# CHAPTER 1

# INTRODUCTION

## 1.1 State of the Problem

The first to the eighth National Economic and Social Development Plans (1962-2001) focused on development of the country through industrial development. As a result, Bangkok has become a center for economic development. Accompanying rapid population growth, distribution of job-housing location took place in unbalance manner. Population density in Bangkok has increased from around 1,365 persons per square kilometer to greater than 3,500 persons per square kilometer in 2004 (see Table 1.1). It shows that population density in Bangkok was around 30 times greater than that of the whole kingdom. Since the Thai government has never achieved city plan, it revealed a concentration of workplace in the inner areas of Bangkok.

For job accessibility, employment structure in Bangkok varies greatly across its areas. For inner[1] Bangkok, commercial, financial, and service sectors play an important role as major sources of employment. The inner areas of Bangkok were occupied by commercial establishments and offices, especially financing and banking businesses as well as government offices. For the outer[2] areas of Bangkok, the major source of employment is production sector, while employment in the middle[3] areas of Bangkok is mixed among production, commercial, and service sectors from the inner to the outer of Bangkok. However, a concentration of high potential job opportunities in inner areas implied that most workers travel into central of the city to work during peaked hours (Traffic Statistic Report, 2004).

---

[1] Inner areas of Bangkok included Bangkholaem, Bangkoknoi, Bangkokyai, Bangplad, Bangrak, Bangsue, Dusit, Klongsan, Pathumwan, Phayathai, Pomprabsattrupai, Pranakorn, Rajadhevi, Samphanthawong, Sathorn, and Thonburi.

[2] Outer areas of Bangkok included Bangbon, Bangkhunthian, Bungkum, Donmuang, Kannayao, Klongsamwa, Ladkrabang, Minburi, Nongchok, Nongkhaem, Pravet, Sapansung, Suanlhuang, Talingchan, Thawiwatthana,.

[3] Middle areas of Bangkok included Bangkapi, Bangkhae, Bangkhen, Bangna, Chatuchak, Dindaeng, Hauykhwang, Jomthong, Klongtoey, Ladprao, Lhaksi, Phrakanong, Phasicharoen, Ratburana, Saimai, Tungkru, Wangtonglhang, Watthana, and Yannawa,

Table 1.1

Population Profile 1960-2004

| Total Population (million) | | |
|---|---|---|
| Year Break-down | a Whole Kingdom | Bangkok |
| 1960 | 26.258 | 2.136 |
| 1970 | 34.397 | 3.077 |
| 1980 | 44.825 | 4.711 |
| 1990 | 54.549 | 5.876 |
| 2000 | 60.607 | 6.320 |
| 2004 | 61.974 | 5.634 |
| Population Density (person per square kilometer) | | |
| 1960 | 51.1 | 1,365.1 |
| 1970 | 67.0 | 1.966.4 |
| 1980 | 87.4 | 3,000.9 |
| 1990 | 106.3 | 3,758.2 |
| 2000 | 118.1 | 3,621.0 |
| 2004 | 121.0 | 3,592.0 |

Source: Census 1960-2004, the National Statistical Office

As a consequence of this job concentration coupled with biased transportation investment of the Thai government, the traffic crisis in Bangkok has accelerated. The amount actually spent on public transit system investment was only 1 percent during the 6$^{th}$ National Economic and Social Development plan, although this increased to 36 percent during the 7$^{th}$ plan (as shown in Table 1.2). Therefore private vehicles have become necessary for commuting as consequence of the lack of public transport. As shown in Figure 1.1, vehicle ownership has increased overtime, especially in 1980.

