A preliminary survey on mode choice and its effect in users’ satisfaction on their journey to the railway station

Nur Fahriza Mohd Ali1,2*, Ahmad Farhan Mohd Sadullah3 and Adnan Zulkiple4
1Pusat Pengajian Kejuruteraan Awam, Kampus Kejuruteraan, Universiti Sains Malaysia, 14300 Nibong Tebal, Pulau Pinang, Malaysia
2Innovative Manufacturing, Mechatronics & Sports Laboratory (iMAMS), Fakulti Kejuruteraan Pembuatan, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia
3Pejabat Naib Canselor, Aras 6, Bangunan Canselor, Universiti Sains Malaysia, 11800 USM, Pulau Pinang, Malaysia
4Fakulti Kejuruteraan Teknologi, Block A2, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26600 Gambang, Kuantan, Pahang, Malaysia

E-mail: fahriza90@gmail.com

Abstract. This paper focuses on two lines of investigation with regard to mode choice to Klang Komuter Station. Firstly, the profile of the access modes on journeys to the railway station is analysed. Secondly, the relationship of users’ mode choice towards overall perception on traveling from home to the railway station is estimated. The data collection was conducted via Revealed Preferences / Stated Preferences (RP/SP) Survey. Meanwhile, the analysis that was implemented in this study was correspondence analysis. This paper discussed more on journey purposes and the effects of distances from home to the railway, users’ trip purposes and travel time between car and bus that was found to have an important effect on the users’ mode choice and their satisfaction on their journey to the railway station. The results show that users were more satisfied to reach the station by car instead of the bus.

1. Introduction
Vehicles and transportation play a significant role owing to the increase in the development rate of our country. An efficient transport network is essential for a developing nation as economic activities apart from others are dependent on it. Ample accessibility and efficient transport systems can increase the productivity, social opportunities, as well as provide economic benefits through better accessibility to markets, additional investments and employment.

A railway journey has been always a part of a journey chain that includes different modes of transport to access and later from the railway station. It is necessary to ensure that door-to-door journey is implemented when using rail in order to achieve a continuous travel by integrating the modes involved in railway journey. Therefore, railway journey will be seen as a feasible and attractive alternative which more users urged to move out from cars. Integrated and efficient modes play an important role towards users’ satisfaction as they are commuting from their respective point of origin to reach their desired destination.
The railway is an alternative mode to avoid road congestion during morning peak hour. Traffic congestion is not supportive towards transport mobility. Congestion can be defined as the slow movement of transports on the road when there are hindrances along the road that force the vehicles to move below their speed limits. In other words, traffic congestion is a condition of road networks due to the increasing demand among users and is characterized by longer trip times, slower speeds, and additional in vehicles queuing along the road. The traffic condition was affected by the number of cars crowding on the roads which these cars slowing down the traffic movement [1] and [2]. As identified by [3] the congestion leads to the increase of travel time in a journey from an origin to destination. Travel time may become more variable and unpredictable as congestion increases. This situation causes the travel time is difficult to be predicted while commuting during morning peak hour. In addition, the new Park and Ride under government’s project near to the Klang Komuter Station have been forecasted to increase the number of cars coming to the town and coincidentally making the traffic congestion worse. Thus, this study explained what causes users to choose cars instead of the bus during morning peak hour and the information revealed can help the government to develop a strategy that can help users in making decisions either to choose bus or car in order to reach their destination.

Travel time consists of walking time, waiting time, and in-vehicle time. The combinations of these components affect the travel time of a transport either it will increase or decrease. The integration of these components is significantly important to achieve door-to-door travel. According to [3], a continuous travel from home is essential to ensure that public transport is viable and attractive mode instead of a car.

Figure 1. Travel time consists of waiting time, walking time, and in-vehicle time.

The importance in attracting users to switch their mode of transport from car to bus during morning peak hour is to ensure that they will have a more quality of life, including healthy lifestyle (reduce stress), a proper time management (avoid road congestion) as well as to promote sustainable transportation.

