DEVELOPMENT OF TRANSIT ORIENTED DEVELOPMENT (TOD) MODEL FOR MALAYSIA

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ABSTRACT

Recently, Transit Oriented Development (TOD) is an increasingly popular concept of development to be implemented at all levels in the world. This concept has several advantages, especially for preserving the environment, hence improve the quality of life for future generations. This concept also helps the public transport system more effective and efficient. The aim of the study is to develop the TOD model. In order to achieve aims, several objectives had been identified, such as to identify and compare best practice of TOD in foreign countries and the suitability of its implementation in Malaysia. Identify the design process based on performance criteria for determining potential areas of TOD and to establish the performance criteria for potential of TOD. Methods of execution in the development of TOD model are divided into three stages, namely: Stage 1 is the data collection, which involves the collection of primary and secondary data throughout the site survey. Stage 2 is the analysis of the distribution of land use consists of commercial, housing and public facilities throughout the site survey by using Geographic Information System (GIS). Stage 3 is the process for development of the TOD model by using the Land Use Public Transport Accessibility Index (LUPTAI) techniques. The model combines the type of land use such as residential, commercial, shop offices, open space and public facilities where this concept emphasizes the walking distance and public transport user in an integrated manner. This situation allows the user to use transit services, public transport, walking and cycling to reduce congestion, air pollution and can help in avoiding urban sprawl occurring in high-density areas.

Keywords: design process; performance criteria; transit oriented development; urban planning

Introduction

Transit Oriented Development (TOD) is a development concept that has been implemented in several countries such as Singapore, China, Australia, India and the United States. TOD is an integrated development of housing, offices, shopping and carrying out their daily activities. Indirectly, it can improve the economy and quality of life to lead more comfortable, and organized according to their respective capabilities (Calthorpe, 1994). Although, there were a lot of efforts and incentives by the Malaysian policies related to TOD were constructed under the 10th Malaysian Plan RMK-10 (Chapter 6), National Physical Plan (NPP), National Urban Plan (NUP) and draft Planning and Design Guidelines for Compact and Livable Development to encourage the use of public transportation, walking and cycling as an alternative to the main modes in this development, however it has not made headway. Practically, various issues pertaining to achieve the Malaysia Plan target is poor diffusion conventional strategies and method systematically to identify the location that is potential to be as TOD. This paper gives focus on this issue, concerning the aim of the study is to develop the TOD model. To achieve its objective study, outlined a number of objectives, namely to identify and compare best practice of TOD in foreign countries and the suitability of its implementation in Malaysia. In addition to identify the design process based on performance criteria for determining potential areas of TOD. Next to establish the performance criteria for the potential area to be as TOD.

Literature review

TOD has been implemented in several countries such as Singapore, China, Australia, India and United States of America (USA).

  i.   Singapore

Singapore, has improved their land transportation system since 2008 such as making public transport a choice mode by expanding the rail services at Boon Lay Extension, Circle Line with extension to Marina Bay and Downtown Line, North-South Line Extension and Tuas West Extension; improving bus services with greater bus priority on the roads and measures to reduce dwell time at bus stops. In addition, the service level of Rapid Transit System (RTS) has been improved because the new RTS routes take a long time to be prepared in order to meet the demands of public service. For instance, awaiting transit within 2 to 3 minutes during the morning peak on time and within 5 to 6 minutes during the afternoon (LTA, 2008).

As part of overall efforts to improve rail service reliability, the Land Transport Authority (LTA) has strengthened the Rapid Transit Systems (RTS) regulatory framework in four key areas, namely: (i) Maintenance of Rail Assets; (ii) Incident Management; (iii) Operating Performance Standards (OPS) and (iv) Penalty Framework. Otherwise, Singapore has implemented fully integrated distance fares since 2010 prior to support a more integrated public transport system. The benefits which could be gained from the implementation of distance fares is the transfer penalty was removed and all commuters pay fares based on the total distance travelled. In an attempt to develop a sustainable development in the transport system, LTA will continue to review the Electronic Road Pricing (ERP) system and has taken initiative of managing road usage by enhancing the effectiveness of the ERP system to improve its efficacy. In 2013, LTA has upgraded all existing bus interchanges by expanding barrier-free accessibility and about half of our public buses are now wheelchair-accessible. By providing more and better bicycle parking facilities at MRT stations and bus interchanges. For example, fordable bicycles allowed on trains and buses during off-peak hours and has been implemented in 2009 (LTA, 2008).

