(7) The topographical map scale of 1/500,000 printed by Topographical Survey Branch, Survey Department H.M.G. in 1988 is used to examine MOCA.

(8) The sites and elevations of new VOR/DME and NDB/locator are based on the ARP (Aerodrome Reference Point) and the elevation of each airport which is described in AIP and UNDP-Airtransport support project's data.

In this study, VOR airways which run east and west in the Terai area have been planned as the trunk line in Nepal, and flights to mountain airports can be made by use of the VOR/DMEs which are to be installed in the Terai area.

The priority of installation of new VOR/DMEs depends on air traffic demand and air traffic volume on each route segment.

In this study, the arrangement of navaids has been based solely on desk plans. Actual conditions at the site where navaids are located can have a significant impact on navaids performance and reliability. Therefore, a flight check should be done to confirm their reliability.

5.7 The Air Transportation Network in the Future

The future air transportation network will be structured as is presented in Fig 5.7.1 and Appendix Table 5.7.1 to 5. Passenger demand estimated by route is also shown by the number of weekly flights.

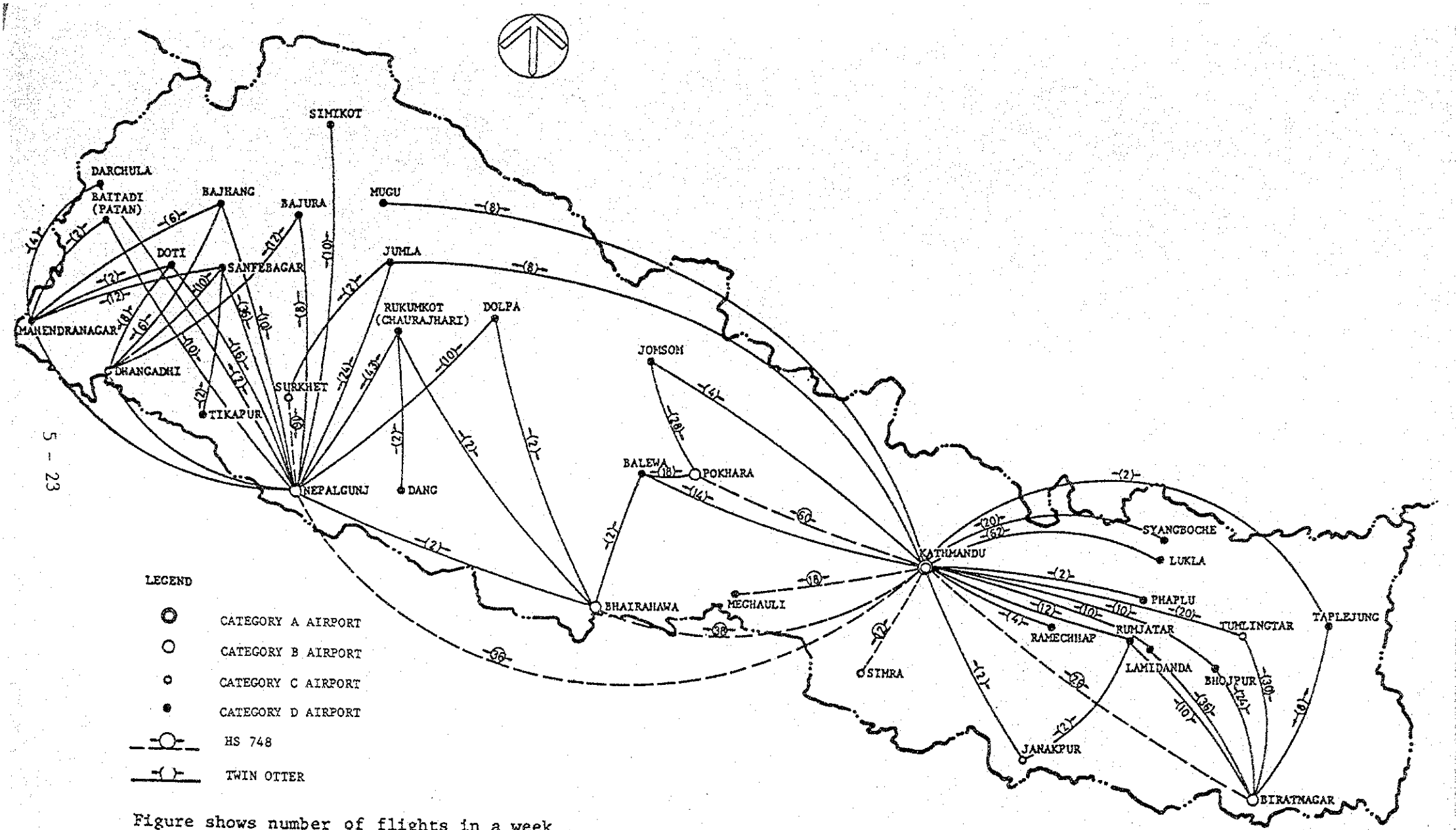


Figure shows number of flights in a week

Fig. 5.7.1 Future Air Transportation Network in 2010

CHAPTER 6 CLASSIFICATION OF AIRPORTS AND NECESSARY FACILITIES

CHAPTER 6 CLASSIFICATION OF AIRPORTS AND NECESSARY FACILITIES

6.1 Classification of Airports

Airports in Nepal have been classified into four categories from A to D in the Seventh Plan on the basis of the operated aircraft and runway length and surface. This classification has been implemented to clarify priorities in installing additional facilities by comparing the basic facilities of each category and existing facilities at each airport.

Based on ICAO classifications, most of the airports in Nepal belong to reference code 1B. Though this classification might be useful for foreign pilots, it is too general and not very useful in classifying the airport in Nepal.

Because the condition of existing facilities is insufficient for safe operation, it is appropriate for the DCA administration to classify the airports by the level to be achieved through airport development. In other words, the classification applied to airports in this study indicates the target level of facilities to be developed instead of the level of existing facilities. Because each airport has a unique role to play, as shown in Table 6.1.1, operating restrictions and the type of aircraft to be served at each airport have to be decided first. Table 6.1.1 indicates the primary components of each category.