Table 1.2

Comparison of Actual and Planned Investment

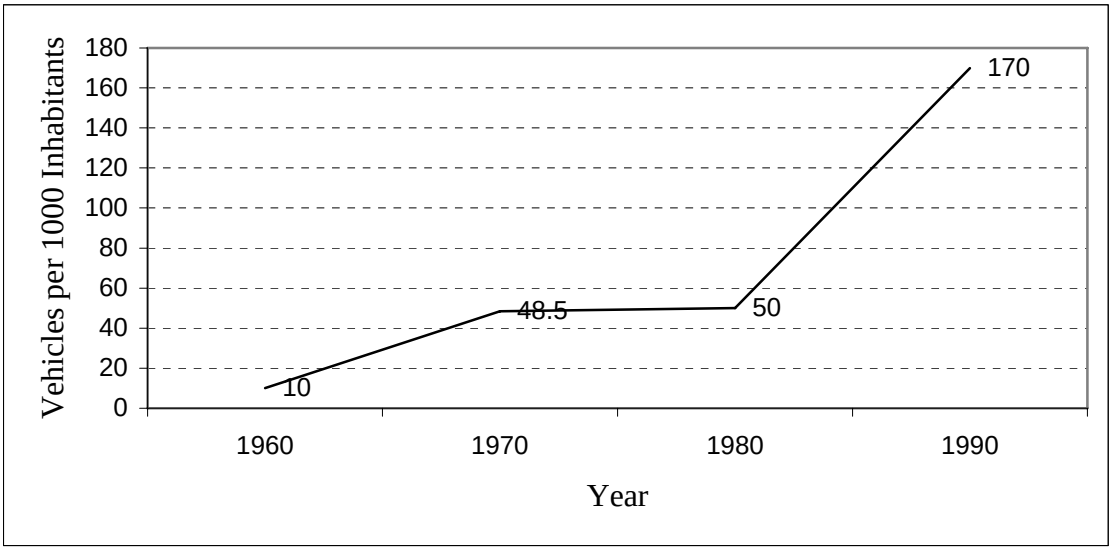
by Transport System

| Transport System | The 6th Plan (1987-1991) | | | |
|---|---|---|---|---|
| | Investment Planned | | Actual Investment | |
| | Billion Baht | Percent (%) | Billion Baht | Percent (%) |
| Road/Expressway | 20 | 70 | 35.9 | 96 |
| Public Transport | 8.5 | 29 | 0.4 | 1 |
| Others | 0.2 | 1 | 0.9 | 3 |
| Total | 28.9 | 100 | 37.2 | 100 |
| Transport System | The 7th Plan (1992-1996) | | | |
| | Investment Planned | | Actual Investment | |
| | Billion Baht | Percent (%) | Billion Baht | Percent (%) |
| Road/Expressway | 174.8 | 52 | 131.3 | 61 |
| Public Transport | 141.6 | 42 | 73.2 | 36 |
| Others | 18.7 | 6 | 6 | 3 |
| Total | 335.1 | 100 | 210.5 | 100 |

Source: Bureau of the Budget (1985-1999)

Figure 1.1

Vehicle Ownership Trend in Bangkok




Source: Office of transport and Traffic Policy and Planning (OTP)

However, alleviating traffic congestion was attempted in the 8th plan (1997-2001). Although the public investment share of 60 percent of the total budget required and allowable in annual transport budget, it was unlikely that all the projects could be implemented. Indeed, the total budget required was found to surpass the government's financial capacity. Fortunately, almost at late 1999, the first rapid rail transit calls BTS with 23.5 kilometers was launched. As the route is too short and the ticket price is too expensive, just 1.6 percent of commuters use this rapid rail transit to travel to work daily (Traffic and transportation Department; TTD). Another rapid rail transit, Mass Rapid transit (MRT), was opened in July 2004, and this rapid rail network extension was expected to yield a lot of transit usage structure changes (as shown in Table 1.3).

Table 1.3

Number of Expected Public Transit Commuter

| Public Transport Mode | 2006 | 2011 | 2016 | 2021 |
|---|---|---|---|---|
| BTS Green Line | 378,000 | 481,000 | 688,000 | 879,000 |
| MRT Blue Line | 187,000 | 513,000 | 720,000 | 932,000 |
| _Orange Line | - | 322,000 | 712,000 | 905,000 |
| _Purple Line | - | - | 92,000 | 112,000 |
| _Feeder Line | 222,000 | 506,000 | 859,000 | 1,485,000 |
| Rapid rail transit | 787,000 | 1,822,000 | 3,071,000 | 4,313,000 |
| Non-air Bus | 4,459,000 | 3,389,000 | 2,512,000 | 1,919,000 |
| Air-condition Bus | 1,211,000 | 1,015,000 | 896,000 | 934,000 |
| Microbus | 322,000 | 304,000 | 253,000 | 241,000 |
| Express Ferry | 160,000 | 142,000 | 150,000 | 156,000 |
| Total | 6,939,000 | 6,672,000 | 6,882,000 | 7,563,000 |

Source: Elevated Rail Transit Project, State Railway of Thailand

Although attempting to alleviate traffic congestion in Bangkok were revealed, they were inefficient. Bangkok residents must adapt themselves to these congested conditions. Middle-class residents have resorted to the twin strategies of residential mobility to the fringes of Bangkok in combination with lengthy commuting to their place of work. Others who have a choice have adopted high rise inner-city condominium living which reduces the distance between their workplace and residence. Finally, those without resources are forced to live in many of Bangkok's slum areas, many of which are located far from potential workplaces.

Changing residential location pattern was studied by LeRoy and Sonstelie (1983). They suggested one explanation shifting of residential pattern is life cycle of a commuting mode. Assuming that income elasticity of housing demand is less than unity, they found that when automobile which is faster but more expensive than the existing mode is introduced, the higher-income workers who have higher value of time found that automobile is economical for them, as saving commuting time cost. Thus they get a comparative advantage in living farther from the city center. Later, as income rises relative to the commuting cost of automobile transit, it becomes economical for the lower-income workers. Eventually almost everyone can commute by this alternative mode. Then they move out of crowded city to live in the outskirts, reducing the comparative advantage of the higher-income workers located at these sites. Residential location then returns to a pattern that prevailed before the new mode was introduced.

