

OPERATIONALISATION OF TRANSIT ORIENTED DEVELOPMENT
STANDARDS AND REQUIREMENTS IN JOHOR BAHRU CITY CENTRE

ZIAD AYMAN BASHIR FRANCIS

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DEDICATION

To those who lost their hopes, dreams, and loved ones, I dedicate this work

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I wish to take this opportunity to express my deepest appreciation and gratitude to my beloved supervisor, Mr. Chau Loon Wai, for his continued support, encouragement, and guidance.

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ABSTRACT

Public transit systems are very crucial in mitigating the effects of climate change, especially in a country like Malaysia, where transportation is the second most emitting sector after industry. However, for these systems to reach their full capacity, there must be an integration between urban and land use planning alongside with transportation planning. As part of a national TOD approach in Malaysia, local authorities in Johor Bahru are working on a BRT network. The aim of this study is to evaluate Johor Bahru City Centre based on TOD standards and requirements to identify the best location for a BRT station within. For that purpose, a list of criteria has been developed based on numerous TOD standards and guidelines, especially those focusing on quantitative requirements. Afterwards, the formulated list was operationalised using primary data collection methods like site inventory and observation for the most part. A base map of the study area was generated based on official cadastral and land use maps to show the results of the appraisal. Many deficiencies were found in the study area that could seriously affect the proposed BRT ridership. In general, development intensity, residential land use (more precisely affordable housing) as well as supporting public uses were found to be lower than TOD requirements, with an increase in surface area allocated for parking facilities. However, some places were found to be better in terms of street network design and destination accessibility criteria. Those places enjoyed shorter blocks, more shaded walkways with visually active facade, and were identified as the best location for a BRT station within Johor Bahru City Centre.

ABSTRAK

Sistem pengangkutan awam merupakan salah satu faktor yang penting dalam usaha untuk mengurangkan kesan perubahan cuaca, terutamanya di Malaysia kerana sektor pengangkutan merupakan sektor kedua terbesar selepas industri dalam mengeluarkan pencemaran. Walaubagai monapun, untuk sistem ini mencapai kapasiti yang penuh, perancacangan bandar dan perancangan guna tanah perlu selari dengan perancangan pengangkutan. Kerajaan tempatan Johor Bahru menjalankan rangkaian BRT sebagai salah satu pendekatan terhadap TOD di Malaysia. Tujuan kajian ini dijalankan adalah untuk menilai Johor Bahru City Centre berdasarkan kepiawan TOD demi mengenal pasti lokasi terbaik untuk menjalankan stesen BRT. Untuk itu, senarai kriteria telah dibina berdasarkan pelbagai piawaian dan garis panduan terutamanya yang memberikan fokus terhadap keperluan kuantitative. Kemudian, senarai tersebut dijalankan menggunakan data pertama iaitu melalui pemerhatian dan inventori tapak. Peta asas kawasan juga dilukis berdasarkan peta kadastral, dan peta guna tanah. Berdasarkan kajian, terdapat banyak kekurangan yang boleh mendatangkan kesan terhadap cadangan pelaksanaan BRT. Secara umumnya, pembangunan secara intensif, penggunaan tanah kawasan perumahan (terutama rumah mampu milik) dan sokongan terhadap penggunaan perkhidmatan awam sangat rendah daripada keperluan TOD, di mana keperluan terhadap tempat meletak kenderaan melebihi piawaian. Walaubagaimanapun, terdapat juga tempat yang mempunyai sistem jalan raya yang baik dan segi reka bentuk dan keboleh sampaian. Tempat-tempat tersebut dapat menikmati block yang pendek, laluan pejalan kaki yang teduh, permandangan yang menarik dan telah dikenali sebagai lokasi terbaik untuk pelaksanaan stesen BRT di Johor Bahru City Centre.

