

# A Study on Factors Affecting the Utilization of Park-and Ride Facilities in Cheras

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**Abstract.** Public transports are convenient nowadays due to high technology and proper planning and the usage of public transport has been increasing steadily over the years. Most of the public transport stations are now integrated with park-and-ride facilities which allow users of the public transport to park their vehicle. The purpose of this study is to identify the factors affecting the utilization of park-and-ride facilities. Several factors have been identified to determine the underutilized of facilities such as safety concern and travel cost issues. Questionnaires have been distributed to collect data in order to analyze the pattern of consumer's behavior on the usage of park-and-ride facilities. This study reveals that majority of the population prefers using private cars instead of transiting between park-and-ride facilities and public transportations mainly due to purpose of their trip and safety issues. An improvement or refurbishment on park-and-ride facilities would be required to increase the utilization of the facilities and to give users assurance that utilizing the facilities was the right choice to be made.

## 1 INTRODUCTION

Kuala Lumpur and traffic congestion in the same sentence is never a strange thing. It is a major issue in Klang Valley. The World Bank predicts that Kuala Lumpur residents spend approximately '250 million hours annually' stuck in traffic and it has negative effect on the productivity of the country's economy [1].

The enormous amount of private vehicles additions every year indicates the economic power of the country but it has exceeded that extent in which our road network infrastructure could support [2]. The pace of private vehicles growth in the country is definitely not proportional to the road network infrastructure. Hence, it is causing all sorts of problems such as air pollution, noise pollution, increased delay time and mainly traffic congestion. The situation is aggravated when the public transportation utilization rate is declining as most of the civilians now could easily finance their private vehicles. Nowadays, the personal earnings are often used to finance the acquirement of private vehicles, it is usually cars or motorcycles, these vehicles are perceived as a necessity more than luxury now [3].

Regardless of the traffic congestion, some people still avoid using the public transit to travel. The people perceive public transit as an unreliable mode of transport because they are often not punctual and prone to delaying due to technical issues [4]. They would prefer to travel by own vehicles because it is more convenient, flexible and reliable in trip planning. Without surprise, only 17 percent of Kuala Lumpur commuters opt for

public transit, whereas in Singapore and Hong Kong is 62 percent and 89 percent respectively [1]. The high dependency on private cars is undoubtedly one of the major factors of traffic congestion; therefore it is very important to promote the usage of public transit [5]. To encourage people switching their mode of movement, the introduction of park-and-ride plays an important role. For instance, instead of driving all the way into the city, in which the road leading to city center is jammed up most of the time, they might choose to park their car at the train stations and take a short trip on the train. When park-and-ride facility is used effectively, surely the traffic flows on the road will be smoother.

Knowing that the current circumstances that people preferences of their own vehicles, the establishment of park-and-ride facility that complement train stations can have an impact on traveler's habit of driving all the way to their destinations. It cannot depend solely on the development of railway network alone such as increasing the stations and increasing connecting bus rides to curb the traffic congestion issues [6]. With the high demands of road usage, combining the use of both private and public transport as an integrated form of movement is surely the effective way forward to tackle traffic congestion issues.

Nonetheless, even with the park-and-ride scheme, there are still many external factors affecting people using the facility. For example, the infrastructure design of the facility, the travel cost comparison and the safety concern of using park-and-ride. To reduce traffic congestion level in urban areas, there is necessary to promote and encourage the usage of park-and-ride to get people to shift from using private cars to taking trains [7].

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With the rapid growth of public transportation network especially the railway stations, it has contributed to the ease of connectivity for the public. The current numbers of railway stations in Klang Valley stand at 70 but 200 stations are expected to be ready by the year 2020 [8]. While travelling is made easy by the railway transportation, the amenities that complement train stations can be further improve. Therefore, this study aims to identify the factors that affecting the utilization of park and ride facilities in Cheras.

