TRIP REGENER MPLEX AND APPLIED DEVELOPMENT OF TRANSPORTATION FACILITIES.

FATHIAH SAKINAH BT ZAINOL ABIDIN

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Faculty of Civil Engineering and Earth Resources
UNIVERSITI MALAYSIA PAHANG

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ABSTRACT

Trip generation and trip attraction is important to the traffic engineer and planner in considering the impact of new development in our country. New development leads at various impacts to the people's daily life activities. The current boom in shopping centre constructions entails the usage of some shopping centre trip factor. The main objective of this research is to determine these rate trip generation, vehicle volume, number of pedestrian and suggestion to community to use public transport. Sogo shopping mall has 2 gates (1 and 2), in use for entering and exiting the shopping premises. Proportional vehicle volumes emanating from shopping premises at gate 1 and 2 connect directly to an access one way road. The study further recommends more sample to be gathered using the formulated survey methodology for the result. Thus trip generation manual must be compiled based on local Malaysian conditions, and the most optimal level for compilation is at national level. In addition, the existences of the Malaysian Trip generation Manual encourage uniformity in practice. Sogo is located along Jalan Tuanku Abdul Rahman and Jalan Raja Laut. Trip generation depends on travel behaviour, which is turn is localized and may differ from place to place. The most typical time for shopping on the weekday is particular 12 to 2pm during lunch hour and 5 to 7pm after work on Fridays attracts the most number of customers on a weekday. In addition Saturday and Sundays are very busy periods for shopping centres having a supermarket and discount stores. It is also affect the level of trip chaining phenomenon in the estimation rate include parking not provide adequately, so congestion occurring at that shopping centre. Thus trip generation manual must be compiled based on local Malaysian conditions, and the most optimal level for compilation is at national level. In addition, the existences of the Malaysian Trip generation Manual encourage uniformity in practice.

ABSTRAK

Penjanaan perjalanan dan tarikan perjalanan adalah penting untuk jurutera lalu lintas dan perancang bandar perlu mengambilkira kesan pembangunan baru di negara kita. Lonjakan semasa dalam pembinaan pusat membeli-belah melibatkan penggunaan beberapa faktor laluan laulintas pusat membeli-belah. Objektif utama kajian ini adalah untuk menentukan generasi perjalanan kadar dan cadangan kepada masyarakat untuk menggunakan pengangkutan awam. Kajian ini seterusnya mencadangkan sampel lagi yang perlu dikumpul menggunakan metodologi kajian dirumuskan untuk mendapatkan keputusan. Kajian kes saya di Sogo adalah gedung terbesar di Kuala Lumpur menpunyai 2 pintu utama. Pintu masuk utama untuk kenderaan keluar masuk dan pintu kedua untuk laluan pejalan kaki. Pusat membeli-belah mempunyai pelbagai tingkat dan jumlah kedai. Sogo terletak di antara Jalan Tuanku Abdul Rahman dan Jalan Raja Laut. Penjanaan perjalanan bergantung kepada keadaan laluan perjalanan, yang seterusnya mungkin berbeza dari suatu tempat ke suatu tempat yang lain. Masa yang paling biasa untuk membeli-belah di hari minggu adalah tertentu 12 hingga 2 petang semasa waktu makan tengah hari dan 5 petang hingga 7 malam selepas kerja pada hari Jumaat menarik paling banyak pelanggan pada hari bekerja. Selain itu, hari Sabtu dan Ahad adalah tempoh sangat sibuk untuk pusat membeli-belah mempromosikan barangan mereka dan membuat potongan harga untuk para penggemar membeli barangan meraka. Ia juga memberi kesan kepada tahap perjalanan chaining fenomena dalam kadar anggaran termasuk tempat letak kenderaan tidak mencukupi, jadi kesesakan yang berlaku di pusat beli-belah itu berlaku konflik. Oleh itu generasi manual perjalanan perlu disusun berdasarkan keadaan tempatan Malaysia, dan tahap yang paling optimum untuk penyusunan di peringkat nasional. Di samping itu, kewujudan daripada Manual Penjanaan perjalanan Malaysia menggalakkan keseragaman untuk penduduk dikawasan bandaraya.

