CHAPTER I

INTRODUCTION

1.1 Background

The Aeronautical Radio of Thailand Ltd. or Aerothai was established in 1948 by the airline companies with the consent of the Royal Thai Government to provide the aeronautical radio services for airline operations, Later in 1963 the government acquired the company's share capital from the founding airlines thereby altering the company's status to that of a state enterprise.

The company's 6,600,000 shares, each valued at Baht 100-, at a total value of Baht 660,000.000-,

- A total of 6,000,000 A-shares, held by the government.
- A total of 600,000 B-shares, held by the member airlines.

The Company's Services

- Provision of Air Traffic Control Services for both domestic and international routes.
- Provision of Aeronautical Communications Services.
- Provision of Related Services consisting of providing communications equipment for air transportation operators at airports in the country and abroad, manufacturing customized communication equipment, providing consulting services , training in Air Traffic Control, Aeronautical Telecommunications and Engineering, installation and maintenance of communications equipment for domestic and international airport.

The Company's Mission

The Aerothai provides air traffic control services for domestic as well as international operators with the highest regard for safety,orderliness and expeditiousness of flights and stand in the forefront of the developments for the growth aviation in the region.

The Company's Policy

1) To perform its duties with efficiency, 24 hours a day and everyday throughout the year.
2) To operate on a non-profit basis with service charges assessed fairly.
3) To be nondiscriminatory to all users.
4) To follow government policy.

Aerothai's Air Traffic Control Services

The Aerothai's main functions are to provide air traffic control services in the Bangkok Flight information Region, the upper airspace of Cambodia(over 19,500 feet) and over the South China sea (over 24.500 feet), to provide approach and aerodrome control services, air navigation facilities.

The Aerothai provides air traffic control services in Thailand airspace system and its territory. The air traffic control services can be divided into three type of services as follows:

Area Control Services

The Aerothai's area control or en-route service is responsible for the provision of air traffic control services for the aircraft flying within the Bangkok Flight Information Region (FIR) including in charge of the upper airspace of Cambodia at the altitude of 19,500 feet and the altitude of 24,500 feet over the South China sea. The Aerothai's area control service are divided into 7 sectors of responsibility as follows:

Sector 1 : The Center Part of Thailand covering Southern Part of Don Muang airport and the gulf of Thailand up to and including the Western Part of U-Tapao airport.

Sector 2 :The Center Part and the Northern Part of Thailand.

Sector 3 :The Southeastern Part of the Gulf of Thailand, including Cambodia airspace and parts of the South China Sea.

Sector 4 : The Western to Southern Part of the North of Thailand.

Sector 5 : The Gulf of Thailand and the Andaman Sea.

Sector 6 : The Gulf of Thailand and Parts of the South China Sea.

Sector 7 : The Northern Part of Thailand.

Approach Control Service

This service provides radar separation to arriving and departing flights. The responsibility cover an area within the radius of 35 nautical miles from airports and from the ground up to the altitude of 11,000 feet which operate at Chiang Mai, Hat Yai and Phuket international airports.

- Bangkok International airport where the control cover a radius of 50 miles from the airport and the level of 16,000 feet .

Aerodrome Control Service

Aerodrome or tower control service provides the service to the aircraft for landing and take off and control the ground traffic at the airport .

Aerothai's aerodrome control service operates at every domestic airports throughout the country.

Introduction to Air Traffic Services

The mission of air traffic services (ATS) organization is to ensure safe and efficient operations, maintenance and use of the air transportation system today and meet tomorrow's challenges to increase system safety, capacity and productivity (FAA,1998)

The objectives of air traffic control services (ATC)

1) To prevent collision between aircraft , between aircraft and obstruction on the maneuvering area. This function will evolve to ground-based flight safety management including safety monitoring and separation assurance , within the parameters of gate-to- gate operations and covering the rules governing the operations of the airspace regimes.
2) To maintain on orderly and expeditious flow of traffic

The phases of air traffic control services can be described more in Fig 1.1, Table 1.1 and Table 1.2

