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ANALYSIS OF PASSENGERS' ACCESS AND EGRESS CHARACTERISTICS TO THE TRAIN STATION

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ABSTRACT

Nowadays, the expansions of train networks in Malaysia are dynamically developed. In the future, the railway networks are predicted to give the important role in the development of a sustainable transportation system in this country. Still, Malaysian is facing the challenge to improve the railway networks' reliability especially that relates with the accessibility to the train stations. Electrified Train Services (ETS) is the first high speed intercity train system in Malaysia. Until the end of 2014, Ipoh is the last stop for Electrified Train Services (ETS) for train that bound for Kuala Lumpur –Ipoh. Due to the increment numbers of the ETS users, the problem of access and egress the station keep on exists. This study is focused on the 1000 ETS passengers' in order to investigate their mode choice to access and egress the Ipoh Station. From the result, the majority of the users preferred to use private car for access (75.7%) and egress (79.6%) the train station. Taxi was the popular choice for public transportation compare to bus for both access (5.2%) and egress (12%). T-test analysis shows the significant different between the access and egress group in terms of travel distance from the origin location to the train station. This might be influenced by the factor of land use between Ipoh and Kuala Lumpur.

1. INTRODUCTION

In order to move from one point to another, factors such as travel time, convenience and cost effective are usually taken into account. The congestion that caused by the increasing numbers of private vehicles on the road has caused the evolvement of train network to ease the mobility. Moreover, the existence of the train networks not only promising the less traffic congestion on the road but also affecting the economic development either at the regional or the local level. In addition, the regional growth of a country may be stimulated if the transit system improves the productivity of the region [1]. Meanwhile local impacts around the stations may result if the train stations provide improved accessibility to locations of interest within the region. In order to bring forth the function of train system as well as to decrease the traffic congestion, effective accessibility is needed to be provided [2].

In the year of 2006, Electrified Train Services (ETS) was executed under the Eighth and Ninth Malaysia Plans in order to increase the operational efficiency of Keretapi Tanah Melayu Berhad (KTMB), as well as promoting the train service for freight transport and also as an efficient alternative for inter-city passenger movements in Malaysia [3]. The ETS has started fully operating since 2nd of August 2010 with eight Ipoh-Kuala Lumpur trips daily to and fro. The ETS service was divided into two types which was rapid trip (back and forth direct trip from Kuala Lumpur – Ipoh/Ipoh – Kuala Lumpur) and the trip that stop at every station along the bound. According to the Ministry of Transport Malaysia in 2012, it was found that there was an increment of 29.1% of ETS users between the year of 2011 and 2012. However, the train passengers were actually facing the problem to access and egress the ETS train station due to the lack of public transport that should be operated as feeder transport to the stations [4]. Due to this problem, the ETS users might have potential to reduce their intention to use the service and shift back to using their private vehicle. As a result, the congestion problem will continue to worsen.

Mode choice is described as an individual choosing among the available transportation modes for specific trip purposes or defined modal split or mode choice as the split (or share) of the trips made among different modes of travel [5,6]. There are many factors that have been claimed to be preferred to commute by using public transport in comparison to using private vehicles which were vice versa for men [7,8]. In addition, in terms of age, older people were found to have a higher tendency to use public transportation compared to younger people [9]. Furthermore, the high-income groups were claimed as most-likely to use private vehicle and less promote to use the public transport [10].

Besides, several studies agree to the fact that a car ownership is a significant factor that affecting the mode choice [7, 11- 13]. It is claimed that mobility to access longer distance is a privilege for those owning a car compare to people that must rely on slower mode of transportation such as public transport has become the concrete reason why people were likely preferred using private car. It also portrays why private cars are the second common (about 40%) of transport amongst the Malaysian [8].

Another important factor that found to give significant impact to mode choice is distance. It was found that when a household is within a walking distances, the probability of walking trips was increased [11]. It is vice versa for long distances travel in which the probability of using private cars were found to be increased [14]. Other finding also supported that the slow mode such as bike would also be less chosen for a larger distance trip [15]. For the case of accessibility to the train station in China, found that 84% of the respondents agreed that the distance was very important influencing factor that encouraged them to use passive mode [16].