A comparison of the category classifications made by the Seventh Plan, ADB Report and JICA Study is shown in Table 6.1.2.

It is recommended that airports be classified into four categories, A to D according to the factors shown in the above table. The aircraft they will mainly serve in the future are:

Cat-A: International Airport for Large Jet Aircraft
B: Domestic Major Airports for HS-748 class
C: Airports in Terai Region for DHC-6 class
D: STOL Airports in Hill Region and High Himalayas for DHC-6 class (and PC-6 at present)

Table 6.1.1 Classification of Airports

Role of Airport					Location	Restriction on Operation	Operated Aircraft	Cate-gory
International	Center of local administration	Center of tourism development	Hub	Large demand	Hill	Nil or Little	DC-10 class	A
Domestic					Terai		HS-748 class	B
			Spoke				DHC-6 class	C
	Public welfare	Tourism spot		Small demand	Hill and High Himalaya	STOL approach		D

Table 6.1.2 Comparison of Classification

No	7th plan	ADB	JICA	close	Char-ter	Airport	Remarks
1	A	A	A			KATHMANDU (TRIBHUVAN)	
2	B	B	B			BHAIRAHAWA	
3	B	B	B			BIRATNAGAR	
4	B	B	B			NEPALGUNJ	
5	B	B	B			POKHARA	
6	C	C	C	●		BHARATPUR	
7	C	C	C			DHANGADHI	
8	C	*B	C			JANAKPUR	*paved
9	C	C	C	●		RAJBIRAJ	
10	C	C	C			SIMRA	
11	C	C	C			SURKHET	
12	C	C	C			TUMLINGTAR	
13	D	D	D			BAITADI (PATAN)	
14	D	D	D			BAGLUNG (BALEWA)	
15	D	D	D			BAJHANG	
16	D	D	D			BAJURA	
17	D	D	D			BHOJPUR	
18	D	*C	C	●		CHANDRAGADI	
19	D	*C	C			DANG (TULSIPUR)	
20	D	D	D			DARCHULA	
21	D	E	D		※	DHORPATAN	
22	D	D	D			DOLPA	
23	D	D	D			DOTI (DIPAYAL)	
24	D	*C	D		※	GORKHA (PALUNGTAR)	*R/W>2500'
25	D	D	D	●		JILI	
26	D	D	D			JOMSOM	
27	D	D	D			JUMLA	
28	D	D	D			LAMIDADA	
29	D	E	D		※	LANGTANG	
30	D	D	D			LUKLA	
31	*D	C	C			MAHENDRANAGAR	*R/W<3000'
32	D	E	D			MANANG	
33	D	C	B			MEGHAULI	
34	D	D	D			PHAPLU	
35	D	D	D			RAMECHHAP (AKASE)	
36	D	D	D	○ 2000		ROLPA	
37	D	D	D			RUKUMKOT (CHAURAJHARI)	
38	D	D	D			RUMJATAR	
39	D	D	D			SANFEBAGAR	
40	D	D	D			SIMIKOT (HUMLA)	
41	D	E	D		※	SYANGBOCHE	
42	D	D	D			TAPLEJUNG	*R/W<3000'
43	*D	**D	C			TIKAPUR	** <2000'
44			D			MUGU	

Category	7th Plan	ADB	JICA
A	1	1	1
B	4	5	5
C	7	11	11
D	31	22	26
E	0	4	0

○ : Airport to be closed in 2000
● : Airport to be closed immediately

ADB : Classification by ADB
" NEPAL TRANSPORT SECTOR PROFILE STUDY "Jan,1988

6.2 Determination on Necessary Related Facilities for Each Category

At Cat-A airport (TIA) it is important to develop all facilities to international standards.