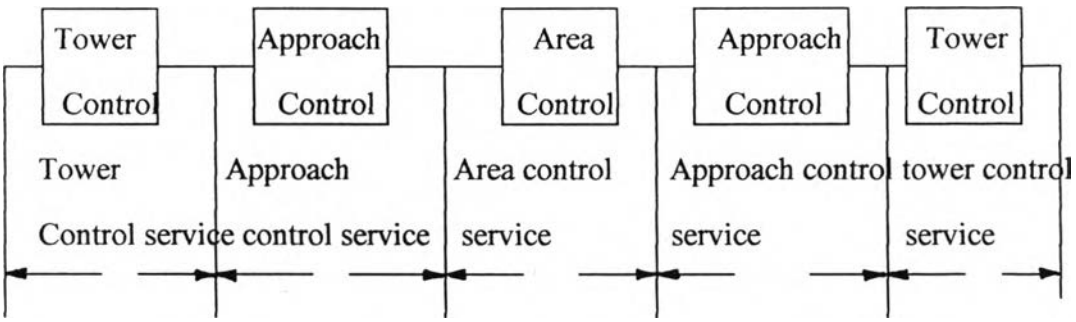

Fig 1.1 Phase of Services

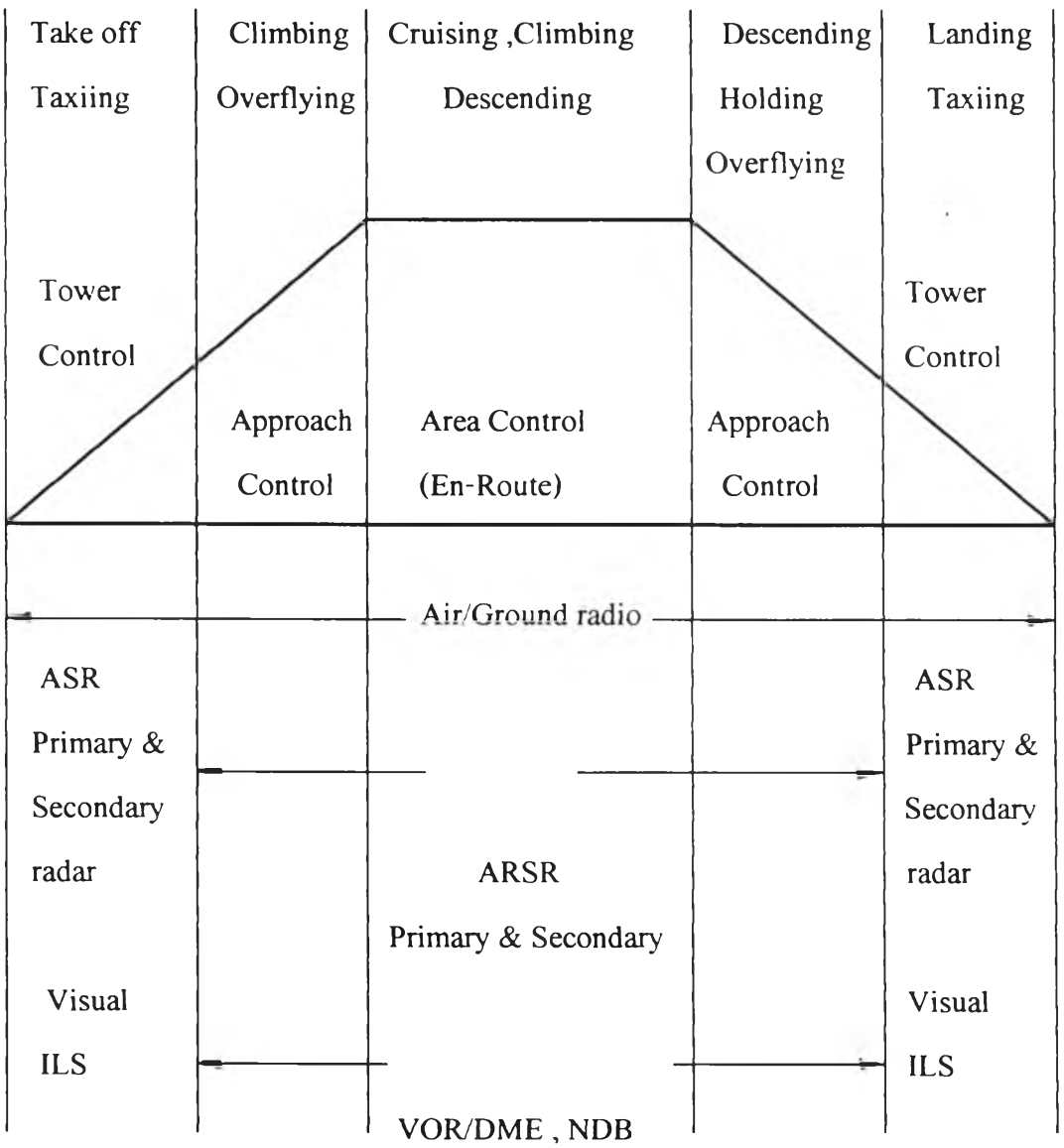

Fig 1.2 Phase of Flight in Control Airspace

Source: Mcintyre (1997) p.78

ASR= Airport Surveillance radar , ARSR= Air Route Surveillance Radar , ILS= Instrument Landing Systems

VOR= VHF Omnidirectional Range , NDB= Non-Directional Beacon

Table 1.1 Phase of Flight in Control Airspace

Phase of Service	Flight Operations	Technology-Used
En-route (Area Control)	Cruising, Climbing, Descending	Communication System : air/ground radio Surveillance System: ASSR en-route radar (primary and secondary radar) Navigation System : VOR/DME,NDB
Approach Control	Descending, Holding Overflying,	Communications System: air/ground radio Surveillance System: primary and secondary radar Navigation System : VOR/DME,NDB
Aerodrome (tower)	Landing ,Take off, Taxiing	Communications System: air/ground radio Surveillance System: ASR (primary and secondary radar) Navigation System: ILS, visual

Source : Adapted from Mcintyre (1997), p.78

The air traffic control services is associated with the primary objective is "separation assurance" . The separation assurance is to provide the pilots to ensure that the aircraft can maintain a safe distance from other aircraft, terrain, obstruction and certain airspace not designated for routine air travel.

In order to achieve the separation assurance, the pilots use instrument procedures rely on air traffic control instructions performed by controllers to control and direct the pilot to fly under visual flight rules and instrument flight rules depend on the aircraft's type. The air traffic control services employ separation rules and procedures that define separation standard for many different environment where aircraft operate (FAA,1998)

In the current air traffic control environment, a pilots establish a flight plan or contact with air traffic controller. The flight plan contains the flight's objectives, flight routes, time of departure, destination airport and flight profiles (speed, climb, dessert) . The flight plan requires the pilot to fly along a specific route. Any deviation from the designed route must be pre-approved by air traffic controller. (Nolan,1994)