## 2 METHODOLOGY

In this study, the correlation between the independent variables and dependent variable will be examined using quantitative approach. The quantitative approach provides information by using numerical data and conducting statistical analysis. To investigate the correlation between dependent and independent variables, survey is conducted to gather relevant data for statistical analysis. Moreover, the descriptive research is chosen to provide the description of the participants, which will participate in the survey, and help to determine the hypothesis.

### 2.1 Hypotheses of the study

- H1: There is a significant relationship between safety concern and the utilization of park-and-ride facility.
- H2: There is a significant relationship between infrastructure design and the utilization of park-and-ride facility.
- H3: There is a significant relationship between car ownership and the utilization of park-and-ride facility.
- H4: There is a significant relationship between travel cost and the utilization of park-and-ride facility.
- H5: There is a significant relationship between trip purpose and the utilization of park-and-ride facility.

### 2.2 Data Collection Method

The method of collecting the primary data in this study is through conducting a survey. By using the survey method, a set of research questionnaires was designed to be filled up by respondents. The rationale for using questionnaire is the large amount of audience can be reached through various channels such as Google form and social media. The secondary data are usually collected from the external sources such as journals, books, magazines, newspaper, libraries or from the internet. It helps to make the collection of primary data by providing a basis for comparison or an idea to collect specific data for the researches. In this study, the secondary data is used to examine the knowledge of the utilization of park-and-ride facility.

### 2.3 Sampling Design

#### 2.3.1 Target Population

The target population in this study is to focus on the commuters in the zone of Cheras and they should be the commuters that have experiences using the park-and-ride facility before.

#### 2.3.2 Sampling Location

Cheras, Malaysia is chosen as the sampling location. Therefore, the questionnaires will only be distributed to the commuters in Cheras.

#### 2.3.3 Sampling Size

It is estimated to conduct the surveys among 150 respondents. The respondents should have experiences of using park-and-ride facility before as they need to use their experiences and knowledge to answer the questionnaires.

#### 2.3.4 Sampling Technique

In this study, convenience sampling is the most suitable sampling method. The method of convenience sampling is when the subject is chosen due to its proximity to the researcher and easy accessibility. The advantages of convenience sampling are that it is considered easiest, cheapest and least time consuming.

## 2.4 Variable Measurement

The dependent variable in this study is the utilization of park-and-ride facility and the independent variables are safety concern, infrastructure design, car ownership, travel cost and trip purpose.

This questionnaire is separated into three sections, namely the Section A (Socio- Demographic Profile), Section B (Commuters Current Practice) and Section C (Factors Affecting Park-and-Ride Facility Utilization).

In section A, details information of respondent's social demographic will be collected, which include age group, race, education level, gender, occupation and monthly income level.

In section B, it will be seeking the opinion about commuter's current transportation practice. The respondents will be asked to fill up the structured questions provided to them with the options of answers in the form of multiple-choice answer or scales.

Lastly, section C it will be asking for respondent's opinion about factors affecting the utilization of park-and-ride facilities in Cheras. It includes questions that associated with measurement of independent variables which are safety concern, infrastructure design, car ownership, travel cost and trip purpose.

## 2.5 Pilot Testing

Before the actual research is being conducted, the pilot test will be carried out by the researcher [9]. A survey

instrument is validated in this test. The pilot study was carried out to evaluate the factors affecting the utilization of park-and-ride facility by employing a pre-test and post-test with a sample of target respondents (n=30). The actual study is dependent on the pilot test result in order to test its practicability and feasibility. Hence, pilot test is also known as the practicability test or feasibility test.

## 2.6 Data Analysis

### 2.6.1 Descriptive Analysis

Descriptive analysis is to summarize and transform the obtained data into an interpretable and understandable form. Standard deviation, mean, frequency distribution and percentage are all used in the descriptive analysis to describe the respondent characteristics through examining their demographic data [10].

### 2.6.2 Normality test

The aim of conducting normality test not just only to look for the differences among the data and but also ensuring the data are same with the normal [8]. So if the skewness and kurtosis values in the range of -1.96 to +1.96 during the normality test, the data will be considered as normal. However, if the skewness and kurtosis values are smaller than -1.96 or larger than +1.96, the data will be considered as not normal [9].

