Chapter 1 Introduction to Airline Operations

General

The flight operation control of airlines adheres to the guideline of "safety first, better service, on time performance, economy and efficiency". All the company flight operation are based on Civil Aviation Law of the P. R. China, International Civil Aviation Conventions, regulations and rules concerning civil air transport, and Operation Certificate, Operation Specification and other items approved and issued by CAAC.

1.1 History of Airlines

1.1.1 History of Airlines in the World

An airline is a company that provides air transport services for traveling passengers and freight. Generally, airline companies are recognized with an air operating certificate or license issued by Civil Aviation Authority. Airlines vary from those with a single aircraft carrying mail or cargo, through full-service international airlines operating hundreds of aircrafts. Airline services can be categorized as being intercontinental, domestic, regional, or international, and may be operated as scheduled services or charters.

The world's first passenger airline, DELAG (Deutsche Luftschiffahrts-Aktiengesellschaft, or German Airship Transportation Corporation, Ltd.) was established on November 16th, 1909, as an offshoot of the Zeppelin Company. Its headquarters were in Frankfurt. The first fixed wing scheduled air service was started on January 1st, 1914 from St. Petersburg, Florida to Tampa, Florida.

While many of the early flights were sightseeing tours, the DELAG began scheduled service between Berlin and southern Germany in 1919 (Figure 1.1). The flight from Berlin to Friedrichshafen took 4-9 hours, compared to 18-24 hours by rail. Bodensee made 103 flights and carried almost 2,500 passengers, 11,000 lbs of mail, and 6,600 lbs of cargo. DELAG also employed the world's first flight attendant, Heinrich Kubis.

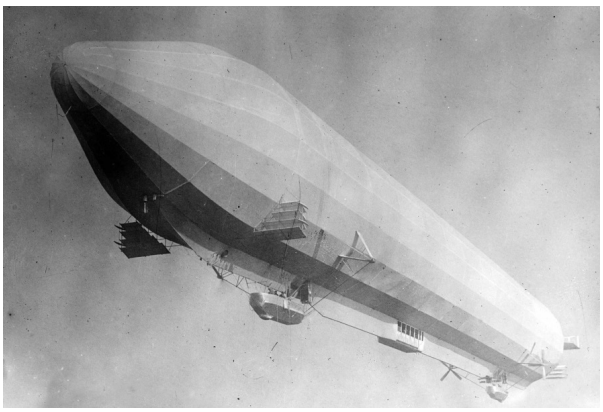

Figure 1.1 First Commercial Flight

The four oldest non-dirigible airlines that still exist are Netherlands'(KLM), Colombia's Avianca, Australia's Qantas, and the Czech Republic's Czech Airlines. KLM first flew in May 1920, while Qantas (which stands for Queensland and Northern Territory Aerial Services Limited) was founded in Queensland, Australia, in late 1920.

1.1.2 History of Airlines in China

Before 1949, there were three airlines operating in China. One was Civil Air Transport (Air China), founded in 1946. In 1949, the government established the aviation authority and operator (General Administration of Civil Aviation of China). At that time, there were only 36 airports on the vast Chinese territory. Most of them were not able to receive large aircraft.

In 1987 China's civil aviation system was operated by the Civil Aviation Administration of China (CAAC). In late 1987, Chinese government decided to split the operating divisions of Civil Aviation Administration of China (CAAC) into six separate airlines: Air China, China Eastern, China Southern, China Northern, China Southwest, and China Northwest. By 1987, China had more than 229,000 kilometers of domestic air routes and more than 94,000 kilometers of international air routes.

Currently there are about 43 different airlines operating in China. China has the fastest growing passenger air market of any country in the world (by total passenger numbers) and between 2009 and 2013 the number of passengers increased over 32% from 266,293,020 to 352,795,296.

1.1.3 Industry Trends

The pattern of ownership has been privatized in the recent years, that is, the ownership has gradually changed from governments to private and individual sectors or organizations. This occurs as regulators permit greater freedom and non-government ownership, in steps that are usually decades apart.

The overall trend of demand has been consistently increasing. In the 1950s and 1960s, annual growth rates of 15% or more were common. Annual growth of 5%-6% persisted through the 1980s and 1990s. Growth rates are not consistent in all regions, but countries with a de-regulated airline industry have more competition and greater pricing freedom. This results in lower fares and sometimes dramatic spurts in traffic growth.

