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A COMPARATIVE ANALYSIS OF LAND USE AND COMPACT CITY PRINCIPLES AND GUIDELINES ON RAIL PUBLIC TRANSIT STATIONS IN MALAYSIA

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Abstract

Transit Oriented Development (TOD) is an emerging concept to optimise the land use development surrounding a transit station and to create a reliable relationship between a densely compact urban form and high public transportation ridership. In Malaysia, the concept of TOD was initiated in the first National Physical Plan in 2005 and mentioned again in National Physical Plan 2 in 2010. This paper identifies the principle of TOD applied in Malaysia and other countries, and discusses the differences and similarities of the TOD practices using comparative analysis and document analysis methods. Findings of this study indicate that mixed-use development, high density, intensity and connectivity are the main TOD principles adopted in Malaysia and other countries around the globe. The current policy and practises of these countries tend to focus more on the better management and increase ridership of these transit rail stations, including ways to encourage users to shift from private vehicles to public transportation. The findings of this study would contribute towards policy decisions and practices of TOD in Malaysia.

Keywords: Transit Oriented Development, principle, mixed-use development, density, connectivity

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INTRODUCTION

This paper identifies the principle of Transit Oriented Development (TOD) applied in Malaysia and other countries and discusses the differences and similarities of the principles. Under *Garis Panduan Perancangan Pembangunan Berorientasikan Transit* (Planning Guidelines for Transit Oriented Development) published by PLANMalaysia in 2018, TOD refers to a well-planned development network, particularly in areas near the transit station. Development in the transit area focuses on high-density development, mixed-use development, residential, commercial, businesses and offices development, of which all the components are readily accessible by public transport.

Globally, TOD is a rising concept introduced to maximise the use of land surrounding a transit station to create a reliable relationship between a densely compact urban form and high public transportation ridership. Around the globe, TOD was first introduced by Peter Calthorpe, an American architect in 1993 where the initial idea of TOD is to plan for a compact pedestrian and bicycle-friendly mixed-use development clustered around transit stations. While in Malaysia, the concept of TOD was initiated in the first National Physical Plan in 2005 (NPP27) and National Physical Plan 2 in 2010 (NPP21). The National Physical Plan stated that “*Transit Oriented Development concept shall be promoted as the basis of urban land use planning to ensure the viability of public transport*”.

To achieve the goal of TOD, a set of principles is established to act as an indicator in implementing TOD on the ground. However, resulting from more than a decade of gaps in the period of implementing TOD between Malaysia and other countries, this paper explores the differences and similarities between the principles of TOD established. Findings from this study are expected to contribute towards additional knowledge in meeting the policymakers’ gaps in Malaysia’s TOD policy formulation.

RESEARCH BACKGROUND

Definition of Transit Oriented Development

The definition of TOD varies according to different guidelines published by different states and countries. Authors also define TOD according to differing perspectives. The Ontario Transit Supportive Guidelines (Ministry of Transportation, 2012) characterised TOD as a type of mixed-use development that incorporates high-density residential areas, high plot ratios commercial areas, as well as community and business amenities, to reduce dependency on private transportation by offering more flexible and comfortable accessibility. The guideline suggests that the boundaries from the transit station towards the surrounding development should reflect about 5-10 minutes walking duration for 400-800 metres walking distance as shown in Figure 1.

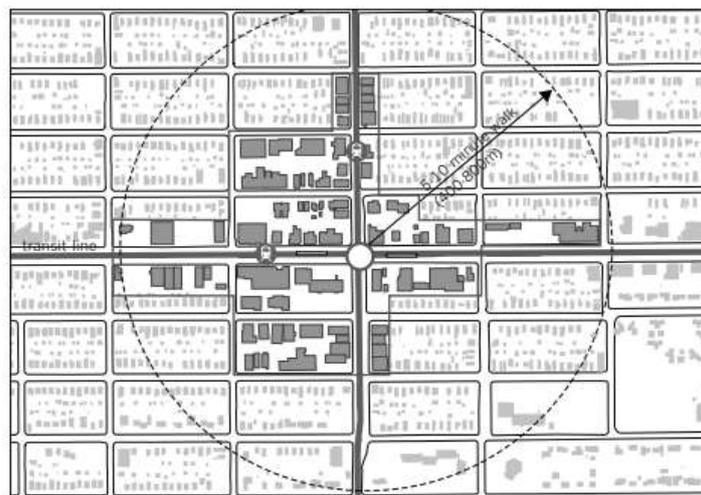


Figure 1: Boundaries of walkability route from the node (transit station)
 Source: Ministry of Transportation (2012)

