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Assessment Of Accessibility For Disabled Persons In Rail Transit Stations In Klang Valley

Case Study: Comparison Between Komuter (KTM) Stations and Light Rail Transit (LRT) Stations

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***Abstract*— This paper was published to present the current condition of accessible facilities for disabled persons provided in rail transit stations in Klang Valley. Accessibility is one of the most important criteria in designing a public transport station. With poor accessibility, the disabled people confront more difficulties and challenges while travelling and using the public transport. Thus the objective of this study is to assess and then to compare the accessibility for disabled persons on rail transit stations around Klang Valley. For this purpose, this study proceed with a qualitative and quantitative approach where an assessment and a questionnaire survey are used as the means to collect the data. A rating system was developed taking the idea from QLASSIC to assess the accessibility of the rail transit stations and its facilities. It is found that KTM stations is averagely accessible by 50.32% and LRT stations is averagely accessible by 71.53%. Overall, both stations are accessible by 61% and its facilities is accessible by 69%. With all the data acquired in the study, this paper shows how the accessibility on rail transit stations are associated with the disabled persons.**

***Keywords*—accessibility, disabled people, rail transit station**

I. Introduction

Public transportation are critical resources for any big city [1]. They enhance versatility and availability while lessening car reliance. Improving the nature of public transportation is an undertaking of essential significance. Preferably, public transportation additionally ought to be fiscally practical, with reasonable charges and helpful. Public transportation between urban communities is ruled via intercity rail, carriers, and coaches.

Trains permit high limit on short or long separation, yet oblige infrastructure, track, stations and signaling to be assembled. Kuala Lumpur's rail-based transit system consists of two Light Rail Transit lines (LRT), three commuter rail lines (KTM), one monorail line and an airport Express Rail Link (ERL) to Kuala Lumpur International Airport (KLIA) and Kuala Lumpur International Airport 2 (KILA2), which consists of an express and a transit service.

Consistently over the year the quantity of passengers are increasing and the rail travel network in Kuala Lumpur keep on developing so that the accessibility is one step ahead. The improvement incorporate augmentation of the current LRT Kelana Jaya Line and Ampang Line and there will be another line to be built between Kota Damansara to the northwest of Kuala Lumpur and Cheras which deceives the southeast of Kuala Lumpur. An alternate 156 km long rail travel network called Mass Rapid Transit (MRT) is to be constructed which comprises of three lines and each one will be incorporated to current rail network.

In spite of the quick growth of public transportation in Malaysia, a review directed by the National Organization on Disabilities (NOD) reported that 30% of people with incapacities experience issues in getting to transportation [2]. Troubles, for example, absence of available transit and amenities kept them from utilizing public transportation and effect in less way to get to transportation choices. This makes them often underestimate the social, monetary and political environment of the group. Accessibility for impaired persons has been a critical issues in the vast majority of created nations which has driven them to distributed rules and measures for giving amenities and other fundamental things in their outline for handicapped persons to go in an area or building. Numerous train stations in Malaysia are not yet completely accessible to individuals with restricted movability. The role of accessible transportation is imperative to comprehend in the socially excluded people with handicaps to help the full involvement of handicapped in all parts of society.

The study was conducted on 2 rail transit systems in Klang Valley which are KTM and Putra LRT. Five stations from each rail transit system are assessed. For KTM, chosen stations for assessment are Kajang, Midvalley, Kuala Lumpur, Bank Negara and Sungai Buloh station. As for LRT, the selected stations are Pasar Seni, Masjid Jamek, Dang Wangi, Kampung Baru and KLCC station. These 10 stations were selected because they have high average daily commuter especially during weekdays as they are located near to the office buildings and commercial areas.

Besides the assessment, a questionnaire study was conducted to widen the scope of work to have more relevant findings. A set of questionnaire was designed and distributed to the study respondents which includes the disabled that are using rail transit as mode of transportation and to few national organizations for people with disabilities such as Malaysia Information Network for the Disabled (MIND), Kiwanis Disability Information and Support Centre (KDSC), Malaysian Association for the Blind (MAB), Malaysian Federation of the Deaf (MFD), etc.