1.2 History of Dispatch

1.2.1 Dispatch in China

With the development of the economy, the demands of air transportation are becoming more and more tremendous both in domestic and foreign market. The portfolio of airline is too huge to handle in an order, safe, and efficient way without someone who is responsible only for the operation control. So the need of dispatcher comes into truth. Just as other occupations, to be a dispatcher working for operation control and flight release must have working method, procedure and operating instruction. So we need establish regulations and specifications to conduct dispatcher what should do and how to accomplish their missions safely. As is known to us, the most important principles of airline operation are safe, order, and efficient. That is also the reasons why the airlines employ dispatcher to manage the flight control. In 1987, Chinese government decides to separate the airline, airport and government according to their function. This policy brings a new type of work – dispatch indirectly. Because the flight operation is becoming more and more complicated and the contest is more intense between different airlines, many airlines employ someone to take charge the business of flight operation. At the beginning time, there are only few people engaged into flight control. But now there are a large number of them working in their occupations.

In China, civil aviation is a young industry. 6 years later than Wright Brothers invented aircraft, Chinese inventor Feng Ru mads the first Chinese own aircraft in 1909. And till the opening up policy came into use, the civil aviation of China got a fast and prosperous development. The number of airlines and flight increased amazingly. So for the aim of managing domestic air transportation, Civil Aviation Administration of China (CAAC) was found in 1949. And then CAAC issued CCAR-25 in 1985. In 1990, the first dispatch handbook was issued. After that, the number of dispatcher has experienced a big improvement. With the development of world economy, a thoroughly change in aviation has been witnessed. To get in close touch with the world, CCAR made many new policies to accelerate the development of Chinese civil aviation. More dispatchers contribute to this field. CCAR-121 is a regulation to illustrate whether the certificate holder can meet the airworthiness requirements. CAAC issues CCAR-65 to standard the management of dispatcher license and the agent who award license. There are also many problems that haven’t

been solved. The technology and equipment we used in practical operation still fall behind Europe and U.S. Some of the domestic dispatchers cannot make a right and direct decision according to their knowledge and skill. The procedure of AOC is too complicated. It is inefficient for airline to accomplish operation mission timely. With the comparison to U.S., our communication system is also behindhand. We cannot organize operation under risk efficiently. Especially in emergency operation and abnormal operation, there are lots of things that we should learn from foreign airlines. From another perspective, we should improve the dispatcher's English level for the aim of learning advanced operation skills outside and meet the requirement of internationalization.

All in all, for the aim of keeping in a close step with the international civil aviation, internationalization of China civil aviation is imperative. On one hand, we should improve the technology and equipment of China civil aviation operation to guarantee that we have no or few problems in operation skills. On the other hand, we must improve the level of dispatchers, and try our best to avoid nagative human factors in practical operation. And to improve the English level of dispatchers is an efficient way to accomplish this mission. Give dispatchers more opportunity to touch advanced operation methods. Making them more and more internationalization is imperative. With the development of the economy, there are more and more air transportation needed. Since dispatch has a short history in China and the fierce increasing of civil aviation, the shortage of dispatchers will exist in a long period. That is to say, the number of dispatchers will increase in the near future. Due to the opening up policy of China, the standard of dispatcher must be improved to satisfy the need of international aviation transportation market. More and more new international operation methods are taken into practical use. Foreign language manuals are introduced from CAAC and other international organizations increasingly. Many new overseas enroute are opened with the time goes by.

1.2.2 Dispatch in the U.S.

In the United States (U.S.), the term "dispatcher" is fairly generic; there are many types of dispatchers, such as taxi, police, and bus dispatchers. For a U.S. airline to function properly, an airline employee whose job performance is critical is the airline dispatcher. The functions the dispatcher fulfills on a regular basis are demanding and impose a variety of stressors, similar to those experienced by other critical airline employees, day in and day out. The job of the U.S. flight dispatcher plays a major, legal role in the operation of an airline. The primary job of the flight dispatcher is to work within the Airline Operations Center (AOC) and provide for flight safety. Flight dispatcher, working within the AOCs, face intense pressures such as severe time constraints, flight/work overload, in addition to external pressure from their superiors. When adverse weather prevails, and other factors compound the situation (e.g., in-flight emergencies), the job of the dispatcher intensifies. Nevertheless, in combination with the captain, who has direct control of his/her aircraft, the flight dispatcher must play an equally important legal role in the safety of every flight.