  ii.   China

The studies were conducted by Christian Bruce, 2012, TOD concept comes from developing countries such as Europe and the United States and has received much attention in China. Some important aspects of the concept of TOD in China are the density, diversity, design, destination accessibility and the proximity to transit stations (distance to transit). In Guangzhou, there are Urban Metro Rail System in five important cities in China, namely Beijing, Shanghai, Tianjin, Shenzhen, and Nanjing (Peng et al., 2012). Meanwhile, in line with the rapid development in Guangzhou, they prioritize how to live a healthy and safe by introducing 'Greenways Project'. It is a safe infrastructure for pedestrians and cyclists. There are 8 principles that are used in China, namely: (1) Encourage users to walk (Walk), (2) The promotion of non-motorized vehicles (Cycle), (3) Creating a balanced network of roads with pavements (Connect), (4) Placing development near public transport quality (Transit), (5) Designing a diversity of land use (Mix), (6) Optimising density and capacity transit (Densify), (7) Establish an area with a short trip (Compact), (8) Changing the mode of transport to non-motorized vehicles such as cycling and walking (Shift) (ITDP China, 2013).

Meanwhile, the MTR train system in Hong Kong is one of the most efficient railways in the world. By providing residential purposes with an attractive option of public transport, TOD has the potential to offer a better alternative to private transport in urban areas by improving the quality of life of the population. The Hong Kong MTR also includes Hong Kong Island, Kowloon and the New Territories (Karen, 2000).

  iii.   Australia

TOD in Australia aims to focus on jobs, housing, services and facilities around major transit facilities, especially railway stations. It is also a strategy to reduce dependence on the automobile and promote sustainability. In addition, it also promotes urban structure that supports and integrates economic, social and environmental sustainability.

The method of Land Use Public Transport Accessibility Index (LUPTAI) is one of the method that used for study in Gold Coast, Australia (Pitot et al. 2005). There are four principles that are given attention, namely, (1) Composite Index, (2) Population and Dwelling Targets, (3) Public Transport Infrastructure / Service Provision, (4) Public Transit. Meanwhile, The State of Queensland Transport (2005) used Geographic Information System (GIS) application system as a method to analyse the data from site survey (Warren Rowe, 2008).

Department of Infrastructure and Planning in Queensland, Australia (2005) identified six principles of TOD which are Location (Infrastructure and Service Levels, Development levels, New development); Land Use (Type, Extent, Density, Intensity, Mix, Continuity); Design (Adaptability, built form, Public Realm, Integration, Safety and Accessibility, Parking); Transport (Mode share and transport efficiency); Social (Social Diversity and Inclusion); and Process (Coordination, Community Engagement, Timeframes).

In Western Australia, have implemented policies and programs to facilitate cooperation between government bodies to promote TOD. In developing areas of pedestrian activity around the train station is not a new concept, but it is a popularity. Dunphy (2003) suggested with 10 principles for development around transit, namely, (1) Develop the region to be better with the right vision (2) Using the power of partnership (partnership) (3) Thinking about development when thinking about transit (4) Getting the right parking (5) Build a place, not a project (6) Encourage the development of the current market, not driven by transit (7)

The diversity order, not necessarily the same in all locations (8) To make buses as a great idea (9) Encourage every corner of the prices for live around transit (10) Making themselves as corporate focus.

iv.   Ahmedabad Janmarg, India

Ahmedabad Railway Station is the main railway station and it is also the largest and most vibrant railway station in Gujarat, India. In addition, it accounts for the second highest generating income for Western Railway parts of Mumbai. The main railway station in Ahmedabad, also known as Ahmedabad Junction Railway Station or Kalupur Railway Station, which is the main station for urban railway transport in Ahmedabad in Gujarat, India. Urban growth has led to improved quality of service to existing modes of transport in this country. The growing nature of the city has forced a rethink on the existing transport modes within the city (Srikanth, 2010).