On the other part of Canada, Winnipeg, through Winnipeg TOD Handbook (2011) defines TOD as a growth development within a compact area and accessible walking distance from transit station. It also promotes the idea of higher public transportation ridership compared to private vehicles. Akin to the Ontario guideline, Winnipeg also suggests for a 5-10 minutes walking duration for 400-800 metres walking distance from the transit station to surrounding development.

Other than that, the City of Calgary TOD Policy Guidelines (Land Use Planning & Policy, 2004) adopts the definition of TOD as a mixed-use development within a development area typically clustered within a radius of 600 meters from the transit station. For Calgary, the 600 metre radius is an appropriate distance that generally used to define the planning for LRT station. The division of TOD areas is also identified where high-density development is clustered surrounding the transit station to promote better accessibility for the population. The planning for high density land uses such as apartment and office towers should be located as close as possible to the transit station. The route leading to these land uses should be short, continuous, barrier-free, safe, easily navigable and design to cater for the local climate. The policy guideline also suggests the development of TOD station includes identification of primary and secondary access routes (Figure 2).

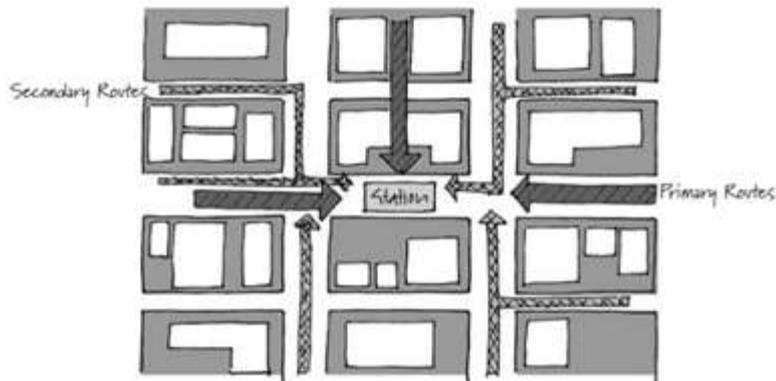


Figure 2: Identify the primary and secondary route towards the TOD station area
Source: *Land Use Planning and Policy* (2004)

In San Francisco, Alameda, Contra Costa and San Mateo, which is being connected by San Francisco Bay Area Rapid Transit District (BART) describes TOD as:

“Moderate to higher-density development, located within an easy walk of a major transit stop, generally with a mix of residential, employment and shopping opportunities designed for pedestrians without excluding the auto. TOD can be new development or reconstruction of one or more buildings whose design and orientation facilitate transit use.”

(San Francisco Bay Area Rapid Transit District, 2003)

In India, TOD is interpreted as integration between land use and transportation to establish targeted sustainable urban growth centres, with walkability and liveability as the main elements in the high density and mixed-use development. TOD in India is clustered within 500 – 800 metres walking distance from the transit station. Figure 2 indicates the illustration of TOD along the transit station in India.