In addition to the flight dispatch function, the AOCs typically house numerous other departments; these comprise crew scheduling, some form of maintenance dispatch, load control, and the management and protection of traffic/revenue.

The flight dispatcher is at the heart of coordination of all AOC departments for safe, efficient flight operations; the workload can be high. At one major U.S. airline, dispatchers may be responsible for handling up to 30 flights at a time. Other major U.S. airlines anecdotally report similar workloads, leading to the generalization that the dispatch function within the AOCs of major airlines can be hectic. The roles of flight dispatcher include additional factors to be discussed during the following investigation.

In light of the fact that there has been a dearth of literature describing the dual mandate of safe and economically efficient performance required of the dispatcher, this qualitative study has explored a variety of operational factors affecting the individuals currently holding airline flight dispatch positions.

The profession of the flight dispatcher has evolved with the many changes that the aviation industry has undergone. In the early stages of aviation, pilots of commercial airlines often had to load mail, passengers, and cargo into their airplanes. There was very little navigation equipment, no communication equipment and there was no way for the airlines to track aircraft in the early days of aviation. Accidents increased over the years, lives were being lost, and a tremendous amount of money was vanishing due to equipment losses.

In 1938, the Congress of the United States passed the Civil Aeronautics Act. This bit of legislation set forth regulations to make certain that all the nations' air carriers operated with the highest degree of safety. One result of this regulatory action was the creation of a new Airman Certificate. The flight dispatcher was created.

The flight dispatcher is a ground based, certificated individual who, according to the regulations, shares responsibility with the pilot for the safe conduct of each flight. Today, the concept of shared responsibility for the safe operation of a flight remains a shared responsibility between the captain and the dispatcher. Over the years, flight dispatchers have been known by many names such as aircraft dispatchers and flight superintendents, as well as flight controllers. No matter what the name is, the function is the same: ensure compliance with all applicable regulations and the pursuit of the highest possible level of air safety.

The Code of Federal Regulations Title 14 Aeronautics and Space (Title 14 CFR) Parts 119 and 121 require all scheduled airlines, which have aircraft with more than nine passenger seats, to maintain an appropriate number of dispatch centers staffed by FAA certificated dispatchers. Dispatching has come a long way since the early years of aviation. The industry safety record has spelled it out.

Today, at most U.S. airlines, dispatchers work in a dynamic flow environment within an AOC. [System Operations Control (SOC) and Operations Control Center (OCC) are similar labels for the AOC facility.] The proper functioning of this control center is vital to the smooth operation of the airline. An AOC is the central control point for all daily operational issues involving security,

emergencies, weather, aircraft crew coordination, aircraft maintenance routing, and overall operational coordination. A key point to mention about the AOC is that it is not required by regulation; AOCs have been implemented by airlines to improve efficiency.

Flight dispatch is responsible for developing and disseminating the flight plan or dispatch release. The dispatch release contains all the information a Captain needs to operate his/her assigned flight from one city to the next. The 14 CFR Part 121 regulations require a dispatch release.

1.3 Airline Organization Structure

1.3.1 Airlines Operation Control

Operation control is the process that the qualified certificate holders use the system and procedures which for flight control, to control the initiating, conducting and terminating of a flight, including the flight before the preparation, flight dispatch release, full flight monitoring, etc. Airlines implement operational control to ensure that the company plans to complete the scheduled flight and ensure flight safety with high efficiency and low cost, and it can effectively fulfill the rules and regulations in the operations manual CAAC and airline.

Responsibility for operational control: domestic & flag operations.

(1) The pilot in command and the aircraft dispatcher are jointly responsible for the preflight planning, delay, and dispatch release of a flight in compliance with this chapter and operations specifications.

(2) Each pilot in command of an aircraft is, during flight time, in command of the aircraft and crew and is responsible for the safety of the passengers, crew members, cargo, and airplane.

