



Bagian 1

PENGANTAR DAN SEJARAH TRANSPORTASI UDARA

Tujuan Perkuliahan

Materi - Bagian 1

Tujuan Instruksional Umum

Setelah mengikuti perkuliahan ini diharapkan mahasiswa memahami kepentingan dan keterikatan angkutan udara dalam sistem transportasi secara global, sejarah penerbangan dan karakteristik kinerja transportasi udara.

Tujuan Instruksional Khusus

1. Mahasiswa mampu menjelaskan konsep penting dalam transportasi udara dan menjelaskan keterikatannya dengan sistem transportasi global.
2. Mahasiswa mengetahui sejarah penerbangan dunia dan mengamati perkembangan penerbangan di Indonesia.
3. Mahasiswa dapat memahami karakteristik kinerja transportasi udara dan mampu membandingkannya (menunjukkan kelemahan dan keunggulan) dengan moda transportasi lainnya.

A. Pengantar Transportasi Udara

ABSTRAK: Materi ini menjelaskan kepentingan transportasi udara secara singkat dan perbandingannya dengan moda pergerakan lainnya dalam hal karakteristik pergerakan, aksesibilitas dan pelayanan angkutan.

Transportasi Udara

Transportasi merupakan bagian yang tidak dapat dipisahkan dari aktivitas manusia. Aktivitas manusia sendiri pada dasarnya merupakan gabungan dari pemenuhan kebutuhan primer dan sekunder (bahkan tersier) dalam klaster obyektivitas ekonomi, sosial, politik, hankam dan budaya. Kesemuanya itu akan mengerucut pada pencapaian kemakmuran dan kesejahteraan sebagai indikator peningkatan taraf hidup manusia yang lebih baik. Secara prinsipnya, aktivitas manusia yang muncul dapat dikategorikan dalam dua aspek yaitu aspek produksi dan aspek konsumsi. Interaksi aktivitas produksi dan konsumsi yang dilakukan melahirkan adanya hubungan aktivitas yang memerlukan media pelayanan pergerakan apabila kedua lokasi aktivitas tersebut dibatasi oleh kondisi geografi dan keterbatasan sumber daya.

Sistem transportasi yang berkembang hingga saat ini (terutama di Indonesia) telah memberikan pelayanan dalam berbagai bentuk pergerakan mekanis. Pelayanan ini

secara keseluruhan dan terintegrasi telah diupayakan secara optimal dapat selaroh dengan pertumbuhan dan perkembangan masyarakat dan aktivitasnya, meskipun pada kenyataannya pencapaian kondisi ini masih belum sepenuhnya berhasil. Salah satu sistem transportasi tersebut adalah sistem transportasi berbasis moda udara.

Dalam sistem transportasi udara terdapat dua dua aspek penting dalam penentu keberhasilannya, yaitu pertama berupa ketersediaan prasarana (infrastruktur) penerbangan. Prasarana transportasi udara sendiri secara konsep dibedakan menjadi dua yaitu prasarana di darat berupa lapangan udara (*airport*/bandar udara) baik perintis maupun pengembangan. Dalam lapangan udara harus tersedia fasilitas pergerakan pesawat di darat berupa landas pacu (*runway*), jalur penghubung dengan terminal (*taxiway*), tempat parkir pesawat (*apron*) dan fasilitas pelengkap lainnya. Aspek kedua adalah ketersediaan sarana (*aircraft*/pesawat udara) dalam kerangka pengembangan sarana angkutan udara berupa kapasitas angkut dan kemampuan teknis atau teknologi sarana. Belajar dari kemampun alamiah burung merpati sebagai sarana transportasi informasi antar wilayah bahkan kepulauan yang cukup mampu mengatasi kebutuhan pergerakan informasi secara cepat, manusia mengembangkan teknologi mekanis kendaraan yang dapat memindahkan manusia dan barang secara cepat tanpa terdapat kendala geografis daratan. Dalam pengembangannya hingga saat ini, teknologi pesawat udara telah mampu bergerak dengan kecepatan yang sangat cepat (*pesawat ultrasonik*) dan kapasitas besar (*airbus*).

Bagan dalam Gambar 1.1 menjelaskan bagaimana integrasi dari dua aspek penting yang mendukung keberhasilan sistem transportasi udara.