Each airport of Cat-B - D should install necessary facilities appropriate for each category, which should be planned according to the basic policy mentioned previously.

6.2.1 Basic Facilities

The necessary facilities of each category airport for basic facilities are summarized.

Table 6.2.1 Necessary Basic Facilities by Classification of Airport

Facilities	Classification of Airport			
	A	B	C	D
Runway	See Table 6.2.2			
Runway strip	o	o	o	o
Taxiway	o	o	o	o
Apron	o	o	o	o

The runway length should not be less than the length determined by compensating for local conditions and performance characteristics of the aircraft. If it is not practical to extend the runway, the following should be provided:

- surfacing of runway,
- "take-off runway extension" and
- "high speed turn off" which is effective as ASD (accelerate stop distance at one engine out)

Regarding the design criteria of necessary facilities, the following regulations are recommended:

Cat-A and B . . . ICAO standard, Annex 14
Cat-C . . . . . ICAO Stolport Manual
Cat-D . . . . . Altiport Recommendations

In addition to these regulations, aircraft operational safety should be carefully considered.

In case where strong cross winds exist, the runway width should be designed to satisfy regulation Cat-C (30 m) rather than regulation Cat-D (18m) even in Cat-D airport. It should be understood that the Altiport Recommendations are only minimum requirements.

Table 6.2.2 Runway Requirement

Category	Cat-B		Cat-C	
Existing Runway	Paved	Un-paved	Paved	Un-paved
Target (Preference)		○ Paving		●
(Future)				○ Paving

Category	Cat-D			
Existing Runway	Sufficient Length		Insufficient Length	
	Paved	Un-paved	Extendable	Un-extendable
Target (Preference)		●	◎ Extension Paving	◎ Paving
(Future)		○ Paving		

● to be paved,when traffic is heavy

◎ to be paved urgently

6.2.2 Air Navigation Systems

The operational requirements for each classified category of airport have been established considering the purpose, utilization, and development level of each category airport.

Cat-A: Precision approach category - I
Cat-B: Instrument, non-precision
Cat-C: Non-instrument or Instrument, non-precision
Cat-D: Non-instrument

The necessary facilities of each category airport for air navigation are summarized in Table 6.2.3.

Table 6.2.3 Necessary Air Navigation Facilities by Classification of Airport

o: necessary facility

Facility/Services Required	Classification of Airport			
	A	B	C	D
[Air Traffic Services]				
- Area Control	o	-	-	-
- Flight Information Service	o	-	-	-
- Rescue Coordination	o	-	-	-
- Approach Control	o	-	-	-
- Aerodrome Control	o	o	-	-
- Aerodrome Flight Information Service	-	-	o	o
[Radio Navigational Aids]				
- MLS/ILS	o	-	-	-
- VOR/DME	o	o	(OPTIONAL)	-
- NDB	o	o	o	o
- Locator	(O P T I O N A L)			
[Air Traffic Control and Telecommunication]				
- VHF Air/Ground Com.	o	o	o	o
- HF Air/Ground Com.	o	-	-	-

Table 6.2.3 Continued

Facility/Services Required	Classification of Airport			
	A	B	C	D
- International AFTN	o	-	-	-
- Domestic AFTN	o	o	-	-
- ATS Direct Speech Circuits	o	o	-	-
- Domestic Ground/Ground HF SSB Circuits	o	o	o	o
- Air Traffic Control Radar	o	-	-	-
- VHF Direction Finder	-	o	(OPTIONAL)	-
- ATC Tape Recorder	o	o	o	o
- Time Generator/Verbal Time Announcer	o	o	-	-
- ATC Intercom.	o	o	o	o
- Public Address System (ATC)	-	-	o	o
- Siren	-	-	o	o
- Control Console				
. Area Control	o	-	-	-
. Flight Information	o	-	-	-
. Approach Control	o	-	-	-
. Aerodrome Control	o	o	-	-
. Surface Control	o	-	-	-
. Aerodrome Flight Information	-	-	o	o
- Automated Terminal Information Service (ATIS)	o	-	-	-
[Aeronautical Ground Lights]				
- Precision Approach Category-I Lighting System	o	-	-	-
- Simple Approach Lighting System	o	o	-	-
- Sequenced Flash Lighting System	o	-	-	-
- Runway Edge Lights	o	o	-	-
- Runway Threshold Lights	o	o	-	-
- Runway Wingbar Lights	o	-	-	-
- Runway End Lights	o	o	-	-
- Runway Threshold Identification Lights	-	o	o	o
- Circling Guidance Lights	-	-	-	-
- T-VASIS	-	-	-	-
- PAPI	o	o	o	o