(3) Each pilot in command has full control and authority in the operation of the aircraft, without limitation, over other crew members and their duties during the flight, whether or not he holds valid certificates authorizing him to perform the duties of those crew members.

(4) No pilot may operate an aircraft in a careless or reckless manner so as to endanger life or property.

Responsibility for operational control: supplemental operations.

(1) The pilot in command and the director of operations are jointly responsible for the initiation, continuation, diversion, and termination of a flight in compliance with this chapter and the operations specifications. The director of operations may delegate the functions for the initiation, continuation, diversion, and termination of a flight but he may not delegate the responsibility for those functions.

(2) The director of operations is responsible for cancelling, diverting, or delaying a flight if in his opinion or the opinion of the pilot in command the flight cannot operate or continue to operate safely as planned or released. The director of operations is responsible for assuring that each flight is monitored with respect to at least the following:

(a) Departure of the flight from the place of origin and arrival at the place of destination, including intermediate stops and any alternate airports.

(b) Maintenance and mechanical delays encountered at places of origin and destination and intermediate stops.

(c) Any known conditions that may adversely affect the safety of flight.

(3) Each pilot in command of an aircraft is, during flight time, in command of the aircraft and crew, and is responsible for the safety of the passengers, crew members, cargo, and aircraft. The pilot in command has full control and authority in the operation of the aircraft, without limitation, over other crew members and their duties during flight time, whether or not he holds valid certificates authorizing him to perform the duties of those crew members.

(4) Each pilot in command of an aircraft is responsible for the preflight planning and the operation of the flight in compliance with this chapter and the operations specifications.

(5) No pilot may operate an aircraft in a careless or reckless manner, so as to endanger life or property.

The AOC's prime responsibility is to insure the safety of flight and to operate the aircraft fleet in a legal and efficient manner. The legal requirements of the AOC, as regulated by the CCAR, are specified in chapter C 121.43.

The AOC's business responsibility requires that the dispatcher conduct individual flights (and the entire schedule) efficiently in order to enhance the business success and profitability of the airline.

At each major airline, normally the AOC function is centralized at an operation center which is responsible for worldwide operations. This center includes the staff, computers and communication systems that enable the airline to control its operations.

Operations Control is the real-time allocation of airline operational resources to maximize the long-run performance of the enterprise with improvements.

- Passenger goods;
- Revenues;
- Costs (Maintenance, Crew, Passenger Protection).

To achieve that AOC needs to have authority and accountability for all operational resource allocation decisions within the agreed time window.

- AOC duty manager is ultimate decision maker;
- Clear definition of scenarios and decisions that are within remit of AOC Central point for all communications and coordination within airlines;
- Active decision making with consent and support of functions.

The AOC fulfills the operational control requirements and the business needs of the airline.

Through the capability to standardize procedures and training and centralize the decision making process, operational proficiency is achieved which will enhance:

- Safety-Dependability-Efficiency-Cost Effectiveness-Growth Potential;
- Airline operating options often cross organizational boundaries;

- Operating choices may shift cost from one organization to another;
- Information available in one organization may not be available or understood in another;
- A structure is required to facilitate cost effective cross organizational decision making.

1.3.2 Airlines Operational Control Organizational Structure

As the core of the airline's operations, the operational control center coordinates the actions and timing of most other elements of the airline. The primary operational elements include dispatch, flight crew (cockpit and cabin), ground crews (fuel, baggage, and maintenance), gate managers and others. In addition, these direct operational organizations are supported by meteorology, engineering, and route planning staff to provide critical information and plans which support daily operations.

