

## Comparative Evaluation of Public Transport Systems

Syahriah BACHOK  
Assistant Professor  
Faculty of Architecture & Environmental  
Design,  
International Islamic University Malaysia  
50878 Gombak  
Kuala Lumpur  
Fax: +60-3-6196-8948  
E-mail: syahriah@iium.edu.my

Tuminah PAIMAN  
Undergraduate Student  
Faculty of Architecture & Environmental  
Design,  
International Islamic University Malaysia  
50878 Gombak  
Kuala Lumpur  
Fax: +603-6196 8948  
E-mail: tuminah.paiman@hotmail.com

Noor Hafiza MOHD MAKSID  
Undergraduate Student  
Faculty of Architecture & Environmental  
Design,  
International Islamic University Malaysia  
50878 Gombak  
Kuala Lumpur  
Fax: +603-6196 8948  
Email: nhafiza@hotmail.com

Noor Alyani YAACOB  
Undergraduate Student  
Faculty of Architecture & Environmental  
Design,  
International Islamic University Malaysia  
50878 Gombak  
Kuala Lumpur  
Fax: +603-6196 8948  
E-mail: alyaniyacob@gmail.com

Sarah ABDUL RAZAK  
Undergraduate Student  
Faculty of Architecture & Environmental  
Design,  
International Islamic University, Malaysia  
Jalan Gombak,  
50728 Kuala Lumpur, Malaysia  
Fax: +603-6196 8948  
E-mail: sarah.razak@ovi.com

Mariana Mohamed Osman  
Assistant Professor  
Faculty of Architecture & Environmental  
Design,  
International Islamic University, Malaysia  
Jalan Gombak,  
50728 Kuala Lumpur, Malaysia  
Fax: +603 61964864  
E-mail: mariana@iium.edu.my

**Abstract:** The study focuses on the public transportation systems provided in three different cities: Singapore, Melbourne and Adelaide. Trip details and public transport systems' attributes were recorded in travel diaries. A comparative study was conducted to identify major similarities and characteristics of the public transport systems from the perspective of different user types namely: frequent travellers and first time users. It was found that after the second trips, most of the first time users were getting familiarized with, among others, the ticketing and routing systems. Qualitative evaluation of seven characteristics of public transport systems was undertaken. Elements such as routes, stations and platform identifications, feeder services coverage, number of transfer or interchanges, seamless transfer or interchanges experiences, single or integrated ticketing systems, existence of free city-circle services, complementary versus competitive feeder services and differences of completing trips for familiar routes or destinations compared to trips for unfamiliar routes or destinations were recorded, transcribed and assessed so as to distinguish the variations of trip making processes between first time users and frequent travellers.

**Key Words:** *Public transport systems, Singapore, Australia, users*

## 1. INTRODUCTION

This paper presents a research conducted on various public transportation systems in 3 different developed cities namely Singapore, Adelaide and Melbourne, Australia.

## 2. BACKGROUND

Transportation is defined as moving goods and passengers by any types of vehicles from one location to another. It is further divided into public transport and private transport. Transport systems consist of several sub-systems. For example, within rail-based systems, there are rolling stocks, routing, vehicle and track maintenance, crossing, safety and information systems.

Multimodality is an imperative feature of public transportation systems. Multimodal transportation refers to the bridging of distance from an origin to a final destination by at least two different transport modes. From the perspective of the supplier of provider of public transport the following sub-systems are essential.

The first is the transit network. Transportation networks are important public transportation systems. A transit network is set of transit lines that connect with each other and are coordinated for efficient operation and provision of integrated services in an area for the convenience of passengers and efficiency of operations.

The second element is the public transportation route alignment, which refers to the direction and configuration of the public transportation lines in order to accommodate the number and distribution of passengers along the line and their trip lengths. The greater the number of passengers and the longer the distances they travel, the more direct the line should be. Along these routes, stations will be designed and allocated accordingly. Changes passengers make from one line to another line are often termed as transfers.

Another important element in public transportation provision is the placement of stations. Stations are locations designed for passenger pick-up and drop-off by transit units. It represents locations which passengers have access to the transit network. Depending on the type of operation, stations or stops may be designated on demand, on-call or fixed.

The next element is the provision of convenient transfer systems. Transfers are changes in modes or lines that a passenger must make in order to reach his/her destination. To achieve seamless intramodal integration of different lines (e.g. within metro or bus networks), as well as intermodal integration, efficient transfers among lines must be provided.

Ticketing/fare collection is also important as it is a major factor in attracting passengers and also in determining the efficiency of operations of a transit service. It is a method of generating revenue for the transit operators and thus, influences the method of financing transit operations in an area (Vuchic, 2005).