2. Literature Review

2.1. Revealed Preference / Stated Preference Survey (RP/SP) Survey
The result of Stated Preference (SP) survey is used to assess how respondents’ choices vary to different hypothetical situations. SP is a survey technique deal with measuring and understanding the preferences underlying people’s stated choices; based on how they react to hypothetical situations. In this research, respondents are introduced with choices between hypothetical but realistic alternatives, with each alternative being described in terms of their characteristics or “attributes”. As noted above, the most common type of questions is, where the respondent is asked to choose, rank or rate different alternatives based on their attributes (e.g., travel time, travel cost, and wait time), thus giving information on the basis of the choice is made. For a choice-based SP survey is aiming to get a choice on the preferred alternative. In a ranking experiment, the respondent has to rank the alternatives in order of preference.
In a rating experiment each alternative must be classified using a scale which measures its attractiveness to the respondent. In general transportation planning, the purpose of surveys is meant to capture users’ current travel behaviour. For instance, a survey is conducted to get data regarding the actual mode a user is using, actual travel times, destinations, and so forth. This is known as Revealed Preference (RP) data, as the user is currently experiencing that behaviour and making a choice based on his or her knowledge of the available travel options. Revealed preference (RP) survey is a method of analysing choices made by users, such as for comparing preferred mode choice to reach Klang Komuter Station. This survey focused on assumption that the preferences of users on mode choice can be revealed by their journey purposes. Revealed preference survey tries to understand the preferences of a user among mode choices, while users were trying to reach the railway station during morning peak hour. For instance, if the users preferred to drive cars to reach the railway station instead of taking a bus, where both modes are available to commute them, it is revealed that users directly prefer cars instead of a bus. However, there might be other factors that involved users’ preferences towards their mode choice.

2.2. Correspondence analysis

Correspondence analysis is a descriptive/exploratory technique designed to analyse simple two-way and multi-way tables containing some measure of correspondence between the rows and columns. Correspondence analysis is applied to contingency tables (i.e. cross-tabulations). Its primary goal is to transform a table of numerical information into a graphical display, in which each row and each column is depicted as a point. In a typical correspondence analysis, a cross-tabulation table of frequencies is first standardised, so that the relative frequencies across all cells sum to 1.0. One way to state the goal of a typical analysis is to represent the entries in the table of relative frequencies in terms of the distances between individual rows and/or columns in a low-dimensional space.

2.3. Mode choice

Mode choice analysis is the third step in the conventional four-step transportation forecasting model. The four steps, in order, are trip generation, trip distribution, mode choice analysis, and route assignment. Mode choice analysis allows the respondents or users to determine their preferred mode of transport that will be used, and the results of modal share.

2.4. Waiting Time

Waiting time is one of the travel time’s components that is well known as the most influential factor in opting for bus as users have to reach their workplace at a stipulated time. As long as the performance of services for public transportation increases by reducing the travel time of the bus, users will be triggered to shift from cars to bus for their daily journey. Besides, the provision of bus should promise door-to-door approach from home to the station. According to [4], it can be concluded that modal shift to public transports can be promoted by increasing the number of public transport that consequently reduce the waiting time at the bus stop; therefore, enabling the users to reach their destination in time. Another research carried out by [5] founds that waiting time is the most arduous component of the public transport travel time. The increasing in waiting time at the bus stop is the factor that urges users away from public transport. [5] Walker (2009) added, according to a study by [6] on the implementation of two modes which are trams and buses, the trams are practically evermore frequent than buses. Therefore, [5] Walker (2009) creates a concept of “frequent bus service” which is by increasing the bus frequency can reduce the waiting time for public transport.

2.5. In-vehicle time

In-vehicle time is also known as sitting time in a transport from initial point to the final point. Typically, although travellers "dislike" all time spent travelling, they dislike walking and waiting parts of the journey more than in-vehicle journey time, and thus would be willing to pay more to avoid them. The
first study in Britain to estimate walk and wait time values was that of [7]. He found that, “walking and waiting times are worth between two and three times in-vehicle time”.