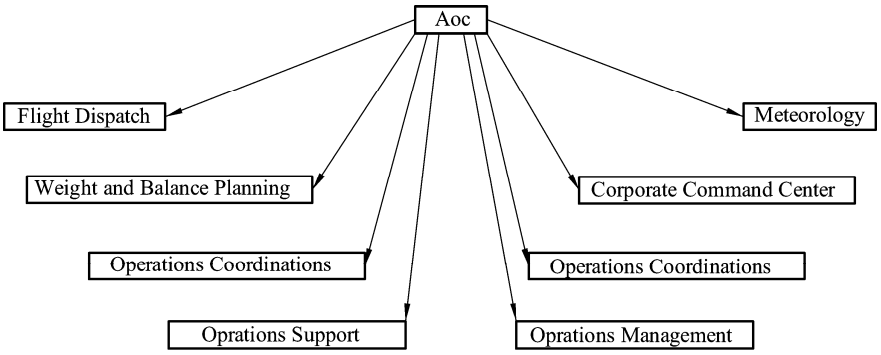

Figure 1.2 Airlines Operational Control Organizational Structure

AOC can be divided into several seats. As the central pivot of AOC, flight dispatcher have to coordinate with all other people, such as crew coordinator, ATC coordinator, to collect all the information provided and to get the best team decision and make the flight plan of each flight.(Figure1.3 and 1.4)