### 2.6.3 Reliability test

The aim of reliability test is to check the stability and consistency in which the constructs are measured in the research [11-13]. Reliability is a critical element to validity but that alone is not enough to justify the validity. In other words, a reliable test is not necessarily valid, but a test cannot be considered valid without being reliable [14]. Internal consistency test compares the same instrument to ensure the existing of correlation between the two instruments. Hence, the method of Cronbach's alpha reliability analysis will be utilized to find out the direction of the correlation between two variables and the intensity. The correlation coefficient value ranged from 0 to 1 [15]. The greater the coefficient esteems, the better the accuracy of estimated information.

### 2.6.4 Validity test

Validity can be defined as the prospects of a research instrument being used for measuring the authentic value of an approach in the hypothesis [9]. The validity of a measurement can be claimed as high is the research instrument used by researcher has the ability to examine the concept of researcher's hypotheses. In contrast, the validity will be considered as low is the there is no consistency in the conceptual and operational definition of the concept [16-18].

In quantitative research method, it emphasizes on the hypothesis testing and accurate measurement based on the sample that has been examined through statistics in data analysis conducted by researchers. The validity of measurement will be deemed as low if the definition of concept is found inconsistent with each other in different stages.

### 2.6.5 Multiple Regression Analysis

It is the best prediction of a dependent variable based on several independent variables, represented through a regression equation [9]. The variable to be predicted is the dependent variable whereas the variables that may affect the value of dependent variable as independent variables. In addition, the SPSS program is widely-known computer software that can used to conduct the multiple regression analysis.

## 3 RESULT AND DISCUSSION

A total of 150 sets of questionnaire were distributed to commuters in Cheras and the responses gathered were analyzed. The information from survey will be analyzed using SPSS version 22.

### 3.1 Normality Test

Table 1 shown all the elements in the socio-demographic section has their skewness and kurtosis value within the range of -1.96 and 1.96. Hence, all the data in socio-demographic profile section are normally distributed.

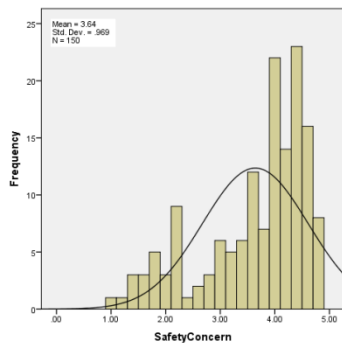
**Table 1.** Normality Test of Skewness and Kurtosis of Socio-Demographic

Socio-Demographic Profile	Skewness	Kurtosis
Gender	0.620	-1.638
Age	1.023	0.807
Ethnic Group	0.373	0.379
Religion	0.508	-0.451
Marital Status	1.554	1.531
Highest Education Level	-0.190	-0.199
Employment Status	0.189	-0.664
Income	0.592	-0.906

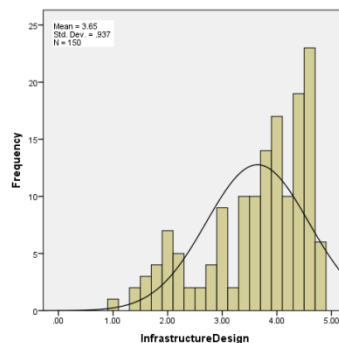
All the independent variables and the dependent variable have their skewness and kurtosis value within the range of -1.96 and 1.96. Hence, all the data collected for independent variables and dependent variable are normally distributed.