2.6. Walking distance
According to [8], a station will be more accessible if there are other transit interchanges such as buses, light rail transits or monorails because the distance that passengers need to walk will be less. For example, a bus stop that is located far away from home can be inconvenient for those who do not have other transportation that brings them to the bus stop. Furthermore, with the assistance of shuttle car services or feeder bus will eventually reduce users’ walking distance as well as users’ travel time from home to the station.

As proven by [8], public transport accessibility is associated with a certain number that is highly related to walking distance or walking time. Walking accessibility is defined as how easy it is for users to access bus stops by the mode of walking [8]. Walking is well known as a green and main mode for a user to access public transport. According to [8], walking and public transportation interrelated; which a proper and attractive walking conditions are necessary for pedestrians to use public transport, since most public transport requires users to walk at one or both ends of their trips. The research carried out by [8], agreed that 500 meters is the accessible walking distance which users are willing to access to the bus stop or to the Klang Komuter Station since Malaysia is a hot-climate country. Whereas, [9] also supported that walking distance that can be tolerated by users is a maximum of 500 meters.

2.7. Summary
From the literature, it can be summarized that this research paper focus on users’ mode choice in order to reach Klang Komuter Station from home and the main characteristics of the users. The analysis also reveals the factors that influenced users’ mode choice to access railway station and how this will affect their satisfaction on the journey from home to the railway station.

3. Methodology
3.1 Origin-Destination (OD) Survey
The data for OD Survey was collected at Klang Komuter Station. The Klang Komuter Station is a unique Traffic Analysis Zone because of the Park and Ride Station is built in the town center, which is against the norm where Park and Ride is located outskirt of the town. Therefore, it will encourage users to bring along their cars when traveling to the station.

The reliability of an O-D Survey results depends on its sampling scheme and sample size. The O-D Survey was conducted by randomly select 500 respondents who are willing to fill the O-D Survey form. The respondents who are selected to fill the forms should be from different gender, race, and age. The collection of the sampling data was done throughout the normal working days, from 7 AM and 7 PM. The OD Survey is also important to investigate which route heading to the Klang Komuter Station is highly congested due to cars crowding on the road during morning peak hour.

3.2 Revealed Preference / Stated Preference Survey (RP/SP) Survey
The data was taken among users of Klang Komuter Station during weekdays morning peak hour from 7 AM until 9 AM. The users were categorized into five (5) journey purposes which are working, studying, visiting, shopping, and banking etc.

The relationships of journey purposes with parameters including preferred waiting time (PreferredWT), preferred walking distance (PreferredWD), preferred in-vehicle time (PreferredIVT) between bus and cars, rating towards travel time between bus and cars, and distance from users’ home to the Klang Komuter Station were investigated. These five (5) aforementioned parameters were selected for this preliminary survey in order to give a basic overview on the factors that affects users’ mode choice and their satisfaction on the journey from home to the railway station.
4. Results

4.1 O-D Survey results
The survey site has been divided into 8 zones to facilitate the process of categorization of users from each origin.
The study area was divided into ten zones which are zone 1 (route from Port Klang to Klang Town), zone 2 (route from Banting to Klang Town), zone 3 (route from Taman Sri Muda to Klang Town), zone 4 (route from Lebuhraya Persekutuan to Klang Town), zone 5 (route from Klang Sentral to Klang Town), zone 6 (route from Kapar to Klang Town), zone 7 (1000 meters radius with center of Teluk Pulai Komuter Station), zone 8 (1000 meters radius with center of Klang Komuter Station), Zone 9 (1000 meters radius with center of Bukit Badak Komuter Station), and the last was zone 10 (the KTM Komuter route heading to Kuala Lumpur Central from Klang Komuter Station). Whereas, the routes that heading to the station can be listed as zone 1, 2, 3, 4, 5, and 6, which some of them have to cross the Klang Town in order to reach the station.