Finally, from the perspective of service providers, a good public transportation system would include the provision of transit hubs. Transit hubs are important key components in a transportation system. The operation of transit hubs is the main link to various elements in the transportation system and serves as a convergence point for different transit modes (Zhenbo *et*

*al.*, 2009).

However, from the perspective of users, trip decision making processes and travelling experiences are essential in influencing repeat trip intentions. Travel experience can be directly related to the provision of the transportation elements by the public transportation providers. This is based on the fact that the quality of services rendered will influence the level of comfort and convenience of the passengers.

The bulk of studies on transportation systems and travel decision making process have been concentrated on aggregated user types. There is limited exposure on the responses towards the services by different types of users including first time users and frequent travellers. The variation in passengers' and public transportation characteristics in this part of the world should be further explored in search of standardised system which can be easily understood by first time users and those already familiar with different public transportation systems.

The study methodology is hence, described. The primary data was collected in August 2010. One frequent traveler and three first time users set their journeys from the country of origin, Malaysia using air transportation and several other land public transportation modes. Data was captured using participatory observation method, whereby the travelers noted their experiences using the system within a 30-hour time window.

The journeys and experiences were recorded using a checklist. The checklist included data on time and place of departure, time and place of arrival, activities at both departure and arrival points and the respective modes. The study focuses on the detailed experiences of the different types of traveler. The travelers were categorized into first time user or frequent travelers; whether there exists an urban rail or light rail network in city of origin and whether the traveler have used at least a public transport mode in a typical day within a typical week in the city or country of origin.

Passengers' travel diaries are collected and data entry was made after cleaning some of the missing or incomplete records. Each trip details were recorded with an assumption that one trip may consist of several legs including access and egress trips to stations, if rail-based transport was made. In addition, it was also assumed that one trip may also involve more than one public transport modes.

Several details are also included in the travel diaries such as:

- Date of trip
- Origin of trip
- Station of origin
- Activity at origin of trip
- Time started
- Time finished
- Destination of trip
- Station of destination
- Activity at destination of trip
- Mode used for each leg of trip
- Route
- Origin of line
- Destination of line
- Fare rates and payment methods
- Embarkation and alighting stations
- Transfers and interchanges
- Population
- Number of lines
- Number of stops
- Travel distance (km)

### 3. CASE STUDIES

Three cities have been selected for the studies which are Melbourne and Adelaide as well as Singapore.

#### 3.1 Melbourne Trips

Melbourne city centre is of iron-grid form and many public transport routes follow this form but radiate from the centre to outer suburbs in north-southern or east-western directions. The centre is generally served by trams and buses. Outer suburbs are also served by the heavy-rail train system. There was also a free tram service, specifically designated for touristic routes within the city centre. Refer to Figure 1 for the alignment and routes of Melbourne tram systems. In addition, there are also taxi services, available at taxi ranks and can be flagged from the street curbs. Melbourne has 1,565 square kilometers of land area with the total population of 3.89 million and the population density of 505.9 persons/sq.kilometer (Australian Bureau of Statistics, 2010).

The journey in Melbourne started at the Melbourne International Airport, Essendon. One frequent traveller` and three first time users had recorded the trip details of their public transport journey. They have also shared the following experiences using the public transportation services.

The first trip was from the airport heading to the hotel which will be the accommodation for the travellers for the duration of the stay. Since travellers had large luggages with them, the best mode of transport for this type of trip and users were the taxis. The taxi rank was easily identified from the terminal exits. The fare meters were activated and the drivers followed the instructions of the GPS navigator guides that had been switched on when the passengers informed the drivers of their destinations. Table 1 summarises the major details of the trips made in Melbourne.

Table 1: Checklist of travel details in Melbourne

	Date	Origin	Origin Activity	Time Started	Time Finished	Destination	Destination Activity	Transport Mode
1	6 Aug 2010	Melbourne Airport	Arrival Airport Kuala Lumpur	10.20 am 12.20 pm	2.40 pm Stop at City Link to pay toll	Malaysia Hall, ST. Kilda Rd	Check in hotel	taxi
2	7 Aug 2010	Malaysia Hall	Sleep	9.00 am	10.00 pm	Swanston Street, Esfeller	Eating	Tram
3	8 Aug 2010	Swanston Street, Esfeller	Eating	12.00 pm	12.15 pm	Victoria Market	Shopping	Tram
4	8 Aug 2010	Victoria Market	Shopping	4.00 pm	4.20 pm	Malaysia Hall	Resting	Taxi

The drivers had to stop at City-Link office to pay for the charges incurred when using a toll-way into the city. The travellers were informed that payment could be made within three days of travel by those who did not possess an in-vehicle automated and electronic payment device. Receipts were dispensed from an in-vehicle taxi fare mini-printing machine. The fare for a single trip from the airport to St. Kilda Road in Windsor suburb of Melbourne cost about

AUD65.