II. Literature Review

A. *Disabled*

A physical or mental weakness that generously restrains as a greater amount of the significant life undertaking of such a single person is known as disability [3]. Incapacity

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influences a huge number of individuals everywhere throughout the world. As per the World Health Organization (WHO), around 10% of the world's populace, approximately 650 million individuals, live with incapacity. Individuals with handicaps have not been dealt with as equivalents. In 2009, the United Nations Convention on the Rights of Persons with Disabilities perceived the privileges of individuals with incapacities in pretty much all arrangement fields. European Disability Strategy 2010 – 2020 spotlights on wiping out all obstacles confronted by more than 80 million Europeans, which frequently keep them from completely joining in the public society.

People with incapacities having less flexibility to travel where, when and how they want. They have different levels of help needs [4]. A few people are extremely free and can get to public transport without aid and there are some in need of special facilities, an individual attendant or relatives to help them to meet their transportation needs. A study demonstrated incapacitated individual have a higher dependence on public transport and a lower dependence on private transport [2].

Individuals with incapacities in Malaysia can be considered as a standout amongst the most helpless in the group of minority in the Malaysian populace. As per the statistics from the Department of Social Welfare, the sum of handicapped individuals in Malaysia is 305640. Among them, 27,363 are visual, 39,303 listening to, 180 speaking, 106,252 physical, 117,699 learning, 2,130 mental and 12,713 various incapacitated individuals [5].

There are different types of open dialogue on the equivalent rights and the quality of life of the individuals with incapacities in Malaysia. Their point of view are regularly eliminated from the choices that influence their welfare and living [6]. Most imperative thing is a huge number of incapacitated individuals that are socially avoided in Malaysia and they are presently out of the fundamental improvement stream [7].

B. *Accessibility*

Accessibility is define as giving equivalent access to everybody and without having the capacity to get to the services and facilities, persons with inabilities will never be completely included. Progressively perceived, accessibility is a key component of a great, productive and manageable transport network.

Most public transportation terminals are lacking on the facilities and design so a significant task toward the matters is expected to guarantee the benefits for all [8]. The surrounding need to be accessible to the whole travellers either by the healthy or by the handicapped.

III. Methodology

A. *Approach*

Design of a research alludes to the real arrangement for the gathering and investigation of information. There are numerous elements that can be considered when picking a suitable method for a research. To determine the method of research, it relies upon the subject and the particular research question. A qualitative methodology is more proper when the researcher is attempting to comprehend and clarify an occurrence as opposed to find for outside reasons. What is more, qualitative research is more favoured research to pick because there were no statistical investigations included. On the other hand, quantification frequently mentions the observable fact more unequivocal and in alternate words, the vicinity of numbers makes it simpler for per-users to comprehend and to clarify facts, because numbers are countable. Therefore, this study proceeds with both qualitative and quantitative approach.

B. *Assessment*

To setup the assessment, the International Best Practice in Accessible Public Transportation for Persons with Disabilities was used as the guideline to assess the accessibility at each rail transit stations. The observations are conducted on all KTM and LRT selected rail transit stations and were evaluated based on these items:

- Pedestrian clearways
- Steps and stairs
- Ramps
- Lifts
- Escalators
- Handrails
- Tactile and visual guidance
- Platforms
- Information
- Ticket counter
- Ticket machine
- Ticket barrier
- Toilet

The facilities were assessed based on its availability, conditions, and measurements as stated in the International Best Practice in Accessible Public Transportation for Persons with Disabilities.

For station accessibility, each facilities that were follows the guideline as per stated in the International Best Practice in Accessible Public Transportation for Persons with Disabilities, a rating of ‘1’ will be given. On the contrary, if the facility does not meet the requirement, a rating of ‘0’ will be given. To calculate the score, rating for each facility obtained were sum up and divided by the full score which is 5. The score then is total up and divided by the full score which is 65 to find the percentage of the stations accessibility. While for the facility accessibility, to get the percentage, it is calculated using simple mathematics based on the score given for each facility at the station accessibility section.

C. *Questionnaire*

Before a questionnaire survey can be conducted, the number of sample size is first to be determined. This was done by using statistics based on Normal Distribution. Factors to be considered in the calculation are:

- Margin of error

- The margin of error is the amount of error that can be tolerated. Lower margin of error requires a larger sample size.