Figure 4 shows ten origins of Klang Komuter users. The highest number of users (38%) comes from Zone 8 which locates the Klang Komuter Station. The second highest (14%) comes from Zone 3 whilst the third highest (14%) come from Zone 10. Then, the result is followed by users come from Zone 4 (12%) and Zone 2 (9%). Meanwhile, the rest of the users come from Zone 6 (6%), Zone 1 (4%), Zone 7 (1%) and Zone 9 (0%).
5 (3%) and Zone 7 (1%). Finally, users come from Zone 9 only consists of one user. Hence, from this investigation, Zone 3 is selected for this study as most of Klang Komuter users come from this route to Zone 8.

4.2. Revealed Preference/Stated Preference (RP/SP) Survey by using Correspondence Analysis

The respondents for Revealed Preference/Stated Preference (RP/SP) Survey is consists of users from Zone 3 (OD Survey). The total respondents of RP/SP Survey are 252 users. The number of female users (142 users) at the Klang Komuter Station is higher than male users (110 users). The survey is conducted during morning peak hour from 7 AM until 9 AM and the users are chosen from the origin of Zone 3. Most of the female users are ferried by their husband to the station. This is possibly because the husband and wife are working in different workplaces; therefore, they would like to reduce the travel cost by implementing carpooling.

4.2.1. Modal split of male users. The split of male users and their mode to reach the Klang Komuter Station were found that car users (87%) are higher than bus users (13%). This research believes that the majority of male users prefers to drive to reach the Klang Komuter Station as they are concerned regarding the travel time from home to the station. In addition, if they happen to opt the bus service, they must wait for bus arrival at the bus stop which will consume plenty of their time. Although car users have to undergo the traffic congestion to reach the railway station, most of them are satisfied with the driving since they are more flexible and can travel at any time they preferred.

4.2.2. Modal split of female users. Meanwhile, the split of female users and their mode to reach the Klang Komuter Station can be found that only 12% of female users commute by bus to reach the station, conversely, 88% of female users commute by cars. The result also suggests an increase of car users and a decrease in bus users among females. This research believes that the majority of female users prefers to drive to reach the Klang Komuter Station since they are concerned about the travel time from home to the station as well. Also, if they commute by bus, they must wait for bus arrival at the bus stop which will consume a lot of their time too. It would be detrimental to them if they arrive at their workplace late as there are rules of the company that they must adhere to. Although car users consequently experience traffic congestion to reach their workplace, many of them are still satisfied with the driving as they are more flexible and can leave for work at any time they prefer. In addition, some of them happen to feel even better for having their own privacy whilst driving. As compared to female, male users seem more likely to commute by bus for working, perhaps they can relax and avoid traffic congestion, especially during morning and evening peak hours.

4.2.3. Journey purpose during morning peak hour. The highest journey purpose of Klang Komuter users during morning peak hour is for working which consists of 47% of users. The second highest journey purpose of Klang Komuter users is for studying (35%); meanwhile, the third highest is for visiting (10%). After that, it is followed by banking (6%). Lastly, the lowest journey purpose of Klang Komuter users is shopping, which consists of 2% of users. As a conclusion, the Klang Komuter is opted by the majority of users as a transportation hub for working and studying during normal weekdays from 7 AM until 9 AM. Hence, the aim in opting the commuter to reach the workplaces, schools, and universities is to avoid congestion on the road during morning peak hour.

4.2.4. Distances from home to Klang Komuter Station. The distances from home (Zone 3) to the Klang Komuter Station were grouped into five categories viz. less than or equal to 5 km, 6 km to 10 km, 11 km to 15 km, 16 km to 20 km, and 20 km above. The distance of the highest number of Klang Komuter users comes from less than or equal to 5 km (150 users), followed by 85 users that travel about 6 km to 10 km. Then, there are 9 users, which the distance from home is between 16 km to 20 km. The result is followed by 6 of users, which the distance from home is more than 20 km. Meanwhile, the lowest number of Klang Komuter users is only two users with the distance is between 11 km to 15 km from home to Klang Komuter Station.
4.3. Correspondence Analysis

This study used the combination of Revealed Preference/Stated Preference (RP/SP) Survey to investigate users’ preference on transport mode choice. The survey has been analysed by the Correspondence Analysis to reveal the relationship between journey purposes and their preferences. The results are important for the government and service provider to plan for better facilities in order to improve time consumption for each stage of a trip from home (origin) to the station (destination).

