



# Bagian 2

## KONSEP DISAIN BANDARA

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## **Tujuan Perkuliahan** **Materi - Bagian 2**

### **Tujuan Instruksional Umum**

Setelah mengikuti perkuliahan ini diharapkan mahasiswa mengetahui konsep dasar disain Bandar Udara yang meliputi pemahaman mengenai master plan, faktor pemilihan lokasi bandara dan layout bandara.

### **Tujuan Instruksional Khusus**

1. Mahasiswa mampu menjelaskan definisi dan konsep disain dan perencanaan Bandar Udara.
2. Mahasiswa mampu memahami master plan bandar Udara.
3. Mahasiswa mampu menjelaskan faktor yang mempengaruhi evaluasi dan pemilihan lokasi bandar udara.
4. Mahasiswa mampu menjelaskan layout Bandar Udara.

## **A. Airport Planning Concept and Master Plan**

**ABSTRACT** : This section briefly describe the concept of airport planning, master plan and its influenced components.

### **1. PLANNING PHILOSOPHY IN AIRPORT DESIGN**

#### **What is PLANNING?**

The concept of planning is illustrated in Figure 2.1. (Please DISCUSS in the class "what is planning, Scope and Concept")

The efficient airport as a whole is that which provides the required capacity for aircraft, passenger, cargo and vehicle movement with maximum passenger, operator and staff convenience and at lowest capital and costs.

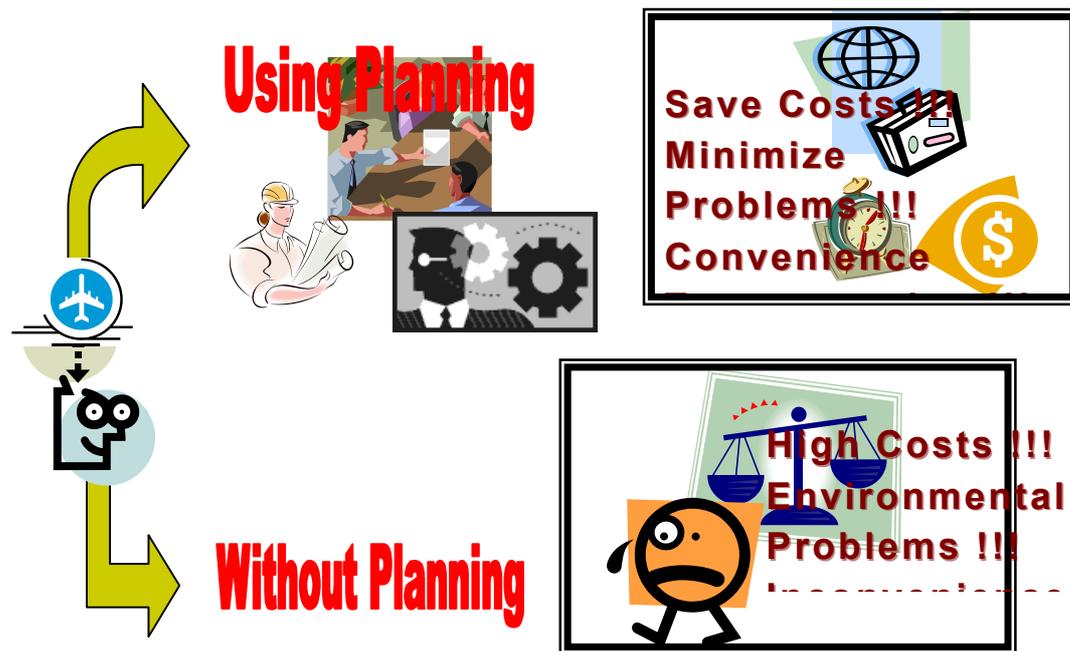


Figure 2.1 The concept of planning

## 2. THE PLANNING SYSTEM

Planning airport is complicated by the diversity of facilities and services which are necessary for the movement of aircraft, passengers and cargo and the ground vehicles associated with them, and the necessity to integrate their planning.

Airport planning is the evaluation of a compromise between conflicting features of the best plan for each of the individual facilities for providing the greatest degree of flexibility and expansibility for future development.