- Confidence level
  - The confidence level is the amount of uncertainty can be tolerated. Higher confidence level requires a larger sample size.
- Population size
  - How many people are there to choose the random sample.
- Response distribution
  - For each question, what are the expected results.

According to [3], in Malaysia the total number of disabled persons are 305,640 people. TABLE I further specify the number based on types of disability.

A total of 68 sets of questionnaires were distributed based on a 10 % margin of error, 90 % level of confidence and a response distribution set of 50 %. All numbers were computed using a computer program to estimate the questionnaire sample size calculator developed by Raosoft Incorporation.

In this questionnaire, a five points Likert scale ranging from "strongly disagree" to "strongly agree" is being used. The data were analysed by using two method. The first method used is the calculation method of analysis. In this method the mean score and the standard deviation of each element of accessibility on the rail transit stations were calculated based on the five points Likert scale and then correlation coefficient test was carried out to find out the relationship between safety when using rail transit and the overall satisfaction. For the second method, a graphical method of analysis is used. A one way-table plots was utilized because it is more simpler and easy to understand compared to two-way and higher-way table plots (cross tabulation).

IV. Results and Discussion

A. *Station Accessibility*

As shown in TABLE I, KTM's Kuala Lumpur station is the least accessible train station with 38.45% accessibility. Kuala Lumpur station have 2 entrance. The first entrance is on the station itself and another one is the entrance from LRT's Pasar Seni station. The assessment was done on the second entrance. This shows that they don't make both entrance accessible for the disabled. If there is disabled person who need to board the train at Kuala Lumpur station from Pasar Seni station, they need to go quite a long way. During the assessment, KTM's Kajang station area is under MRT construction and some of their facility is not available and inaccessible. Even though having MRT construction nearby, they provide a better accessibility than Kuala Lumpur station. On the other hand, the most accessible train station is LRT's Masjid Jamek station with 79.46% accessibility.

TABLE I. ACCESSIBILITY OF KTM AND LRT RAIL TRANSIT STATIONS

KTM		**LRT**	
Station	***Accessibility***	***Station***	***Accessibility***
Midvalley	63.40%	Masjid Jamek	79.46%
Bank Negara	52.75%	Pasar Seni	76.98%
Sungai Buloh	51.48%	Dang Wangi	68.02%
Kajang	45.52%	Kampung Baru	68.02%
Kuala Lumpur	38.45%	KLCC	65.18%
Average	**50.32%**	**Average**	**71.53%**

KTM stations is averagely 50.32% accessible by the disabled persons while for LRT (Kelana Jaya line), it is accessible averagely by the value of 71.53%. This result shows that LRT provide a better accessibility to the disabled persons despite both KTM and LRT have significantly low percentage of accessibility on their station.

Overall, it was found that the stations is only 61% accessible. This findings replicate the findings of [9] on access for disabled persons where the condition of the existing access and facilities for the disabled persons in Kuala Lumpur is unsatisfactory.

B. *Accessible Facility*

Based on the results shown in TABLE II, ticket counter is the least accessible facility for the disabled persons. It is only 10% accessible. Conversely, ticket machine and ticket barrier is perfectly designed for the disabled and 100% accessible.

TABLE II. ACCESSIBLE FACILITIES

Facility	**Percentage Of Accessible (%)**
Pedestrian clearway	90.00
Step and stair	73.44
Ramp	85.00
Lift	44.67
Escalator	83.30
Handrail	80.80
Tactile	50.00
Platform	76.68
Information	56.66
Ticket counter	10.00
Ticket machine	100.00
Ticket barrier	100.00
Toilet	41.42
TOTAL	**69%**

Overall, the accessible facilities provided for disabled persons between rail transit stations in Klang Valley are

calculated to be as 69%. As found by [10], efforts by the government bodies and huge demand of re-designing the current facilities are needed to increase the disabled persons accessibility in Malaysia.

C. *Questionnaire*

Among the respondent, half of them were having vision impairment and 20% of the respondent were having hearing impairment, and another 20% were having speech impairment and another 10% were having movement impairment.