Table 6.2.3 Continued

Facility/Services Required	Classification of Airport			
	A	B	C	D
- Runway Centerline Lights	(OPTIONAL)	-	-	-
- Distance Marker Lights	-	-	-	-
- Taxiway Edge Lights	o	o	-	-
- Taxiway Centerline Lights	-	-	-	-
- Taxiing Guidance System	o	-	-	-
- Aerodrome Beacon	o	o	-	-
- Apron Floodlights	o	o	-	-
- Logical Control System	o	-	-	-
- Manual Control System	-	o	o	o
- Illuminated Wind Indicator	o	o	-	-
[Meteorological System]				
- Automatic Weather Data Collecting/Recording System	o	-	-	-
- RVR Meter	o	-	-	-
- Ceilometer	o	-	-	-
- Manual Observation system	-	o	o	o
- Radiosonde	o	-	-	-
- HF Facsimile	o	-	-	-
- APT Receiver	o	-	-	-
- Met. Radio Teletype	o	o	-	-
- Wind Sock	-	-	o	o
[Power Supply System]				
- Uninterrupted Power Supply (UPS) Equipment	o	-	-	-
- Commercial Power Supply	o	o	o	-
- Solar Battery Supply	-	-	o	o
- Emergency Generator	o	o	o	o
- DC Power Supply	o	o	o	-
- Voltage Regulator	o	o	o	-

6.2.3 Other Facilities

The necessary facilities of each category airport for other facilities are summarized in Table 6.2.4.

Table 6.2.4 Other Necessary Facilities by Classification of Airport

o: necessary facility

Facility	Classification of Airport			
	A	B	C	D
Passenger Terminal Bldg.	o	o	o	o
Cargo Building	o	o	-	-
Hangar	o	o	-	-
Control Tower	o	o	o	o
Police Quarter	o	o	o	o
Staff Quarter	o	o	o	o
Guard House	o	o	o	o
Fire Station	o	o	o	-
Water Supply System	o	o	o	o
Drainage, Sewerage Disposal, etc.	o	o	o	o

CHAPTER 7 RECOMMENDATION ON OPERATIONAL IMPROVEMENT, INSTITUTIONAL REQUIREMENTS AND MANAGEMENT

CHAPTER 7 RECOMMENDATION ON OPERATIONAL IMPROVEMENT, INSTITUTIONAL REQUIREMENTS AND MANAGEMENT

7.1 General

Due to many geographical limitations in Nepal as described in Chapter 1 in detail, air transportation plays a major role in delivering emergency goods, in maintaining the welfare of people living in out-lying areas, and in promoting tourism. Civil aviation in Nepal is administered by the Department of Civil Aviation (DCA) which is under the Ministry of Tourism.

Presently Tribhuvan International Airport and other 42 local airports are administered by the DCA. However, there are many issues on maintaining and administration of these airports due to lack of budget and personnel.

In 1985, Integrated Development System (IDS), Baneswor, Kathmandu, which was referred by the United Nations Development Programme (UNDP) drew up a report pertaining to the status of DCA.

In this Report, the present condition of DCA is analyzed in detail and various issues are pointed out. Therefore, in this chapter, the present condition of DCA is discussed based on the IDS Report.