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LIST OF ABBREVIATIONS

BRT	-	Bus Rapid Transit
CIQ	-	Customs, Immigration, and Quarantine
FAR	-	Floor Area Ratio
GHG	-	Greenhouse Gas
IRDA	-	Iskandar Regional Development Authority
ITDP	-	Institution for Transportation and Development Policy
JBCC	-	Johor Bahru City Centre
JBCS	-	Johor Bahru City Square
KTM	-	Keretapi Tanah Melayu (Berhad)
LRT	-	Light Rail Transit
MRT	-	Mass Rapid Transit
RTS	-	Rapid Transit System
TOD	-	Transit Oriented Development

CHAPTER 1

INTRODUCTION

1.1 Research Background

The world today faces many challenges that may change the way people live in the future. One of the top challenges facing our planet is climate change. There is already evidence of climate change with extreme heat waves, longer drought seasons, higher sea levels and so on. The problem with climate change is that it will keep getting worse unless we do something about it. Climate change is mainly caused by the greenhouse gas emissions of CO₂, Methane, and others. Among other sectors, transportation accounts for 14 per cent of Global GHG emissions (IPCC, 2014). In Malaysia, transportation is the second most GHG emitting sector with 50 million metric tons of CO₂ per year, as well as consuming over 37 per cent of the national energy consumption (GIZ, 2016) (Figure 1.1). The high dependency on motorized transportations like cars and motorcycles is a result of decades of planning cities revolving around cars.

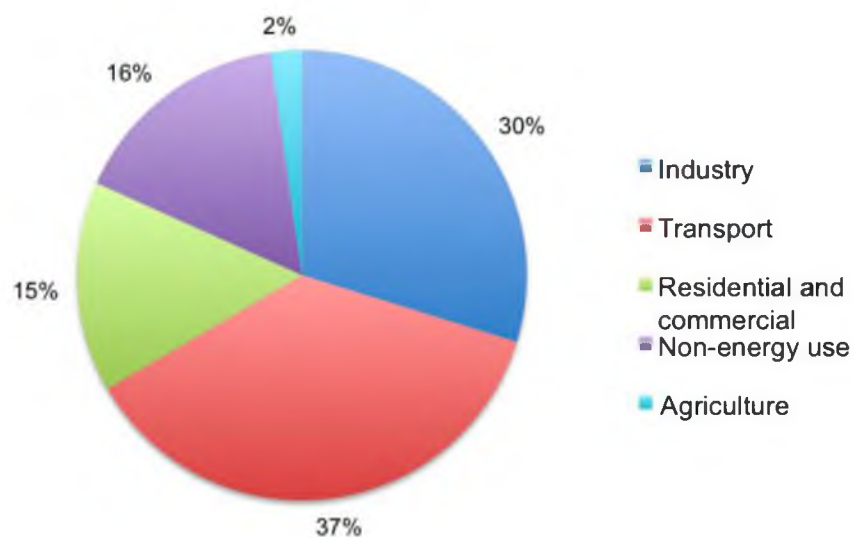


Figure 1.1 Energy consumption by Sector, Malaysia 2012 (Source: energyramblings.com)

In its Nationally Determined Contribution (NDC) submitted in Paris Agreement in 2015, the Malaysian government has committed to reduce its GHG emissions by 35 per cent by the year 2030. As well as an additional ten per cent conditional upon financial assistance. This is reflected in the policies formulated by the government in the 10th and 11th Malaysia Plan. Transportation is a key sector in mitigating the effects of climate change, and Malaysian government has set a target, that by 2030, 40 per cent of all communities use public transport (SPAD, 2018). Cascading down to the state level of Johor, the Comprehensive Development Plan (CDP ii 2014-2025) for Iskandar Malaysia focuses on increasing transit ridership and reducing miles travelled by private cars (IRDA, 2014). Johor Public Transport Masterplan (2015-2045) gives a detailed description of the stages of transformation to a Transit Oriented Development approach all over the state of Johor. It is targeted that by 2045, public transport ridership reaches 54 per cent (PAJ, 2016).

To increase public transit ridership, many countries around the world are heading towards what is known as Transit Oriented Development (or TOD). The concept of TOD, introduced by Peter Calthorpe (1993), is revolved around a 10 minute walk to the transit station. Calthorpe argued that a high density, mixed use development around the transit station will encourage people to use public transportation, as well as non-motorised transportation like walking and cycling. This has proven to be very successful in cities like Singapore, where 65% use public transport in their daily trips. In New York, U.S.A, the percentage is 67, and in Hong Kong it goes up to 85 per cent (Palliyani & Lee, 2017).

As part of the TOD approach, a Bus Rapid Transit system (or BRT) is proposed in Johor Bahru City. The idea of BRT is to have a dedicated lane or roadway exclusively for buses, which increases the efficiency of the bus service. The proposed BRT plan is composed of three stages with a total of ten corridors. The first stage was supposed to be finished by 2018 (PAJ, 2016), however, there seems to be some kind of delay. Madam Kamisah Mohd Ghazali, senior vice president of IRDA, stated that the engineering design stage is now underway, and the first stage of the BRT network is set to be finalised by 2021. There is also a plan to link Johor Bahru to the existing MRT network of Singapore through JB Sentral. This project is significantly important to many residents from both countries who travel daily or

weekly from one country to the other. The author interviewed Haji Abdul Jalil bin Tasliman, from MBBJ, and he stated that construction will start next year.