The second trip was from St. Kilda Road to the city centre for the purpose of eating-out. All travellers walked from the hotel to the nearest tram stop. Stop 27 of St. Kilda Road stop provided information on the tram number and route destination. There were other sources of estimated arrival time such as the countdown for the duration of the next arrival from the mini-monitor located at the end of the station rooftops. Figure 1 shows the main tram network in the city and Figures 2, 3 and 4 depict the trams of Melbourne.

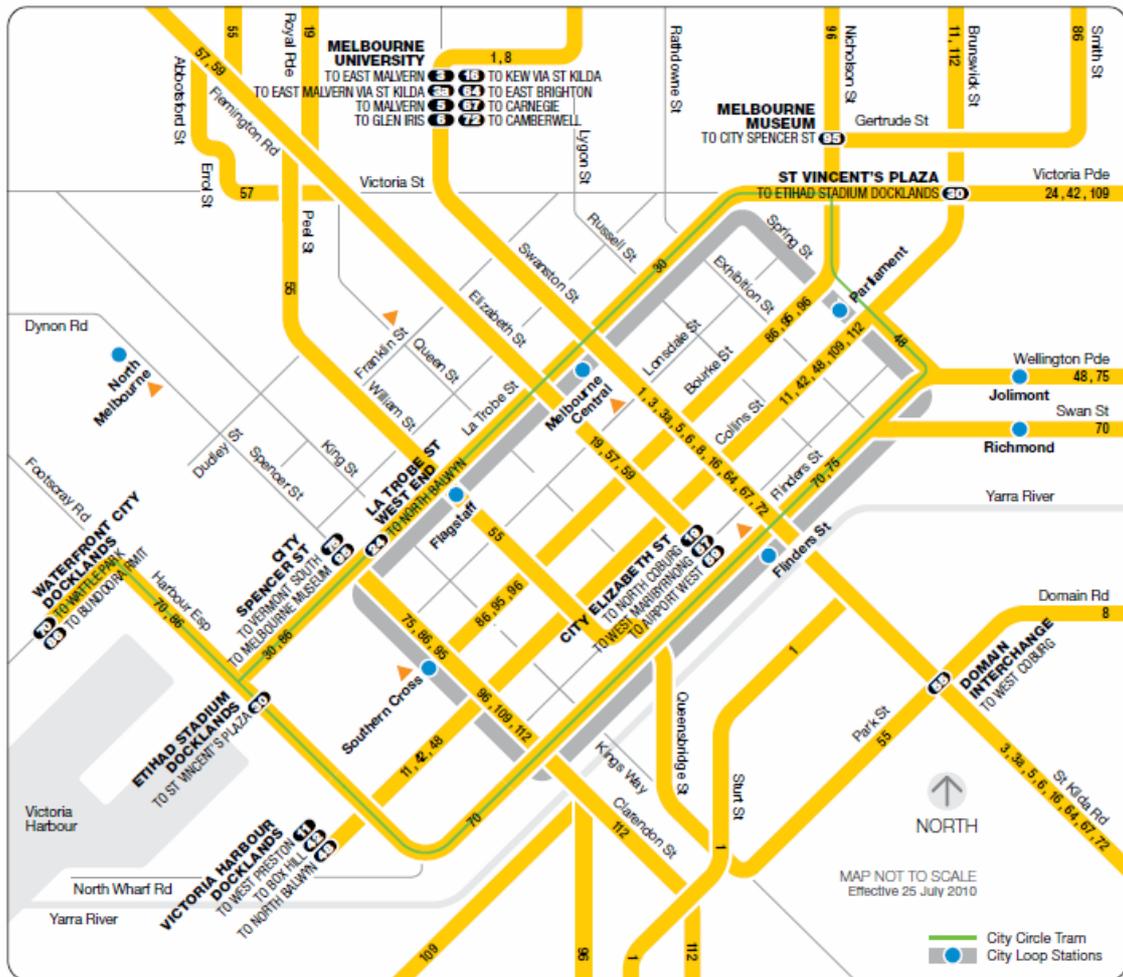


Figure 1: Melbourne Tram Network Map City  
 Source: [www.metlinkmelbourne.com.au](http://www.metlinkmelbourne.com.au)