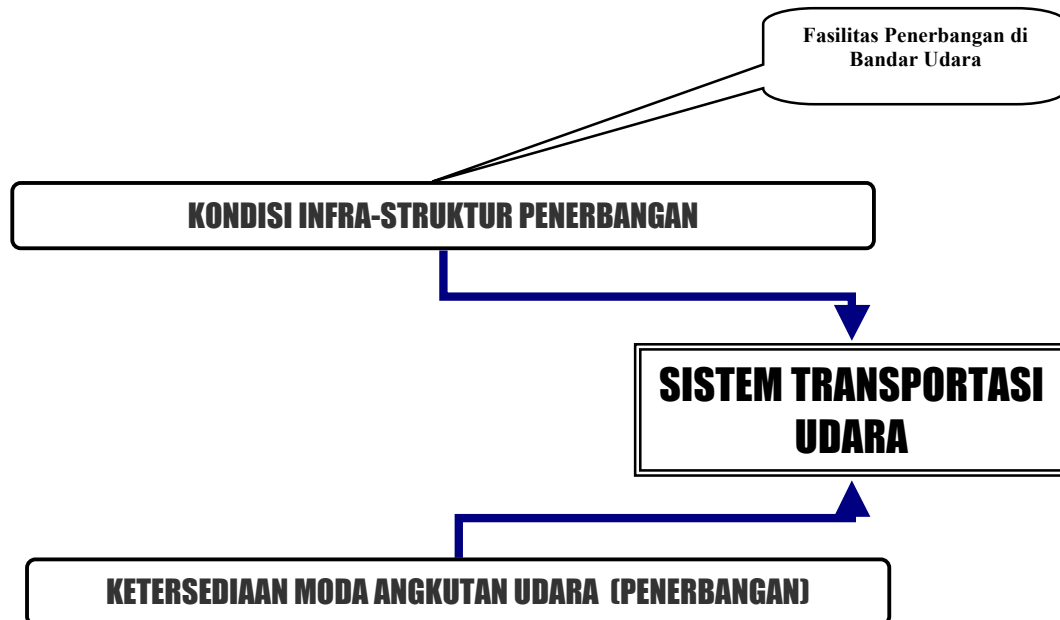
Perkembangan transportasi udara telah membawa dampak secara langsung beberapa bidang diantaranya :

1. Perekonomian

Adanya angkutan udara mengakibatkan faktor jarak dan geografis daratan bukan lagi menjadi batasan pergerakan manusia atau barang untuk pencapaian yang cepat. Kondisi ini mengakibatkan hubungan antara aktivitas produksi dan konsumsi dapat dicapai dengan lebih cepat dan waktu yang lebih singkat, misalnya distribusi barang kebutuhan pokok menggunakan pesawat ringan (swasta) di Provinsi Papua yang harus melewati kondisi geografis pegunungan dan tidak memungkinkan untuk dilalui oleh kendaraan darat dengan mudah.

2. Sosial Kemasyarakatan

Angkutan udara menyebabkan interaksi budaya (sosial) menjadi lebih dekat dan cepat dengan mengeleminasi fungsi jarak. Masyarakat di suatu daerah dapat dengan mudah mengenal secara langsung kondisi sosial di masyarakat lainnya. Hal ini juga dapat menyebabkan berkembangnya interaksi sosial (pertukaran budaya) bahkan dapat memungkinkan adanya perubahan karakter sosial kemasyarakatan suatu komunitas yang dipengaruhi oleh komunitas lainnya.



Gambar 1.1 Aspek pendukung keberhasilan sistem transportasi udara

Efek lain yang adalah kemudahan pencapaian suatu lokasi terkait dengan timbulnya suatu bencana pada suatu kelompok masyarakat di suatu wilayah. Kelompok masyarakat lainnya dengan mudah dan cepat dapat memberikan bantuan di wilayah tersebut meskipun terpisahkan oleh jarak (jauh) dan kondisi geografis yang buruk, misalnya peranan angkutan udara militer (helikopter) dalam memberikan bantuan kemanusiaan pada bencana Tsunami di Aceh (Indonesia) pada akhir bulan Desember 2004.

3. Politik dan Keamanan/Pertahanan

Peranan angkutan udara pada bidang politik dan khususnya pada keamanan/pertahanan di suatu wilayah negara menjadi sangat penting. Mobilisasi pasukan dan peralatan tempur menggunakan angkutan udara menjadi semakin cepat. Teknologi pesawat udara pun telah berkembang hingga saat ini berbagai jenis pesawat tempur telah berhasil dikembangkan yang memiliki kualifikasi tempur yang tangguh (persenjataan lengkap) dan daya jelajah yang lebih jauh.

B. Sejarah Transportasi Udara

History of Air Transportation

ABSTRACT: In this sub-chapter, a history of the world aviation is briefly described. It was started from the brilliance idea of a wooden pigeon on 400 B.C., until now, in the era of the aircraft made using modern technology has been doing.

BAKUAN KOMPETENSI SOFT-SKILL : Materi ini diberikan dalam teks berbahasa Inggris sebagai bakuan kompetensi kepada mahasiswa untuk memahami literasi lapangan terbang dalam teks berbahasa Inggris.

Early Experiments

As early as 400 B.C. Archytas, a Greek scholar, built a wooden pigeon that moved through the air. It is unknown exactly how this was done, but most believe that the Greek coated it to a steam powered arm that made it go in circles. About 300 B.C, the Chinese developed kites, which are a form of gliders, which much later in history allowed humans to fly in them.