Figure 1 shows the histogram of Safety Concern whereby the skewness and kurtosis value for safety concern data are -0.984 and -0.092 respectively. Figure 2 shows the histogram of Infrastructure Design whereby the skewness and kurtosis value for infrastructure design data are -0.906 and -0.165 respectively. Figure 3 shows the histogram of Car Ownership whereby the skewness

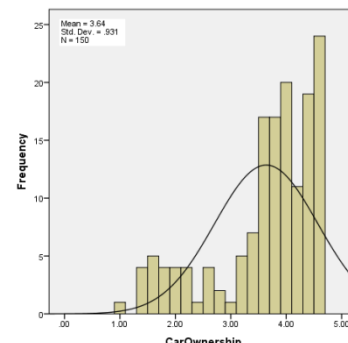
and kurtosis value for car ownership data are -1.144 and 0.324 respectively. Figure 4 shows the histogram of the Travel Cost whereby the skewness and kurtosis value for travel cost data are -0.852 and -0.175 respectively. Figure 5 shows the histogram of Trip Purpose whereby the skewness and kurtosis value for trip purpose data are -1.018 and -0.119 respectively. Figure 6 shows the histogram of the Utilization of Park-and-Ride Facility whereby the skewness and kurtosis value for the utilization of park-and-ride facility data are -1.285 and 0.621 respectively.



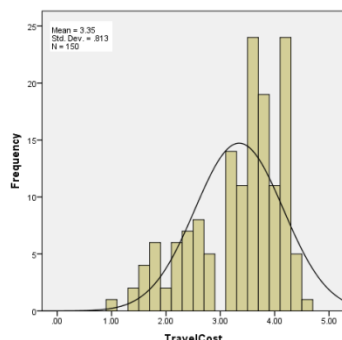
**Figure 1.** Histogram of Safety Concern



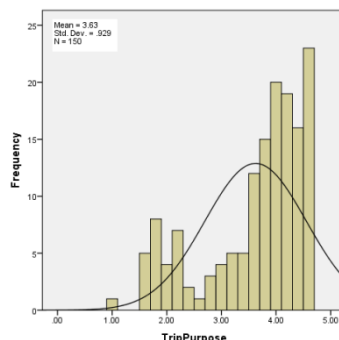
**Figure 2.** Histogram of Infrastructure Design



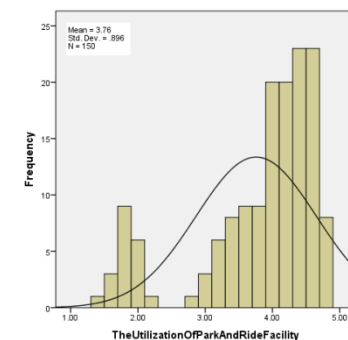
**Figure 3.** Histogram of Car Ownership



**Figure 4.** Histogram of Travel Cost



**Figure 5.** Histogram of Trip Purpose



**Figure 6.** Histogram of the Utilization of Park-and-Ride Facility

### 3.2 Reliability Test

The 2 shows the Cronbach's Alpha value of the 25 elements of independent variables which is 0.954, and the Cronbach's Alpha value of the 10 elements of

dependent variables which is 0.933, a value that signify the elements are highly reliable based on the rules of Thumb of Cronbach's Alpha coefficient size which state that any value greater than 0.9 is deemed as an excellent in terms of strength associations [15].

**Table 2.** Reliability test for Independent Variables and Dependent Variable

Reliability Test	Cronbach's Alpha	No. of Items
Independent Variables	0.954	25
Dependent Variable	0.933	10

#### 3.2.1 Reliability Test of Independent Variables

Table 3 shows the outcome of the reliability test of the five independent variables and the Cronbach's Alpha values of the variables are within the range of 0.763 and 0.893. The value range shows that the measurement

scales are reliable and consistent. As arranged in an ascending order, the least reliable variable would be travel cost which has Cronbach's Alpha vale of 0.763, followed by trip purpose with a value of 0.834, infrastructure design are third with 0.855, then car ownership at 0.869 and lastly the most reliable variable according to the test which is safety concern that has the highest value among all variables of 0.893.