Figure 2: Tourists tram in Melbourne city



Figure 3: physical appearance of the tram car in Melbourne



Figure 4: another example of tram car easily available in Melbourne City

For the frequent traveller, this information was easily digested. What needed to be clarified and further sought were the fare rates and the stop nearest to the restaurant. Even though tickets could not be attained from the station, the information about ticketing could be sourced from an automated ticket machine installed on-board the tram. Fares were based on travel zones, ticket type; whether trips made within two hours or short distance trips and whether adults or children travelling. There were also rates for concessionary travellers. For the frequent traveller, ticket selection was made without many difficulties. Using small change prepared earlier, payment was made by inserting the coins into the machine. A one-way two hour ticket costing about AUD3 was printed and dispensed by the machine. The subjects also alighted at the designated stop with great ease, since the restaurant was visible from the moving tram.

First time travellers found it very difficult to familiarize themselves with the route, tram number and destination by only accessing information at the stop. No physical or paper map was provided as a way-finding means to the system. There were no humans staffing the station and not many passengers were standing on the platform to seek information from. They glanced at the mini-monitor but could not visualize the route or the tram. Finally, as a last resort, they inquired about the information from a familiar frequent traveller.

Similarly, tickets could not be purchased from the station. The first time travellers observed and followed the actions of the frequent traveller. They also inquired about the appropriate types of tickets to be purchased. Alighting at the destination was also based on the information gathered from the frequent traveller. They tried communicating with the locals who used the systems with ease, but not much information could be gathered since first time users were not very familiar with the local accents and jargons.

The next trip's destination was Victoria Market which is popular with the locals and tourists. This shopping trip originated from the restaurant, with a 5 minute walk to the nearest stop to board tram number 57. The subjects used the tickets that were still valid and easily identified Victoria Market from the moving tram. However, only the frequent traveller knew where to alight, so the other travellers followed by alighting at the stop nearest to the market.

No bus trips were made because the first time travellers were of the opinion that the routes were complicated and they had a lot of shopping bags to carry. As a result, the return trip was made by taxis to the hotel in St. Kilda. Taxis can be flagged from the streets near Victoria Market. After being informed of the destination, the drivers switched on the GPS-navigator and followed the instructions. The fare was about AUD15. The subjects did not experience any major difficulties travelling in taxis, because most of the drivers were street-wise and familiar with the final destination.

### **3.2 Adelaide Trips**

Adelaide has 870 square kilometers of land areas with the total population of 1.17 million and the population density of 641.6persons/sq.kilometer (Australian Bureau of Statistics, 2010). Adelaide transport systems consisted of buses, trams, train and taxis. The city is also grid-iron in form and most bus services radiate from the city centre to the north-south and east-west. Taxis could be easily identified at many taxi ranks and some were available when flagged from the street sides. There are four heavy-rail systems and only one tram system. Figure 5 illustrates the major rail-based transportation in Adelaide.



Table 2: Checklist of travel details in Adelaide

	Date	Origin	Origin Activity	Time Started	Time Finished	Destination	Destination Activity	Transport Mode
1	10 Aug 2010	Crittenden Mall	Sleep	7.00 am	8.00 am	Adelaide Festival Centre	Convocation	Bus
2	10 Aug 2010	Rundle Mall	Eating	11.45 am 2.00 pm	2.20 pm	City West Car Park	Retrieve parked car	Tram
3	11 Aug 2010	Harbour Town, Brooklyn Park	Shopping	9.30 am	10.15 am	Bank	Closing Account	Bus
4	11 Aug 2010	Rundle Mall	Closing Account	11.20 am	12.15 pm	Brooklyn Park Harbour Town	Shopping	Bus

On the first day, the subjects took a bus to the city from one of Adelaide’s northern suburbs along Crittenden Road. The first task was to identify the bus route, bus number and the fare system. The frequent traveller knew the location of the destination and had no problem identifying the route and where to alight once the bus reached the city centre. Additionally, no cash transactions were made on the bus but a ten-trip ticket was validated on the bus’ ticket machine. A one-way trip made within two-hours using the pre-paid ticket cost about AUD3. Figure 6 and 7 show two types of trams in Adelaide whereas Figure 8 depicts a typical bus in Adelaide.

For the first time users, they first had to identify the destination, the estimated arrival time of the next bus and the estimated arrival time at the destination. In addition, they had to inquire about the ticketing method, the fare rate and the nearest bus stop to their destination, the Adelaide Festival Centre. One source of information regarding the bus schedule and frequency was the information board found at the departure bus stop. However, no information on fares and the destination’s bus stop was provided. Consequently, many of the inquiries were made to the driver, who was single-handedly operating the bus. The first timers had to prepare small change for the tickets which cost about AUD4 for one-way trip or about AUD8 for whole-day or return trips.