Therefore, none of the existing modes available that can satisfy the demand of users in this city. In order to overcome this, the authority already takes an action to invest the BRT system which known as Ahmadabad Bus Rapid Transit System (BRTS). The BRTS began operation in October 2009. Some 155 kilometres have been identified for this ART corridor and it will be complete with three phases. Technically, the network expanded to 89 kilometres for this Ahmedabad BRTS by December 2015 with daily ridership of 1,32,000 passengers. BRTS won several nations and international awards for design, implementation and operation and it was rated Silver on BRT standard in 2013 (UNFCC, 2009).

v.   The United States of America (USA)

City planners and transportation planners particularly hoping that this Transit Oriented Development (TOD) concept will encourage the use of transit, increase housing opportunities, promoting a mode of walking and cycling as well as facilitate the renewal of a neighbourhood center. For example, at present, there are approximately 100 neighbourhood TOD concept in the United States (Cervero et al, 2004). But there are many positive and negative issues that can prove the validity of the concept plan submitted by the city planner for the Transit Oriented Development (TOD). It shows from the that has been made by Lund (2006), examine the reasons why people in a neighbourhood centre choose to stay in the neighbourhood of Transit Oriented Development (TOD) and its relation to the use of transit. In this study, Lund (2006) has carried out "Household survey" involved 605 respondents against the people who had moved to the neighbourhood of Transit Oriented Development (TOD) centre concept within "walking distance" of rail transit stations in the region. The findings of the study revealed that easy access to transit is one of the three main reasons that cause them to choose to live in TOD concept of neighbourhood centres (Journal of the American Planning Association, 2006). There are five criteria that were used in the study in Calgary, United States of America, namely: (1) Transit Supportive Land Use; (2) Density Around Transit Stations; (3) Pedestrian-Oriented Design; (4) Make each station area a "place"; (5) Manage parking, bus and vehicular traffic (Calgary Land Use and Planning Policy, 2004).

Methodology And Tools
This section describes the technique use in selecting the potential area for TOD in Selangor. The methods of execution in the development of TOD model are divided into three stages, namely:

Stage 1: Method of Data Collection
The collection of data which involves the collection of primary and secondary data throughout the site survey. The primary data that results from the site study and can be done in accordance with the set path of bus and train routes. Data were collected by using a checklist and scoreboard (Table 1 and Table 2) for site visits. Secondary data are regarded to the study area that obtained from the local government. It is consisting of (1) Technical report from the Local Authority (LA); (2) Distribution of land use data of commercial, residential and public facilities around the site area and (3) Data regarding to the rail and bus routes in the site area.

Table 1: The checklist to determine the location of TOD in Selangor, Malaysia

Phase Indicators	Weak	Low	Moderate	High
Radius (meter)	>700m	500m < x ≤ 700m	250m < x ≤500m	≤ 250m
Commercial Maximum plot ratio in Negeri Selangor is 1:4 *Source:* *RSN Selangor (Draft) 2035*	• Within >700m • High/Low Density	• Within 500m < x ≤ 700m	• Within 250m < x ≤ 500m Plot Ratio 1:3 • High Density	• Within ≤ 250 m • Plot Ratio > 1:4 • High Density
Residential Density of Population 1 km² = 100 hec 60 unit/hec *Source:* *Manual Garis Panduan dan Piawaian Perancangan Negeri Selangor.* *RSN Selangor (Draft) 2035*	• Within >700m • Density High/Low Eg: • Terrace Housing / Semi Detached • Detached • Apartment	• Within 500m < x ≤ 700m • High Density Eg: • Terrace Housing / Semi Detached • Detached • Apartment	• Within 250m < x ≤ 500m • Plot Ratio 1:4 • High Density Eg: • Terrace Housing / Semi Detached • Detached • Apartment	• Within ≤ 250m • Plot Ratio > 1:4 • High Density Eg: • Terrace Housing / Semi Detached • Detached • Apartment
Public facilities Density: 1 km² = 100 hec *Source:* *Manual Garis Panduan dan Piawaian Perancangan Negeri Selangor.* *RSN Selangor (Draft) 2035*	• Within >700m walking distance • School PS:Class =1:25 SS:Class =1:25 3,000 population (12 classroom) 10,800 population (40 classroom) • Hospital : bed:ppl 1:5	• Within 500m < x ≤ 700m walking distance • School PS:Class =1:25 SS:Class =1:25 3,000 population (12 classroom) 10,800 population (40 classroom) • Hospital : bed:ppl 1:5	• Within 250m < x ≤ 500m walking distance • School PS:Class =1:25 SS:Class =1:25 3,000 population (12 classroom) 10,800 population (40 classroom) • Hospital : bed:ppl 1:5	• Within ≤ 250 m walking distance • School PS:Class =1:25 SS:Class =1:25 3,000 population (12 classroom) 10,800 population (40 classroom) • Hospital : bed:ppl 1:5