Meanwhile, previous studies also claimed that accessibility is also a significant factor that affects the mode choice to travel [9,11,17]. It is also suggested that walking accessibility do influence the passengers to go to a train transit stop thus using it [18]. In addition, mismatched suburban residents have a higher tendency to use transit than their matched neighbours, in which many thought they have no other option (given the mismatch between the transit level of service available to them and, e.g., the location of their workplace and their lifestyle constraints) than to commute by personal vehicle [7].

It is also stated that possibility of changing to public transportation is high if the travel time reliability has improved greatly [19,20]. For example, people were actually preferred to use public transportation if the travel time is fast and sufficient [21]. In addition, travel cost is also claimed to play an important role to mode choice as his findings indicated that most travellers were to be receptive to changes in cost including the car users [13]. Meanwhile, in direct and cross elasticity analysis also showed different effects towards public and private transportation [21].

The focus of this paper is to investigate the access and egress characteristics of the ETS train station in order to understand the

passengers' need of feeder transportation system. This study can be used by the local municipal and authorities to design a strategic plan to upgrade the level of service for public transportation in the city.

2. MATERIAL AND METHOD

The aim of this study is to obtain the factors that affecting the passenger's mode choice to access ETS train station nailing on Ipoh KTMB train station for KL Central-Ipoh-KL Central route. Figure 1 shows the ETS route and the location of Ipoh train station.

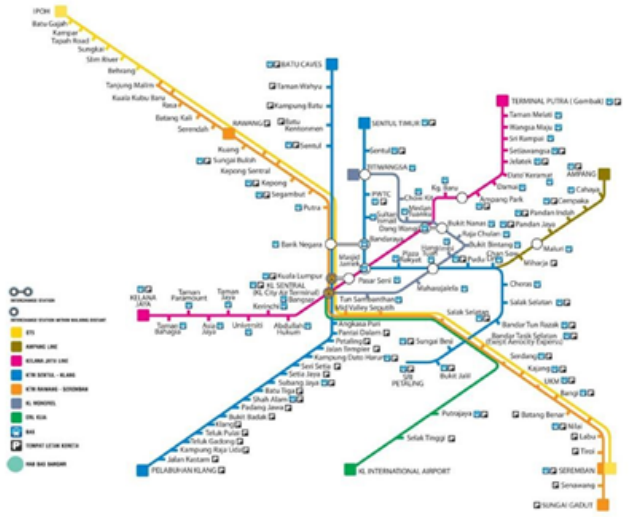

Figure 1: Train networking in Malaysia including ETS route and Ipoh train station.

Questionnaire survey is used as a method to collect the data. The respondents targeted were the passengers that cover a wide range of people that comes from various places and of different backgrounds. The respondents targeted were amounting to 1000 respondents. Data collection was done for one week dated 8th of February till the 15th of February 2014 avoiding public holidays as to avoid bias in the data. The questionnaire consisted of information such as vehicle ownership, sociodemographic information, travel information as well as the origin-destination information.

3. RESULT AND DISCUSSIONS

Table 1 shows the detail descriptive analysis of the respondents in this study. In this study, the respondents consist of 51% male and 49% female, 50.8% of the respondents were Malay, 28.8% were Chinese, 14.4% were Indian. Majority of the respondents were single with 62.3% while 36.7% were married. The working respondents mostly had an income ranged in between RM1000-RM3000 with percentage of 33.1% and the mean age was 25 years old. Moreover, majority of the respondents claimed that they owned private car with percentage of 52.9%, in comparison to owning a motorcycle with 17.9% and van/lorry with percentage of 1%. It is shown in this result that owning a car among Malaysian is the norm. For travel behaviour characteristics of the respondents, it shows that the frequent users of ETS's respondents resulting in 30.6% used of the ETS for 1-3 times per month, 9.8% for 1-3 times per week and 5.9% for 4 or more per week. The respondents who used the ETS for 4 or more per week were mostly the daily user of ETS. Out of all of the respondents in this study, 480 of them were the respondents who access the train station meanwhile 52% of them were the egress from the train station. Meanwhile most of the respondents prefer to be driven by for both access with a percentage of 54.2% and egress with a percentage of 72.7% respondents. This is due to the fact that there are limited parking spaces available which made the ETS users uncomfortable in leaving their car behind. Even so, there are also some that prefers to drive on their own, 21.5% for access respondents while 6.9% for egress respondents. Even though Malaysia has a high rate of motorcycle users only 5.2% (25) access respondents and 2.9% (15) chose to use motorcycle as their transportation mode to the KTMB Ipoh Train Station. This is due to the fact that motorcycle cannot carry a lot of stuff. For the respondents who have a lot of things in their possession at that time, the probability of them chose motorcycle as their transportation mode is very low.

