

# CHAPTER 1

## Introduction

### 1.1 Statement of the Problem and the Significant of the Study

The growth rate of population in Thailand has an exponential tendency, especially in Bangkok that has a higher density of population than other provinces in Thailand due to people moving from rural areas to urban areas Bangkok has less area but has a huge population leading to problems.

The Bureau of Registration Administration (BORA) (2015), reported that the density of population in 50 districts in Bangkok in December 2015. It found that in Pom Prap Sattru Phai has the most population density account for 25,160.54 people per square kilometres. The second is Samphanthawong account for 18,145.48 person per square kilometres and in Phasi Charoen has the least population density account for 7.20 person per square kilometres. Although, in Pom Prap Sattru Phai has a high population density but there are less the value of land and economic activities when compare with the value of land in Silom line because the electric train come from Mo Chit pass through Siam and interchange to Silom line because the value of land and economic activities are higher than those of the value of land and economic activities in Pom Prap Sattru Phai about 55 percent (Department of Land, 2017). That's why the electric trains pass through that routes.

The progress of urban area refers to the people in the rural area moving to urban area more and more. Urbanization brings with it many problems such as public utility, pollution, poverty, crime, crowded, and etc. But, it obviously is seen that the traffic jam is the main problem that effects to the people unavoidably. Traffic jams are a complex problem arising from many factors including economic prosperity, society, technology, driver behaviour, and the rapid and large increase in vehicles. All of these lead to traffic moving slowly.

The one main cause of traffic problem is lack of public transportation due to loss of profit or not popular. Nowadays, the amount of public transportation has not enough for people demand and limited area, especially in urban areas leads to some areas have a few choices when people want to travel thereby most people in Bangkok use private cars instead of public transportation.

Bangkok is the capital and most populous city that is the economic centre of Thailand, and the heart of the country's investment and development and becomes an urbanization. Bangkok has rapidly grown with very little urban planning or regulation. This has led to inadequate infrastructure. By 2030, Bangkok is expected to become one of the world's megacities with a population surpassing 10 million.

**Table 1.1:** Bangkok Population Data (Urban Area)

| Year | Population        | Growth Rate (%) | Growth         |
|------|-------------------|-----------------|----------------|
| 1950 | 1,360,000         | 0.00%           | 0              |
| 1955 | 1,712,000         | 25.90%          | 352,000        |
| 1960 | 2,151,000         | 25.60%          | 439,000        |
| 1965 | 2,584,000         | 20.10%          | 433,000        |
| 1970 | 3,110,000         | 20.40%          | 526,000        |
| 1975 | 3,842,000         | 23.50%          | 732,000        |
| 1980 | 4,723,000         | 22.90%          | 881,000        |
| 1985 | 5,279,000         | 11.80%          | 556,000        |
| 1990 | 5,888,000         | 11.50%          | 609,000        |
| 1995 | 6,106,000         | 3.70%           | 218,000        |
| 2000 | 6,360,000         | 4.20%           | 254,000        |
| 2005 | 7,228,000         | 13.60%          | 868,000        |
| 2010 | 8,213,000         | 13.60%          | 985,000        |
| 2015 | 9,270,000         | 12.90%          | 1,057,000      |
| 2016 | 9,444,000         | 1.90%           | 174,000        |
| 2020 | 10,137,000        | 7.30%           | 693,000        |
| 2025 | 10,953,000        | 8.00%           | 816,000        |
| 2030 | <b>11,528,000</b> | <b>5.20%</b>    | <b>575,000</b> |

Source: World Population Review (2016)

In table 1.1, Bangkok's 2016 population is now estimated at 9,444,000. In 1950, the population of Bangkok was 1,360,000. Bangkok has grown by 174,000 in the last year, which represents a 1.90 percent change. These population estimates and projections

come from the latest revision of the UN World Urbanization Prospects. These estimates represent the urban agglomeration of Bangkok, which typically includes Bangkok's population in addition to adjacent suburban areas (World Population Review, 2016).

The city was the centre of economy and prosperity. Nowadays, the big problem of Bangkok is traffic jam cause of the population and tourism have a larger amount in Bangkok, and the amount of user's private car in Bangkok is continuously increasing and have limited road lead to severely traffic jam.

**Table 1.2:** Congestion level in Bangkok

| World Rank | City           | Congestion Level<br>(Extra travel time) |
|------------|----------------|-----------------------------------------|
| 1          | Mexico City    | 59%                                     |
| 2          | <b>Bangkok</b> | <b>57%</b>                              |
| 3          | Istanbul       | 50%                                     |
| 4          | Rio de Janeiro | 47%                                     |
| 5          | Moscow         | 44%                                     |
| 6          | Bucharest      | 43%                                     |
| 7          | Salvador       | 43%                                     |
| 8          | Recife         | 43%                                     |
| 9          | Chengdu        | 41%                                     |
| 10         | Los Angeles    | 41%                                     |

Source: TomTom Traffic Index (2016)

Table 1.2 shows Bangkok is the second most congested city in the world as we already knew that the traffic is one of the worst things about Bangkok and a study has confirmed that the city has worse traffic jams than any other place in the world apart from Mexico City. Drivers in Bangkok spend on average 57 percent extra travel time stuck in traffic at any time of the day (TomTom Traffic Index , 2016).