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INTRODUCTION

1.1 Background of Study

Shopping centre attract customers by their rich retail and catering offer, opportunities to spend leisure time, as well as by their size itself (total area) and sophisticated architectural form. Contemporary shopping centres are complex and planned space whose is to fulfil several varied function. The most often cited definition, that by (R.J McKeever) states that a shopping centre is a group of shop planned, constructed, and managed as a single object, connected by their localisation, size (total retail space) and the type of shops with the area of influence of the entire facility; with a car parking separated from the street and located on the same land lot (Wilk 2003).

A trip as a journey made by an individual between two different points. Each trip is performed using one or multiple transportation modes for a defined purpose a given time. Although a trip may involve more than one purpose, it is usually identified by its principal purpose (Hobbs, 1979). Trip generation analysis, as Meyer (1974) puts it, seeks to estimate the volume trips that will be made by individual work, shopping, school and so forth, but not the flows between points within the whole system. The functioning of metropolitan cities is highly dependent on the movement of people, good and information (Muller, 1995) and trip attraction studies are a vital part of transportation planning, due to the recursive nature of the urban transportation modelling procedure (Bruton, 1986; Badoe and Steuart, 1997).

Trip generations are obviously most pertinent relative to traffic at specific land use activity. It also plays a role in many phases of transportation planning and traffic engineering related activities. It is the part of trip generation in the travel forecasting process. It involves the estimation of the total numbers of trips entering a parcel of land as a function of the socioeconomic, location and land use characteristics of the parcel. In the reliable sector, urban transportation covers the movement of both people and goods within an urban area.

At the individual level, urban transportation can be characterized by a trip. However, at the metropolitan area level, millions of these individual trips define urban transportation. A trip as a journey made by an individual between two different points. Each trip is performed using multiple transportation modes for a define purpose at a given time.