The second trip was made from Rundell Mall area using the tram system to University of South Australia’s city west campus. The trams could be easily identified because the station was situated at the intersection of the Rundell Mall and King William Street which are two of the main roads in the city. There was no difficulty for the frequent traveller to identify the routes, the destination station and fare rates. For the first timers, they had to read the information provided on the board situated at the station. For fare rates, they asked the frequent user regarding these matters. There were not many complications because the tram services were free from the South Terrace to the North Terrace, and the university building was clearly visible from the moving tram. For all the subjects, using the tram was not as challenging as riding the buses. This could be attributed to their familiarity with a similar system that is available in Kuala Lumpur, the subjects’ city of origin.

The next trip was from the shopping centre of Harbour Town to the city via Brooklyn Park, a western suburb of Adelaide. The destination was Rundell Mall. This trip was easily made by

the frequent user, with almost no complications. For the first timers, they had to inquire regarding the route, timetable and fares. Since information regarding the routes, bus number, destination and stops were available at the bus stop and no other prospective riders were visible during their wait at the bus stop, they had decided to obtain the fare information from the frequent traveller.

The last trip was the return trip to Harbour Town. It was only during this trip that the first time travellers did not inquire about the trip information such as fare, bus number or routes. They had become familiar with the bus systems in Adelaide. However, they had to observe and follow the actions of the frequent traveller in order to alight at the right bus stop before walking to the shop lots.

### **3.3 Singapore Trips**

Singapore covers 710.3 square kilometers of land area with the total population of 5.08 million whereas the density of the city is 7,022 persons/sq. kilometer for year 2009. (<http://www.singstat.gov.sg>, 2009). Singapore's public transportation system network is among the most excellent ones in Southeast Asia. It consists of MRT and LRT, bus services and taxi systems. Each and every mode of public transport is seamlessly integrated to enable easy access by the users. There are a combination of four MRTs, which are North South Line, East West Line, North East Line and Circle Line; and three LRT links. These networks are shown in Figure 9. Bus services were available in every railway station along with taxi services to facilitate transfers. The location of taxi stands, bus station and bus stops throughout the city of Singapore can be identified easily.

Prior to their trip, the subjects were exposed to different types of information regarding the MRT system that were widely available at the airport. Table 3 lists the trip details. Subjects arrived from Kuala Lumpur around 11pm; fortunately they managed to reach the destination on the last train of the day. As first time users on MRT, subjects were confused on how to purchase the tickets since the MRT station lacked visual and written information on ticketing information. Figure 10, 11 and 12 show the bus, train and taxi systems found in Singapore.

They soon discovered that tickets could not be purchased at the counters as counters were meant for money changes and seasonal ticket top-ups. Standard tickets were only available for purchase through ticketing machine. With the help of a staff and an experienced traveller; the subjects successfully, albeit hurriedly, purchased their tickets as they were alerted by an announcement regarding the next train being the last train.

The routes for the MRT system have been previously studied from an official website. However, the subjects were not capable of deciding their destination as they have no knowledge of the location of the hotel. Subjects then made their final decision regarding their destination with help from an experienced traveller. After that, subjects were able to embark the train on the right platform since the information system was reliable. In addition, the system was similar to the LRT in Malaysia, of which the subjects were frequent users. During the trip, subjects interchanged at Outram Park Station from East West line to North East Line. Subjects were not exposed to this particular interchange and it was already midnight, so they thought it would be much safer for them to follow the experienced traveller.

Once they arrived, they came across eight different exits which confused them. Consequently,

the subjects retraced their journey back from the ticket machine after their deposit money was returned and referred to the maps to orientate themselves.