(Note: the leftmost rotated label reads "1 LAND USE")

*(Area [km²/percentage [%])

Table 2: The scoreboard to determine the location of TOD in Selangor, Malaysia

| SCOREBOARD	1 POINT Weak (25%)	2 POINT Low (50%)	3 POINT Moderate (75%)	4 POINT High (100%)
2 WALKING DISTANCE — **WALKING DISTANCE** *General walking distance is about 5 minutes or 200m* *Sumber: O'Sullivan (1996); Manual Garis Panduan dan Piawaian Perancangan Negeri Selangor* Distance and time walking distance from transit station Distance to achieve public transportation Distance and time walking distance connect with the other land use	>400m walking 10 minute	400m < x ≤ 600m walking; 7.5 minute	200m < x ≤ 400m walking; 5 minute	≤ 200m walking 2.5 minute
3 PARKING SPACE — **PARKING SPACE** *Source: Manual Garis Panduan dan Piawaian Perancangan Negeri Selangor* Walking Distance to Park and Ride Walking Distance to Parking Area Walking Distance to Motorcycle Parking Area	>600m walking 10 minute	400m < x ≤ 600m walking; 7.5 minute	200m < x ≤ 400m walking; 5 minute	≤ 200m walking 2.5 minute
On Street Parking Total of Private Car Total of Motorcycle	≥ 35% from site	< 35% from site	< 25% from site	< 15% from site
Off Street Parking Total of Private Car Total of Motorcycle	< 20% from car park	< 40% from car park	< 60% from car park	> 80% from car park
4 RANGE OF CAR PARK — **THE CHARGE RATE OF CAR PARK** *Source: Manual Garis Panduan dan Piawaian Perancangan Negeri Selangor* According to the rates set by the Council Parking area in residential area, commercial area Except in the local authority's area or private parking area	< 31% rates	<30% rates	<20% rates	100% rates
5 SAFETY URBAN DESIGN — **SAFETY AND URBAN DESIGN** *Source: Manual Garis Panduan dan Piawaian Perancangan Negeri Selangor* Pedestrian walkways provided with shading and shelter Pedestrian walkways provided with safety infrastructure or bollard and railing etc. Pedestrian walkways are continuously Pedestrian walkways connected with bus station and lay by bus and taxi station Pedestrian walkways provided with shaded tree, hardscape and landscape	< 30% from overall	<50% from overall	<74% from overall	>75% from overall
Total (%)				
Total Overall				

Stage 2: Method of data analysis using the Geographic Information System (GIS)

The method of analysing data using Geographic Information System (GIS) system is the analysis of the distribution of land use consists of commercial, housing and public facilities throughout the site survey. At this stage, the percentage of the total area of the distribution of land use will be identified in the range of 400 to 800 metres of walking distance. Then the analysis conducted on the basis of the selection criteria for the classification by differentiating with 4 colours, whereby from the highest level to the lowest level consists of green, yellow, orange, and red.

- Green is a high level of development characterized by a high density plot ratio exceeding 1: 4. High-density development for businesses and housing and height exceeding 4 level and are in the range of less than 200 metres walking distance. While the public utilities focused on educational institutions (schools) and health centers (hospitals) located within 200 metres walking distance.

- Yellow (75%) is characterized by the moderate development which is medium or high density of at least reaching plot ratio of 1: 3. For business development, housing and public facilities such as hospitals or schools located at a distance of 200 metres to 400 metres within walking distance.

- Orange (50%) is low levels of low-density development that is at the level of 1: 2 and is located at a distance of 400 metres to 800 metres within walking distance.

- Red (25%) is the weakest level with low density development with the distances exceeding 800 metres pedestrians and upwards.