Table 1. Correspondence table of the journey purposes and preferred waiting time.

| Journey Purpose | Preferred Waiting Time (PreferredWT) | 1 < 5 min | 2 6-10 min | 3 11-15 min | 4 16-20 min | 5 21-25 min | 6 26-30 min | 7 31-40 min | 8 > 40 min | Active Margin |
|-----------------|-------------------------------------|----------|-----------|------------|------------|------------|------------|------------|------------|--------------|
| 1 Work          |                                     | 69       | 49        | 0          | 0          | 0          | 0          | 0          | 0          | 0            |
| 2 Study         |                                     | 0        | 18        | 46         | 23         | 2          | 0          | 0          | 0          | 89           |
| 3 Visit         |                                     | 0        | 0         | 0          | 1          | 6          | 18         | 1          | 0          | 26           |
| 4 Shopping      |                                     | 0        | 0         | 0          | 0          | 0          | 0          | 8          | 4          | 12           |
| 5 Banking, etc. |                                     | 0        | 0         | 0          | 0          | 0          | 0          | 7          | 7          | 7            |
| Active Margin   |                                     | 69       | 67        | 46         | 24         | 8          | 18         | 9          | 11         | 252          |

From Table 1, users with working purpose show the highest tendency towards preferred waiting time for bus arrival at the bus stop which is less than 5 minutes. Meanwhile, for the study purposes, the tendency towards preferred waiting time for bus arrival at the bus stop is within 11 to 15 minutes. The users with visiting purpose tend to wait for bus arrival within 26 to 30 minutes while for shopping the tendency towards preferred waiting time for bus arrival at the bus stop is within 31 to 40 minutes. Lastly, the purposes of the users’ journey of banking and other activities have a tendency towards preferred waiting time for bus arrival at the bus stop more than 40 minutes. It is apparent that time management is greatly important for those users with working purposes since they have to make their arrival at working place punctually. As a consequence of not having the provision of a bus that meets their needs, the users choose to make their journey by cars.

Table 2. Correspondence table of journey purposes and preferred walking distance.

| Journey Purpose | Preferred Walking Distance (PreferredWD) | 1 ≤100 m | 2 101-150 m | 3 151-200 m | 4 201-250 m | 5 251-300 m | 6 301-350 m | 7 351-400 m | 8 401-450 m | 9 451-500 m | 10 >500 m | Active Margin |
|-----------------|------------------------------------------|----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------|--------------|
| 1 Work          |                                     | 96       | 22          | 0           | 0           | 0           | 0           | 0           | 0           | 0          | 118       |              |
| 2 Study         |                                     | 0        | 33          | 21          | 19          | 16          | 0           | 0           | 0           | 0           | 0         | 89          |
| 3 Visit         |                                     | 0        | 0           | 0           | 3           | 5           | 8           | 5           | 5           | 0           | 0         | 26          |
| 4 Shopping      |                                     | 0        | 0           | 0           | 0           | 0           | 0           | 3           | 9           | 0           | 0         | 12          |
| 5 Banking, etc. |                                     | 0        | 0           | 0           | 0           | 0           | 0           | 0           | 7           | 7           | 0         | 7           |
| Active Margin   |                                     | 96       | 55          | 21          | 19          | 19          | 5           | 8           | 5           | 8           | 16       | 252         |

From Table 2, the highest number of users preferred walking distance to the bus stop at less than or equal to 100 meters for working purpose. Meanwhile, for the study purposes, the tendency towards preferred walking distance to the bus stop is within 101 to 150 meters. The purpose of the users’ journey which is for visiting has a tendency towards preferred walking distance to the bus stop within 351 to 400 meters while for shopping purposes, the tendency is more than 500 meters. From the correspondence analysis, it can be understood that users with working purposes were more likely to punctually arrive at their working place. Therefore, users would not likely to spend their time on walking which they end up choose cars as their preferred mode.
Table 3. Correspondence table of journey purpose and preferred delay of travel time between bus and cars.