**Table 3.** Reliability test for each Independent Variables

Independent Variables	Cronbach's Alpha	No. of Items
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Safety Concern	0.893	5
Infrastructure Design	0.855	5
Car Ownership	0.869	5
Travel Cost	0.763	5
Trip Purpose	0.834	5

### 3.3 Descriptive Analysis

The total respondents that took part in our survey are 150 people. Table 4 shows percentage of male respondents is 64.7% and female respondents are the remaining 35.3%. Majority of the respondents are between ages 19 and 25, contributed by 56.7%. The respondents mostly are Chinese about 60.7%, while there is other ethnic such as Japanese about 2.7%. Besides that, Buddhism and Christianity are the most among the respondents contribute by 42.7% and 21.3% respectively. The other

religion about 3.3% is made up of minority such as Taoism. Most of the survey respondents are single which has a number of 111 people at 74% of total respondents. The highest education levels of the respondents are Bachelor Degree, 51.3%, Diploma, 24.7%, Secondary School, 18%, Master, 4.7% and PhD, 1.3%. Moreover, majority of the respondents are student about 44.7% and employed for wages about 34.7% and the rest are self-employed, retired, voluntary worker and part-timer. Regarding the income level, most of the respondents about 40.7% have an income less than RM1000.

**Table 4.** Social Demographic Profile

Criteria	Category	Frequency (n)	Percentage (%)
Gender	Male	97	64.7
	Female	53	35.3
Age	Below 18	14	9.3
	19 to 25	85	56.7
	26 to 35	30	20.0
	36 to 45	14	9.3
	46 to 55	7	4.7
Ethnic Group	Malay	23	15.3
	Chinese	91	60.7
	Indian	32	21.3
	Other	4	2.7
Religion	Islam	25	16.7
	Buddhism	64	42.7
	Christianity	32	21.3
	Hinduism	24	16.0
	Other	5	3.3
Marital Status	Single	111	74.0
	Married	35	23.3
	Divorced/Separated/Widowed	4	2.7
Highest Education Level	Secondary School	27	18.0
	Diploma	37	24.7
	Bachelor Degree	77	51.3
	Master	7	4.7
	PhD	2	1.3
Employment Status	Employed for Wages	52	34.7
	Self-employed	26	17.3
	Student	67	44.7
	Retired	2	1.3
	Other	3	2.0
Income Level	Below RM1000	61	40.7
	RM1001 to RM2500	19	12.7
	RM2501 to RM3500	22	14.7
	RM3501 to RM5000	26	17.3
	More than RM5000	12	8.0
	Other	10	6.7

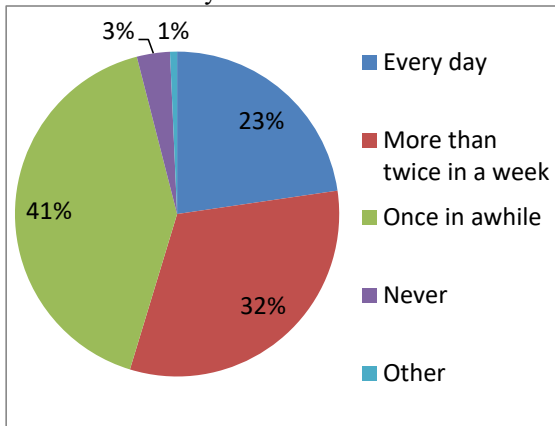
#### 3.3.1 Commuter's Travelling Practice

Figure 7 shows majority of respondents travel by public transport once in a while which is 41.3% of total respondents. Then, 32% of the respondents are said to be using public transport more than twice a week and

followed by 22.7% of the respondents which claimed to be traveling everyday by public transport. Furthermore, about 3.3% of the respondents claimed that they have never been on a public transport with the remaining 1 respondent filling rarely as answer. Besides that there are 60% of total respondents which are 90 peoples have tried using park-and-ride facility before whereas the remaining