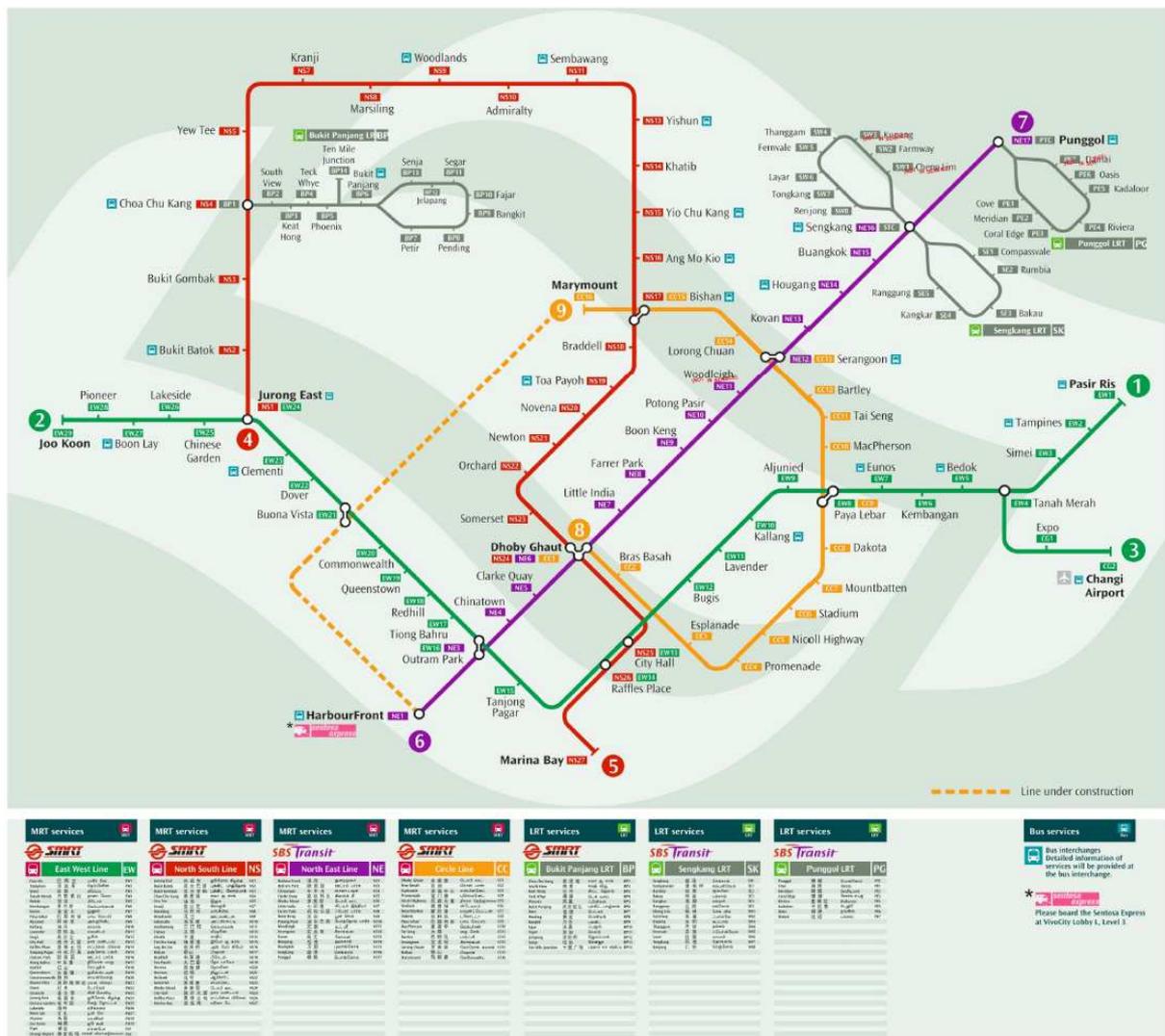


Figure 9: Public Transportation Route Network of Singapore  
 Source: <http://www.smrt.com.sg>



Figure 10: 2 types of buses differ in terms of physical appearance in Singapore



Figure 11: standardised train coaches in Singapore



Figure 12: an example of taxis among the various types of taxis available at Singapore

Table 3: Checklist of travel details in Singapore

	Date	Origin	Origin Activity	Time Started	Time Finished	Destination	Destination Activity	Transport Mode
1	19 Aug 2010	Changi Airport, Singapore	Arrival from Kuala Lumpur	11.00 PM	12.15 AM	Fortuna Hotel	Check In	MRT
2	20 Aug 2010	Hotel Fortuna, Farrer Park		10.50 AM	11.15 AM	Orchard Road	Shopping	MRT
3	20 Aug 2010	Orchard Road	Shopping	12.50 PM	1.10 PM	Bugis Street	Shopping	MRT
4	20 Aug 2010	Bugis Street	Shopping	2.20 PM	3.00 PM	Fortuna Hotel, Farrer Park	Resting	MRT
5	21 Aug 2010	Hotel Fortuna, Farrer Park	Check Out	8.35 AM	9.50 AM	Tampines Street 11	Visiting Family Member	MRT Walking Bus
6	21 Aug 2010	Tampines Street 11	Visit Family Member	11.15 AM	1.05 PM	National University of Singapore	Data Collection	Bus MRT Bus
7	21 Aug 2010	National University of Singapore	Data Collection	5.30 PM	6.20 PM	Tampines Street 11	Visiting Family Member	Bus MRT Bus
8	21 Aug 2010	Changi Airport, Singapore	Departure	11.00 PM	12.05 AM	LCCT	Arrival	Airplane

With experience from the first trip, subjects were able to purchase the tickets. With Malaysian LRT ticketing system in mind, subjects made a mistake of buying two tickets, one to the interchange station, and another to the final destination. They were supposed to buy only one ticket direct to the final destination. MRT lines in Singapore are integrated and it is not necessary for users to purchase a different ticket for different lines.