The current air traffic control system attempts to satisfy each pilot's request for a specific routes or attitude. The procedural restrictions ensure positive aircraft separation and an efficient, orderly flow of traffic, reduce the potential conflict between the aircraft from each other. The procedural restrictions are the tool used by controller to limit workloads and avoid congestion (FAA,1998)

Air Traffic Controllers

The air traffic control services would not happen without the controllers. The controllers play an important role in air traffic control services. They guide and direct the pilot to fly safely and orderly. They give the pilots traffic advisories when needed. They cooperate, interact and share information with pilots to ensure that the aircraft can maintain maximum safety and orderliness.

The duties and responsibilities of controllers are to provide and ensure safe separation among aircraft in their sectors. The tasks in air traffic control process done by controllers rely on the cognitive abilities of the controllers to interpret information and to produce an operating strategy that need the goals of system, aircraft and controllers (Stoner , 1995)

In the current air traffic control environment, The controllers perceive many sources of information. The controllers monitor the current aircraft situation in terms of speed, altitude, destination by radar display and scanning flight progress strips, including use the weather report, communicate with pilot and others controllers, predict the future aircraft situation of each aircraft and relates its actual movement to the predicted through the next sector airspace. If deviations are detected, The controllers mentally determine corrective actions and translates them into necessary control instructions. The controllers then transmits the instruction as and ATC clearance to the flights. The flight progress strips and the system are updated manually. The process is repeated for each flight under control until the flight is pass over to the next control sectors. In order to clearly descried the controller tasks, the controllers task model can be shown in Figure 1.3