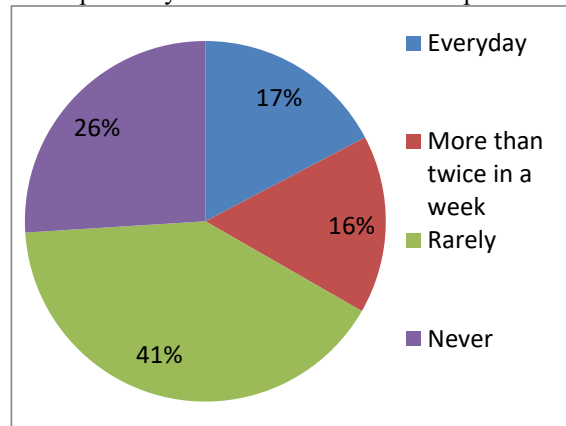
40% which are also 60 of the respondents have never tried using any park-and-ride facility before. Figure 8 displays that majority of respondents rarely use the park-and-ride facility which is 40.7% of total respondents. Then, 26% respondents claimed themselves that they never used any park-and-ride facility. There are 17.3% of the respondents which claimed to be traveling everyday by using park-and-ride facility. Lastly, about 16% of the respondents travelled by park-and-ride facility more than twice a week.

Figure 9 shows the main concern of using park-and-ride facility shown by respondents are safety concerns which 61.3% voted yes. Travel cost came in second with

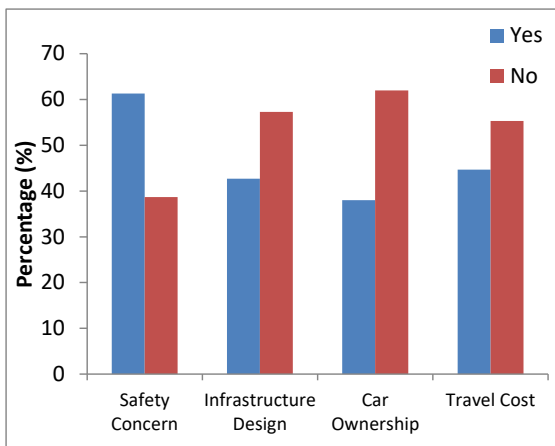


**Figure 7.** Commuter's travelling practice (How frequent respondents use public transport)

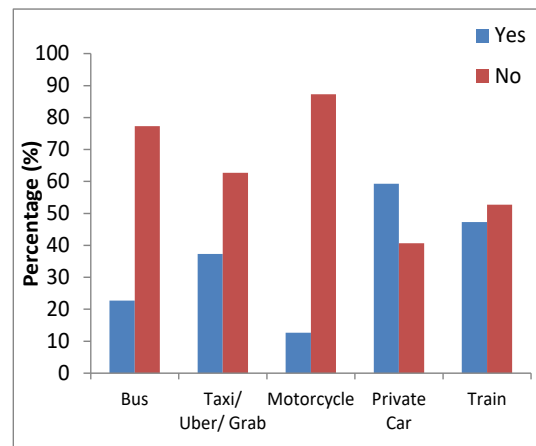
44.7% of the respondents raised their concern on the variable followed closely by infrastructure design which are chosen 42.7% of the respondents. There are 38% and 32% of the respondents who chose car ownership and trip purpose respectively as their concern of using park-and-ride facility. Figure 10 shows the main type of transport used most frequently by respondents are private cars about 59.3%. Train came in second with 47.3% of the respondents chose that as their most used mode of transport followed by taxi/Grab/Uber which are chosen by 37.3% of the respondents. There are 22.7% and 12.7% of the respondents who chose bus and motorcycle respectively as their most used of transportation mode.



**Figure 8.** Commuter's Travelling Practice (Frequency of using park-and-ride facility)



**Figure 9.** Types of concern of using park-and-ride facility



**Figure 10.** Types of transport used most frequently

### 3.4 Multiple Regression Analysis

Based on the Table 5, the significant value shown for safety concern is 0.005. The value displayed is less than 0.05, hence, H1 is accepted, which means that safety concern has significant relationship with the utilization of park-and-ride facility. This finding is similar to (Yesuiah 2016), which the article indicates that public is greatly concern about their personal safety while considering the usage of park-and-ride facility [19].

The significant value shown for infrastructure design is 0.001. The value displayed is less than 0.05, hence, H2 is accepted, which means that infrastructure design has

significant relationship with the utilization of park-and-ride facility. This finding is similar to (Cornejo et al. 2014), which indicates that the design of a building or the ergonomics have significant impact towards the utilization of park-and-ride facility [20].