The subjects were still referring to the route map to confirm which platform was the right one. Throughout this trip, there were two different destinations namely Orchard Road and Bugis Street. Orchard Road is considered as the intermediate leg for this trip given that Bugis Street was the final destination. Other than the above mentioned issues, subjects did not face any other problems in using the public transportation system.

As the third trip route was strikingly similar to the second trip's route, so it was much easier for subjects to familiarize themselves with the MRT systems. As mentioned before, they were frequent users of LRT system in Malaysia, so understanding a new comparable system did not require much effort. Subjects checked out from the hotel and headed to Tampines Street 11 to visit family members. With experience from the previous trips, no problem had occurred with the MRT trip.

At one point in transferring to the bus system, the subjects needed more time in deciding which bus they were supposed to ride. They could not understand the provided bus information due to the fact that it was the first time that they were on such a bus system. The system has been actually reliable, but subjects could only figure out how the system works with further study about it only after they had returned to Malaysia.

Due the problem mentioned before, when subjects were to buy tickets, they had to directly ask the bus driver about the fare. From Tampines to the National University of Singapore (NUS), subjects were able to use MRT without much difficulty. Unfortunately, during the interchange they had mistakenly waited at the station which bus passengers alighted. They followed the locals. They thought that the station which they were heading to was the departing station, i.e. where they were supposed to wait for the bus. Once they were about to board the bus, the bus driver told them that he would not pick up any passengers there because it was the last station and was meant only for dropping off passengers. A local then guided them with direction to the right interchange station, located across the road. Subjects were later confident in choosing the bus to NUS because they had enough information from the internet beforehand.

On a return trip from Tampines to the airport, the subjects did not face any problems since it was the same route as the previous trip. A family member suggested for subjects to ride a taxi as mode of transport to the airport since it was fairly close (approximately 10 minutes' drive). At first, the subjects hesitated to choose a taxi as they were worried about the fare, so they decided to opt for the MRT. The family member then convinced subjects that taxis in Singapore were reliable and it was a much easier option compared to MRT ridee which was going to result in longer travel time to reach the airport. Taxis were widely available, the condition was excellent, and the rate was reasonable. Information system in the taxi could be easily understood and helpful for the riders to determine the travel time and fares.

#### 4. COMPARATIVE EVALUATIONS

A comparative study was conducted to identify major similarities and differences between selective public transport systems, including Kuala Lumpur. Eight physical elements of services and city characteristics have been compared. Table 1 lists these characteristics.

Table 1: Comparison between main public transport systems in four cities.

City	Route/length (km)	Number of routes	Number of stops	Population	Size (km <sup>2</sup> )	Density (persons / km <sup>2</sup> )	Track (km)/1000 persons	Number of stops/1000 persons	Track/ city size ratio (km/km <sup>2</sup> )
Melbourne	245.0	25	1813	3,900,000	1565	505.9	0.628	4.649	0.16
Adelaide	125.9	6	81	1,200,000	870	641.6	1.049	0.675	0.14
Singapore	122.7	6	80	4,600,000	710	7022.0	0.267	0.174	0.17
Kuala Lumpur	183.0	8	105	5,800,000	2137	2700.0	0.316	0.181	0.09

The experiences of comparing other characteristics of the public transportation systems have also been verbally recorded and qualitatively analysed. These characteristics included:

- i. routes, stations and platform identifications,
- ii. feeder services coverage,
- iii. number of transfer or interchanges
- iv. seamless transfer or interchanges experiences,
- v. single or integrated ticketing systems,
- vi. existence of free city-circle services,
- v. complementary versus competitive feeder services
- vii. differences of completing trips for familiar routes or destinations compared to trips for unfamiliar routes or destinations

Since the evaluation was qualitative in nature and the expressions of the subjects have been transcribed as the above, it was very challenging to model the experiences of subjects. Additionally, very limited justified comparisons can be made to physical attributes of the public transport systems as can be seen in Table 1. First, the route length of cities' public transport system ranged from 122 to 245 km, whereby a system in Melbourne has about twice the length of that of Singapore. However, Singapore needed relatively lower number of stops or stations (0.174) to serve a thousand population because it has a higher density of 7,022 people per km<sup>2</sup> compared to Melbourne which needed nearly 5 stations for the same number of population.

