

LAND USE MODELING FOR POPULATION GROWTH
A CASE STUDY OF SKUDAI TOWN

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A project report submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Engineering (Civil –Transportation and Highway)

Faculty of Civil Engineering
Universiti Teknologi Malaysia

June 2009

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank my supervisor, **Assoc. Prof. Dr. Johnnie Ben-Edigbe**, for all his kind patience, ideas, guidance and advice throughout the process of this study.

I would also like to thank my friends and course mates who have given and shown much support and interest in this study. I would especially like to thank my parents, brother and sisters for their support and encouragement.

ABSTRACT

Demand for transportation is one of the major issues in Malaysia. There are several factors which likely to influence the demand for transportation over large geographic interest. Therefore, a study is conducted to estimate the population growth pattern in the future. The main objective of this study is to establish predictive models for Skudai Town in difference time period. Four parameters were indentified as the main elements that influence the development of that particular town. These four indicators are land value, accessibility of employment, holding capacity and percentage of relative growth. The study design is adapted from a hypothetical town transportation planning study in England. The linear regression model is applied in developing the predictive model for the study area. Since the land area is finite, a log transformation of linear regression is applied. At the end of this study, several tests such as t-test, R^2 and F –statistics are applied to test the predictive models and the factor that influence the population growth is also identified.

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LIST OF ABBREVIATIONS

| | | |
|-------|---|--|
| NPP | - | National Physical Plan |
| MPJBT | - | Johor Bahru Central Municipal Council (<i>Majlis Perbandaran Johor Bahru Tengah</i>) |
| CBD | - | Central Business District |
| 8MP | - | 8th Malaysia Plan |
| 9MP | - | 9th Malaysia Plan |

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CHAPTER I

INTRODUCTION

1.1 Background

Most of the early transportation studies were essentially traffic engineering studies with the usual requirements of traffic flows and vehicle speed along individual roads, sometimes supplemented by simple origin and destination surveys. The development from traffic engineering studies to comprehensive land use/ transportation studies necessitated the carrying out of a much more extensive system of surveys designed to give knowledge not only of vehicle speeds and flows, but also of all those socio-economic factors likely to influence the demand for transportation over large geographic interest. The study is aimed at Skudai town in Johor.

Skudai town is located in Johor State, Malaysia and total land area is 18,957 acres. It is under administrative of Johor Bahru Central Municipal Council (Majlis Perbandaran Johor Bahru Tengah, MPJBT). It is the one of the ten fastest growing towns in Malaysia in the period 1991-2000, which is stated in National Physical Plan (NPP), 2005. Total population for Skudai town is 40,566 persons in year 2000, while total population for Malaysia is only 23,274,700 persons.

In Malaysia, average annual population growth rate is around 2.3 – 2.7 per cent from year 1960 to year 2005. The national labour force grew by 3.1% per annum from 7.042 million in 1990 to 9.572 million in 2000. Total employment during the corresponding periods was 6.686 million and 9.271 million respectively, an increase of 3.3% per annum. The unemployment rate is decline which is 5.1% in 1990 to 3.1% in 2000 or from 356,000 to 301,000.

While it is of great interest to give a detailed historic background of transportation planning in context, this study will assume a more technical approach and get straight to the body of the project, but not without mentioning that external zones are comprised of national system of zoning. In the light of the discussion so far, the remainder of the chapter will discuss the purpose and objectives of the study. It will also define the study area.

1.2 Problem Definition

Population growth and land use change is related each another. The growth of population will increase the demand for residential, industrial and commercial area. Indirectly, it will change the land-use type, accessibility, land cost, holding capacity and others of that particular place. This relationship has been done by Swerdloff and Stowers in Greensboro City, U.S ^[1]. However, this kind of study is no yet done in our country especially in local context. In Malaysia, there are lot study have done about the land use change and urban growth. All of this study is done by using spatial analysis method. But, this method only shows the land use change and urban growth in term of spatial format. Then, population growth for the area is estimated from the result. Furthermore, this method cannot predict the population growth for next 10 or 20 years accurately if compare to land use modeling.

Beside this, according to Voorhees and his colleagues, there are many factors such as land availability, cost, services, status, views and topography, and in some way transport that are likely to influence the different growth pattern. But, these parameters are not study in any town in Malaysia. According to Swerdloff and Stowers, accessibility is the main factor influence the growth in dwelling units per vacant land, 1948-60 in Greensboro City ^[1]. So, a detail study about these parameters is needed, in order to determine the main indicator which influences the population growth for Skudai Town.

