URBAN RAIL STATION ASSESSMENT MODEL FOR TRANSIT ORIENTED DEVELOPMENT IN GREATER KUALA LUMPUR

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DEDICATION

I would like to dedicate this research to the

"ALMIGHTY"

(for giving me the strength and knowledge to carry out this research)

Thanks with endless love to my wife fatha Mustaffa's who have poured out all the sacrifices and affections that have not stopped accompanying along the journey. This is a success for us

To all my sons Iskandar, Izzuddin, Ilyas and Ikmal thank you for constantly giving passion and support to me. Wishing all of you excel in this life,and glorious in the day hereafter.

For father and mother, may Allah grant you a Jannah and happiness in life there. Mother, this is your dream even though we cannot jointly celebrate that day. For my father and mother-in-law, indeed, this success is from the spirit and perseverance that is padded from you.

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ABSTRACT

To make the city sustainable and comfortable for residents, the essence of development plans must be able to fill the present and future needs. Planning made just to fit the current need will create a big problem in the future. The government plans to upgrade the public transport system in the capital Kuala Lumpur by allocating large provisions. It has to be channeled in a way that is better for the greater good and long-term interests. In view of the many effects the railway transportation system contributed to Kuala Lumpur city, especially in terms of the development of the surrounding area, this research studies the correlation between the provision of the station and with development and growth of the surrounding vicinity. Organized planning pays off the large financial provisions by the Government. Research considers the development of stations or terminals must be correlated to the Transit-Oriented Development in which each station must meet or achieve a sustainable level of TOD. The research proposes a method to assess the level of achievement of a station that has been developed or is in the pipeline to be developed with the rating method. The research's objective is specifically to propose an urban rail station assessment model for station development toward TOD. The data was collected through a field survey and was subjected to statistically analysed through descriptive statistics, factor analysis, multiple and simple linear regression analysis using the Statistical Package for Social Sciences (SPSS) version 22 and interpreted to answer the research questions and the research objectives formulated to achieve the study. Rating given to a station depends on the resulting impact of the development and growth of the surrounding area. Reviewing the type of the resulting impact serves as the basis for planning the type of development to be made as objective by TOD. The development towards sectorial basis such as residential, commercial, or mixed development is a fundamental thing that is important for city residents' wellness.

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ABSTRAK

Bagi menjadikan pembangunan bandar mampan dan selesa untuk kehidupan penduduk, intipati rancangan pembangunan mestilah memenuhi keperluan masa kini dan masa depan. Perancangan yang dibuat hanya untuk memenuhi keperluan semasa akan menimbulkan masalah besar pada masa akan datang. Kerajaan merancang untuk menaik taraf sistem pengangkutan awam di ibu negara Kuala Lumpur dengan memperuntukkan peruntukan yang besar. Ia perlu disalurkan dengan cara yang lebih baik untuk kepentingan jangka panjang. Memandangkan banyak kesan yang disumbangkan oleh sistem pengangkutan rel kepada Kuala Lumpur, terutamanya dari segi pembangunan kawasan sekitar, kajian ini mengkaji korelasi antara penyediaan stesen dengan pembangunan dan pertumbuhan kawasan sekitarnya. Perancangan yang teratur menghasilkan pulangan setimpal dengan peruntukan kewangan yang besar oleh Kerajaan. Penyelidikan berpendapat pembangunan stesen atau terminal mesti dikaitkan dengan Pembangunan Berorientasikan Transit di mana setiap stesen mesti memenuhi atau mencapai tahap TOD. Ia mencadangkan kaedah untuk menilai tahap pencapaian stesen yang telah ada atau dalam perancangan untuk dibangunkan dengan kaedah penarafan. Objektif penyelidikan adalah untuk mencadangkan model penilaian stesen rel bandar untuk pembangunan stesen ke arah TOD. Data tersebut dikumpulkan melalui tinjauan lapangan dan tertakluk kepada analisis statistik melalui statistik deskriptif, analisis faktor, analisis regresi linear berganda dan mudah menggunakan Pakej Statistik untuk Sains Sosial (SPSS) versi 22 dan ditafsirkan untuk menjawab soalan penyelidikan dan objektif penyelidikan yang dirumuskan untuk mencapai kajian. Penarafan yang diberikan kepada stesen bergantung kepada kesan yang terhasil daripada pembangunan dan pertumbuhan kawasan sekitarnya. Dengan kajian semula jenis kesan yang terhasil, ia berfungsi sebagai asas untuk merancang jenis pembangunan yang akan dibuat sebagai objektif oleh TOD. Pembangunan ke arah asas sektorial seperti kediaman, komersial, atau pembangunan bercampur adalah perkara asas yang penting untuk kesejahteraan penduduk bandar.