Second, it is not justified to compare Melbourne which has 25 main rail-routes with Adelaide and Singapore which has each only six routes. For first time users, in this case, who were already familiar with Kuala Lumpur's six routes system, Adelaide's and Singapore's systems were easier tolerated than those of Melbourne. Next, limited comparison can be made on the experiences of both users from the perspective of the ratio of tracks length per thousand population. For example, longer tracks (1.049km) were needed to serve a thousand population in Adelaide compared to Singapore (0.267km). This means that on average subjects would find it less crowded to use a rail-based public transport in Adelaide compared to in Singapore, hence less pressure on completing journeys smoothly and safely. Additionally, it was more challenging for both first time and frequent users to manage their trips while identifying the correct stops or destinations among Melbourne's 1813 stations along 25 routes than in Singapore's and Adelaide 80 and 81 stations along six routes respectively.

The experiences and hardships of these journeys have been recorded and transcribed accordingly. However, modelling these experiences is unsuccessful because these two variables could not be easily quantified. Hence, this is a limitation to the study.

Subjects realised that the transportation systems in other countries can be easily understood since subjects were frequent users of public transport in Malaysia. It shows that similar public transportation systems allow first time travellers to travel in other countries without facing any major problems. After the subjects had familiarised themselves with the transportation system, the subjects realised that the transportation system was easily understood based on the similarities between Kuala Lumpur's LRT system and Singapore's MRT system. Among the similarities that can easily be identified are that the MRT system has small number of lines, and that Singapore has an extensive and efficient bus system that does not compete with the rail transit system but rather, complements it. The subjects' knowledge about public transportation in Malaysia can be used in other countries even though the system is not the same. On the other hand, there are also some differences apparent between the two systems. One of the differences is that the ticketing in Singapore is more integrated and uniformed, allowing for smoother transfers between lines, compared to the Malaysian LRT system. The bus system also differs in the former as it is too extensive and comprehensive that it confused the first time user. Nevertheless, the subjects can easily familiarise themselves with the new system based on their own experiences.

However, the same was not true of Melbourne and Adelaide cases. This study could not generalise the experiences of the first time users who travelled in these two cities. Two of the subjects who travelled in Melbourne and Adelaide were not familiar even with the public transportation in Malaysia because they were not users of the system. Additionally, one of the

differences between Singapore public transportation systems and the systems in Melbourne and Adelaide is that the latter cities provide free tram services.

On the other hand, the frequent traveller only experienced two difficulties during the journeys in the two countries, both of which occurred in Singapore. This could be attributed to the familiarity of the subjects with the surrounding area and destination in Melbourne and Adelaide. However, the trips with difficulties were to new destinations made by the frequent traveller. In other words, even though the public transportation system in Singapore is similar to that of Kuala Lumpur, for frequent traveller heading to an unfamiliar destination, he or she will still face what a first timer user would be experiencing.

The use of travel diaries has to a great extent provided the researchers with deep insight into trip making decisions. The study evaluated the perception of public transport systems from the viewpoints of passengers, namely the first time users and the frequent travellers. In addition, other details such as routes and stations identifications, alignments based on urban form, fares and ticketing system, ease of transfers or interchanging and return trip planning and decision making were successfully recorded. The study also evaluates the perception of public transport systems from the viewpoints of passengers, namely the first time users and the frequent travellers. In this paper, the systems included routes and stations identifications, alignments based on urban form, fares and ticketing system, easiness of transfers or interchanging and return trip planning and decision making.

## 5. CONCLUSIONS

Public transport systems in three cities located in two different continents have been studied. Four types of sub-systems have been captured and recorded for comparison purposes during a 30-hour travel using public transportation in Melbourne, Adelaide and Singapore. These systems are route networks, station designs, ticketing system and information systems.

From the data analysis, it can be concluded experiences of public transport usage differ between first time and frequent users. Comparison that different cities' public transport systems have different effects on different types of users has also been made, to a limited extent. Most cities adopted their transportation networks based on the urban forms since the latter are more flexible, sustainable and had co-existed with developments from the previous century. Cities such as Melbourne, Adelaide, Singapore and Kuala Lumpur, where the subjects originally reside have differing physical public transport system characteristics and socio-economic attributes. It can also be concluded that first time users of the public transportation modes will easily adapt to any new system if they were frequent users of familiar a similar system or were familiar with the environs and destinations.

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