However, the effect of the new transport innovation, rapid rail transit was cited differently. Regaining people living near rapid transit network cannot be solely explained by the effect of introduction of subway system but demographic, socio-economic, and neighborhood environment are also significant factors (Helms; 2003, Steen; 1986, and Kern; 1981).

Nevertheless, there was evidence shown that many apartments and condominiums in Bangkok were constructed around the areas that the rapid rail transit passed through or was expected to pass in later years. Based on data collected by Agency of Real Estate Affair (AREA), among the total new launches in 2006, condominiums and townhouses registered the first and second highest growth of 65 and 26 percent, respectively. The major concern focuses on low ended condominiums

(unit pricings are concentrated around 1-3 million Baht), which is expected to dramatically increase in the next few years as the strong demand for CBD condominiums located near BTS and MRT lines, due to the relatively high oil prices (Annual Report 2006, AREA).

However, there has been no research conducted on effect of the shift of the transportation system on residential pattern in Bangkok. Therefore the study for the influence of transportation facility innovation on residential location pattern in Bangkok, through the period before and after rapid rail transit is available, is needed.

## 1.2 Objective of the Study

1. To examine whether transport innovation in form of the rapid rail transit can influence residential location pattern in Bangkok.
2. To analyze residential location chosen by different-income households in Bangkok in the periods before and after the rapid rail transit (1998 and 2004 respectively).

## 1.3 Scope of the Study

Based on the rapid rail transit system (BTS and MRT), this study is conducted in the period of pre-rapid rail transit system and post-rapid rail transit system becoming available.[4] Because this study analyzes the influence of transport innovation through the introduction of the rapid transit system in comparative static approach, I will employ two data sets which is Socio-Economic Survey (SES) collected by National Statistical Office (NSO) in 1998 for the pre-rapid transit system period and in 2004 for the post-rapid rail transit system period.[5]

[4] The first rapid rail transit known as Skytrain or BTS was introduced on December 5, 1999.

[5] Data on transport expenditure of sample households were collected in terms of private and public transit which did not categorize by transit mode in 2006. So we employ data in 2004 instead.

For areas of study, based on the availability of rapid transit network, Bangkok area can be divided into two parts as follows[6];

1.) The areas with rapid rail transit network comprise 27 sub-districts[7].

2.) The areas without the rapid rail transit network comprise 127 sub-districts.

## 1.4 Organization of the Study

Organization of this study is as follows

Chapter 2 describes the theoretical framework. Traditional residential location theory of Alonso (1968) and the bimodal-choices of transits model of LeRoy and Sonstelie (1983). Then some related literatures are reviewed.

Chapter 3 first explains the specific model for estimation. Then the additional assumptions involved for the Bangkok case study is set. Variable discussion, hypothesis setting expected signs are mentioned next. In the last part, data and variables are discussed.

Chapter 4 reports the empirical results. Diagnostic tests and goodness of fit of the model are shown for reliability of the model. Then econometric results and other notification are interpreted.

Chapter 5 is the conclusion of the study. Limitations of the study are also indicated. Finally, policy implication and recommendations for future study are mentioned.

---

[6] See for more detail in Appendix A.

[7] Map of mass rapid rail lines based on the MapMagic (Bangkok 2004-2005 ET) program compiled by ThinkNet Co,Ltd were used to determine which sub-district had rapid rail running through.

## 1.5 Definition

Specific definitions involving mode choices of transit are priory defined in order to avoid confusion and easily capture the concept of the study.

Transport Innovation: according to the study, transport innovation is referred to as the innovating of the new alternative transport mode which yields lower transportation costs whether through monetary costs (in terms of fixed and/or variable costs) or time cost for the commuter. It provides better alternative choice of transit for residents commuting to work.

Although transport mode choice can be classified in different ways, in this study, choice of transit mainly depends on the average speed[8] of transit or time cost spent in transit. Nevertheless, monetary costs in terms of fixed and variable costs are also concerned

Bus transit is defined as the commuting by bus, minibus, regular bus, and/or air-conditioned bus. In this study, whether bus transit service is served by government as public transit or by private sector is not excluded. Notice that bus transit is the slowest mode (among other transits mentioned in this study).

Automobile transit or car transit is the commuting by private vehicle which includes motorcar, van, and pick-up truck, but excludes motorcycles and other hired-vehicles such as taxi, tricycle-taxi, and hired-motorcycle. Although it is faster than bus transit, it is slower than rapid rail transit particularly during peak hours.

Mass rapid rail transit or rapid rail transit is the transit based on trail with fastest speed served to the central city. It includes both BTS and MRT[9], but does not include the expected rapid rail lines and bus rapid transit (BRT) which are hoped to be available in the future.

---

[8] Average speed on each choice of transit is shown in Appendix B.

[9] The sky-train “BTS” has been conducted by the Bangkok Mass Transit System Public Company Limited in December, 1999 and the underground-train “MRT” was concession by the Rapid rail transit Authority of Thailand in July, 2004.