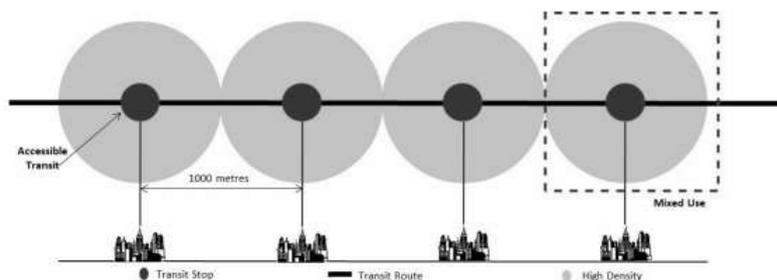


Figure 2: TOD along the transit station in India
Source: *Ministry of Housing and Urban Affairs* (2021)

Definition of Transit Oriented Development in Malaysia

According to Transit Oriented Development Guideline by PlanMalaysia in 2018, TOD is defined as a development concept centred around rail transit or bus station which promotes high connectivity, public transportation-friendly, pedestrian and bike-friendly, and reduce dependency on private vehicles. This manual envisions TOD as a concept that encourages mixed-use development with a bearable walking distance from the station to the surrounding development. One of the purposes is to increase public transportation ridership from residential to commercial land uses, economical spaces and socio-cultural spaces near the transit station. TOD in Malaysia also encourages the inclusivity and optimum use of land and space to cater for all needs.

A bit indistinguishable from the above guideline, Transit Oriented Development Policy in Selangor by PLANMalaysia Selangor in 2016 defines TOD as a supporting development towards increasing public transportation ridership in a high-intensity growth area, with walkable distance from the transit station towards the mixed-use development in the surrounding transit area. *Kajian Pelan Potensi Pembangunan Berorientasikan Transit* in Selangor (PLANMalaysia@Selangor, 2013) suggests that the TOD concept focuses more on accessibility, surrounding land uses, population density, integration with other transportation modes, existing bus routes and rail station design and routes.

On the other hand, MRT Selangor-Kuala Lumpur Line Integrated Land Use and Public Transportation Master Plan (PLANMalaysia, 2017) identifies TOD as the area within 400 – 800 metres with 10 minutes walking duration from the transit station. The transit station is located at the very centre of TOD and ought to be accessible and act as a node to other transportation modes. Meanwhile, Petaling Jaya TOD Guideline (2016) adopts the same definition as the Selangor's TOD policy, which envisions TOD as a development that supports the use of highly integrated public transport within walking distance from transit stations to the surrounding mixed-use development which encompasses residential, employment, shopping and interacting spaces.

METHODOLOGY

This study adopts a comparative analysis on the differences between the principle of TOD applied in Malaysia with other countries. In Malaysia, the concept of TOD has only been widely introduced since 2005, while in many other parts of the world the concept has been well known since 1993. Thus, it brings several differences resulting from the different period of TOD implementation.

The study uses the document analysis method as the main method in collecting and analysing the data. According to Bowen (2009), document analysis is defined as a structured technique for analysing or assessing records, for which it includes both written and electronic content (computer and internet-based). For

this study, the documents collected as part of the evaluation are from the government’s publications, manuals, journals, organisational and institutional reports and other various public records.

The data is presented in the form of cross-tabulation method and matrix table, which entails detailed information on the principle of TOD and thus, differentiate the similarities and differences between the local and overseas principles.

FINDINGS AND DISCUSSION

Findings in this section indicate the comparative analysis between the principle of TOD locally and globally. Different kind of TOD principles gathered from several practises in Malaysia are tabulated in Table 1 below:

Table 1: Principle of TOD in Malaysia

Guideline	Principle
Garis Panduan Perancangan Pembangunan Berorientasikan Transit (PLANMalaysia, 2018)	<ul style="list-style-type: none"> ▪ Diversity ▪ High Intensity ▪ Connected ▪ Inclusive ▪ Liveable ▪ Resilient ▪ Smart ▪ Green and Low Carbon ▪ Optimise Resources
Pelan Induk Perancangan Bersepadu Guna Tanah Dan Pengangkutan Awam Laluan MRT Selangor – Kuala Lumpur (PLANMalaysia, 2017)	<ul style="list-style-type: none"> ▪ Pedestrian, PWD and bike-friendly environment ▪ Connectivity ▪ Mixed-use development ▪ Smart, compact and high-density development ▪ Efficient parking management ▪ Attractive and safe urban design ▪ Inclusive development ▪ Provision of suitable and adequate public facilities ▪ Environmental protection and green living lifestyle ▪ Placemaking
Dasar Perancangan Pembangunan Berorientasikan Transit Negeri Selangor (PLANMalaysia@Selangor, 2017)	<ul style="list-style-type: none"> ▪ Mixed-use and diverse development ▪ Higher intensity ▪ Provision of the affordable unit in commercial land uses ▪ Additional provision of affordable commercial spaces ▪ Pedestrian and bicycle lane ▪ Provision of adequate public facilities