During Greek times a great mathematician, Archimedes discovered the principle of buoyancy in about 200 BC. He discovered how and why some objects float in liquids This fact helped in the progress of true flight. When the great libraries in Alexandria, Egypt were destroyed in 500 A.D. the discoveries of Archimedes and many others were lost for a thousand years. 2000 years later men used Archimedes' principle to help them with the hot-air-balloon. Later in 1290 A.D Roger Bacon theorized that air, like water, has something solid around it, and something built correctly could be supported by the air.

First Attempts

Early attempts to defy gravity involved the invention of ingenious machines, such as ornithopters. These were based upon designs written in 1500 by Leonardo da Vinci. This type of flying machine utilizes the flapping of the wings in order to achieve flight. Needless, is to say that all attempts to fly using this type of machine failed. n 1680, Giovanni Borelli stated that people's muscles are too weak to flap the large surfaces needed to obtain flight. Later, additional reasons were found. Since the remarkable physiological capabilities of birds can never be matched by human beings. In other words our heart beat rate must have to go up to 800 heart beats per minute in order to be able to achieve flight.

2nd Attempts at Flight

The first free flight in a artificial device was done by two Frenchmen, Jean F. Pilatre de Rozier, and Marquis d'Arlandes. They achieved this with large linen ballon, and floated for more than five miles over Paris, France.

The idea of filling a closed container with a substance that normally rises through the atmosphere was as early as the thirteen century. Over a five hundred year span, different substances came to be known as being lighter-than-air. Between 1650 and 1900 this approach was used to flight. The most common gases proposed was water vapor, helium and hydrogen. The first successful attempts at achieving flight using his type of crafts were made by the Montgolfier brothers in France. Their most successful attempt was in 1783 when in a public demonstration, they achieved 6000 ft in a balloon with a diameter of more than 100 ft. As time went by, it was soon recognized that balloons although able to achieve flight, were basically handicapped by a total lack of directional control. This problem was solved with the introduction of power plants or engines in elongated-like balloons. This elongated shape helped reduce drag in order to decrease the power size. The most successful builder of this type of lighter-than-air craft was Count Ferdinand von Zeppelin, whose name is synonymous with large rigid dirigibles. The term "dirigible" really means controllable. In the early 1930's the German Graf Zeppelin machine was able to make a Trans-Atlantic flight to the United States. They flew 18 mph and had a rigid metal frame that kept it in flight even if gas or power was lost. The Zeppelin design was copied and improved by others throughout the world. One such airship was 3 times larger than a Boeing 747 and cruised at 68 mph. It made regular flights from Europe to South America in which 24 people had their own suites and dined from menus prepared by famous chefs. The large Hindenburg was equally successful until it was destroyed by fire while attempting a landing in 1937 in Lakehurst, New Jersey. The Hindenburg marked the end of large scale Zeppelin travel. Nowadays, the blimp has become ubiquitous, appearing over the skies of ballgames and large outdoor events.

Glider Flight

In 1804, a British inventor, George Cayley, built the first successful glider. His original craft was a small model. A later full-sized glider carried his coachman, going unwillingly, across a valley. He founded the study of aerodynamics, and was the first to suggest a fixed wing aircraft with a propeller.

Otto Lilienthal, a German, developed the first gliders in which the glider could be piloted. His work (1891-1896) inspired other inventors to take up the work of gliders. They included: Percy Pilcher of Great Britian, and Octave Chanute of the United States. These early gliders were hard to control, but could carry the pilot hundreds of feet into the air.

Powered Flight

In 1843, William S. Henderson, patented plans for the first plane with a engine, fixed wings, and propellers. After one unsuccessful try the

inventor gave up. Then in 1848, John Stringfellow built a small model which worked, but could only stay up a short period of time.

In 1890, a French engineer by the name of Clement Ader attempted flight in his steam powered plane. His plane failed, he could not control, or keep the plane in the air. A another steam powered plane, built by Sir Hiram Maxim, lifted off briefly, but did not fly. It was a gigantic steam powered machine with two wings, two engines, and two propellers.

In the 1890's a American by the name of Samuel P. Langley, a scientist, attempted piloted flight. His early experiments involved a small steam powered plane called the aerodrome. In 1896 it flew half a mile in ninety seconds. Later he created a full-sized aerodrome with a gas engine which was designed for piloted flight. Two attempts were made, on October 7, 1903, and December 8, 1903, and both failed.

Piloted Heavier-than-Air Powered Flights

The Wrights first became interested in flight after they began reading of Lilienthal's gliding flights in Germany. Upon his death they vowed to continue his progress. The Wright Brothers began flying gliders near Kitty Hawk, North Carolina. For 4 years they made 1000 successful gliding flights on those dunes.