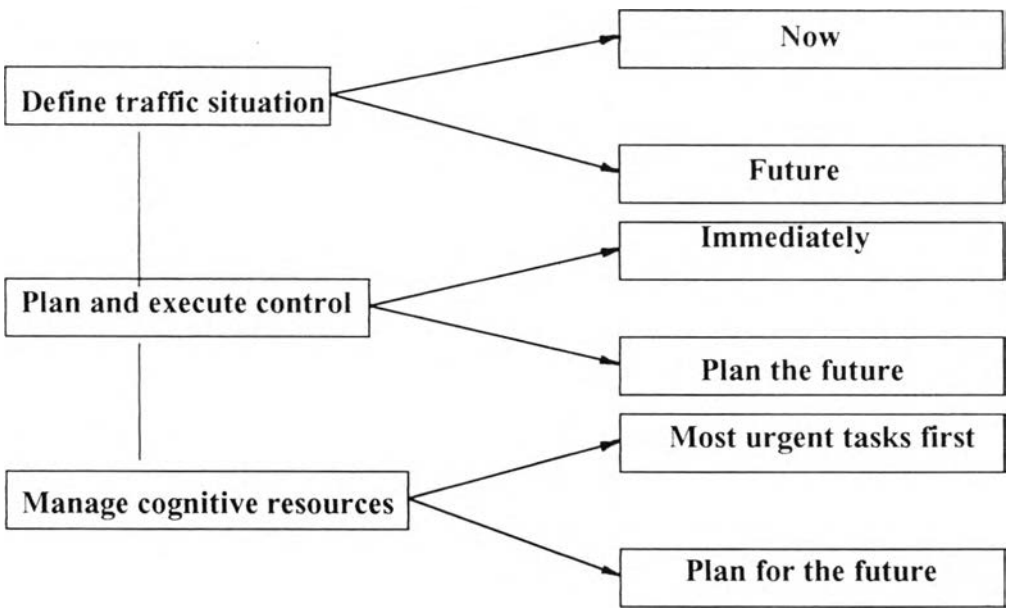

Fig 1.3 The controller task model

Source : Stoner (1995) p.37

Cadosi and Murphy (1995) explain that the tasks or activities in air traffic control process are associated with human information processing. They describe the human information processing as " the controller processes many different kinds of information from many sources : flight data information, communications from pilots and other controllers, information on equipment status and various other kinds of information too numerous to list. On the basis of his or her assessment of the situation, the controller makes and implements decision. He or she decides if any control action is necessary, decides what action to take, formulates instructions and issues instruction to aircraft, often under very flight time constraints". All of these are information processing activities that can be classified into the activities as follows:

- Information gathering
- Situation assessment
- Generation of alternative plan and course of action
- Evaluation of the alternative
- Selection of a plan for implementation

Air Traffic Control Technology

The separation assurance by the air traffic control services (ATC) would not happen without the supporting by air traffic control technologies. To ensure that the aircraft can fly safely and orderly, the controllers must know and identify the aircraft's positions. The controllers must communicate with pilots to interact, cooperate and share information in order to guide and direct the aircraft safely. The communications system is a vital technology for supporting air traffic control process. Radar technology is used for identifying and monitoring the aircraft's situation to controllers and the navigation system provides the guidance to pilots to identify their locations and positions along the flight routes.

The air traffic control technology can be divided into three main systems as follows:

1)Communications System

Mobile communications

Short-range: VHF air/ground communications

Long-range: HF air/ground communications

2)Navigation System

2.1 Radio Navigation System (VOR/DME, NDB)

2.2 Instrument Landing Systems (ILS)

3) Surveillance System

3.1 Primary Radar

3.2 Secondary Radar

1.2 Statement of the Problems

Aerothai is the air traffic services (ATS) organization which operates for safe, orderly and efficient operations of the air transportation system. The company provides the services delivery for all the airspace users within Thailand airspace system. The company is faced with several problems associated with the air traffic control services.