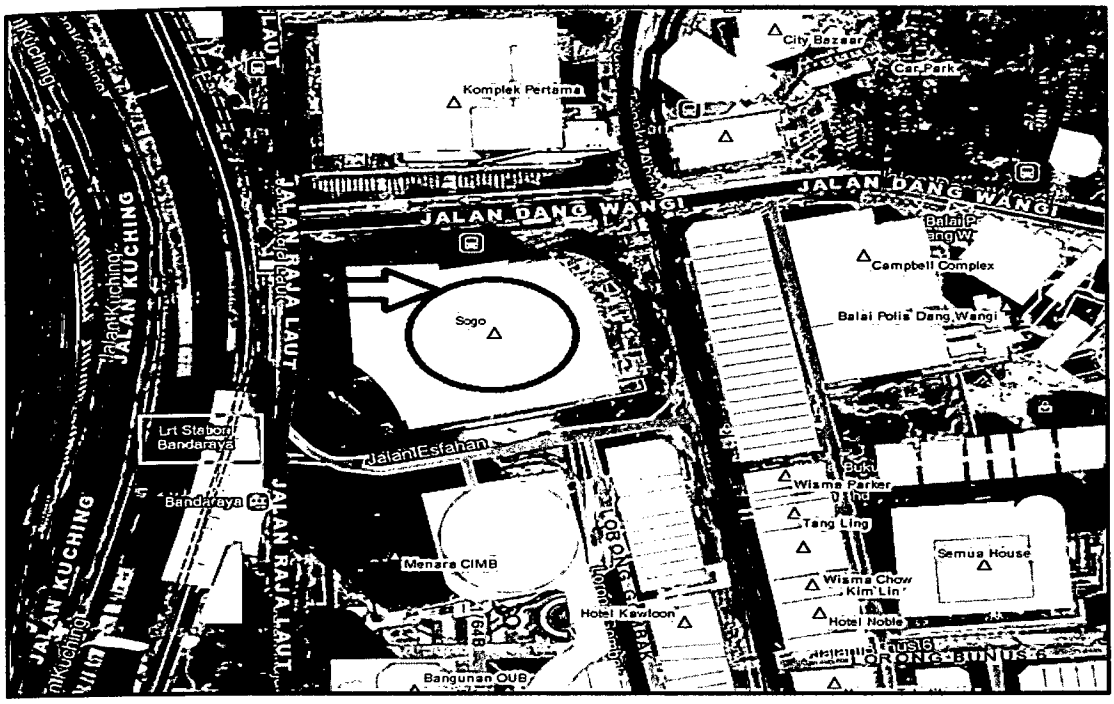


Figure 1.1 : Map of Sogo Shopping Centre Located

1.2 Study Area

Sogo Kuala Lumpur shopping mall has approximately 700,000 square feet the leading retailer in Kuala Lumpur, Malaysia, filled with the latest fashion trends, home convenience wares, hottest sales and promotions and the greatest shopping experience. This is a large Shopping Center with a large supermarket, a large discount retail store, one or two restaurants, a bank, and many small stores are located.