Unable to find an engine manufacturer to meet their specifications of 8 horsepower and engine weight of less than 200 pounds, they decided to design and build their own engine. Aided by their bicycle mechanic Charlie Taylor, they were able to build an engine that produced 12 horsepower. With the engine built, they then faced the problem of how to build a propeller since very little was known on the subject. Surprisingly, with their previously collected wing data, they were able to build accurately the engine propellers. Using the basic airframe of their 1902 Glider, the Kitty Hawk Flyer was born.

After numerous improvements, and studying how birds fly they were ready to test the Flyer out. They flipped a coin, and Wilbur won. They tested the Flyer, but the plane crashed after a wing dipped down. On December 17, 1903 it was Orville's turn which resulted in a 120-foot, 12-second flight at Kitty Hawk, North Carolina. The aircraft represented the first powered flight in a heavier-than-air machine.

After their success the Wright Brothers tried to sell their design to other governments. Since the brothers never made a official and public flight the governments were not about to spend on something they didn't even know that worked.

The first person to fly as a passenger was Leon Delagrange, who rode with French pilot Henri Farman from a meadow outside of Paris in 1908.

Charles Furnas became the first American airplane passenger when he flew with Orville Wright at Kitty Hawk later that year.

Early Aircraft Companies

In 1905 Charles and Gabriel Voisin started the world's first aircraft company. They two French fliers set up a factory outside of Paris to build the custom planes. This was the first of many European companies to start.

The first US airplane company was founded by Glenn Curtiss in Hammondsport, New York. The first commercial airplane sale was made by this company to the Aeronautic Society of New York for 5,000 dollars.

In 1909, two other American airplane companies were formed. The Wright brothers established one, and Glenn Martin formed another. The Wright brothers had their first official public flight in 1908. The US government, amazed by the capability of the plane, ordered a specialized plane for 30,000 dollars. The world's first military plane was for use in the Army Signal Corps. In November of 1909, a group of wealthy Americans loaned the Wright brothers money to start their own plant. They started the Wright Company which quickly became the leading supplier of military planes. Later Wilbur died of typhoid in 1912, and Orville sold his portion out in 1915 to Eastern investors.

First scheduled air service

The first scheduled air service began in Florida on Jan. 1, 1914. Glenn Curtiss had designed a plane that could take off and land on water and thus could be built larger than any plane to date because it did not need the heavy undercarriage required for landing on hard ground. Thomas Benoist, an autoparts maker, decided to build such a flying boat, or seaplane, built for a service across Tampa Bay called the St. Petersburg-Tampa Air Boat Line. His first passenger was ex-St. Petersburg Mayor A.C. Pheil, who made the 18-mile trip in 23 minutes, a considerable improvement over the two-hour trip by boat or 12-hour trip by rail between the two cities. The single-plane service accommodated one passenger at a time, and the company charged a one-way fare of \$5. After operating two flights a day for four months and carrying a total of 1,205 passengers, the company folded with the end of the winter tourist season.

World War I (1914 - 1918)

These and other early flights were headline events, but commercial aviation was very slow to catch on with the general public, most of which was afraid to ride in the new flying machines. Improvements in aircraft design also were slow. However, with World War I, the military value of aircraft was quickly recognized and production increased significantly to meet the rising demand for planes from governments. Most significant

was the development of more powerful motors, enabling aircraft to reach speeds of up to 130 mph, more than twice the speed of pre-war aircraft. Increased power also made bigger aircraft possible.

On the other hand, the war was bad for commercial aviation in several ways. It focused all design and production efforts on building military aircraft. In the public's mind, flying became almost totally associated with bombing runs, surveillance, and aerial dog fights. In addition, there was such a large surplus of planes at the end of the war that the demand for new production was almost non-existent for several years. As a result, many aircraft builders went bankrupt. Some European countries such as Great Britain and France helped commercial aviation by starting air service over the English Channel. However, nothing similar occurred in the United States where there were no such natural obstacles isolating major cities and where railroads could transport people almost as fast as an airplane, and in considerably more comfort. The salvation of U.S. commercial aviation industry following World War I was a government program, but one that had nothing to do with the transportation of people.

Airline Growth

With the surplus of planes left after World War I, thousands of military planes were converted to civilian use. In 1919, bombers were being converted in Europe to form over twenty small new airlines. The first regular international airline service was started by one of those. The company setup by Henry and Maurice Farman used old Farman bombers to make weekly flights between Paris and Brussels.

By 1917, there were seventeen regularly operating airlines in Europe, Africa, Australia, and South America. Some airlines from that era that are still operating include: Royal Dutch Airlines (KLM), SABENA World Airlines, Lufthansa, and Qantas. In the '20s American aviation was quite slow. There were a few small airlines, but they often failed after only a few months of service. Americans viewed air travel as a dangerous sport, not a safe means of transportation. By the 1920's governments started to form national airlines through combining a few private airlines. One such case is the British government who formed Imperial Airways.