The problems that exist in Aerothai's air traffic control environment today can be illustrated as follows:

Increasing Traffic Demand

The growth rate of the air transportation as well as the volume of flights increase every year. The total volume of traffic carried out by Aerothai in 1989 were 126,678 flights compare to 310,703 flights in1997. The volume of flights increases 145% or increase approximately 18.1 % per year.

Table 1.2 Aircraft Movements at All Thailand's Airports ; 1985-1997

Year	Grand Total All Thailand's Airport
1985	99898
1986	107813
1987	109516
1988	123367
1989	147890
1990	182976
1991	201335
1992	210869
1993	219869
1994	219804
1995	234076
1996	252788
1997	262578

Source : JICA (1998)

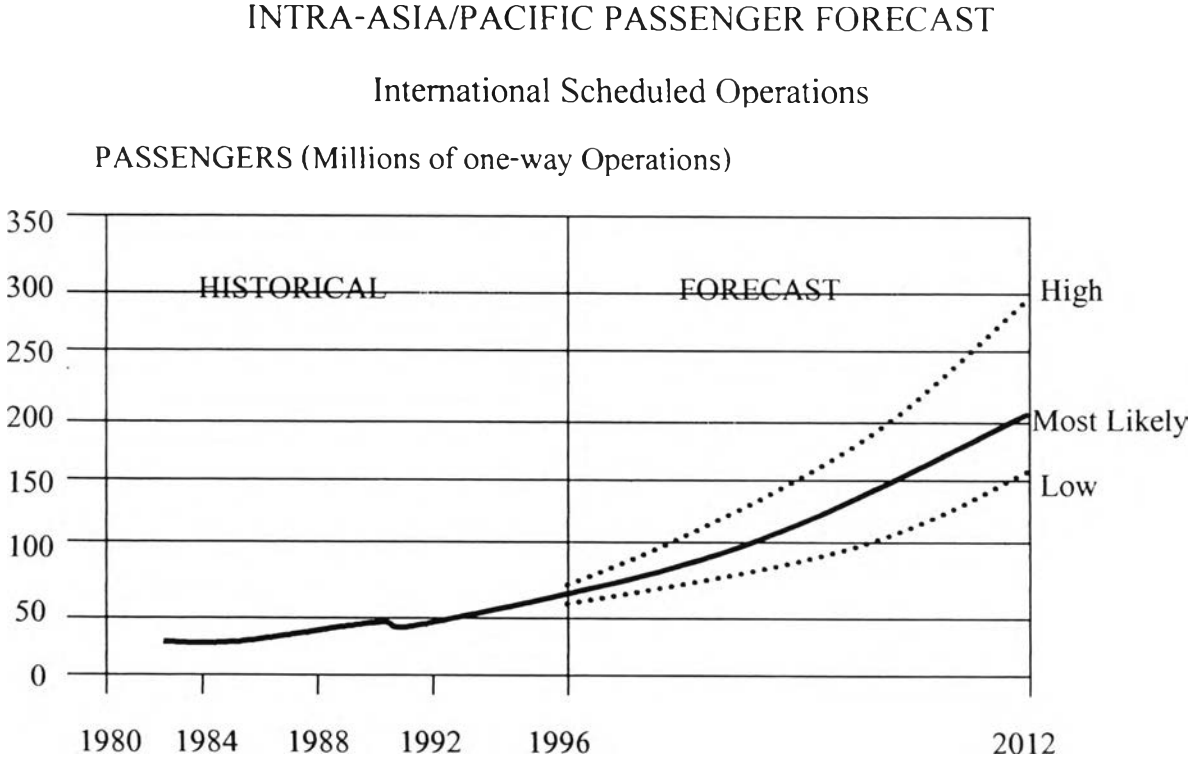

Fig 1.4 Asia/Pacific Traffic Forecasts Annual Aircraft movements

Source : ICAO (1997) p. 4A-5

Table 1.2 represents the increased aircraft movements at all Thailand's airports since 1985 and Figure 1.4 represents the trend line of aircraft movements in Asia/Pacific region that will increase every year.