Guideline	Principle
	<ul style="list-style-type: none"> ▪ Reducing the provision of parking spaces ▪ Provision of feeder bus ▪ Encourage green building concept
Kajian Pelan Potensi Pembangunan Berorientasikan Transit (TOD) Negeri Selangor (PLANMalaysia@Selangor, 2013)	<ul style="list-style-type: none"> ▪ Supporting land use development and high density residential area ▪ Improving public services and facilities management ▪ Increasing the exchange of transportation modes ▪ Strengthening the efficiency of the transportation system ▪ Creating safe and liveable architectural urban design development
Petaling Jaya TOD Guidelines (2016)	<ul style="list-style-type: none"> ▪ Mixed-use and diverse development ▪ Higher intensity ▪ Provision of affordable unit in commercial land uses ▪ Additional provision of affordable commercial spaces ▪ Pedestrian and bicycle lane ▪ Provision of adequate public facilities ▪ Reducing the provision of parking spaces ▪ Provision of feeder bus ▪ Encourage green building concept
Final Report, Petaling Jaya Urban Design Study	<ul style="list-style-type: none"> ▪ Diversity ▪ High Intensity ▪ Mobility ▪ Reducing parking spaces ▪ Provision of affordable housing ▪ Provision of green corridor (open space) ▪ Provision of integrated public facilities ▪ Ensuring a safe public space ▪ Suitable setback for buildings ▪ Low carbon ▪ Smart initiatives ▪ Unique character
Draft Local Plan of Subang Jaya	<ul style="list-style-type: none"> ▪ Optimise the existing land uses for future growth ▪ Creating new land uses surrounding transit area to cater for residential and public facilities ▪ Creating a new character for cities in classifying LRT station and transit centre to show the character and functions

Guideline	Principle
	<ul style="list-style-type: none"> ▪ Creating higher density for residential, commercial and office spaces to support transportation infrastructure investment ▪ Creating safe and comfortable circulation to create a different mode of public transportation including pedestrian and cyclist ▪ Towards low carbon city in 2030 ▪ Increasing the ridership of public transportation and reducing the dependencies on private transportation

Source: Pelan Induk Perancangan Bersepadu Guna Tanah Laluan MRT Putrajaya (2019)

Based on Table 1, several principles can be seen interconnected with the others. Using the method of cross-tabulation, this study identifies the significant TOD principles mostly used in Malaysia's TOD guidelines, as shown in Table 2 below.

Table 2: Cross-tabulation between different guidelines and application of TOD principles in Malaysia

Principle	Guideline						
	TOD Guideline	MRT Selangor – KL TOD Masterplan	Selangor TOD Policy	Selangor TOD Potential Plan Study	Petaling Jaya TOD Guideline	Final Report, Petaling Jaya Urban Design Study	Draft Local Plan of Subang Jaya
Mixed-use development and diversity of land use activities	√	√	√	√	√	√	
High intensity/ density and compact development/ optimise resources	√	√	√	√	√	√	√
Connectivity – comprehensive provision of public transportation, pedestrian walkway, bicycle lane and PWD - friendly	√	√	√	√	√	√	√
Provision of affordable house and job opportunities			√		√	√	
Liveable	√			√			
Provision of adequate public facilities and amenities		√	√	√	√	√	
Resilient	√						

Principle	Guideline						
	TOD Guideline	MRT Selangor – KL TOD Masterplan	Selangor TOD Policy	Selangor TOD Potential Plan Study	Petaling Jaya TOD Guideline	Final Report, Petaling Jaya Urban Design Study	Draft Local Plan of Subang Jaya
Preserving urban design, image and character of the city		√		√		√	√
Green technology and low carbon city	√	√	√		√	√	√
Provision of feeder bus			√		√		
Parking management		√	√		√	√	

Based on Table 2 above, amongst the main principle that co-exists in most of the guidelines in Malaysia are mixed-use development, diversity of land use activities, high intensity/ density and compact development, connectivity, adequate public facilities and green technology, green building and low carbon city. Meanwhile, the least adopted principles are the principles of liveable, resilient and feeder buses. On top of that, the principles that are seen as less dominant but equally important are affordable houses and job opportunities, urban design, image and character, as well as parking management.