Table 1: The Descriptive Statistic of the Respondents

Variables	Frequency	Percentage	Standard Deviation	Mean
Gender				
Male	490	49.0	0.500	1.51
Female	510	51.0		
Ethnicity				
Malay	508	50.8	0.913	1.76
Chinese	288	28.8		
Indian	144	14.4		
Others	60	6.050.8		
Age				
Under 15	10	1.0		
15 – 20	164	16.4		
21 – 25	276	27.6		
26 – 30	145	14.5		
31 – 35	67	6.7	2.971	5.02
36 – 40	61	6.1		
41 – 45	41	4.1		
46 – 50	47	4.7 4.1		
51 – 55	41	5.8		
56 – 60	58	8.7		
Above 60	87			
Monthly Income	175	17.5		2.92
< RM1000	331	33.1		
RM1000 - RM3000	135	13.5	1.449	
RM 3000 - RM 5000	121	12.1		
> RM5000	238	23.8		
No Income				
Vehicle Ownership	529	52.9	0.499	0.53 0.18
Car	179	17.9	0.384	0.01
Motorcycle	10	1.0	0.100	
Van/Lorry				
Frequency of Using ETS				
4 or more/week	59	5.9	1.040	3.46
1-3 times/week	98	9.8		
1-3 times/month	306	30.6		
< 6 times/year	396	39.6		
< 12 times/year	141	14.		

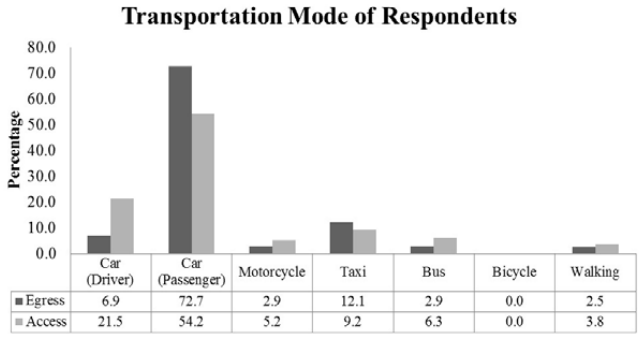

Figure 2: Percentage of mode preference for access and egress groups at Ipoh train station

Figure 2 shows the percentage of respondents' transportation mode. The usage of taxi is higher than the usage of bus in terms of public transportation. 9.2% of the access respondents and 12.1% of the egress respondents chose to use taxi in comparison to the bus. However, only 6.3% of access respondents and 2.9% of egress respondents chose bus as their transportation mode. The respondents that chose taxi to bus are due to the fact that some busses do not go into their residential areas. There are also those that prefer taxi because of less travel time. 3.8% of the access respondent and 2.5% of the egress respondent walked to and from the KTMB Ipoh Train Station. Most of the respondents who went on foot were the tourists that go around sightseeing around the Ipoh town for a short travel distance. There were also some that came from a nearby hotel. Out of all transportation modes, the bicycle is the unpopular transportation mode in which none of the respondents chose it. The weather in Malaysia is the main reason for it. The hot weather restrains the road users in using bicycle which expose the user to the sunlight directly for a given time.

An independent sample t-test was conducted to compare the factors affecting mode choice for access and egress conditions as shown in Table 2. There are a few variables that were tested including age, monthly income, vehicle ownership, location of access and egress, origin and estination, travel distance, travel cost and travel time as