The significant value shown for car ownership is 0.012. The value displayed is less than 0.05, hence, H3 is accepted, which means that car ownership has significant relationship with the utilization of park-and-ride facility. This finding is similar to (Islam et al. 2015b), which indicates that people who own personal vehicle tend to disregard the utilization of public transport facility [21]. The significant value shown for travel cost is 0.047. The value displayed is less than 0.05, hence, H4 is accepted, which means that travel cost has significant relationship

with the utilization of park-and-ride facility. This finding is similar to (Steele 2014), which indicates that the perception of travel cost will influence the utilization of park-and-ride facility [22].

The significant value shown for trip purpose is 0.000. The value displayed is less than 0.05, hence, H5 is

accepted, which means that trip purpose has significant relationship with the utilization of park-and-ride facility. The finding is similar to (Shen et al. 2017), which indicates that the utilization of park-and-ride facility is often down to a commuter travelling purpose [23].

**Table 5.** Multiple Regression Test

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1					
(Constant)	.260	.161		1.619	.108
Safety Concern	.196	.069	.213	2.841	.005
Infrastructure Design	.235	.068	.246	3.435	.001
Car Ownership	.153	.060	.159	2.547	.012
Travel Cost	.130	.065	.118	2.003	.047
Trip Purpose	.258	.064	.267	3.996	.000

a. Dependent Variable: The Utilization Of Park And Ride Facility

Table 6 shows the R value is shown as 0.886, R Square value is 0.785 whereas the adjusted R Square is 0.778 for our study. Based on the R square value, it means that there are a total 77.8% of the variation in the

utilization of park-and-ride facility can be explained from the five independent variables. ANOVA result in Table 7 shows that the overall model is significant with F ratio = 105.213 and P = 0.000.

**Table 6.** Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.886a	.785	.778	.42235

a. Predictors: (Constant), TripPurpose, TravelCost, CarOwnership, InfrastructureDesign, SafetyConcern

**Table 7.** ANOVA of Predictors: (Constant)

ANOVA <sup>a</sup>					
Model	Sum of Squares	df	Mean Square	F	Sig.
1					
Regression	93.837	5	18.767	105.213	.000 <sup>b</sup>
Residual	25.686	144	.178		
Total	119.524	149			

a. Dependent Variable: TheUtilizationOfParkAndRideFacility  
 b. Predictors: (Constant), TripPurpose, TravelCost, CarOwnership, InfrastructureDesign, SafetyConcern

Furthermore, the following equation is developed.  $Y = a + b_1$  (Safety Concern) +  $b_2$  (Infrastructure Design) +  $b_3$ (Car Ownership) +  $b_4$ (Travel Cost) +  $b_5$ (Trip Purpose)+  $\epsilon$ . The Utilization of Park-and-Ride Facility= 0.260 + 0.196 safety concern + 0.235 infrastructure design + 0.153 car ownership + 0.130 travel cost + 0.258 trip purpose. Hence, there is a positive relationship between the utilization of park-and-ride facility with trip purpose, travel cost, car ownership, infrastructure design and safety concern. In addition, the most and the least influential independent variables towards the dependent variable are indicated by the standardized coefficient (beta value). Based on the Table5, the most influential independent variable toward the dependent variable is the trip purpose concern which has the highest beta value among other independent variable at 0.258. This means that for every unit of decrease in trip purpose concern, there will be increment in the utilization of park-and-ride facility by 0.258 units. Other variables are followed by safety concern (0.196), infrastructure design (0.235), car ownership (0.153) and travel cost has the lowest beta value (0.130) among all the independent variables, which

also indicates that it is the least affecting factor towards the utilization of park-and-ride facility.

## 4 Conclusion

All five hypotheses have their significant level lesser than 0.05, which means the hypotheses (H1, H2, H3, H4, H5) are all accepted. Thus, safety concern, infrastructure design, car ownership, travel cost and trip purpose have a strong relationship with the utilization of park-and-ride facility.

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