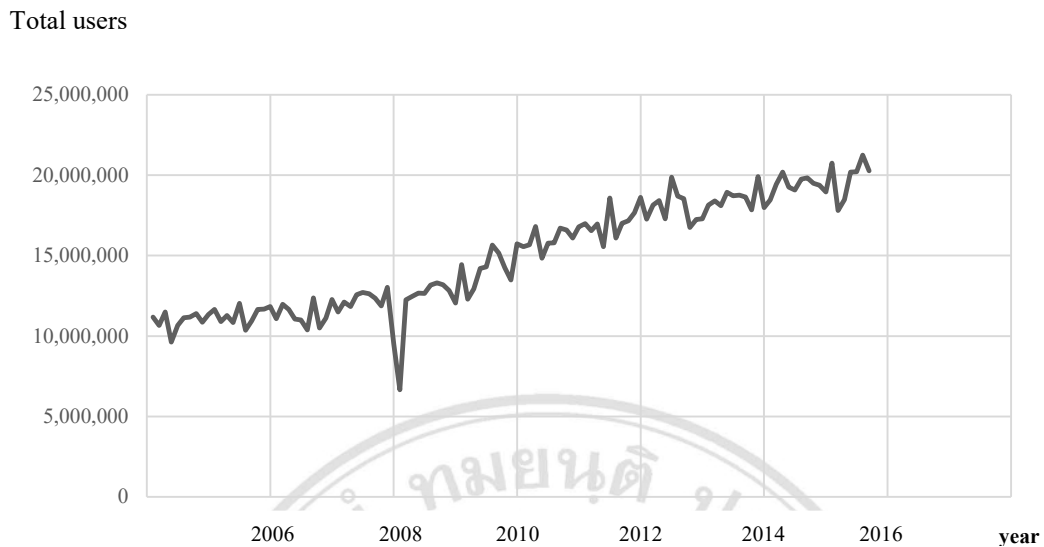
Bangkok is currently served by three rapid transit systems compose of the Bangkok Mass Transit System or BTS Sky train, the underground MRT or Mass Rapid Transit and the elevated Airport Rail Link or ARL. Besides, four rapid transit lines are now in operation, with more systems under construction or planned by the national government and the Bangkok Administration.

Bangkok is typified by rapid growth and inadequate infrastructure systems. The city has turned to public transport in order to solve this major problem. The government add the new way to transport that is electric train for response to people demand and also help to reduce pollution in the city. The growth of rail users is crucial for economic planning, so forecasting of rail users is needed.

In this situation, people will turn to public transportation which is fast, convenient, economical, and safe. These will make people use public transportation increasingly. Thus, the study needs to study behaviour and forecast the growth rates of public rail transportation use in Bangkok.

Forecasting passenger growth in the rail system in order to forecast growth requires past history data. This is needed to create a mathematical model for forecasting the growth rate of railways users and for planning improvements or creating new innovations for more efficient and more effective use. One way to have a reasonable forecasting model for the future construction of the rail system is to consider the growth rates of the existing rail systems. These growth rates are essential for planning the future of the rail system.

The determination of the user growth rate in the Bangkok rail systems is the central point of this thesis. Since there is data available from BTS, MRT the study will be limited to BTS. According to the past history data of BTS (Figure 1.1), it can be seen that the growth in user numbers have exponential trends. In addition, there exists the uncertainty of growth. Consequently, the stochastic exponential growth model will be employed to model the temporal variation of user numbers.



Source: BTS (2016)

**Figure 1.1:** Annual user numbers of BTS

This study aims to model and forecast the growth rates of public rail transportation use in Bangkok. The ridership growth rate can be used to assess the use capacity of the existing rail systems. In other words, it informs whether the existing service capacity is adequate for the number of users in the future or not. For the planning of new rail systems, such a user growth rate can be used as a guideline to determine the service capacity. This is due to the fact that there was no historical data at the stage of planning for the new and similar characteristic routes.

## 1.2 Objective of the study

1.2.1 To model a public rail transportation use in Bangkok.

1.2.2 To forecast the ridership growth rates in Bangkok.

## 1.3 Contributions of the study

The obtained the ridership growth rates can be used for assessment of capacity improvement of existing rail systems. For the planning of new rail systems, such a ridership growth rate can be used as a guideline for the planning of new and similar characteristic routes because there is no historical data for unconstructured of such new ones. The growth of public rail transportation ridership is crucial for economic planning, so forecasting of rail users is needed.