This study takes place in Johor Bahru City Centre, heart of the historic city of Johor Bahru. In addition to its historical and cultural importance, Johor Bahru City Centre is home to the KTM train station going to Woodlands, Singapore; as well as serving as the main bus terminal in the city. Johor Bahru City Centre is also one of the main commercial centres in the city, not only for local residents, but for many Singaporeans as well. In the future, Johor Bahru City Centre continues as one of five main flagships to the upcoming BRT system (refer to Figure 3.3).

1.2 Problem Statement

The benefits of TOD are numerous: less GHG emissions, less energy consumption, reduced traffic congestion, more interaction between people, and a healthier life style. However, these benefits cannot be realised simply by constructing a BRT network. Transit Oriented Development cannot reach its full capacity without an integration between transportation planning and urban planning (Belzer & Autler, 2002).

In Johor Bahru City Centre, the proposed BRT route and stations follow the existing and former bus network. There are eight proposed BRT stations, four of which are currently in service. The other four were previously in service, prior to 2015 (refer to Map 3.3 and Figure 3.22). This suggests that no TOD-based study has been conducted prior to proposing these stations. During an interview with her, Madam Kamisah Mohd Ghazali, senior vice president of IRDA, confirmed this claim.

The current public transport in Johor Bahru is solely dependent on buses. According to Transportation Blueprint 2010-2030 for Iskandar Malaysia (IRDA, 2011), public transit ridership is in decline. It is estimated that by year 2030, the modal split ratio drops to only 10%, including buses, as well as taxis. This is due to

the rapid land use development, leading to urban sprawl, which has resulted in increased dependency on private cars, causing serious traffic jams during peak hours.

Side by side with public transport projects, urban and land use planning should pave the way for the upcoming BRT project to be successful. Without high dense, mixed-use development that supports public transit, ridership numbers will not improve. For example, affordable housing is one of the key factors in TOD success, as it provides the needed patronage. However, there is a high rise luxury apartment, R&F Princess cove, being built adjacent to the proposed BRT stations, with a minimum of RM600,000 per unit.

TOD requires on-street and off-street parking to be minimised within the TOD station's high catchment area, to give more space for walkways and recreational facilities. However, Johor Bahru City Centre is crammed with both. In fact, the Transportation Blueprint 2010-2030 for Iskandar Malaysia clearly states that large park and ride facilities are going to be built adjacent to BRT stations (IRDA, 2011). This directly reduces the efficiency of TOD as a place, as Belzer & Autler (2002) stress the importance of TOD as both a node and a place at the same time.

A street network that supports walking and cycling is another factor of success. It is known that transit always begins with a walk and ends with a walk. However, Johor Bahru is not known for its pedestrian-friendly streets, where most do not have constructed walkways, nor for having the adequate infrastructure to attract cyclists. These and other issues point out the need to assess Johor Bahru City Centre based on internationally agreed TOD requirements and standards.

1.3 Research Aim and Objectives

The aim of this study is to assess the area of Johor Bahru City Centre based on TOD standards and requirements, and recommend the best location for a BRT station within. Research objectives are listed below:

- (a) To formulate a list of criteria based on TOD standards and requirements to be used to assess the area of Johor Bahru City Centre.
- (b) To examine the study area, evaluating the current situation based on the formulated list.
- (c) To recommend the best location for a BRT station within the study area based on the assessment results.

1.4 Research Questions

- (a) What criteria should be used to assess Johor Bahru City Centre for a future transit oriented development?
- (b) How well does the study area perform under the chosen criteria?
- (c) What is the best location for a BRT station within the study area?

1.5 Scope of Study

The research explores many TOD related studies and references, in order to formulate a list of criteria that is used to perform the assessment. References range from articles discussing TOD success factors; books explaining the concept of TOD, most famously Peter Calthorpe's "The Next American Metropolis, 1993"; in addition to standards and guidelines issued by local authorities, that interpret these principles into direct quantitative measures.