The increasing traffic demand will impact directly on the company's responsibilities. The company will face with the challenge of increasing traffic demand. With increased traffic demand, diversity and flexibility are needed. The company must improve its services ability to meet users for both current and future demand.

High Competitiveness among Airline Business

Today, the airlines are highly competitive and become more globalized. Those airlines need to achieve a competitive advantage and can only survive by trying to reduce operating cost and maximizing its profit by increasing payloads and flight schedules to improve its services to meet the passengers requirements. These will cause the airlines to turn a pressure on air traffic control organizations like Aerothai in order to reduce and/or maintain flight charges and improve the services. The airlines require the company to provide maximum benefits to those airlines that pay for flight charges. This will allow the users to operate in an efficient manner, reduce delays, shorten flight paths, reduce flight time and increase number of on time flights for the airlines.

System Constraints and Deficiency

The company is faced with the system constraints and deficiency to cover its services delivery to meet the airlines requirements. The existing systems and technologies have many shortcomings and constraints that lead to a lack of system capacity to meet the challenge of increasing traffic demand in the future.

Resources Constraints

The resources constraints are becoming the key problems for the company to operate for achieving a satisfactory manner due to the limitations of the airspace, flight routes facilities, airports, run way and taxi way while traffic demand is continuously increasing.

The Nature of Business

Aerothai is fully authorized to operate its services for safe, efficient operations of the air transportation system within Thailand airspace. The company's services operate on a monopoly basis that is difficult to test the market to investigate the performance feedback among others air traffic control organizations and the world's best.

The key problems as mentioned earlier will force Aerothai to improve its services operations . The company must continuously measure and improve its service performance as well as its key operations support in order to create the optimization of its services delivery to aviation communities.

In order to achieve the key issues as discussed above, the comparison of the company performance with the world leader in air traffic control services must be conducted. This is the alternative way to accomplish the service performance improvement needed. Benchmarking is an effective approach to these problems.

Benchmarking can be defined as " the systematic services and process measurement by comparing the company's services against the best-in-class in order to take an information that will help the company take a corrective action and improve its service performance.

Aerothai must seek the best-in-class or the world leader in the air traffic control services by learning the best practices in its services operations so that Aerothai can adopt, change and improve its air traffic control services to meet the user satisfaction and requirements for both current and future challenge .

1.3 Objective of the Study

To improve the air traffic control services operations by using benchmarking as a methodology for seeking the best practices,in terms of services operations enhancement for the Aeronautical radio of Thailand Ltd. in a case study.

1.4 Scopes of the Study

1. The study aims at improving Thailand's air traffic control services operated by the Aeronautical Radio of Thailand ltd.
2. The study is based on the operations of the Aeronautical Radio of Thailand Ltd. and the benchmarked company.

3. The study will select the best-in-class in air traffic control services to be used as the benchmark.
4. The study will conduct an essential benchmarking research as an information required for benchmarking process.
5. The results of the study will be presented in terms of action plans in its areas of improvement.

1.5 Study Methodology

1. Study the benchmarking process and literature search.
2. Plan benchmarking study.
3. Select the factors to benchmark and the benchmarked company.
4. Collect the data.
5. Analyze the data.
6. Determine benchmarking findings
7. Develop improvement plans.
8. Write a final report.

1.6 Expected Benefits of the Study

This research will be conducted with the purposes of achieving the benchmarking results and bringing the service performance improvement needed. The benefits can be illustrated as follows:

1) The company will increase the awareness of the customer requirements and optimize services delivery to meet those requirements.
2) The air traffic control performance will enhance as well as the air traffic control's practices will improve.
3) The company will increase the awareness of continuous services improvement
4) The company will gain the competitive advantage in the world class air traffic services arena.

1.7 Organization of the Report

Chapter 1: Addresses the background of the benchmarking study and view of air traffic control services.

Chapter 2: Addresses a literature search on benchmarking.

Chapter 3: Introduces benchmarking process model and the application of benchmarking.

Chapter 4: Addresses the results of the benchmarking study; planing, collecting, analyzing and improving including analysis and discussion of its results.

Chapter 5: Addresses recommendations and suggestions of the study.