1.3 Research Questions

Trend of population growth is one of the important elements in transportation study. From this study, a better understanding about the population growth in Skudai town can be obtained. Once the transport engineer or planner understands the population growth pattern, transport problems for particular area can be minimized. Thus, land use model is important and should be used to determine the population growth pattern in Skudai Town area. Based on the discussion, this study tries to answer the following questions:

- i) What is the trend for the population growth in Skudai Town?
- ii) What is the main factor that contributes to the population growth in Skudai Town?
- iii) How the land use model for Skudai town can be determined?

1.4 Objectives

The main objective is to develop a land use model for population growth in Skudai town.

The following sub-objectives were formulated in line with the purpose of the study:

- i) To determine the trend of cost index;
- ii) To estimated the holding capacity; and
- iii) To estimate travel time and accessibility of Skudai Town.

1.5 Scope of Study

The scope of study covers the aspects which are studied in this project. The scope of study also acts as a guideline in order to keep the study within the boundary. In order to fulfill the above goals and objectives, the following scopes are formulated:

- i) Boundary of the study area

The study focuses on the population growth in the Skudai Town area. The Second Link (west), Railway line (south), Sungai Melana -natural feature (east), Jalan Skudai (north-east) and North South Expressway –E2 (north) will be defined as study area. However, this boundary may be different from any party. Next stage is to define the boundary of every housing estate or zoning in this study area.

Boundary of every housing estate was obtained from local authority –Johor Bahru Central Municipal Council (MPJBT) as well as the land use data for Skudai Town.

ii) Holding Capacity

Holding capacity of the Skudai Town will be determined by using the present population number and percentage of land developed last and present year. In this study, year 2000 will be the base year and all the data in the projected year will compute base on this year.

iii) Accessibility of employment zone

There are two main factor influences the accessibility of employment which are number of jobs and travel time from home to work. Data for number of job can be calculated from the population-employment ratio which is stated in National Physical Plan, 2005 while travel time data from residential zone to employment zone can be measured by using land use map and Google Earth.

iv) Cost Index of zone

Average housing price for residential area would be applied to define the cost index for each residential zone as well as for industry and commercial zones. It is difficult to obtain the property value in year 2000. Therefore, property value in this study is obtained from the property market report 2007. It is assume that, the property value is stable and no changes within this period.

1.6 Significance of Study

Transportation planning can be defined as the process that examines the potential of future actions to guide a situation or system toward a desired direction. The growth in population determines the growth in urban area economic activity, the requirement for additional or new land uses and future levels of travel demand. It is essential that both the amount and the location of population growth expected in an urban area be known since these factors are basic to estimating future trip generation and inter-zone travel.

Population growth does not occur uniformly throughout the urban area nor does its pattern remain constant in time because any changes set continuously to modify the patterns of economic activity and land use. Population estimates are subject to uncertainty however derived. Because of this uncertainty, it is better if transportation plans are based on urban area levels of population rather than on completion by particular date.

Trend of population growth study is significant for those who want to get a better understanding and want to plan the Skudai Town. Beside this, this study can become a base for others study and research which is related to the population growth. From this study, the main factors that influence the population growth pattern can be determined.

1.7 Study Approach

This study will be approached in four phases as follow:

Phase 1: Preliminary Study

The preliminary study involves literature studies to understand the concept of landuse model, relationship between landuse and transport, landuse model and population growth factor. Books, journals, articles and websites on landuse model and its application on population growth were studied in order to get a better understanding of how this model works how to apply it in transportation planning context.

Beside this, planning document such as the Iskandar Development Region Master Plan, the Johor State Structure Plan, Johor Bahru District Local Plan and other related documents are read to get a better understanding about the Skudai Town in the past, present and future.

Phase 2: Data Collection

There are several data need to be obtained before proceeding the study. These data can be obtained from the population census report, property market report, Johor State Structure Plan report and other documents. Then these data will become a base of information to which the study could be based upon. The selection of the study area was also conducted at this stage of the study.

Phase 3: Analysis

The collected data in this study will be analyzed through the use of the appropriate statistical methods. The analysis will be focused on the calculation that explain the relationship between population growth, accessibility of employment zone, cost index and holding capacity index of Skudai Town. In this part, population growth in current and future situation will be determined as well as the relationship between population growth and these three indicators. The details of the methods of study and analysis as well as the results of the analysis are to be found in the later chapters of this study. The use of a regression model is employed in estimating the population growth of Skudai Town with design year 2020.

Phase 4: Conclusion

After analyzing the data obtained, a conclusion on the findings of the study will be made to develop a land-use model for Skudai Town area. Beside this, a predictive model for population growth in Skudai Town will be determined.

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