The study looks into the background of the TOD concept, and the reasons for its manifestation. TOD definition and components are studied extensively. Then, a journey is undertaken throughout the evolution of TOD, from its beginnings in 1993,

through the 5-Ds framework and how they were formulated, to today's official standards being drafted by many local authorities around the world. Theoretical study concludes with success stories from cities that have similarities with Johor Bahru, whether its weather or geography.

As for the study area, Johor Bahru City Centre, is one of the five BRT proposed flagships in the city (refer to Figure 3.3). The proposed BRT route and stations within this area are examined. There are eight proposed BRT stations, namely: Komtar, Meldrum, Tun Sri Lanang Waterfront, Lot 1 Waterfront, MBBJ, Segget, Wong Ah Fook Selatan, and Wong Ah Fook Utara (IRDA, 2013) (refer to Figure 3.22). The boundaries of the study area are formulated based on the high catchment area surrounding BRT stations. Iskandar Regional Development Authority (IRDA) has set a 400 metres radius around each station. The integration of the high catchment areas results in the final boundaries of the study area (refer to Map 3.1).

1.6 Research Methodology

By the end of the literature review, a list of criteria will be formed to conduct the evaluation of the study area. Secondary data like local documents and land use maps are needed for this evaluation. However, most data needed are collected on-site. Primary data collection includes site inventory and observation, as well as interviews with local officials.

1.6.1 Secondary Data Collection

Two types of secondary data are reviewed and analysed in this study. The first type is local documents such as the Comprehensive Development Plan for Iskandar Malaysia (CDPii 2014-2025), the Transportation Blueprint for Iskandar Malaysia (2010-2030), and the Johor Public Transportation Plan (2015-2045). These documents are useful in obtaining information about the phases of construction for different TOD projects, as well as the location of the proposed stations, and other

information concerning study area. The second type is the current and proposed land use maps, which are analysed using AutoCAD software. The analysis includes calculating the area and percentage of the different land uses within the study area, as well as the percentage of streets with walkway segments, crosswalks, shaded walkways, and walkways facing active facades. A cadastral map was also used to generate a base map of the study area that displays information about different criteria included in the assessment.

1.6.2 Primary Data Collection

The author conducted several visits to planning authorities in Johor Bahru City, like Johor Bahru City Council (MBJB) and Iskandar Regional Development Authority (IRDA) to make interviews with local officials who can give a clear picture about the situation in Johor Bahru City Centre and the future projects regarding the development of public transport and the quality of life in general.

However, most primary data are taken from direct on-site inventory and observation techniques. Almost all items in the list of criteria need data collected on-site. Development intensity need to be observed then data are assigned to the maps. Land use data (commercial, residential, public) need to be confirmed on-site, since many changes have not been registered by MBJB. In addition, Data for design indicators like walkways and crosswalks do not appear on land use maps, nor on GIS applications. All these primary data are collected, assigned to the Maps, then analysed in Chapter 4.

1.7 Stages of Research

Figure 1.2 shows a flowchart of the research stages. Explanation of each stage is discussed below:

- Stage One: at this stage several books on various urban planning and design issues were reviewed to determine the topic of interest for this research. Then, local documents were reviewed to determine the research gap. Once an issue has been identified, the research aim and objectives have been set. Outlines for literature review and research methodology were adopted as well.
- Stage Two: an intensive literature review covering all the perspectives and view points regarding the issue of study. This includes a general review of the concept of TOD, its components, benefits and principles. Then, a review of different guidelines and standards discussing the requirements of TOD, success factors, and some examples of cities that implemented the concept of TOD successfully.
- Stage Three: at this stage initial visits to the study area take place, as well as visits to some local authorities like MBBJ and IRDA, to make interviews with the officials. The visits also help obtaining some secondary data regarding public transport projects in the study area, in addition to land use and cadastral maps of the region.
- Stage Four: this stage is about collecting primary data and assigning them to the AutoCAD generated maps. The data are collected during routine visits to the study area, then, AutoCAD software is used to calculate the percentage for each item in the list of criteria.
- Stage Five: after preparing all the maps, findings are discussed and analysed to determine whether they meet the standards in the list of criteria. Then, the best location for a BRT station is recommended. The research concludes with some recommendations that may enhance Johor Bahru City Centre as a TOD.