The results of the classification ranking the four stages of colour will produce two results of drawing plans within 800 metres of the land use and the plan with the percentage according to the ranking. The percentage of GIS data systems are shown in the checklist Bus Routes GIS analysis and GIS Analysis of Railway Routes. While, data for parking, walking and cycling and safe urban design was analysed by using the system of weighting LUPTAI. However, the data can be analysed by walking distance with time travel and observation by percentage. More description regarding on this method will be shown in the method of LUPTAI analysis. The Figure 1 and Table 3 and 4 shows one of the result out of 88 stations. The area covers 500 to 1 kilometres metres radius within walking distance. The figure below shown the sample of the location at KTM Komuter Subang Jaya Station.

Figure 1: (a) Distribution of land use; (b) Ranking of mixed land use
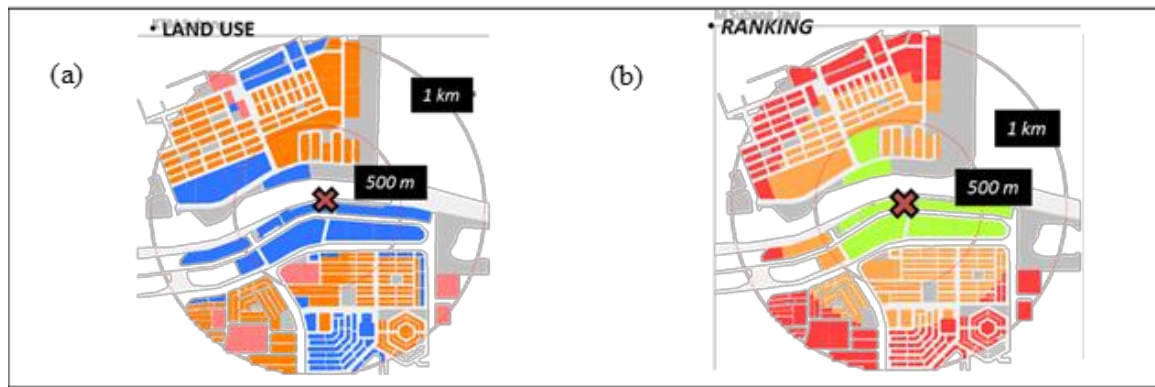
Table 3: Distribution of land use

Distribution of Land Use		
Mixed Land Use	Area (km^2)	Percent (%)
Commercial	368	44.07
Housing	0.02	
Public Facilities		.99
Total	0.835 km^2	100

	Ranking							
Level	Weak		Low		Moderate		High	
Mixed Land Use Area/Percent	km^2	%	km^2	%	km^2	%	km^2	%
Commercial	0.210	57.07	-	-	-	-	0.158	42.93
Housing	0.360	81.45	0.082	18.55	-	-	-	-
A Public Facilities	0.006	24	0.019	76.00	-	-	-	-
Total (km^2/100)	**0.58**	**162.52**	**0.1**	**94.55**	**-**	**-**	**0.158**	**42.93**
Total (A+300x100%)	**-**	**54.17**	**-**	**-**	**-**	**-**	**-**	**14.31**

	Ranking							
Level	Weak		Low		Moderate		High	
Area/Percent	km^2	%	km^2	%	km^2	%	km^2	%
Mixed Land Use								
Commercial	0.210	57.07	-	-	-	-	0.158	42.93
A Housing	0.360	81.45	0.082	18.55	-	-	-	-
Public Facilities	0.006	24	0.019	76.00	-	-	-	-
Total (km^2/100)	**0.58**	**162.52**	**0.1**	**94.55**	**-**	**-**	**0.158**	**42.93**
Total (A+300x100%)	**-**	**54.17**	**-**	**-**	**-**	**-**	**-**	**14.31**

Table 4: Ranking of mixed land use

Stage 3: The process for development of the TOD model by using the Land Use Public Transport Accessibility Index (LUPTAI) techniques.

The third stage is the method of data analysis system by using the Land Use Public Transport Accessibility Index (LUPTAI) techniques. LUPTAI aims to simplify analysing methods for accessibility by taking into consideration the distance to educational institutions, health, business, housing and public transportation or walk (Pitot et al, 2005). Analysing the data by using the LUPTAI weighting system has its own value and the analysis is based on the scoreboard set. This stage is the combinations of stage 1 and 2 which includes of data analysis, data of GIS and a scoreboard. The model combines the type of land use such as residential, commercial, shop offices, open space and public facilities where this concept emphasizes the walking distance and public transport user in an integrated manner.