Airmail

By 1917, the U.S. government felt it had seen enough progress in the development of planes to warrant something totally new, air mail. That year, Congress appropriated \$100,000 for an experimental airmail service that was to be conducted jointly by the Army and the Post Office between Washington and New York, with an intermediate stop in Philadelphia. The first flight left Belmont Park, Long Island, for Philadelphia on May 14, 1918, and the next day continued on to Washington where it was met by President Woodrow Wilson.

With a large number of war-surplus aircraft in hand, the Post Office almost immediately set its sights on a far more ambitious goal, which was transcontinental air service. It opened the first segment, between Chicago and Cleveland, on May 15, 1919, and completed the service on Sept. 8, 1920, when the most difficult part of the route, the Rocky Mountains, was spanned. Airplanes still could not fly at night when the service first began, so the mail was handed off to trains at the end of each day. Nonetheless, by using airplanes the Post Office was able to shave 22 hours off coast-to-coast mail deliveries.

Beacons

In 1921, the Army deployed rotating beacons in a line between Columbus and Dayton, Ohio, a distance of about 80 miles. The beacons, visible to pilots at 10-second intervals, made it possible to fly the route at night.

The Post Office took over the operation of the guidance system the following year, and by the end of 1923 constructed similar beacons between Chicago and Cheyenne, WY, a line later extended coast-to-coast at a cost of \$550,000. Mail then could be delivered across the continent in as little as 29 hours eastbound and 34 hours westbound (prevailing winds from west to east accounted for the difference), which was two to three days less than it took by train.

The Contract Air Mail Act of 1925 - Kelly Air Mail Act

By the mid 1920s, the Post Office mail fleet was flying 2.5 million miles and delivering 14 million letters annually. However, the government had no intention of continuing airmail service on its own. Traditionally, the Post Office had used private companies for the transportation of mail. So once the feasibility of airmail was firmly established, and airline facilities were in place, the government moved to transfer airmail service to the private sector by way of competitive bids. The legislative vehicle for the move was the 1925 Contract Air Mail Act, commonly referred to as the Kelly Act after its chief sponsor, Rep. Clyde Kelly of Pennsylvania. It was the first major legislative step toward the creation of a private U.S. airline industry. Winners of the initial five contracts were National Air Transport (owned by the Curtiss Aeroplane Co.), Varney Air Lines, Western Air Express, Colonial Air Transport, and Robertson Aircraft Corporation. National and Varney would later become important parts of United Airlines (originally a joint venture of the Boeing Airplane Company and Pratt & Whitney). Western would merge with Transcontinental Air Transport (TAT), another Curtiss subsidiary, to form Transcontinental and Western Air (TWA). Robertson would become part of the Universal Aviation Corporation, which in turn would merge with Colonial, Southern Air Transport and others to form American Airways, predecessor of American Airlines. Juan Trippe, one of the original partners in Colonial, would later pioneer international air travel with Pan Am -- a carrier he founded in 1927 to transport mail between Key West,

FL, and Havana, Cuba; and Pitcairn Aviation, yet another Curtiss subsidiary that got its start transporting mail, would become Eastern Air Transport, predecessor of Eastern Airlines. Because of this act, Henry Ford's airline was the first airline to transport US mail. Many of these companies who flew the mail started carrying passengers on flights. In 1926, airlines in the US carried 6,000 passengers. By 1930, passengers flying on US airlines had soared to 400,000.

The Morrow Board

The same year Congress passed the Contract Mail Act, President Calvin Coolidge appointed a board to recommend a national aviation policy (a much-sought-after goal of Herbert Hoover, who was Secretary of Commerce at the time). Dwight Morrow, a senior partner in J.P. Morgan's bank, and later the father-in-law of Charles Lindbergh, was named chairman. The board heard testimony from 99 people, and on Nov. 30, 1925 submitted its report to President Coolidge. It was wide-ranging, but its key recommendation was that the government should set standards for civil aviation and that the standards should be set outside of the military.

The 1926 Air Commerce Act

Congress adopted the recommendations of the Morrow Board almost to the letter in the Air Commerce Act of 1926. The legislation authorized the Secretary of Commerce to designate air routes, to develop air navigation systems, to license pilots and aircraft, and to investigate accidents. In effect, the act brought the government back into commercial aviation, this time as regulator of the private airlines spawned by the Kelly Act of the previous year. The Bureau of Air Commerce was set up to enforce these regulations.

Congress also adopted the board's recommendation for airmail contracts by amending the Kelly Act to change the method of compensation for airmail services. Instead of paying carriers a percentage of the postage paid, the government would pay them according to the weight of the mail. This simplified payments, and it proved highly advantageous to the carriers, which collected \$48 million from the government for the carriage of mail between 1926 and 1931.