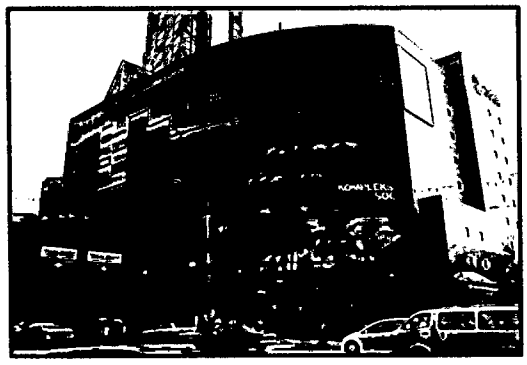


Figure 1.2 : Building of Sogo Shopping Centre Located

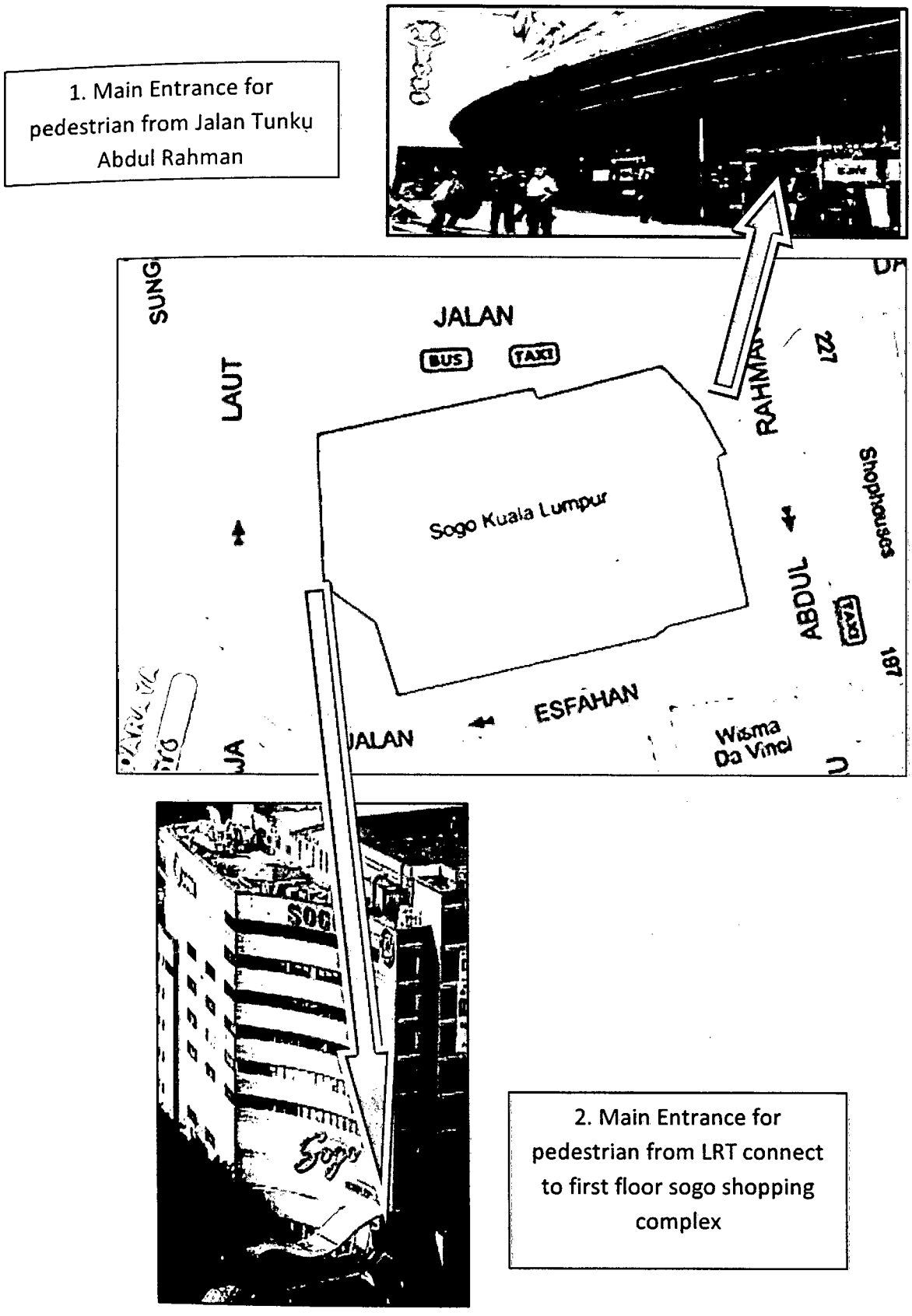


Figure 1.3 : Main Entrance for Pedestrian to enter the Shopping Complex

1.3 Problem Statement

Even though peak hour for other sites are generally from 7am to 10am and 7pm to 8am, however shopping centre attract customer by their rich detail and catering offer opportunities to spend leisure time, the trip generation rate of shopping centre (Sogo Kuala Lumpur) is influenced by a number of factors, including time of the day, day of week, seasonality, weather, configuration and composition of the shopping centre. The most typical time for shopping on the weekday is particular 12 to 2pm during lunch hour and 5 to 7pm after work on Fridays attracts the most number of customers on a weekday. In addition Saturday and Sundays are very busy periods for shopping centres having a supermarket and discount stores. It is also affect the level of trip chaining phenomenon in the estimation rate include parking not provide adequately, so congestion occurring at that shopping centre.

Figure 1.4: Congestion traffic flow at parking area

1.4 Objective of study

a) To determine operational rate in term of entry and exit vehicle parking adequacy demand versus supply and the trip generation pattern and variation during peak hour of shopping centre.
b) To suggest a balance public transport and private transport user to and from the shopping centre and build trip generation model for trip made by population at Sogo Kuala Lumpur.

1.5 Scope of study

To achieve the objective, the scope of study is defined as follows:

i. To collect reliable information of land use and number of parking with population in the shopping centre
ii. To identify variable such as type of vehicles/modes of travel and to ascertain the users of public transport and private transport from the study area.

1.6 Research Significance

The trip generation enables practitioners to make an estimate of vehicular traffic that will be generated by a particular land use type. Generated traffic is divided into trip attraction (IN) and trip production (OUT). For instance, trips produced by a residential development can be attracted by economic or some other commercial land use. Malaysia experience high generated traffic volume as its economy expands. In many instances, these extra trips adversely impact existing levels of traffic demand at the shopping centre.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

It is important to understand the fundamental of trip generation and trip attraction in order to determine the shopping trip attraction in Sogo Pernas Kuala Lumpur city centre. According to Soslau et., (1978), The transportation planning process relies on travel demand forecasting procedure. Furthermore, concepts of the trip generation modelling and trip attraction analysis have to be understood before modelling the shopping trip generation for Kuala Lumpur city centre. Shopping malls are normally set up to promote the synergistic effects of having many different stores in one place, car parks are often provided to encourage family and out location shopping. Car parks in turn act as a storage and discharge outlets of vehicles onto adjoining road network.

According to McNally (2000), "A trip generation is calculated by trip production and trip attraction". Even with the exploration of new generation travel demand models such as activity based model, the traditional four step procedure remains the most widely used model by transportation planning agencies because of institutional and financial requirement.