Result And Findings
Scoreboard is based on the method of determining the TOD score assigned by the selection criteria of the TOD area as shown in Table 5. Selection is determined by area and the percentage in each of the five criteria of land use which consists of commercial, housing and public facilities, walking or cycling mode, parking and urban design form. The determination of the site of Transit Oriented Development (TOD) has been identified based on a 2 stages techniques as above. As a result, there are 88 potential TOD areas that have been identified in four colour level ranking was developed by the GIS system (as shown in the appendix). Analysis of the percentage of each class will be judged by the colour of preference to green (high). All the analysis that has been designated by the GIS system will be prepared based on the highest percentage, followed by the low percentage to obtain accurate data collection analysis for potential TOD centers. The results of the data collection and analysis are based on the land use GIS distribution and the ranking for rail and bus routes.

Table 5: The result of scoreboard set of the LUPTAI weighting system of Subang Jaya Station

Level Percentage		Weak	Low	Moderate	High
	2 Walking Distance	-	-	-	**100**
	3 Parking Area	-	-	-	**100**
B	4 Safety Urban Design	-	-	-	**100**
	Total (%)	-	-	-	-
	(B ÷ 300) x 100%	-	-	-	-
	A+B	**54.17**	**31.52**	-	**114.31**
(A+B ÷ 200) x 100%		**27.09**	**15.76**	-	**57.16**

Meanwhile, the total of 88 locations has been identified by using LUPTAI techniques as potential to be as TOD areas (as shown in the appendix), it has been sort down to only 27 locations all over Selangor which suited the criteria listed from the previous analysis. The list of 27 locations are shown in the Table 6 as below:

Table 6: The list of 27 locations of TOD potential areas

TOD Potential Areas		
Mass Rapid Transit (MRT) Routes	KTM Commuter Routes	Light Rapid Transit (LRT) Routes
1. Kota Damansara	1. Subang Jaya	1. Taman Bahagia
2. Taman Cuepacs	2. Petaling	2. Taman Jaya
3. Bandar Kajang	3. Klang	3. Taman Melati
4. The Curve	4. Serdang	4. Cahaya
5. One Utama	5. Setia Jaya	5. Ara Damansara
6. Balakong	6. Kajang	6. Taman Paramount
7. Bandar Tun Hussein Onn	7. Shah Alam	7. Universiti
8. Taman Sunway	8. Sungai Buloh	8. Putra Height
9. Taman Suntex	9. Seri Setia	9. Ampang

- Innovation

This LUPTAI tool is innovative and representative of the determination of potential areas of TOD. Meanwhile, it also makes the public transport system more effective, efficient and protect the environment while enhancing the quality of life for future generations. This concept is the best practice that it builds on the principles of existing accessibility to create a first in Malaysia and one of the tools existing elsewhere.

- Advantages

This concept prevents urban sprawl from happening and to reduce traffic congestion and air pollution. Meanwhile, it also can form a variety of benefits at the local level and by encouraging the development of feature walkability, compact and infill development.

- Entrepreneurship

This technique has the potential to create greater sales as well as can be applied by the Department of Town and Country Planning, Local authority, Land Public Transport Commission and Consultant as well as support the local business by achieving an appropriate provision and level of public transport.

Conclusions

The development of Transit Oriented Development (TOD) model has been proposed with the aim of developing the TOD model and of determining potential areas of TOD. The development of TOD model and determining the potential areas itself can be executed through three stages, which are the following: data collection, analyzing the distribution of land use and the Land Use Public Transport Accessibility Index (LUPTAI) techniques. The development of TOD model introduces checklist and scoreboard of detailed requirements which can be used as a guide to determining the potential areas of TOD process itself. In fact, the method has also the aim of being an effort in providing the suitability of the implementation of TOD concept for creating a systematic and comprehensive implementation of transit stations in urban areas to overcome the problem and conflict of traffic congestion. i.e. it can be used as a guide to determine the potential areas of TOD by local government or planners to solve the problem of rapid and massive urbanization recently. I believed that the proposed model has also the effect of increasing the level of implementation of project development in the transport planning phase, as detailed requirements of the determining the potential areas of TOD process.