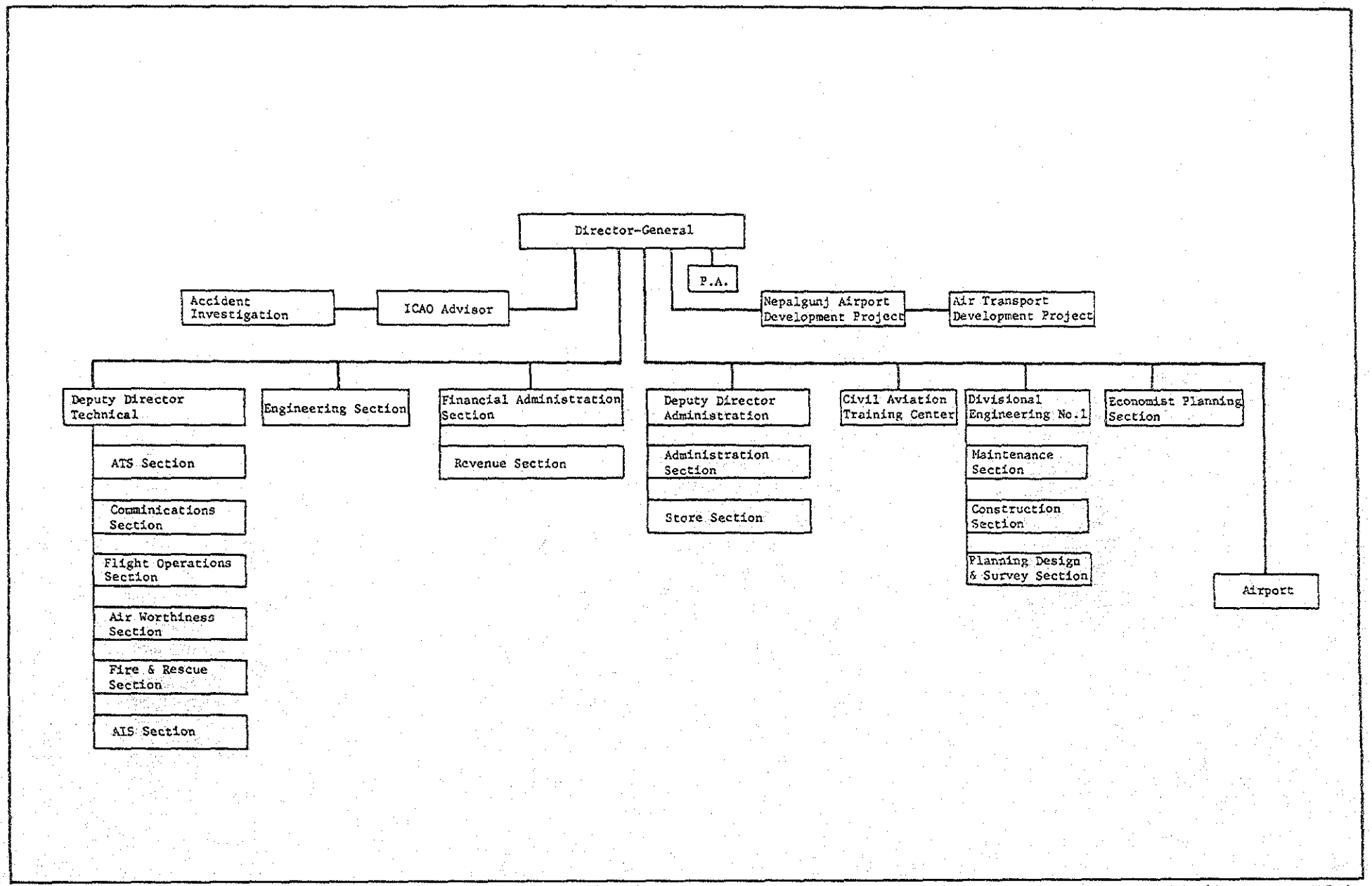
7.2 Present Condition of DCA

7.2.1 Organization

In 1965, DCA was established under the Ministry of Transport. Thence, in 1982, DCA was transferred to the Ministry of Tourism. Personnel, 128 gazetted and 216 non-gazetted are now working in DCA. Fig. 7.2.1 shows the existing organization structure of DCA. In spite of increment of air traffic volume in Nepal year by year as described in Chapter 2, existing organization structure of DCA has not been reformed so as to cope with the present condition.

7.2.2 Local Airport Office

Table 7.2.1 shows the number of staff at each airport office. No staff is stationed at seven airports among the 43 airports.



(Source : DCA)

Fig. 7.2.1 The organization of the Department of Civil Aviation as of August, 1988

Table 7.2.1 The Number of Staff of the Airport Office

as of Oct. 1988

Name of Airport	Total		Classification					
	Officer	Non-Officer	TWR	RDO	RDO ENG STAFF	MECH	CAF	OTHER
BAGLUNG	2	4	-	2	-	-	-	4
BAITADI	1	3	-	-	-	-	-	4
BAJHANG	2	3	-	2	-	-	-	3
BAJURA	1	3	-	1	-	-	-	3
BHAIRAHAWA*	13	48	11	-	2	3	23	22
BHARATPUR*	4	10	1	-	-	1	-	12
BHOJPUR	2	2	-	2	-	-	-	2
BIRATNAGAR*	19	43	11	-	4	4	20	23
CHANDRAGADHI	2	10	-	2	-	1	-	9
DANG	2	9	-	2	-	1	-	8
DARUCHULA**	1	-	-	-	-	-	-	1
DHANGADHI	2	10	-	2	-	1	-	9
DHORPATAN**	-	-	-	-	-	-	-	-
DOLPA	1	3	-	1	-	-	-	3
DOTI	2	3	-	2	-	-	-	3
GORKHA (PALUNGTAR)**	2	8	-	2	-	1	-	7
JANAKPUR*	6	29	4	-	2	2	11	16
JIRI**	-	-	-	-	-	-	-	-
JOMSOM	2	3	-	2	-	-	-	3
JUMLA	2	3	-	2	-	-	-	3
KATHMANDU*	93	235	64	-	13	6	48	197
SUB-TOTAL	159	429	91	22	21	20	102	332