| Journey Purpose | Delay of Travel Time | Active Margin |
|-----------------|----------------------|---------------|
|                 | < 5 min | 6-10 min | 11-15 min | 16-20 min | 21-25 min | 26-30 min | 31-40 min |
| 1 Work          | 32      | 68       | 18        | 0         | 0         | 0         | 0         | 118       |
| 2 Study         | 0       | 0        | 46        | 25        | 18        | 0         | 0         | 89        |
| 3 Visit         | 0       | 0        | 0         | 0         | 21        | 1         | 4         | 26        |
| 4 Shopping      | 0       | 0        | 0         | 0         | 0         | 4         | 8         | 12        |
| 5 Banking, etc. | 0       | 0        | 0         | 0         | 0         | 2         | 5         | 7         |
| Active Margin   | 32      | 68       | 64        | 25        | 39        | 7         | 17        | 252       |

From Table 3, the purpose of the users’ journey which is working has the highest tendency towards the preferred delay of travel time between cars and bus within 6 to 10 minutes. Meanwhile, for the study purposes the tendency towards the preferred delay of travel time between cars and bus within 11 to 15 minutes. The purpose of the users’ journey which is visiting tends towards preferred delay of travel time between cars and bus within 21 to 25 minutes while for shopping purposes the tendency towards preferred delay of travel time between cars and bus is within 31 to 40 minutes. From the correspondence analysis, it can be understood that users with working purposes will accept the delay of travel time between bus and car no later than 15 minutes.

Table 4. Correspondence table of journey purpose and users’ view towards car’s travel time.

| Journey Purpose | Rating towards Travel Time | Active Margin |
|-----------------|----------------------------|---------------|
|                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |   |               |
| 1 Work          | Strongly agree | Agree | Somewhat agree | Neither agree / disagree | Somewhat disagree | Disagree | Strongly disagree |   | 118 |
|                 | 89 | 29 | 0 | 0 | 0 | 0 | 0 |   |               |
| 2 Study         | 0 | 53 | 27 | 9 | 0 | 0 | 0 |   | 89 |
| 3 Visit         | 0 | 0 | 2 | 13 | 11 | 0 | 0 |   | 26 |
| 4 Shopping      | 1 | 0 | 0 | 0 | 7 | 2 | 2 |   | 12 |
| 5 Banking, etc. | 0 | 0 | 0 | 0 | 0 | 6 | 1 |   | 7 |
| Active Margin   | 90 | 82 | 29 | 22 | 18 | 8 | 3 |   | 252 |

From Table 4, the purpose of the users’ journey which is working has strongly agreed that the travel time of a car is lower than a bus. Meanwhile, for the study purposes, the users agree that travel time of cars is lower than bus. The purpose of the users’ journey which is visiting were neither agreed nor disagree that travel time of a car is lower than bus while for banking and other activities purpose, the users disagree that travel time of cars lower than a bus. From the corresponding analysis, it can be understood that users with working purposes agree that travel time of a car is lower than a bus; therefore users most attracted towards cars than the bus as their main mode to reach the destination. The results indicated that the improvement towards bus provision is important to ensure that users were attracted to choose bus instead of a car as their mode choice.
Table 5. Correspondence table of journey purposes and distance from users’ home to the Klang Komuter Station.

| Journey Purpose | Distance | 1 | 2 | 3 | 4 | 5 | Active Margin |
|-----------------|----------|---|---|---|---|---|--------------|
| Work            | ≤5 km    | 118| 0 | 0 | 0 | 0 | 118          |
|                 | 6 -10 km | 32 | 57| 0 | 0 | 0 | 89           |
|                 | 11 -15 km| 0 | 26| 0 | 0 | 0 | 26           |
|                 | 16 - 20 km| 0 | 2 | 2 | 5 | 3 | 12           |
|                 | >20 km   | 0 | 0 | 0 | 4 | 3 | 7            |
|                 | Active Margin | 150| 85| 2 | 9 | 6 | 252         |