2.2 Trip Generation

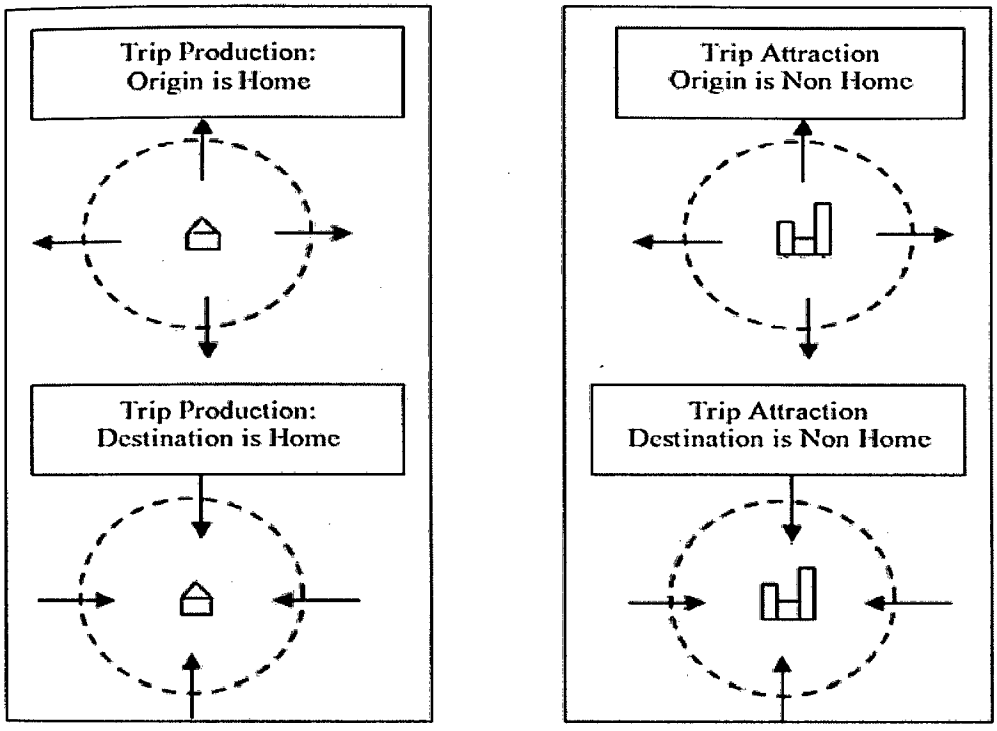
Trip production estimation is the first step of the conventional four-step transportation demand forecasting process. In this study, this stage of transport modelling will be used to produce the trip generation model. Hence, some description of trip generation by a few authors or researchers will be presented. According to Lane (1971), trip generation often used as a general term to describe the trip-end forecasting models of generation and attraction.

Trip generation is an examination of the relationship between the number of trips made and certain quantifiable parameters. Trip generation rates are used to predict the number of vehicle trip generated by specific land use when further planning of any development is to be carrying out. Based on this outcome, the volume of traffic that would be generated by the development can be forecasted and the impacts can be analysed.

Every trip will have two trips end, an origin and a destination. At both ends there always associate with a purpose, for instance, 'from home' 'to work'. Based on the study of Lane (1971), trip ends in this form were used in many of the early studies. As transportation planning technology developed later, it was found necessary to introduce new definitions. It was observed that trips could be classified in to two types, home based and non-home-based, the former being defined as having one end of the trip at the home of the person making trip, and the latter having neither end at the home of the person making the trip. It was then also found convenient to split trips ends in to two classes: end from which trips radiated, known as 'trip generations' and ends to which trips were attracted known as 'trip attractions'.

2.2.1 Types of trip

A 'trip generation' was therefore defined as the home end of a home-based trip, or the origin of a non-home-based trip; while a trip 'attraction' was defined as the non-home end of a home-based trip or the destination of a non-home-based trip.