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LIST OF ABBREVIATIONS

BRT	-	Bus Rapid Transit
CDP	-	Comprehensive Development Plan
DBKL	-	Dewan Bandaraya Kuala Lumpur
ECRL	-	East Coast Rail Line
ERL	-	Express Rail Link Service
HSR	-	High Speed Railway
LRT	-	Light Rapid Transit
MRT	-	Mass Rapid Transit
TOD	-	Transit Oriented Development

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Sustainable development seeks to create an urban environment that maximizes economic growth and social equity while minimizing the natural environment (Renne, 2003). The population of Malaysia reached 33.45 million residents in 2021. People in Malaysia nowadays want to stay in the ultra-modern urban metropolitan areas rather than the suburbs. For instance, in 2017, approximately 75 percent of Malaysia's population lived in urban areas and cities (Hirschmann, 2020). This puts Malaysia as one of Southeast Asia's most urbanized countries. The metropolitan area of Greater Kuala Lumpur (GKL) (also known as the Klang Valley region) is centred in Malaysia's capital city of Kuala Lumpur. It includes other adjoining cities and towns in Selangor, covering 2,793 km^2 or approximately four times the size of Singapore. With more than 7.2 million people, this significant urban agglomeration is the country's main economic engine hub and most populated region (Kushairi, 2017; Hirschmann, 2020), the only one in the country equipped with an extensive public rail transportation system (Chuen et al., 2014).

The Dewan Bandaraya Kuala Lumpur (DBKL), the city council of Kuala Lumpur (KL), and the Selangor State Government through land use and town amendment planning policies. These government agencies have encouraged development within a 400-800 meter radius from a transit station. The impact of the development of the railway system in Kuala Lumpur on property prices has become a discussion topic among economists. The 2017 Budget, announced in 2016, allocated RM56.2 billion to fund new railway projects and track upgrades (MOF, 2017). The

government allocated a total of RM80 billion for developing rail transportation infrastructure in Kuala Lumpur and the surrounding area in 2016 (MOF, 2016). According to the Malaysian Sustainable Cities Program (2016), the aim of making Kuala Lumpur a world-class city includes more than just developing a railway system to boost public transportation. Its goal is to use rail transportation as a catalyst for transforming the surrounding areas into an integrated and sustainable development for residential and commercial (Malik, 2016).

The government has also prioritized and given incentives for the creation of the areas surrounding transit terminals in the Kuala Lumpur Structure Plan 2020. An intensive development near the transit terminal would be promoted to improve an integrated transportation strategy. DBKL has no direct control over the adequacy of infrastructure, facilities, and services due to municipal development and the growing population of Kuala Lumpur. DBKL must ensure that these services are well planned and coordinated to meet the city's residents (Pelan Struktur Kuala Lumpur, 2020). Indirectly, the city's growing population and disorganized development would exacerbate the numerous issues associated with a lack of development space, traffic congestion, business and residential areas, and basic amenities such as health, safety, and health. Between 1985 and 1997, the percentage of people who used public transportation fell from 34.3 percent to 19.7 percent. This indicates a change in public transportation demand, especially bus transportation, due in part to an increase in the standard of living, which leads to an increase in car ownership and a decrease in bus service. Increased dependency on private car transportation, in particular, has put a strain on the road network and led to traffic congestion. While traffic management has been implemented to improve traffic flow, especially in the city centre, it remains a problem as the number of vehicles on the roads continues to rise. Traffic management strategies alone are ineffective in improving the capacity of existing highways. As a result, to solve the issue, improvements to the rail-based transportation system have become the foundation of this structure plan.