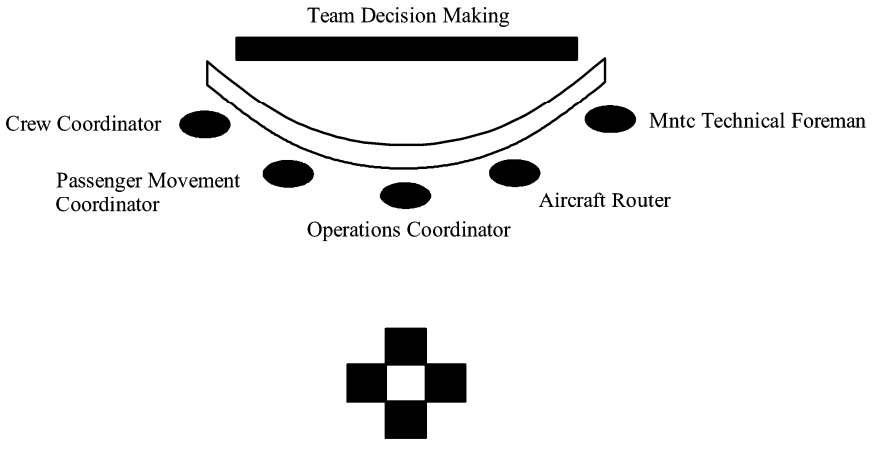

Figure 1.3 Team Decision Making

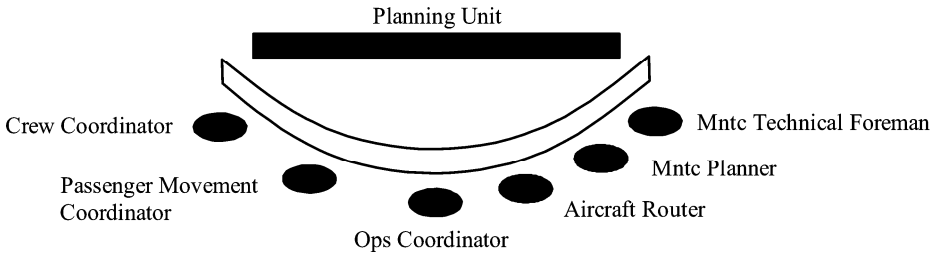

Figure 1.4 Planning Unit

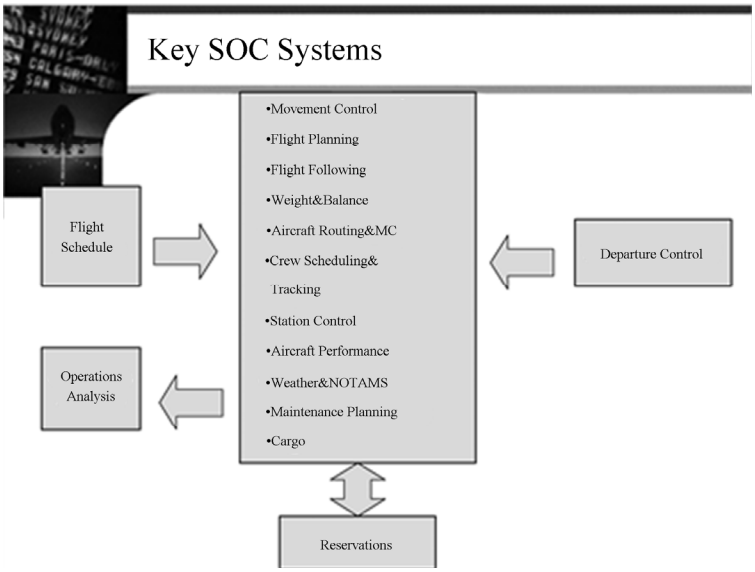

Figure 1.5 KEY SOC Systems

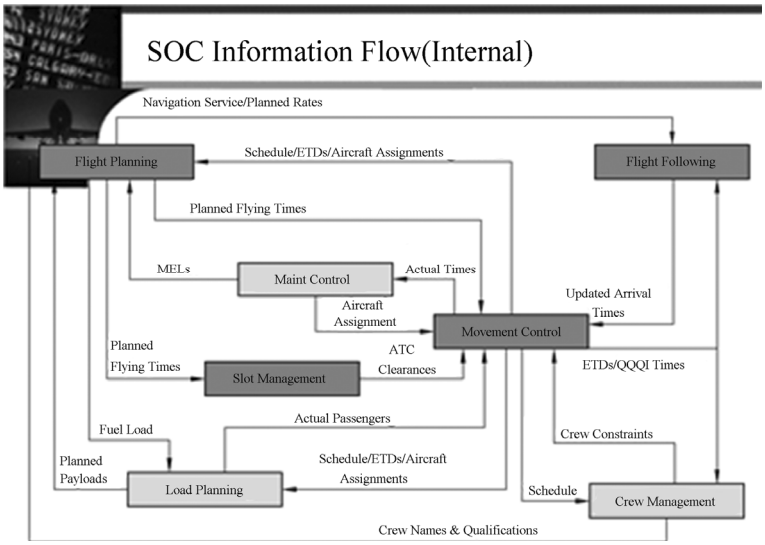

Figure 1.6 SOC Information Flow (internal)

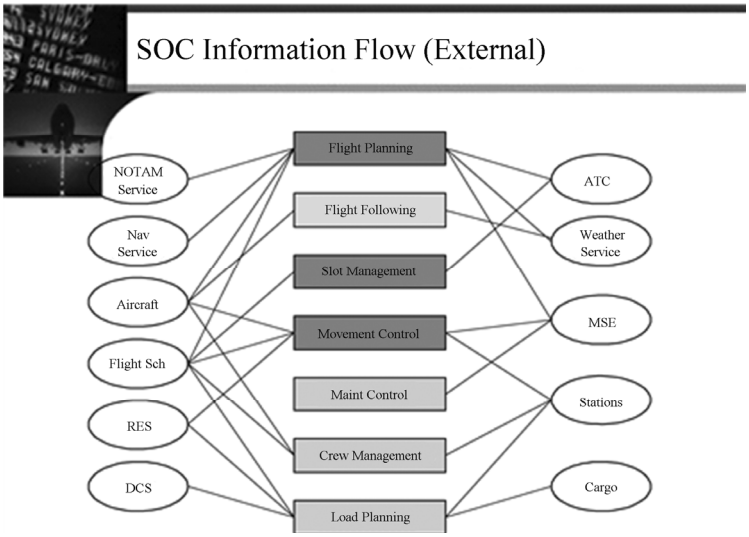

Figure 1.7 SOC Information Flow (external)

1.3.3 Airlines Operational Control Functions

1. Movement Control

Movement Control System is mainly responsible for the production and release of the three days of flight plan, the date of the overall monitoring of the flight dynamics of the whole company and not under normal circumstances the adjustment of the flight capacity.

2. Flight Planning

The Flight Planning System provides upload and issued information in real time for all units of the company.

3. Crew Tracking

The Crew Tracking system is responsible for crew pairing and crew scheduling.

4. Crew Briefing

Brief the flight information to the flight crew before and post flight.

5. ATC Coordination

Coordinate all unit of company to ensure flight normal operate.

6. Weight & Balance

Weight and Balance systems directly with ticketing, departure and cargo systems interconnect, each flight, passengers, cargo and mail traffic data at a glance with the onboard computer in accordance with the models the maximum allowable takeoff weight, landing weight, oil-free weight and center of gravity range of conditions, accurate calculation of the loading capacity of each flight the aircraft center of gravity, optimize the loading and print out the manifest, a change in the manual calculation is not accurate, error-prone, slow and disadvantages.