Ford's Tin Goose

Henry Ford, the automobile manufacturer, was among the first successful bidders for airmail contracts, winning the right in 1925 to carry mail from Chicago to Detroit and Cleveland aboard planes his company already was using to transport spare parts for his automobile assembly plants. More importantly, he jumped into aircraft manufacturing and in 1927 produced the Ford Trimotor, commonly referred to as the "Tin Goose." It was one of

the first all-metal planes, made of a new material called duralumin that was almost as light as aluminum and twice as strong. It also was the first plane designed primarily to carry passengers rather than mail. The Ford Trimotor had 12 passenger seats, a cabin high enough for a passenger to walk down the aisle without stooping, and room for a "stewardess," or flight attendant, the first of which were nurses hired by United in 1930 to serve meals and assist airsick passengers. Its three engines made it possible to fly higher and faster (up to 130 miles per hour), and its sturdy appearance, combined with the Ford name, had a reassuring effect on the public's perception of flying. However, it was another event in 1927 that brought unprecedented public attention to aviation and helped secure the industry's future as a major mode of transportation.

Other New Aircraft Companies.

In Santa Monica, California, Donald Douglas started a new company called the Douglas Company. In 1923 another company was formed, the Consolidated Aircraft Corporation. This company was based in East Greenwich, Rhode Island. Pratt & Whitney started making aircraft engines in 1925 in their Hartford, Connecticut plant. In 1929 the two companies, Wright and Curtiss, merged into the Curtiss-Wright Corporation. Also, in 1929 the Grumman Aircraft Company started business on Long Island, New York.

Charles Lindbergh

Slightly before 8 a.m. on May 21, 1927, a young pilot named Charles Lindbergh set out on an historic flight across the Atlantic Ocean, from New York to Paris. It was the first continent-to- continent non-stop flight in an airplane, and its effect on both Lindbergh and aviation was enormous. Lindbergh became an instant American hero. Aviation became a more established industry, attracting millions of private investment dollars almost overnight as well as the imagination and support of millions of Americans.

The pilot that sparked all of this attention had dropped out of engineering school at the University of Wisconsin to learn how to fly. He became a barnstormer, doing aerial shows across the country, and eventually joined the Robertson Aircraft Corporation to transport mail between St. Louis and Chicago.

In planning his transatlantic voyage, Lindbergh daringly decided to fly by himself, without a navigator, so he could carry more fuel. His plane, the Spirit of St. Louis, was slightly under 28 feet in length, with a wingspan of 46 feet, and it carried 450 gallons of gasoline that comprised half its takeoff weight. There was too little room in the cramped cockpit for navigating by the stars, so Lindbergh flew by dead reckoning. He divided maps from his local library into 33 100-mile segments, noting the heading he would follow as he flew each segment. When he first sighted the coast

of Ireland, he was almost exactly on the route he had plotted, and he landed several hours later with 80 gallons of fuel to spare.

Lindbergh's greatest enemy on his journey was fatigue. The trip took an exhausting 33 1/2 hours, but he managed to keep awake by sticking his head out the window to inhale cold air, by holding his eyelids open, and by constantly reminding himself that if he fell asleep he would perish. In addition, he had a slight instability built into his airplane that helped keep him focused and awake.

Lindbergh landed at Le Bourget outside of Paris at 10:24 p.m. Paris time on May 22. Word of his flight had preceded him and a large crowd of Parisians rushed out to the airfield to see him and his little plane. There was no question about the magnitude of what he had accomplished. The air age had arrived.

The Watres Act and the Spoils Conference

In 1930, Postmaster General Walter Brown pushed for legislation that would have another major impact on the development of commercial aviation. Known as the Watres Act (after one of its chief sponsors, Rep. Laurence H. Watres of Pennsylvania), it authorized the Post Office to enter into longer term contracts for airmail, with rates based on space, or volume, rather than weight. In addition, the act authorized the Post Office to consolidate airmail routes where it was in the national interest to do so. Brown believed the changes would promote larger, stronger airlines as well as more coast-to-coast and nighttime service.

Immediately after Congress approved the act, Brown held a series of meetings in Washington to discuss the new contracts. The meetings were later dubbed the "spoils conference" because Brown gave them little publicity and directly invited only a handful of people from the larger airlines. He designated three transcontinental mail routes and made it clear that he wanted only one company operating each service rather than a number of small airlines handing the mail off to one another across the United States. Brown got what he wanted -- three large airlines (American, TWA and United) to transport the mail coast-to-coast -- but his actions also brought political trouble that resulted in major changes to the system two years later.

Scandal and the Air Mail Act of 1934

Following the Democratic landslide of 1932, some of the smaller airlines began telling news reporters and politicians alike that they had been unfairly denied airmail contracts by Brown. One reporter discovered that a major contract had been awarded to an airline whose bid was three times higher than a rival bid from a smaller airline. Congressional hearings followed, chaired by Sen. Hugo Black of Alabama, and by 1934 the scandal had reached such proportions as to prompt President Franklin

Roosevelt to cancel all mail contracts and turn mail deliveries over to the Army.