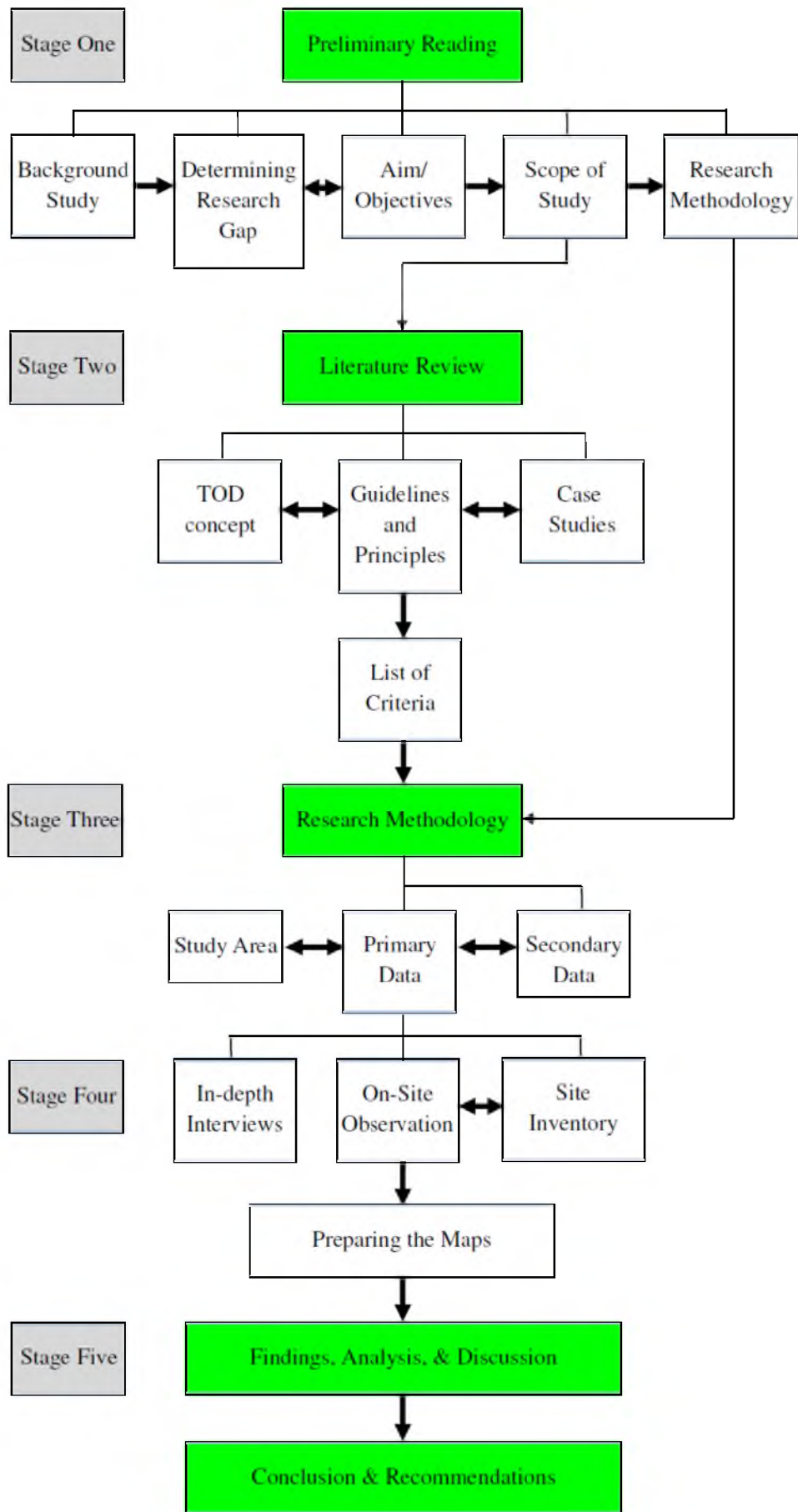


Figure 1.2 Flowchart of the Research Stages

1.8 Summary

As a whole, this chapter serves as an introduction to the research conducted to operationalise TOD standards and requirements in Johor Bahru City Centre. The role of public transport to mitigate the effects of climate change was discussed first, as a background to discuss about TOD and the importance of implementing it. Then, the chapter discussed the policies and strategies obtained by the Malaysian government to implement TOD, including the proposed BRT network in Johor Bahru. It was pointed out that these projects cannot reach its full capacity without an integration between transportation planning and urban planning. Chapter One included initial discussion about the topics that are covered in the literature review, and the methods in which primary and secondary data are collected. Chapter Two discusses in detail the concept of TOD, and the different guidelines used to assess the quality of TOD projects.

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