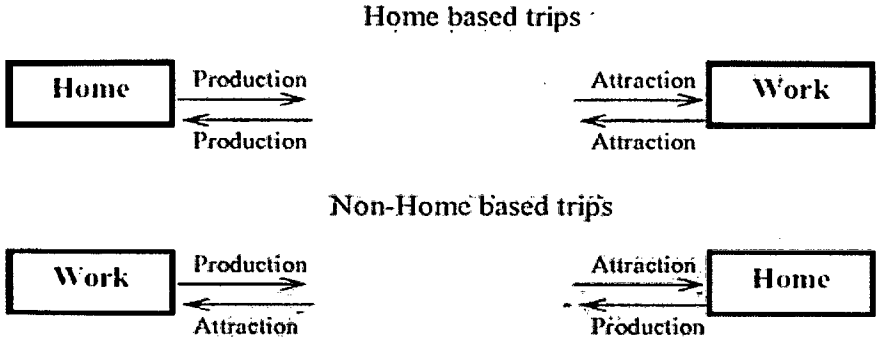
Source :Bell, M.G.H. 1991. The estimation of origin-destination matrices by Transportation Research B, 25, pp13-22

Figure 2.2.1 : Relation between Trip Production and Trip Attraction

In the trip generation study (Pilot Study) of Malaysia (Highway Planning Unit, 1977) trip generation can be defined as the total number of inbound and outbound vehicle trip-ends from a site over a given period of time. "Generation" here is does not imply a direction. Trip is a journey of a person or vehicle that begins at one location and ends at another one. Trip-Ends are defined as the start or end of a trip. Each trip has two trip-ends, an origin and a destination. When the number of vehicles entering or exiting a site is counted, trip-ends are counted.

2.2.2 Homes Based Trip and Non Home Based Trip

For the purpose of a site-specific traffic impact study, the destination between trips and trip-ends is non-important. For area-wide traffic studies, however, the distinction between a trip and trip-end is very important because care needs to be taken that the trip is not counted twice. Trip generation modeling is to analysis and estimates the person or vehicle trips. The techniques used for the purpose are usually identifying the relationship between travel characteristics and the environment. The generation models are available for land uses in many development countries. The most common are those presented by the Trip Generation (Institute of Transportation Engineers, 1991).



Source: Tom V. Mathew and K V Krishna Rao, 2007

Figure 2.2.2 : Types of trip

Trips can be classified by trip purpose, trip time of the day, and by person type. Trip (attraction and production) models are found to be accurate if separate models are used based on trip purpose. The trips can be classified based on the purpose of the journey as trips for work, trips for education, trips for shopping, trips for recreation and other trips. Among these the work and education trips are often referred as mandatory trips and the rest as discretionary trips. All the above trips are normally home based trips and constitute about 80 to 85 percent of trips. The rest of the trips namely non home based trips, being a small proportion are not normally treated separately. The

second way of classification is based on the time of the day when the trips are made. The broad classification is into peak trips and of peak trips.

2.3 Trip Generation Model

Conventionally, trip generation models can be categorized into: aggregate or disaggregate approaches. The former is a direct estimation of trip frequency by zones regression analysis methods are widely used in this approach. In contrast the disaggregate approach estimates trip production from the household or person level and category analysis is common methodology. An aggregate approach provides a very convenient zonal estimation of trip frequency with a few regression variables and it is very economical in terms of data collection calibration and operation.

In contrast, a household-based or a person-based disaggregate approach can require a significant amount of data for model calibration and testing. However, a disaggregate approach can provide a more precise estimation on trip frequency, and it can respond better to the different travel needs due to the different socioeconomic and demographic backgrounds of travellers. According to Chatterjee, Martinson, and Sinha (1977) detailed discussion of this classification scheme is presented by thorough analysis of all these types of trips shown in data analysis requires a large amount of data. These data are collected by using origin-destination (O-D) surveys.

Banks (2002) said that trip generation models are intended to predict the total number of trip produced or attracted by a zone. Trips usually thoughts of as being two way extrusion originating at the trip marker's home. They are said to be produced by residential development and attracted by economic or other activity.

Travel time budget research indicates that increased traffic speeds often result in more mobility rather than saving time. People tend to average about 75 minutes of daily travel time regardless of transport conditions (Levison and Kumar, 1997). National data indicate that as freeway travel increases, average commute trip distance and speed increase, but trip time stays about constant (Levison and Kumar

1997). As a result, traffic congestion tends to maintain a self-timing equilibrium: once congestion becomes a problem it discourage further growth in peak-period travel.