### What's NEEDED in the airport planning !

- **An Airport Master Plan** : “presents the planners conception of the ultimate development of a specific airport”.
- **Master plan** is applied to the modernization and expansion of existing airports and to construction of new airports.

### Airport Master Plan as a Guide

- Development of physical facilities of an airport (aviation or non aviation use).
- Development of land uses for areas surrounding an airport.
- Determination of the environmental effects of airport construction and operation.
- Establishment of access requirements of the airport.

### **3. TYPE OF ACTIVITY INVOLVED IN THE MASTER PLAN PROCESS**

- Policy/co-ordinative planning.
- Economic Planning.
- Physical Planning.
- Environmental Planning.
- Financial Planning.

### **4. STEPS IN PLANNING PROCESS**

1. Prepare a master planning work programme.
2. Inventory and document existing condition.
3. Forecast future air traffic demand.
4. Determine gross facilities requirements and preliminary time-phased development of same.
5. Evaluating existing and potential constraints.
6. Agree upon relative importance or priority of various elements such as airport type, constraints, political and other consideration.
7. Develop several conceptual or master plan alternatives for purposes of comparative analysis.
8. Review and screen alternative conceptual plans.
9. Select most acceptable and appropriate alternative.

### **5. PLAN UPDATE RECOMMENDATIONS**

Master plan should be ...

- reviewed at least annually and adjusted as appropriate to reflect conditions at the time of review.
- thoroughly evaluated and modified every five year, or more often if change in economic, operational, environmental and financial condition indicate an earlier need for such revision.

### **6. LIMITATION OF MASTER PLAN**

- Master plan is just a guide and nothing more.
- Master plan is not implementation programme.
- Master plan does not develop specific with respect to improvements, it is only a guide to the types of improvements.

### **7. PREPLANNING CONSIDERATIONS**

Successful expansion (*existing airport*) and development (*new airport*) will result from the guidelines established in an airport master plan. Accordingly, if a master plan is

to be useful to airport authorities certain preplanning requirements must be understood and followed.

Preplanning considerations for providing the frame works of an effective and implemented airport master plan include the following:

1. Pre-planning co-ordination.
2. Information sources.
3. Goals and schedules.
4. Land requirements.
5. Financing considerations.
6. Planning team.
7. Planning organization.
8. Planning procedure.
9. Environmental considerations.

## **B. Airport Site Evaluation and Selection**

**ABSTRACT** : The important factors affect the airport site evaluation and selection of location is discussed herein.

### **1. INTRODUCTION**

The provision of a new airport or the development of an existing one involves substantial capital investment and large-scale construction works. In order to avoid premature obsolescence and waste of valuable financial and material resources, it is important that they should have the longest useful possible life which is achieved with providing the sufficient ground area for progressive development in step with growth in air traffic demand, for realization of maximum benefit from the investment and to ensure the safety of aircraft operation and to avoid hazards or discomfort to the surrounding community without limiting growth or the efficiency of an airport. Therefore, sites must be chosen with land area which offers the best potential for long-term development at least financial and social cost.

### **2. MAJOR STEPS IN THE SITE EVALUATION AND SELECTION PROCESS**

1. Broad determination of the land area required.

Before inspection any potential sites including existing sites, it is necessary to make a broad assessment of land area likely to be required. This can be achieved by considering the space necessary for runway development which generally forms the major proportion of land required for an airport. This required consideration of the following factors: runway length, runway orientation, number of runways and combination of above factors to form an outline scheme for rough assessment of the order of magnitude of land required.

(1). Runway Length

This material will be discussed in the next chapter which talks about the determination of runway length.