TWR : Air Traffic Controller
RDO : Communication Officer
RDO ENG STAFF : Radio Engineering Staff
MECH : Mechanical Staff
CAF : Crush and Fire Fighting Staff

Table 7.2.1 Continued

Name of Airport	Total		Classification					
	Officer	Non-Officer	TWR	RDO	RDO ENG STAFF	MECH	CAF	OTHER
LAMIDANDA	2	4	-	2	-	-	-	4
LANGTANG	-	2	-	-	-	-	-	2
LUKLA	1	3	-	1	-	-	-	3
MAHENDRANAGAR **	2	1	-	2	-	-	-	1
MANANG	-	1	-	-	-	-	-	1
MEGHAULI	1	8	-	1	-	1	-	7
NEPALGUNJ*	13	32	9	-	4	2	12	18
PHAPLU**	-	-	-	-	-	-	-	-
POKHARA*	6	30	5	-	1	3	13	14
RAJBIRAJ	2	9	-	2	-	-	-	9
RAMECHAP	1	3	-	-	-	-	-	4
ROLPA**	1	3	-	1	-	-	-	3
RUKUMKOT	2	2	-	2	-	-	-	2
RUMJATAR**	-	-	-	-	-	-	-	-
SANFEBAGAR	2	3	-	2	-	-	-	3
SIMARA*	7	30	4	-	3	4	12	14
SIMIKOT	1	4	-	1	-	-	-	4
SURKHET	2	9	-	2	-	1	-	8
SYANGBOCHE**	-	-	-	-	-	-	-	-
TAPLEJUNG**	1	2	-	1	-	-	-	2
TIKAPUR**	-	-	-	-	-	-	-	-
TUMLINGTAR	2	4	-	2	-	-	-	4
SUB-TOTAL	46	150	18	19	8	11	37	103
TOTAL	205	579	109	41	29	31	139	435

(Source: DCA)

Note:

*) Aerodrome control service is available

**) Unmanned airport (No technical staff stationed)

7.2.3 Issues Pointed Out by IDS

The followings are summary of issues pointed out by IDS.

(1) At present, the two Deputy Directors, the Chief of Civil Aviation Training Centre (CATC), the ICAO Advisor, the Chiefs of three development projects i.e. Air Transport Development Project (TIA), Nepalgunj Airport Development Project, and manager TIA also report directly to the Director General.

Thus, Director General has a little time to concentrate on policies and other major issues.

(2) A view to grouping similar functions together under one administrative head, all construction projects should be grouped together under a chief of construction project.

(3) The Department lacks direction in its objectives, policies and planning. This is reflected in the greater departmental focus on construction projects and a comparative neglect of regulatory and service functions performed quietly and away from public visibility.

(4) Many of the departmental officials are much occupied in day to day activities to attend to the need for improving operations and services, and the task of laying down policies and standards, and enforcing them remains neglected.

(5) There are no recognized job descriptions for important positions in the department, and responsibilities for different tasks are not clearly defined.

(6) Budget allocations are grossly inadequate to maintain different facilities at prescribed standards. This may soon result in a deterioration in the performance of civil aviation functions, adversely affecting not only tourism but also the development of air transport in the country.

(7) Little attention is being given to maximizing revenue from different facilities and services provided to the airlines or other users. Charges* for services have not been revised since 1980. The DCA has little incentive to explore potential for enhancing revenues as its budget allocation is not related to

its earnings.

Note: * Charges for services have been revised in 1988.

(8) Management capability of the department has been on a decline over years as reflected in the extremely slow progress in implementation of development projects and in the lowering of operational and maintenance standards.

7.3 Major Recommendations by IDS

As a result of an analysis of administration and management of DCA, IDS pointed out the issues mentioned above, thence, made recommendations for administrative reform in DCA.

The followings are summary of recommendations:

7.3.1 Organization Structure

(1) Establishment a new position of Deputy Director General (DDG) to enable the Director General (DG) to concentrate on policies and other major issues and to improve the administrative functions in DCA.

(2) A new Office of Planning and Policies (OPP) has been proposed to provide staff assistance to DG in his functions of planning supervision and control. OPP will deal with planning, economic and financial analysis, foreign aid, air transport policies, manpower planning, and monitoring and evaluation.