The purposed development of TOD model is based on the three (3) stages requirements identified from pertinent literature and existing standards. A model and the weightage of indicators has been developed and the weighted sum of every level in each criteria has been indicated to be the Development of TOD model of the evaluated schedule. It is believed that a main result has been the description of the best potential areas for TOD development and will achieve comprehensive implementasion of TOD in Selangor state listed in the appendix (Table 1A), which is seen as inspired by the existence of communication network infrastructure and efficient public transport services, as well as municipal development is concentrated in the central area transit. Therefore, from these findings, the policy maker will learn systematically of the implementation of TOD. The implementation of this study prior to the needs and objectives which can make comparisons of the TOD's best practice implement by the foreign countries and the suitability of its implementation in this state. Additionally, it is necessary to allows the user to use transit services, public transport, walking and cycling as well as to reduce congestion, air pollution and can help in avoiding urban sprawl occurring in high-density areas. Finally, since the development of TOD model focused on the public transportation in Selangor, further research should be conducted in other state and on the other types of transportation project by applying the same research method for comparative purposes.

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APPENDIX

Table A1: The location of potential areas of TOD (station)

No	The Location of Potential TOD (station)	Location	Weak	Low	Moderate	High
1	Kota Damansara	MRT	36.91	5.64	-	57.46
2	Subang Jaya	KTM	27.09	15.76	-	57.16
3	Taman Cuepacs	MRT	23.34	18.32	1.05	57.30
4	Bandar Kajang	MRT	31.81	13.56	-	54.63
5	The Curve	MRT	35.72	13.89	-	50.38
6	Petaling	KTM	12.12	23.63	14.25	50.00
7	One Utama	MRT	24.28	15.32	10.41	50.00
8	Taman Bahagia	Kelana Jaya Line	33.52	8.76	7.69	50.00
9	Taman Jaya	Kelana Jaya Line	28.38	13.38	7.17	50.00
10	Balakong	MRT	31.36	13.03	5.60	50.00
11	Bandar Tun Hussein Onn	MRT	31.57	15.42	3.01	50.00
12	Taman Sunway	MRT	39.28	8.04	2.68	50.00
13	Taman Suntex	MRT	36.78	11.24	1.86	50.00
14	Saujana Impian	MRT	24.77	25.24	-	50.00
15	Taman Mesra	MRT	24.80	25.21	-	50.00
16	Kampung Baru Sungai Buloh	MRT	34.70	17.31	-	50.00
17	Sungai Buloh	MRT	30.79	14.32	-	50.00
18	Kajang	MRT	38.77	11.23	-	50.00
19	Klang	KTM	39.10	10.91	-	50.00
20	Taman Koperasi	MRT	44.79	5.21	-	50.00
21	Serdang	KTM	37.88	6.34	-	39.12
22	Taman Melati	LRT Extension	21.42	3.67	19.14	39.11
23	Setia Jaya	KTM	35.01	12.21	9.21	35.25
24	Cahaya	Ampang Line	40.41	7.89	13.27	34.27
25	Kajang	KTM	34.89	15.11	12.50	33.33
26	PJU5	MRT	27.96	5.04	12.85	29.17
27	SMK Taman Selayang	KL-Tanjung Malim	38.45	6.14	12.50	26.25
28	RRI	MRT	39.97	10.04	-	25.00
29	Ara Damansara	LRT Extension	18.95	15.66	15.60	24.81
30	Sek. Men. Teknik Klang	KL-Sepang	26.43	15.07	12.96	24.72
31	Jusco Bukit Tinggi	KL-Sepang	30.03	12.92	15.53	20.68
32	Sekolah Tengku Ampuan Rahimah	KL-Sepang	35.32	0.77	12.50	20.58
33	Shah Alam	KTM	42.34	3.92	25.00	20.42
34	Taman Paramount	Kelana Jaya Line	38.14	16.15	12.82	20.40
35	Convent Tengku Kelana	KL-Sepang	39.14	10.64	12.50	16.67
36	Kompleks Amaniah	KL-Tanjung Malim	33.14	32.18	1.36	16.67
37	Simpangan Jalan Duku	KL-Sepang	26.67	19.44	-	16.39
38	Universiti	Kelana Jaya Line	38.30	-	10.65	16.39
39	Kolej MARA	KL-Beranang	33.88	15.33	-	13.56
40	Kajang Prima	KL-Beranang	24.33	13.95	12.50	13.30
41	Masjid Al-Jamiyah	KL-Sepang	23.15	18.39	12.50	13.00
42	Masjid Al-Rahimah	KL-Sepang	37.46	7.13	12.50	12.63
43	Sungai Buloh	KTM	41.70	8.49	-	9.58
44	Klang Parade	KL-Sabak	31.10	19.42	12.50	8.14
45	Taman Dato Hormat	KL-Sepang	35.55	15.31	25.00	7.80
46	Hospital Kajang	KL-Beranang	35.55	27.09	-	7.48
47	Kedai Jubin	KL-Beranang	41.32	11.55	-	6.03
48	Seri Setia	KTM	34.92	18.58	25.00	5.47
49	Putra Height	LRT Extension	38.73	4.30	15.92	4.82
50	Ampang	Ampang Line	29.56	34.91	6.17	4.74
51	Kota Kajang	KL-Beranang	37.49	16.52	12.50	4.37
52	Dato Harun	KTM	38.90	32.10	-	4.32

