service from the passenger's point-of-view. It takes a different approach to service evaluation than that historically used by the transit industry, which is to measure the business aspects of transit service – things such as ridership, cost-effectiveness, and productivity. Transit quality of service appraisal are not intended to replace these traditional measures but somewhat to supplement them. For an example, transit quality of service measures can help transit agencies have better understand their ridership patterns and help them plan their service to supply the best quality of service possible to the greatest number of potential customers within the constraints of their budget.

There are two primary aspects of quality of service to consider. The first is the availability of service both geographically and by the time of day. If the service does not available between the locations where one wants to travel or does not provide at the time one wants to travel, then transit isn't an option for that trip. Besides that's, even if the service is available, but people need to know how to use it and utilized it. This is when the transit planning is very important for the transit agencies to make sure the transit service is available for the convenient of the riders.

The second aspect is the comfort and convenience of the service. This encompasses a number of factors for an example, the waiting environment at the bus stop, the ability to get a seat on the bus, the overall travel time, the

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