(3) All construction projects have been grouped together under a Chief of Construction Projects with a view to grouping similar functions together under one administrative head.

(4) Airways Engineering function is now separated to two independent units, i.e., Engineering Section and COM/NAVAID Project. This status brings the lack of coordination, overlapping and some disharmony between the two units. Thus, two units should be amalgamated to form a new Airway Engineering Division under a separate Deputy Director (DD).

(5) Figure 7.3.1 shows the organization chart proposed by IDS.

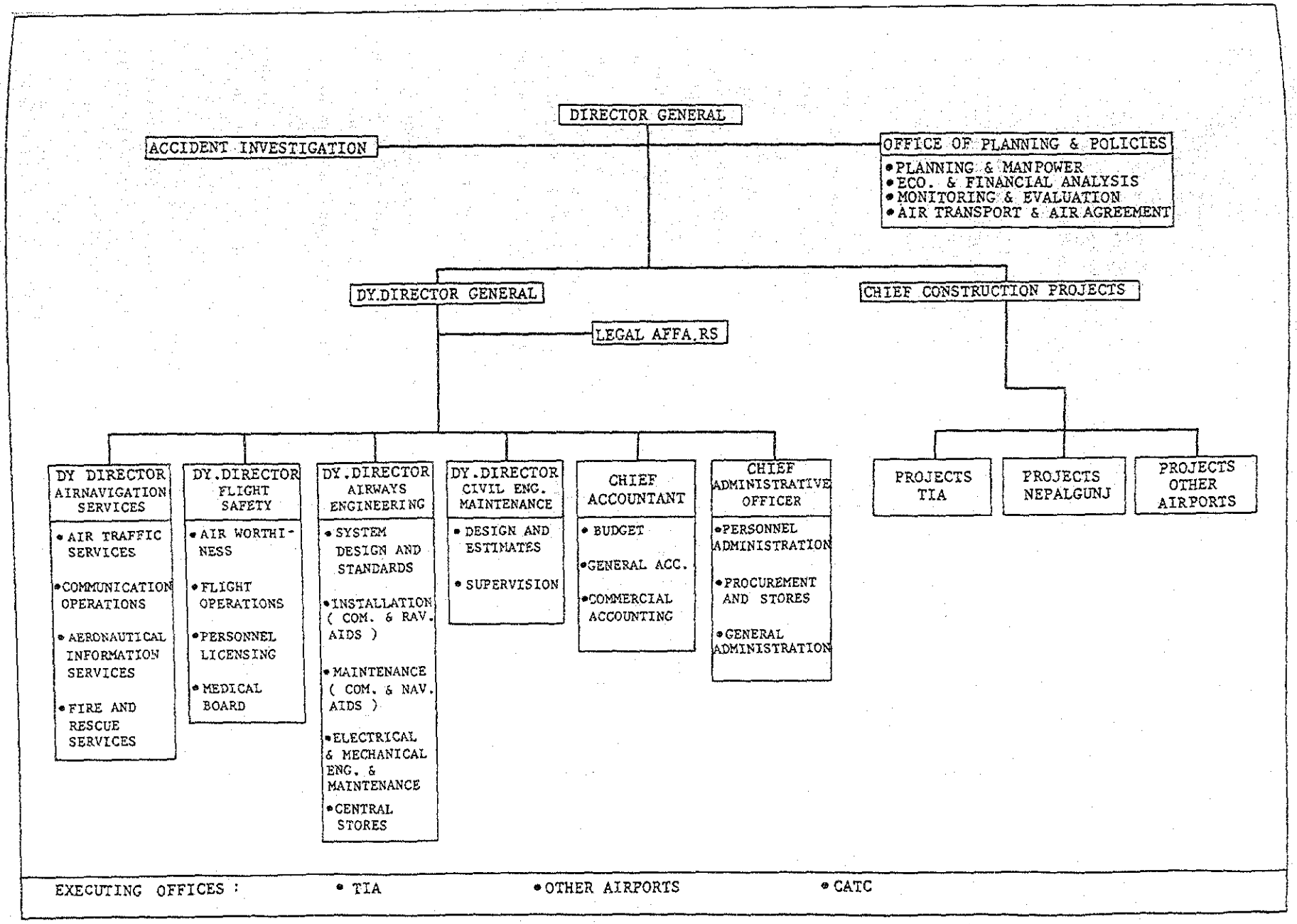


Fig.7.3.1 Organization Scheme for Civil Aviation Department proposed by IDS (Source : IDS Report)

7.3.2 Delegation of Authority

The financial and administrative powers belonging to the DG should be delegated substantially to the DDG, the Chief of construction Projects, Director TIA, Principal CATC, and the Division Chiefs.