On the other basis, different kind of TOD principles from other countries are gathered and tabulated in Table 3 below:

Table 3: Principle of TOD from different countries

Guideline	Principle
TOD Implementation Resources & Tools, World Bank Group, China (2018)	<ul style="list-style-type: none"> ▪ Transportation <ul style="list-style-type: none"> - Excellent transit system design (500m walking distance) - Integration of transportation modes (pedestrian walkway, PWD facilities and bicycle lane) - Sufficient provision of roads - Traffic management ▪ Public space <ul style="list-style-type: none"> - Transit plaza - Pedestrian facilities - Public realm - Public park ▪ Built environment <ul style="list-style-type: none"> - Compact development (optimised density) - Mixed-use development

Guideline	Principle
	<ul style="list-style-type: none"> - Diversity of residential development - Informal sector integration ▪ Supporting elements <ul style="list-style-type: none"> - Climate change - Inclusive - Market value - Universal access - Sustainable infrastructure - Bike-friendly - Technology integration
Transit Oriented Development (TOD), Shenzen, China (2007)	<ul style="list-style-type: none"> ▪ Density ▪ Mixed-use development ▪ Connectivity ▪ Provision of comprehensive public transportation
Transit-Oriented Development in Emerging Cities: Principles From Singapore (2019)	<ul style="list-style-type: none"> ▪ Public transportation ▪ Land use (affordable residential development) ▪ Management ▪ Technology
Transit Oriented Development Guide, Queensland (2010)	<ul style="list-style-type: none"> ▪ Location ▪ Land use <ul style="list-style-type: none"> - Supporting the transit development - 5 – 10 minutes walking duration to the transit station - High residential density - Increase in commercial intensity - Mixed-use development - Connectivity up to 800 metre ▪ Design ▪ Transportation ▪ Social <ul style="list-style-type: none"> - Supporting inclusivity and diversity - Diversity in job opportunities - Diversity in commercial activities - Affordable housing ▪ Process <ul style="list-style-type: none"> - Coordination - Community engagement - Period
Transit Oriented Development Strategy, Denver (2014)	<ul style="list-style-type: none"> ▪ Connectivity ▪ Innovative ▪ Efficient ▪ Place (active, vibrant, destination) ▪ Mixed activities (choice, diversity, resilient)

Guideline	Principle
	<ul style="list-style-type: none"> ▪ Shift (car-free/car-lite, public space, reduce and energize)
Institute for Transportation and Development Policy (ITDP), United States of America (2017)	<ul style="list-style-type: none"> ▪ Pedestrian ▪ Cyclist ▪ Connect ▪ Transit ▪ Mixed-use development ▪ Densify ▪ Compact ▪ Shift
Transit Oriented Communities Design Guidelines, Metro Vancouver, Canada (2012)	<ul style="list-style-type: none"> ▪ Destination ▪ Distance ▪ Design ▪ Density ▪ Mixed-use development ▪ Management
The Urban Transit Group, United Kingdom, The Place To Be (2019)	<ul style="list-style-type: none"> ▪ Compact development ▪ Transportation ▪ Affordable houses ▪ Mixed-use development ▪ Connectivity ▪ Pedestrian and cyclist

Source: *Pelan Induk Perancangan Bersepadu Guna Tanah Laluan MRT Putrajaya (2019)*

The principles from six countries are tabulated to find the correlation between the set of TOD principles applied. According to Table 4 below, mixed-use development, density, pedestrian walkway, bicycle lane and PWD friendly, connectivity, public transportation and management are the most dominant principles adopted in the implementation of TOD. Meanwhile, the least applied principles are affordable housing, design and technology. On the other hand, public space is the principle that is halfway dominant compared to the 6 countries analysed.