Most of the respondent which answered the questionnaire are using rail transit as their mode of transportation for most of the time. 20% of respondents said they are seldom use the train to travel and the rest is equally distributed the frequency of using the train between frequently, sometimes and almost never.

Every facilities provided on the train station was rated as averagely accessible by most of the respondent. There are no facilities that was rated as very poor or excellent. However, some facilities like ticket counter and ticket barrier are left blank by some respondent in the questionnaire.

30% of respondents said they feels very safe when using train and the rest which representing the majority of the respondent said they feels moderately safe when using train as their transportation to commute and travel. None of the respondent feels extremely safe or not safe at all in choosing train as their transport.

The result shows that 50% of respondents said they are satisfied with the accessibility provided for them on the train stations while 40% respondents agree that they are neither satisfied nor dissatisfied. However, during the questionnaire answering, most of the respondents took a long time to answer this question which most probably because they have to settle down with the current accessibility provided for them even though the accessibility on the train station can be improved a lot more.

The format of the 5-point scale used on the accessibility rating are:

- 1 = Very Poor
- 2 = Poor
- 3 = Average
- 4 = Good
- 5 = Excellent

Correlation analysis is related in the sense that it deals with relationship among variables. The correlation coefficient is a measure of linear association between two variables. Values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that two variables are perfectly related in a positive linear sense, a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense, and a correlation coefficient of 0 indicates that there is no linear relationship between the two variables.

A correlation analysis between safety when using train and overall satisfaction was carried out to find out the relationship between these two variables. It is found that the strength of the correlation was 0.592. In statistics, it is generally accepted that the following scale can be used to estimate the strength of effect size:

For those who responded to this survey, higher safety scores were correlated with higher overall satisfaction scores, r=0.592, which can be considered as a large effect as stated in TABLE III. These findings were similar to the findings of [10].

TABLE III. GUIDELINE ON STRENGTH OF EFFECT SIZE

Correlation, r	Effect
r = +/- .10 to .29	Small
r = +/- .30 to .49	Medium
r = +/- .50 to 1.0	Large

Due to time constraint, there are not much response for the questionnaires that can be collected. 68 questionnaires was given out but less than half were given back. There is problem encountered in conducting the research questionnaire. Most of Malaysia's organisations for people with disabilities are no longer active. Moreover, some email addresses of the organisations are not in service. During a few contact with them through the telephone, some of them are not picked up and some picked up but said that they don't take any disable persons anymore into their organization.

V. Conclusion

The research findings shows that for both KTM and LRT train stations are accessible for the disabled persons by 61 % while the facilities for the disabled persons provided by KTM and LRT on their train stations are accessible by 69 %. It can be concluded that the condition of the existing accessibility and facilities for the disabled persons on rail transit stations around Klang Valley are moderate.

Based on the results obtained, comparing the accessibility between the rail transit stations, KTM's train stations is averagely 50.32 % accessible by the disabled persons while for LRT's train stations, it is accessible averagely by the value of 71.53 %. Between the 10 train stations assessed in this research, LRT's Masjid Jamek station is the most accessible rail transit station by the disabled persons and the least accessible rail transit station to the disabled persons is KTM's Kuala Lumpur station. As a conclusion, LRT is providing a better accessibility to the disabled persons.

To get more relevant findings, survey was conducted through distribution of questionnaires to the respondents which are disabled and using rail transit as mode of transportation and to a few national organizations for people with disabilities in Malaysia. This questionnaire is ought to get the disabled persons impression towards the accessibility provided for them on rail transit stations. This questionnaire will act as a supplementary data to support the primary findings. From the results analysis, even though the results shows that the disabled are satisfied with the accessibility provided for them, during the questionnaire answering, the

respondents were confused to choose between satisfied and neither satisfied nor dissatisfied. Based on the primary findings, it can be concluded that the disabled persons are neither satisfied nor dissatisfied with the accessibility provided for them on rail transit stations.

This research would significantly promote and enhance the public transport terminals for better value by focusing on the disabled friendly facilities and design, thus promote the friendliness atmosphere of the public transport terminals for better usage and accessibility. In Malaysia, the level of public transportation awareness on the issues of disabilities are still lacking behind other countries.

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