The decision was a mistake. The Army pilots were unfamiliar with the mail routes, and the weather at the time they took over the deliveries (February, 1934) was terrible. There were a number of accidents as the pilots flew practice runs and began carrying the mail, leading to newspaper headlines that forced President Roosevelt to retreat from his plan only a month after he had turned the mail over to the Army.

By means of the Air Mail Act of 1934, the government once again tendered the mail to the private sector, but it did so under a new set of rules that would have a significant impact on the industry. Bidding was structured to be more competitive, and former contract holders were not allowed to bid at all, so companies changed their names and appointed new executives. The result was a more even distribution of the government's mail business, and lower mail rates that forced airlines, and aircraft manufacturers, to pay more attention to the development of the passenger side of the business.

In another major change, the government forced the dismantling of the vertical holding companies common up to that time in the industry, sending aircraft manufacturers and airline operators (most notably Boeing, Pratt & Whitney, and United Airlines) their separate ways. The industry was reorganized and refocused.

Aircraft Innovations

For the airlines to attract more passengers away from the railroads, they needed both larger and faster airplanes. They also needed safer airplanes. Accidents such as the one in 1931 that killed Notre Dame Football coach Knute Rockne and six other men kept people away from flying in droves.

Aircraft manufacturers responded to the challenge. There were so many improvements to aircraft in the 1930s that many believe it was the most innovative period in aviation history. Air-cooled engines replaced water-cooled engines, reducing weight and making bigger and faster planes possible. Cockpit instruments also improved, with better turn indicators, altimeters, airspeed indicators, rate of climb indicators, compasses, and the "artificial horizon," which showed pilots the attitude of the aircraft relative to the ground -- important for flying in reduced visibility.

Dawn of the Jet Age

Aviation was poised to advance rapidly following the war, in large part because of the development of jets, but there still were significant problems to overcome. In 1952, the British Overseas Airways Corporation (now British Airways) was formed. It used the new jet engine technology in its de Havilland Comets. The Comet was a 36-seat British-made jet

which flew from London to Johannesburg, South Africa, at speeds as high as 500 miles per hour. Two years later, the Comet's career ended abruptly following two back-to-back accidents in which the fuselage burst apart during flight -- the result of metal fatigue caused by repeated pressurization cycles. The Comet was later redesigned to be safer.

The cold war between the Soviet Union and the United States following World War II helped secure the funding needed to solve such problems and advance the jet's development. Most of the breakthroughs related to military aircraft that later were applied to the commercial sector. For example, Boeing employed a swept-back wing design for its B-47 and B-52 bombers to reduce drag and increase speed. Later, the design was incorporated into commercial jets, making them faster and thus more attractive to passengers. The best example of military-civilian technology transfer was the jet tanker Boeing designed for the Air Force to refuel bombers in flight, thus extending their range. The tanker, called the KC-135, was a huge success as a military plane but even more successful when revamped and introduced in 1958 as the first U.S. passenger jet, the Boeing 707. With a length of 125 feet and four engines with 17,000 pounds of thrust, the 707 could carry up to 181 passengers and travel at speeds as high as 550 miles per hour. Its engines proved more reliable than piston driven engines, and they produced less vibration, putting less stress on the plane's airframe and reducing maintenance expenses. They also burned kerosene, which cost half as much as the high octane gasoline used in more traditional planes. With the 707, first ordered and operated by Pan Am, all questions about the commercial feasibility of jets were answered. The jet age had arrived, and other airlines soon were lining up to buy the new aircraft.

The Federal Aviation Act of 1958

Following World War II, air travel soared, but with the industry's growth came new problems. In 1956 two aircraft collided over the Grand Canyon and 128 people were killed. The skies were getting too crowded for existing systems of aircraft separation, and Congress responded by passing the Federal Aviation Act in 1958.

The legislation created a new safety regulatory agency, the Federal Aviation Agency, later called the Federal Aviation Administration when Congress created the Department of Transportation in 1967. The agency was charged with establishing and running a broad air traffic control system to maintain safe separation of all commercial aircraft through all phases of flight. In addition, it assumed jurisdiction over all other aviation safety matters, such as the certification of aircraft designs, and airline training and maintenance programs. The Civil Aeronautics Board retained jurisdiction solely over economic matters, such as airline routes and rates.

Widebodies and Supersonics

1969 marked the debut of another revolutionary aircraft, the Boeing 747, which Pan Am was the first to purchase and fly in commercial service. It was the first widebody jet, with two aisles, a distinctive upper deck over the front section of the fuselage, and four engines under its wings. With seating for as many as 450 passengers, it was twice as big as any other Boeing jet and 80% bigger than the largest jet up until that time, the DC-8.