listed in the in Table 2. For socio-demographic factor of the respondents, there was not a significant difference in age for access (M=25.75, SD=9.848) and egress (M=25.08, SD=9.771) conditions; t (998) =1.105, p=0.269. These results suggest that age does not have an effect on factors affecting mode choice. However, by logic monthly income does affect the mode choice of passengers but the result shown otherwise. There was not a significant difference in monthly income for access (M=0.83, SD=1.92) and egress (M=2.94, SD=1.61) conditions; t(998) =-0.597, p=0.55.Vehicle ownership also does not give a significant difference for two types of modes, the car; access (M=0.5, SD=0.56) and egress (M=0.5, SD=0.5) conditions; t(998)=1.66, p=0.097 and the motorcycle; access (M=0.4, SD=0.2) and egress (M=0.37, SD=0.16) conditions; t(998)=1.665, p=0.096. The van/lorry however resulting in significant difference in the factors affecting for access (M=0.11, SD=0.01) and egress (M=0.09, SD=0.01) conditions; t(998)=0.763, p=0.005. The results obtained indicate that van/lorry ownership does have effect on factors affecting mode choice. Trip characteristics such as the location of origin and destination was not a significant difference for access (M=1.24, SD=0.25) and egress (M=1.17, SD=0.377) conditions; t(998)=0.777, p=0.437. The result indicates that the location of origin does not affect the passengers' mode choice. Origin and destination of accessing and egressing train station was tested and results is not a significant difference. For access (M=1.24, SD=0.596) and egress (M=1.4, SD=0.754) conditions; t(998)=0.636, p=0.525 which suggests that the origin and destination does not affect the passengers' mode choice. The travel distance however shows a slight significant difference in which the p-value is less than 0.1. For access (M=4.49, SD=1.446) and egress (M=4.16, SD=1.417) conditions; t(998)=-1.69, p=0.09. There was not a significant difference in travel cost for access (M=1.87, SD=1.039) and egress (M=1.02, SD=1.83) conditions t(998)=-1.57, p=0.115 which indicates that travel cost does not affect passengers' mode choice. There was not a significant difference in travel time for access (M=2.12, SD=0.931) and egress (M=4.47, SD=1.628) conditions; t(998)=-1.17, p=0.241. These results indicate that the travel time was not a significant difference to factors affecting passengers' mode choice.

Table 2: T-test Analysis between Access and Egress group at Ipoh Train Station

Variable	Access		Egress		t-stat	p-value
	SD	Mean	SD	Mean		
Age	25.75	9.85	25.08	9.77	1.11	0.27
Monthly income <RM1000 RM1000-RM3000 RM3000-RM5000 >RM5000 No income	0.83	1.09	2.94	1.46	-0.60	0.55
Vehicle ownership Car Motorcycle Van/Lorry	0.50 0.40 0.11	0.56 0.20 0.01	0.50 0.37 0.09	0.50 0.16 0.01	1.66 1.67 0.76	0.10 0.10 0.01
Location Ipoh Outside Ipoh	1.24	0.425	1.17	0.377	0.777	0.437
Origin and destination: House Office Others	1.24	0.596	1.4	0.754	0.636	0.525
Travel distance from origin to train station <500m 500m-1km 1km-5km 5km-10km 10km-20km 20km-50km 50km-100km >20km	4.49	1.446	4.16	1.417	-1.696	0.090
Travel cost to access and egress: <RM5 RM6-RM10 RM11-RM20 RM21-RM50 RM51-RM100 >RM100	1.87	1.039	1.02	1.830	-1.577	0.115
Travel time to access and egress: <10min 10-30mins 30mins-1hr 1-2hrs >2hours	2.12	0.931	4.47	1.628	-1.173	0.241

4. CONCLUSION

This study is aimed to investigate the characteristics of passengers at intercity rapid train station in terms of access and egress the station. Most of the users of ETS in this study were at the average age of 25 years old with an income ranged between RM1000-RM3000 with a percentage of 33.1%. From this study, it also can be concluded that ETS passengers were likely to ask either their friend or family to send or fetch them at the train station. Other regular mode of transport that also being used as the feeder transport to train station were car (self-drive), motorcycle, taxi, bus and small proportion of walking.

Among the factors that were tested through T-test analysis for both groups of access and egress, the study found that only travel distance showed the significant different. It shows that the access and egress groups were likely to have different locations either to start or to end the journey to/from the train station. Even though travel time and travel cost were found to be not significant different in this study, in order to prepare and plan the feeder transportation system for the train network in Malaysia, both variables are still suggested to be considered. Numerous of planning has been made in order to improve Malaysia's public transportation to international level. The strategies have to be executed properly to get what we yearn for. These strategies were able to be made through proper research. To further enhance the data obtained from this study, a further research and extra respondents should be taken in getting more accurate results.

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