From Table 5, the distance for working purposes from home to Klang Komuter is less than or equal to 5 km. Meanwhile, for study purposes, the distance from home to the station is within 6 to 10 km while for shopping purposes, the distance from home to Klang Komuter within 16 to 20 km. From the correspondence analysis, it can be understood that those users (especially workers and students) who come to the station during morning peak hour live near to the station (less than or equal to 5 km and within 6 to 10 km). It can be concluded that most users who were getting to the railway station are those who live near to the station between 5 to 10 km or less than such distance. Therefore, the improvement in accessibility and to reach the station is necessary to ensure that users are satisfied with their journey.

4.4. Findings from Revealed Preference/Stated Preference (RP/SP) Survey
Revealed Preference/Stated Preference (RP/SP) Survey can be applied to investigate users’ preference on transport mode choice, especially in travel time aspect, as focused on this study. The results also can help the government to establish a future strategy for better facilities in order to improve the time consumption for each stage of a trip from home (origin) to the station (destination). In addition, the results from RP/SP Survey also can help the service provider to gain information on bus travel time compared to a car; therefore, they can make some improvement in the provision of bus services. Hence, users will find that bus is way more attractive than the car in term of travel time.

5. Discussion
The result from this study shows that commuting to work and journeys to schools or studies are the main reasons for traveling during weekdays, meanwhile non-work and non-studies journey purposes account for about one-fifth of the journeys. The access from home to the station profile is different for those who live up to 5 km from the station and those who live further away. Distance from home to the station affects the journey purposes of users during morning peak hour. The number of workers is the highest (refer Table 5) compare to other journey purposes for distance up to 5 km from the station. According to [10], the research found that the demand for inter-city rail travel is relatively high elasticity of demand with respect to the distance from home to the station. Therefore, they suggest that the access to the station can be improved by lowering the distance which can attract more users. The fact that shows from this study is in line with the previous study which most of the users (150 users) were origin from below to 5 kilometers to the Klang Komuter Station. Railway stations are usually located relatively far from housing area which getting to the station has become a great issue to be discussed by the service provider and government as well in order to increase the number of rail users. Therefore, a systematic and convenient public transport especially bus should be well provided in order to attract users to choose bus instead of car while travelling to the railway station.

As expected, journey purposes affect the mode choice, it appears, mainly when the highest number of users (refer Table 4) with working purpose strongly agree that cars is more accessible and faster to reach the train station as compared to a bus. The park and ride is provided near to station which motivates the workers to bring along their cars to the station. Some of the workers and students also agree that traveling by cars is faster and accessible than a bus since they can manage their travel time and arrival time at the
final destination as well. However, a few of the respondents that preferred car as their travel mode revealed that they were fetched by family members or by carpooling in order to access the rail station. According to [13], the accessibility of a station might perform as an important element in determining either railway is chosen as a travel alternative. Meanwhile, [11] added that access and egress to the railway station should exceed an absolute maximum threshold or users will not use the public transport system. An improvement towards current travel time for a bus is necessary to ensure users’ satisfaction while traveling by bus to reach the railway station. Thus, users will be triggered to choose bus as their main mode instead of car which is absolutely will help in overcome user’s problem especially traffic congestion while making their way to reach working place during peak hour.

Besides, the users surveyed with working purposes are most likely to consider to commute by bus if the difference of travel time between bus and car is between 6 to 10 minutes or at least less than 15 minutes (refer Table 3). This situation might happen since workers have to reach their working place punctually or they will be in trouble if they arriving late at their office. As compared to students, their timetable might be flexible which they can compromise with the larger gap of travel time between bus and car. Furthermore, economical factor or that a car is not available to them so that it might affect towards their decision in considering bus as their mode choice to commute from home to the railway station. Therefore, a campaign or scheme to attract more students to choose bus should be considered since it is noticeable that when free public transport was offered for students, it will lure those who currently use cars to move out from it. Thus, this method is positively improving the public transport that connected to the railway station.