The construction of a rail-based transportation system can potentially significantly reduce traffic congestion in the area. It has also indirectly affected the real estate sector and local businesses. Several studies have demonstrated that a rail station system's presence causes shifts in demand and market value of the land. In a

real sense, the introduction of a rail-based transportation system has significantly affected the environment's development and growth. This should be used as one of the methods for proper and conducive planning by all parties interested in making Kuala Lumpur a world-class city that meets the people's needs. To address urban transport issues, Transit Oriented Development (TOD) is now becoming a popular approach to optimise the use of land.

1.2 Problem Statement

The increase in population, especially in the heart of the country, led to an increase in demand for homes, job seekers, and electric vehicles on the road, which also affected increased traffic congestion, greenhouse gas emissions, and other environmental, social, and economic impacts (Sohoni, Thomas, & Rao, 2017). The constant increasing trend of car ownership and car usage in Malaysia concerns both the government and the public as it maintains and exacerbates the country's current car dependence and traffic problems. According to the 12th Malaysia Economic Monitor of the World Bank (2015), the time Malaysians spend in traffic jams contributed to the loss of 1.1% to 2.2% of GDP in 2014, adding to the high cost of suburbanization, especially in high-density urban centres such as Guara Lumpur (GKL). It warned the Malaysian government of the urgent need for an integrated urban transport system to stimulate sustainability. Urban transport is the backbone and lifeblood of urban areas, so any problems arising from it can affect the economic and social sustainability of the city. One fact we already know about Malaysian cities is that as they grow bigger, richer, and more, so does the ownership and use of vehicles, resulting in (among other things) traffic jam problems.

Debrezion, Pels, and Rietveld (2007), railway stations serve as nodes in transportation networks and locations in the urban world. They affect property value by affecting accessibility and the environment. A study was conducted on the effect on traffic and public transportation in Kuala Lumpur and the impact on the value of a real estate in the surrounding area. There was also a lot of research on the efficiency of the service, accessibility, safety, and facility features in rail station premises. Several studies indicate that the construction of railway systems impacts more than just

reducing traffic congestion. This is due to critical traffic congestion that forces residents to commute almost one to four hours daily (Yap & Goh, 2017). This ongoing issue amplifies the need for government and private developers to promote TOD in Malaysia's capital Kuala Lumpur, by allocating significant resources, which must be channelled best for the common good and long-term interests.

TOD is a term that describes the physical integration and linkage of public transportation investments and urban land development at or near a station (Cervero, 2012). TOD has become a popular tool for achieving sustainable development. TOD is a development that provides employment opportunities, accommodation, and services for transit users (Calthorpe, 1993; Cervero & Day, 2008; Papa & Bertolini, 2015). Although many TOD-related studies are conducted in developed economies (e.g. USA, UK and Australia), there is still a lack of relevant research in the context of developing economies. The one-size fits all approach to TOD does not seem to be supported (Kamruzzaman et al., 2014), justifying the need for additional research to gain deeper insights into the potential and requirements of TOD in Malaysia. Thus, KL has the potential to promote TOD due to its high population density, which is comparable to other major cities in Japan, Korea, and Singapore (The World Bank, 2015a).

However, the implementation of Malaysian TODs is still in its early stages, and the public is largely unaware of this liveable compact development concept (Yap & Goh, 2017). As Najib et al. (2020) highlight, the development of TODs in Malaysia is still unclear because of the lack of specific development and planning guidelines relating to TOD that have been gazetted at the federal level. The potential benefits of TOD are sometimes not well considered (Abutaleb et al., 2020). There also remains a substantial gap in the knowledge of the underlying factor structure of a successful TOD in a developing Asian country such as Malaysia, as most published studies are related to the Western world and developed East Asian countries with a subtropical climate.