Recognizing the economies of scale to be gained from larger jets, other aircraft manufacturers quickly followed suit. Douglas built its first widebody, the DC-10, in 1970, and only a month later, Lockheed flew its contender in the widebody market, the L- 1011. Both of these jets had three engines (one under each wing and one on the tail) and were smaller than the 747, seating about 250 passengers.

During the same period of time, efforts were underway in both the United States and Europe to build a supersonic commercial aircraft. The Soviet Union was the first to succeed, testing the Tupolev 144 in December of 1968. A consortium of West European aircraft manufacturers first flew the Concorde two months later and eventually produced a number of those fast, but small, jets for commercial service. U.S. efforts to produce a supersonic passenger jet, on the other hand, foundered in 1971 due to public concern about the sonic boom produced by such aircraft. U.S. airlines have never operated a supersonic aircraft.

C. Karakteristik Kinerja Transportasi Udara

ABSTRAK : Materi ini menjelaskan karakteristik kinerja (performance characteristics) transportasi udara yang terdiri dari kecepatan, kelengkapan moda, ketergantungan, kapasitas, frekuensi dan biaya. Selain itu, transportasi udara memiliki karakteristik khusus dalam sistem pergerakannya yaitu aturan penerbangan harus mengikuti aturan internasional yang dikeluarkan oleh ICAO dan FAA.

Karakteristik kinerja transportasi udara (Bowersox et al., 1981) dibagi dalam beberapa aspek tinjauan yaitu kecepatan (*speed*), kelengkapan moda (*modes completeness*), ketergantungan (*dependability*), kapasitas (*capability*), frekuensi (*frequency*) dan biaya (*cost*)

KECEPATAN

Kecepatan didefinisikan sebagai perbandingan jarak tempuh perjalanan terhadap besaran waktu ketika suatu moda transportasi mulai bergerak hingga menuju ke titik

tujuannya. Transportasi udara memiliki keunggulan dalam kecepatan hingga sepuluh kali lebih cepat dibandingkan moda transportasi lainnya.

KELENGKAPAN MODA

Kelengkapan moda didefinisikan sebagai jaringan moda dan jumlah moda yang terkait dengan suatu transportasi. Transportasi udara sangat terbatas aksesnya, meskipun dari fungsi pencapaian, transportasi udara mampu bergerak melalui batasan Negara dengan cepat. Transportasi udara memerlukan Bandar udara yang biasanya terletak jauh dari daerah pemukiman, dan letak Bandar udara yang tidak setiap lokasi atau daerah ada. Dengan demikian, transportasi udara memerlukan kelengkapan moda yang terlibat di dalamnya, khususnya untuk akses darat menuju ke tempat tujuan yang lebih spesifik.

KETERGANTUNGAN

Transportasi udara dalam operasinya sangat bergantung dengan kondisi cuaca. Asap, kabut dan awan biasanya dapat menyebabkan tertunda atau berhenti sementara pengoperasian penerbangan. Meskipun terdapat sistem navigasi yang canggih dan pengawas lalu lintas udara, pada kondisi cuaca tertentu tetap dapat menyebabkan terhentinya penerbangan.

KAPASITAS

Pesawat udara memiliki kapasitas berat untuk terbang dan ukuran fisik terbatas, sehingga kapasitas angkut pesawat sangat dibatasi. Selain berat, ukuran dan jenis barang yang dimuat pun sangat terbatas.

FREKUENSI

Frekuensi didefinisikan sebagai jumlah perjalanan yang dapat dilakukan pada periode waktu tertentu. Karena memiliki keunggulan dalam kecepatannya, transportasi udara memiliki potensi frekuensi perjalanan yang tinggi. Meskipun demikian, waktu tunggu muat barang dan penumpang terkadang menyebabkan penurunan frekuensi. Dalam sisi ini juga, sebenarnya perbandingan frekuensi perjalanan antar moda berbasis ukuran kecepatan tidak mudah. Frekuensi penerbangan bisa lebih dari satu tujuan setiap harinya dengan jarak yang jauh, walaupun jika diukur tingkat frekuensi terhadap waktunya menjadi kurang baik.

BIAYA

Biaya merupakan jumlah uang yang harus dibayarkan oleh pelaku perjalanan atau penerima jasa terhadap perjalanan yang dialaminya. Untuk pengoperasian pesawat diperlukan komponen utama dan pendukung yang tidak sedikit. Selain penilaian biaya operasi pesawat dan faktor pengembalian investasi, penerbangan juga memerlukan fasilitas pendukung penerbangan misalnya ATC, airport, dll., yang memerlukan biaya yang besar. Dibandingkan dengan moda transportasi lainnya, transportasi udara memerlukan biaya operasional yang tinggi, sehingga pengguna jasa penerbangan biasanya akan membayarkan uang yang jumlahnya lebih besar daripada menggunakan moda transportasi lainnya.