Table 4: Cross-tabulation between different cities and application of TOD principles

Principle	Countries							
	China (2018)	Shenzhen (2007)	Singapore (2019)	Queensland (2010)	Denver (2014)	United States (2014)	Vancouver (2012)	United Kingdom (2019)
Mixed-use development	√	√	√	√	√	√	√	√
High density/ Compact	√	√		√		√	√	√

Principle	Countries							
	China (2018)	Shenzen (2007)	Singapore (2019)	Queensland (2010)	Denver (2014)	United States (2014)	Vancouver (2012)	United Kingdom (2019)
Pedestrian walkway, bicycle lane and PWD friendly	√			√	√	√		√
Connectivity	√	√		√	√	√	√	√
Public transportation		√	√	√		√	√	√
Public space	√			√	√		√	
Affordable housing			√	√				√
Design				√			√	
Technology	√		√					
Management			√	√	√	√	√	

The findings indicate that several principles of TOD implemented in Malaysia and other countries overlap with similarities (Table 5). Mixed-use development is the common main principle adopted in implementing TOD. TOD promotes the diversity of land uses surrounding the transit area including residential, commercial, offices, public spaces and public park. Other than that, a higher density and intensity development is also promoted as the main criteria for TOD in both cases. It optimises the resources within the transit area to achieve compact development that will be beneficial to all. Similarities are also found in the principle of connectivity, where the accessibility back and forth to the transit station is considered as absolutely crucial in designing a TOD development. It incorporates all level of users including the provision of a comfortable pedestrian walkway for the pedestrians, a safe bicycle lane for the cyclist and guidable facilities for the disabled people.

Table 5: Summary comparison of TOD principles in Malaysia and overseas

Principles	Malaysia	Oversea Practises
Most dominant TOD principles	<ul style="list-style-type: none"> ▪ Mixed-Use Development ▪ Diversity of Land Use Activities ▪ High Intensity/ Density and Compact Development ▪ Connectivity ▪ Adequate Public Facilities ▪ Green Technology Green Building and Low Carbon City 	<ul style="list-style-type: none"> ▪ Mixed-Use Development ▪ Density ▪ Pedestrian Walkway, Bicycle Lane and PWD Friendly ▪ Connectivity ▪ Public Transportation ▪ Management

Less dominant TOD principles	<ul style="list-style-type: none"> ▪ Affordable Housing and Job Opportunities ▪ Urban Design, Image and Character ▪ Parking Management 	<ul style="list-style-type: none"> ▪ Public Space
Least dominant TOD principles	<ul style="list-style-type: none"> ▪ Liveable ▪ Resilient ▪ Feeder Buses 	<ul style="list-style-type: none"> ▪ Affordable Housing ▪ Design ▪ Technology

Nevertheless, the overseas practises are also accentuating the management of TOD. A TOD has to be planned and managed at the same time to achieve the targeted goals. TOD management includes objectives to shift the usage of private vehicles to public transportation, which was less seen in the TOD practices in Malaysia. Other management masterplan includes conducting coordination between different agencies to achieve TOD's target and conducting community engagement with the residents benefiting from the TOD planning.

On a different note, Malaysia is seen to promote the elements of affordable housing, urban design, image and character of city and parking management more compared to other countries. According to TOD characters, several guidelines evolved on the idea of preserving the image of the city through the transit design and classifying stations. However, design and affordable housing elements are considered as the least dominant principle according to the overseas practises, alongside technology.

SUMMARY AND CONCLUSION

To summarise, mixed-use development, high-density and intensity and connectivity are the main TOD principles adopted in Malaysia and worldwide. The leading reason for this is to create a compact development with the highest benefit to the public and ensuring the success of the planned TOD transit station. The overseas practises focused more on the management side, including ways to shift the usage of private vehicles to public transportation and thus, increase the ridership at the TOD transit station. It is a crucial element in meeting the policymakers' gaps in Malaysia's TOD policy formulation.

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