(2). Runway Orientation

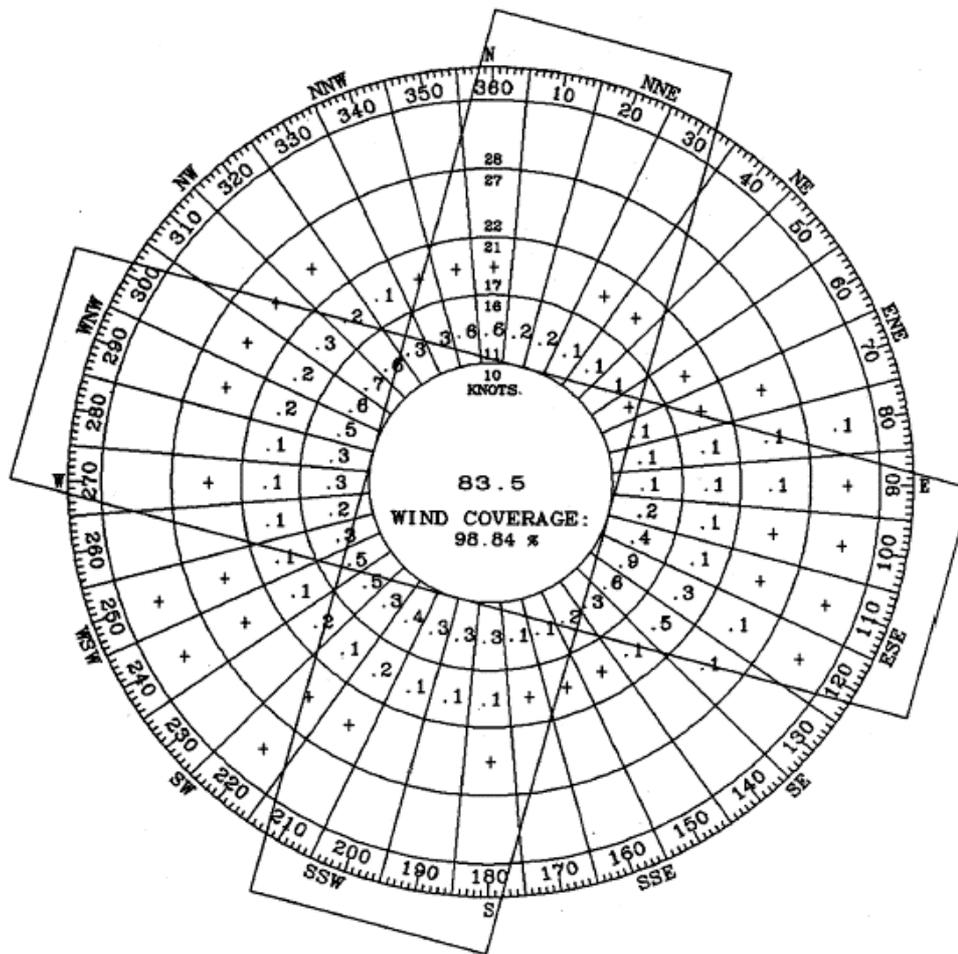
- Runways should be oriented so that aircrafts are not directed over populated areas and obstructions are avoided. Subject to all other factors being equal they should be oriented in the direction of the prevailing wind when it blows consistently from one direction.
- Primary runways should be oriented as closely as practicable in the direction of the prevailing winds.

Prevailing Wind Effect

- When landing and taking off, aircraft are able to manoeuvre on a runway as long as the wind component at right angles to the direction of travel (defined as cross wind) is not excessive.
- The maximum allowable cross-wind depends not only on the size of aircraft but also on the wing configuration and the condition on the pavement surface.
- Transport category aircraft can manoeuvre in cross wind as high as 56 km/h (30 kt) but it is quite difficult to do so; hence lower values are used for airport planning.
- Runway should be oriented as aeroplanes may be landed at least 95 per cent of the time with wind cross components as follows (ICAO Annex 14) :  
 37 km/h (20 kt) = 1500 m or over,  
 24 km/h (13 kt) = 1200 - 1500 m,  
 19 km/h (10 kt) = less than 1200 m.