53	Rasa, Hulu Selangor	KL-Tanjung Malim	26.55	35.27	1.08	4.00
54	Teluk Panglima Garang	KL-Sepang	26.70	24.74	12.50	3.77
55	Pekan Meru	KL-Sabak	31.97	15.49	25.00	2.73
56	Rawang Centre	KL-Tanjung Malim	48.82	12.95	2.68	2.54
57	Starbucks, Setia Alam	KL-Sabak	34.74	29.74	-	2.22
58	Cempaka	Ampang Line	40.49	16.23	25.00	2.19
59	Bangunan UMNO Kapar	KL-Sabak	33.90	15.33	25.00	1.62
60	Batang Kali	KTM	20.14	29.86	37.50	0.78
61	Rawang	KTM	37.06	12.93	37.50	-
62	UKM	KTM	39.61	10.40	37.50	-
63	Stesen Hentian	KL-Sabak	24.87	13.80	36.34	-
64	Asia Jaya	Kelana Jaya Line	37.58	13.18	28.42	-
65	Warta Lama	KL-Tanjung Malim	41.06	16.73	25.55	-
66	Bangi	KTM	33.76	24.57	25.00	-
67	Jalan Templer	KTM	41.46	16.88	25.00	-
68	Wangsa Maju	LRT Extension	15.23	34.77	16.67	-
69	KTM Batu Caves	KTM	49.18	9.16	12.50	-
70	Kelana Jaya	Kelana Jaya Line	39.54	27.13	12.50	-
71	Subang Jaya	LRT Extension	40.76	24.87	10.45	-
72	Gombak	KTM	24.28	40.13	10.41	-
73	Glenmarie	LRT Extension	47.36	40.31	4.43	-
74	Sri Rampai	LRT Extension	48.16	10.72	3.23	-
75	Hospital Baru Kajang	KL-Beranang	23.17	11.16	-	-
76	Rasa	KTM	27.42	41.50	-	-
77	Taman Rimba Templer	KL-Tanjung Malim	16.00	47.58	-	-
78	Simpang Jln Rinching Tengah	KL-Beranang	23.38	43.29	-	-
79	Batang Kali	KL-Tanjung Malim	26.17	40.50	-	-
80	USJ 21	LRT Extension	32.68	33.99	-	-
81	Simpang Taman Asia Jaya	KL-Beranang	35.64	31.03	-	-
82	Serendah	KTM	45.87	24.97	-	-
83	Simpangan Jalan Utama	KL-Sepang	39.25	23.25	-	-
84	USJ 7	LRT Extension	39.71	22.79	-	-
85	Taman Industri Sungai Buloh	MRT	50.32	20.51	-	-
86	Taman Mewah, Jalan Semenyih	KL-Beranang	45.07	13.26	-	-
87	Serendah	KL-Tanjung Malim	50.04	11.82	-	-
88	Kedai Hardware Rinching	KL-Beranang	48.97	9.37	-	-