Meanwhile, the research shows that journey purposes affect the willingness of the users to reach bus stop or railway station since the users surveyed are less likely to walk to the station. Apparently, most users with working purposes will only consider walking for about 100 meters or less in order to reach the bus stop or to the railway station (refer Table 2). Compare to other studies in which was conducted in Netherlands by [12], the result shows that the access-environment is materializing into an access to station profile that is dominated by walking, bicycling, and public transports. An assumption that can be made regarding this situation is due to factors such geography and hot weather which are unconducive to attract users to reach the bus stop or station by walking. According to the results presented, it is suggested to the service provider or government to provide more convenient facilities such as walking pedestrian with rooftops so that users will be more interested to walk while commuting to the bus stop or railway station.

Lastly, journey purposes seem to give a great impact towards preferred waiting time at the bus stop. Most workers (refer Table 1) are willing to wait for bus arrival at the bus stop less than 5 minutes. This analysis clarifies that the reasons of slow traffic movement during morning peak hour is due to the majority of users bring along their cars to reach their destination since waiting time at the bus stop is usually unpredictable. Therefore, it is crucial to provide bus services that meet users need to lure those users move out from their cars. Further studies should be conducted to investigate the factors that influence users preferred waiting at the bus stop, either due to inconvenient facilities, safety, the bus schedule or else. Waiting time is one of travel time components that is important to be well managed in order to attract users to switch mode from cars to a bus.

6. Conclusion

The research found that there is a concrete reason for the users to choose cars instead of bus during morning peak hour. The travel time plays an important reason while users were making their decision on mode choice. Besides, those workers need to arrive punctually at their working place which becomes one of the main reasons that influences their decision making to choose cars as they can manage their travel time by driving their own vehicles.

References

[1] Stradling S., Meadows M. and Beatty S 2000 Helping drivers out of their cars Integrating transport policy and social psychology for sustainable change Transp. Policy 7 207–15
[2] Stephen P R 2004 Reducing road congestion: a reality check Transp. Policy 11 117–31
[3] Fosgerau M and Engelson L 2011 The value of travel time variance Transp. Res. Part B Methodol. 45 1–8
[4] KII M and HANAOKA S 2003 Comparison of Sustainability Between Private and Public Transport Considering Urban Structure IATSS Res. 27 6–15
[5] Walker 2009 11th conference on competition and ownership in land passenger transport Delft University of Technology (The Netherlands) 20-25 September 2009 How flexible should bus service be? frequent networks as a tool for permanent change 20–5
[6] Infrastructurist 2009 36 Reasons Streetcars Are Better Than Buses « CincyStreetcar Blog
[7] Quarmby D A 1967 Choice of travel mode for the journey to work: some findings J. Transp. Econ. Policy 273–314
[8] Din M A M, Karim M R and Saritha P 2006 The Aspect Of Walking Accessibility In The Development Of GIS-Based Transit System Modelling In Kuala Lumpur Int. Cartogr. Assoc.
[9] Matulin M, Bošnjak I and Šimunović L 2009 Different approaches to the modal split calculation in urban areas Conf. Proc. ICTS 2009 Transp. Marit. Logist. Sci. 1–7
[10] Wardman M and Tyler J 2000 Rail network accessibility and the demand for inter-urban rail travel Transp. Rev. 20 3–24
[11] Krygsman S, Dijst M and Arentze T 2004 Multimodal public transport: An analysis of travel time elements and the interconnectivity ratio Transp. Policy 11 265–75
[12] Givoni M and Rietveld P 2007 The access journey to the railway station and its role in passengers’ satisfaction with rail travel Transp. Policy 14 357–65
[13] Rietveld P 2000 The accessibility of railway stations: The role of the bicycle in The Netherlands Transp. Res. Part D Transp. Environ. 5 71–5