Calculating Example of Wind Observation

WIND OBSERVATION:			HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)								41 OVER	TOTAL	
			0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40			
STATION: ANYWHERE, USA			1	469	842	568	212	0	0	0	0	0	2091
RUNWAY ORIENTATION: 105.00 195.00 DEGREE			2	568	1263	820	169	0	0	0	0	0	2820
CROSSWIND COMPONENT: 10.50 10.50 KNOTS			3	294	775	519	73	9	0	0	0	0	1670
TAILWIND COMPONENT: 60.00 60.00 KNOTS			4	317	872	509	62	11	0	0	0	0	1771
WIND COVERAGE: 98.84 %			5	268	861	437	106	0	0	0	0	0	1672
			6	357	534	151	42	8	0	0	0	0	1092
			7	369	403	273	84	36	10	0	0	0	1175
			8	158	261	138	69	73	52	41	22	0	814
			9	167	352	176	128	68	59	21	0	0	971
			10	119	303	127	180	98	41	9	0	0	877
			11	323	586	268	312	111	23	28	0	0	1651
			12	618	1397	624	779	271	69	21	0	0	3779
			13	472	1375	674	531	452	67	0	0	0	3571
			14	647	1377	574	281	129	0	0	0	0	3008
			15	338	1093	348	135	27	0	0	0	0	1941
			16	560	1399	523	121	19	0	0	0	0	2622
			17	587	883	469	128	12	0	0	0	0	2079
			18	1046	1984	1068	297	83	18	0	0	0	4496
			19	499	793	586	241	92	0	0	0	0	2211
			20	371	946	615	243	64	0	0	0	0	2239
			21	340	732	528	323	147	8	0	0	0	2078
			22	479	768	603	231	115	38	19	0	0	2253
			23	187	1008	915	413	192	0	0	0	0	2715
			24	458	943	800	453	96	11	18	0	0	2779
			25	351	899	752	297	102	21	9	0	0	2431
			26	368	731	379	208	53	0	0	0	0	1739
			27	411	748	469	232	118	19	0	0	0	1997
			28	191	554	276	287	118	0	0	0	0	1426
			29	271	642	548	479	143	17	0	0	0	2100
			30	379	873	526	543	208	34	0	0	0	2563
			31	299	643	597	618	222	19	0	0	0	2398
			32	397	852	521	559	158	23	0	0	0	2510
			33	236	721	324	238	48	0	0	0	0	1567
			34	280	916	845	307	24	0	0	0	0	2372
			35	252	931	918	487	23	0	0	0	0	2611
			36	501	1568	1381	569	27	0	0	0	0	4046
			0	7729	0	0	0	0	0	0	0	0	7729
TOTAL:			21676	31828	19849	10437	3357	529	166	22	0	0	87864



2. Evaluating of factors affecting airport location.

- Aviation Activities.

The needed information is got from consulting to the aircraft operators, potential operators and pilot organizations.

- Development of Surrounding Area.

The information is collected from planning authorities and agencies in order to obtain plans of existing and future land use. A disturbance by the activity of airport on the residential area and schools should be as less as possible. The study of prospective land uses is essential to avoid the future conflicts.

- Atmospheric Condition

Obtain data on presence of fog, haze, smoke which may consequently reduce the visibility and the capacity of an airport. List any special local weather factors for example variation in weather pattern, prevailing winds, fog, low cloud, rainfall, snow, turbulence, etc.

- Accessibility to ground transport.

Transit time from passengers' point of origin to the airport is a matter of major concern. Note the location of roads, railways and public transport routes.

- Availability of land for expansion.

Availability of suitable land for the future expansion of an airport is necessary. Study aeronautical, land, road and topographical map to ascertain area with suitable slopes and drainage. Review the geological maps showing distribution of soil and rock types. Ascertain location and availability of construction materials, quarries, etc. Ascertain general land values for various area and usage (residential, agricultural, etc.)

- Topography.

Note significant factors affecting cost of construction such as the need for excavation or filling, drainage and poor soil conditions.

- Environment.

Note locations of wildlife reserves and migratory areas, and also note noise-sensitive areas such as school and hospital.

- Presence of other airports in the general area.

Note locations of existing airports and ATS routes together with their associated airspace and any future plans to change them.

- Availability of utilities.

Note locations of main power, water supplies, sewage and gas mains, telephone services, etc.

- Proximity to aeronautical demand.

3. Preliminary office study of possible sites.
4. Site inspection.
5. Environmental study.
6. Review of potential sites.
7. Preparation of outline plans and estimates of costs and revenues.
8. Final evaluation and selections.

9. Report and recommendations.

### 3. FACTOR INFLUENCED AIRPORT SIZE

- Performance characteristics and size of aircraft expected to use the airport.
- Anticipated volume of traffic.
- Meteorological condition.
- Elevation of site.

## C. Airport Layout

**ABSTRACT** : This section contains the illustration of airport layout.