One of the key missions of the Government Transformation Programme (GTP) is to create an integrated and efficient public transportation system while also improving urban living conditions. Researchers must look at how to maximize the use efficiency of urban space and perfect urban functions while achieving the collective and distributive role of railway passenger transportation. In order to achieve the goal

of making Kuala Lumpur a world-class capital, or "The Great Kuala Lumpur," financial and growth planning should not be limited to addressing current issues such as traffic congestion. It should be able to meet the needs of residents in the future, such as residential, commercial, and other needs that can be met through integrated growth for the convenience and comfort of Kuala Lumpur residents for a long time.

Because of the numerous benefits provided by the railway transportation system to the city of Kuala Lumpur, especially in terms of the development of the surrounding area, this study examines the relationship between station provision and development in the surrounding area. So, with broad financial provisions provided by the government, all of the coordinated preparation pays off. The study suggests a system to measure the level of achievement of a station built or in the pipeline to be developed using the rating method. As a result, this study discusses how station or terminal growth is linked to TOD. Each station has to reach or exceed a sustainable level of TOD.

1.3 Research Questions

The following research questions need to be addressed based on the problem statement.

i). What are the main management components that influence the provision of railway stations in this study area?

ii). What are the contributing factors responsible for enhancing the management of railway station provision that is responsible for enhancing the transit-oriented development in the study area?

iii). How to assess the impacts of urban rail stations on the surrounding growth and development concerning Transit Oriented Development in the study area.

iv). What is a proposed and validate urban rail assessment model for a Transit Oriented Development?

1.4 Research Aim

This research aims to develop an urban rail station assessment model using the TOD concept.

1.5 Research Objectives

i). To determine the main components of management that influence railway stations in the study area.

ii). To evaluate the major significant management components of urban rail stations which are responsible for enhancing the TOD in the study area.

iii). To analyze the significant impacts of urban rail stations on the surrounding growth and development in relation to TOD in the study area.

iv). To propose and validate an urban rail station assessment model for a station using the TOD concept.

1.6 Scope of Study

The research scope is to identify the main management component that influences the existence of an urban railway station. The management component includes the activities of setting the strategy of an organization and coordinating the efforts of its employees or volunteers to accomplish its objectives through the application of available resources. At first, one views management functionally, such as measuring a quantity, adjusting plans, and meeting goals. Many factors influence the development and growth of the surrounding Railway Station. Information regarding land use, population characteristics, economic base, distribution of functional units, and the image and identity of locality need to be reviewed to focus on preliminary findings that will form a module of development and growth in the area around Railway Station. This research identifies three major attributes related to strategic planning linked with the importance and performance of transport terminals that should be included in the critical evaluation to provide a station that can reach people's expectations.

Infrastructure, location, and accessibility make up these three key factors. It evaluates the most significant management components responsible for enhancing the study's urban rail station provision. The research proposes a rating method for the urban railway station or terminal as a guide in Transit-Oriented Development.

In addition, the research scope for this study is to demonstrate the assessment model for the TOD in Kuala Lumpur. For this purpose, the basic information on the station area population serves as an important input for the appraisal. Most TOD-related research has drawn their data from the survey area to gain information about the population of the station area. For this research, the target population were the resident of Kuala Lumpur and those working in Kuala Lumpur City.

However, this research only focuses on the three research areas, commercial, residential, and mixed residential-commercial, which are included in the study area. Three zones identified as an area of research are three stations along Kelana Jaya to Gombak route known as the Kelana Jaya line, starting from KJ1 Gombak to KJ24 station Kelana Jaya. The three stations selected were KJ24, the Kelana Jaya line Station represents a residential area, station KJ7 Dato' Keramat represents residential area, and station KJ1 Gombak represents a mixed residential-commercial area.

1.7 Research Process

The research process shows the process of how the research is done. This is demonstrated in figure 1.1. Through five stages, it began with the determination of the research title. It identified issues related to research, literature reviews, data collection, data processing and analysis, and the summary review or conclusion. The problem statement has been built from the issues derived from observation of the study area. Besides that, it also considers reports from sources of Government through its economic planning. The problem statement is obtained from various sources in the mass media. The problem statements are further examined in the literature review, whereas the title of this study was created by compiling the problem statements. The data collection process was done based on the research's approach, strategy and method. After that, the data was analysed, and a researcher included the analysis results in an easy-to-understand format. Premier data were collected through questionnaires

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