2.4 Regression analysis

Regression analysis is a technique used for the modeling and analysis of numerical data consisting of values of a dependent variable (response variable) and of one or more independent variables (explanatory variables). The dependent variable in the regression equation is model as a function of the independent variables, corresponding parameters ("constant"), and an error term. The error term is treated as random variable. It represents unexplained variation in the dependent variable. The parameters are estimated so as to give a "best fit" of the data. Most commonly the best fit is evaluated by using the least squares method, but other criteria have also been used. The underlying assumptions of linear regression modeling are:

The sample must be representative of the population for the inference prediction.

- The dependent variable is subject to error. This error is assumed to be a random variable, with a mean of zero. Systematic error may be present but its treatment is outside the scope of regression analysis.

- The independent variable is error-free. If this is not so, modeling should be done using errors-invariables model techniques.

- The predictors must be linearly independent, i.e. must not be possible to express any predictor as a linear combination of the others.

- The errors are uncorrelated, that is, the variance-covariance matrix of the errors is diagonal and each non-zero element is the variance of the error.

- The variance of the error is constant . If not, weights should be used. The errors follow a normal distribution. If not, the generalized linear model should be used. The sample will attach in **Appendices D.**

2.5 Shopping Trip Attractions

2.5.1 Shopping mall employee and shop number

Shopping mall employee number is a factor for calculating trip attraction rate of shopping mall. Total number of shops is also calculated for developing trip attraction rate for shopping malls. These are done by surveys.

2.5.2 Gross floor area of shopping mall

Area of shopping mall is a factor readily available from maps. Shopping mall gross floor area is a more reliable indicator of shopping trip attraction which is calculated by multiplying the one floor area and total number of floor.

2.5.3 Number of parking spaces

Number of parking spaces available for car parking is another important factor for estimating Trip Attraction Rate.

2.5.4 Traffic Analysis Zone

The location of shopping mall also effects the trip attraction of individual Shopping Center. A traffic analysis zone is the unit of geography most commonly used in conventional transportation planning models. The main reason for undertaking traffic parking survey is to provide an objective measure of existing situation. A survey will provide a measure conditions at the time that survey and observation was taken. Traffic flow varies by time of day, day of the week and month of the year (Mike Slinn, 2005).

2.6 Vehicle Movement on Transportation Facilities

2.6.1 Vehicle Movement

Vehicles movement on transportation facilities generally can be classified into uninterrupted flow and interrupted flow. Roger, Elena, and William (2004), are stressed that:

a. Uninterrupted flow

Uninterrupted flow actually can occur on facilities that have no fixed elements which can cause interrupted flow. For example, at traffic signals drivers need to stop when color is red. So this condition can cause interrupted for the traffic flow. Traffic flow condition is thus the result of intersection among vehicle in the traffic stream and between vehicles and the geometric characteristics of the roadway system. Besides that, the driver of the vehicle does not expect to be required to stop by the factors external to the traffic stream.

b. Interrupted Flow

Interrupted flow occurs on transportation facilities that have fixed elements that causing periodic interrupted to traffic flow. For instant, traffic signals and stop sign. The drivers have no choice when arrived and must stop when there is stop sign. The devices cause traffic to stop or slow down periodically irrespective of how much traffic exists. Normally in this case the driver expects to be required to stops as and when required by fixed elements at that place.

2.6.2 Level of Service

'Level of Service' describe in a qualitative way the operational conditions for traffic from the viewpoint of the road user. It gauges the level of congestion on a highway in term of variables such as travel time and traffic speed, (Martin Rogers, 2003).

Malaysia Highway Manual Capacity (2006), lists six level of service ranging from A (best) to F (worst). There are each defined as follows:

LOS A:

This present free flow conditions where traffic flow is virtually zero with low volumes, densities, and high speeds. Comfort and convenience levels for road users are very high as vehicles have almost complete freedom to maneuver and no delay.

LOS B:

Represent reasonable free flow conditions. Comfort and convenience level for road users are still relatively high as vehicles have only slightly reduced freedom to maneuver or some slight delay. Minor accidents are accommodated with ease although local deterioration in traffic flow conditions would be more discernible than in service A.

LOS C:

Delivers stable flow conditions. Flows are at level where at a level where small increase will cause a considerable reduction in the performance or 'service' of the highway. There are marked restrictions in the ability to manoeuvre and care is required when changing lane. Speeds and maneuverability are more closely controlled by