Also authority for all repairs which can be done locally and all minor construction works should be delegated to the hands of all domestic airports.

7.3.3 Management Control System

A simple management control system has been proposed which will enable the DG to monitor the trend of activities in the Department, evaluate them, identify areas needing greater attention and improvements, and thus keep the departmental activities on the right course. The Deputy Director of the proposed Office of Planning and Policies, and the Monitoring and Evaluation Office, will help the DG in implementing the system.

7.3.4 Rules, Management and Others

(1) Existing Civil Aviation Rules should be amended to include the powers of the DCA to issue regulations or orders on various technical matters pertaining to civil aviation.

(2) In order to improve management, operational manuals for different types of domestic airports, should be prepared incorporating authority and responsibilities of different officials and containing schedule of operational and maintenance activities to be carried out at these airports.

(3) Functions and responsibilities of all important positions including those of section heads have been laid down in the Annex of the IDS Report.

(4) Steps should be taken to improve office management procedures e.g. filing, documentation, optimizing use of office space etc., by appointing local experts in this area.

(5) A system of excessive paperwork which has developed in the DCA can be reduced by delegation of authority on the lines recommended in the Report. It is, however, suggested that a new style of management should be introduced in which informal consultations with colleagues and superiors are frequently used, saving time and cutting down on paper work.

(6) Funds allocated to the maintenance of airport infrastructures and equipments should be substantially increased to maintain these facilities at the highest standards of serviceability.

(7) A programme for upgrading of the airports facilities do not always seem to be based upon a proper assessment of priority needs of the country. It is recommended that any further investments on civil aviation should be based upon a careful study of traffic level, urgency of facilities needed, etc. and should also be coordinated with plans for the development of other modes of transport in the country.

7.3.5 Creation of an Autonomous Civil Aviation Authority

The establishment of an autonomous Civil Aviation Authority of Nepal (CAAN) to replace the present Department of Civil Aviation.

7.4 Recommendations by the JICA Study Team

(1) Reform of Organization Structure of DCA

Although the JICA Study Team has received close cooperation from DCA on our activities during our three months' stay in Nepal, it was observed that lack of adaptability of organization structure and lack of personnel of DCA for the administration of the existing civil aviation in Nepal which is developed year by year.

Accordingly, the JICA Study Team agrees in principle IDS's draft for reform of organization structure of DCA which contains the following:

a) New establishment of DDG

b) New establishment of OPP

c) Intensive management of construction projects and airway engineering function

d) Delegation of Authority

(2) Provision of Rules

DCA has the responsibility to administer the following matters in accordance with the Civil Aviation Act (CAA).

a) Development of air transport services for national socio-economic development, for strengthening national integration, and for extending international relation,

b) Development and maintenance of airports,

c) Regulation of air transport services for safety and efficiency

d) Operation of airport communications and navigation facilities.

To accomplish the duty, DCA should maintain the complete Civil Aviation Rule for each item. But at present, CARs for the following items have only been enforced:

a) Registration and Marking of Aircraft

b) Issuing License to the Flight Crew

c) Airworthiness

d) Medical Board and Fees

e) Investigation of accident

Hence, DCA should be put the CARs through the proper procedure for the following items:

a) Operations of Aircraft

b) Aerodrome and Air Navigation Aid

c) Aeronautical Light

d) Air Transport Business including scheduled air transport business, non-scheduled air transport business and aircraft using business

e) Foreign Aircraft

(3) Due to incompleteness of job descriptions for each Division and Section in the DCA, IDS proposed the draft of job descriptions which are pertaining to the responsibilities and functions for DG and other main positions in the Annex of the Report. In general, it is considered that this draft is possible to introduce to DCA after precise checking in DCA. Thence, it should be incorporated into an organization act through the regular procedures.

(4) Compilation of Standard Operating Procedure (SOP)

During our three months' stay in nepal, we visited the following local airports:

Tumlingtar	Biratnagar
Lamidanda	Janakpur
Pokhara	Jomsom
Dolpa	Simikot
Nepalgunj	Lukla
Bharatpur	

Each airport was maintained and operated with a few personnel from DCA. The management of routine works at each airport was based on the personnel's experience. To maintain and promote the safety of aircraft operations, DCA should compile the Standard Operating Procedures (SOP) including the following:

a) The Functional Responsibilities of the Airport Technical Departments

b) Airport Surface Inspections

c) Ground Checks of Visual Aids

d) Flight Checks of Visual Aids

e) Adverse Weather Conditions

f) Measurement of Surface Friction

g) Control of Work in Progress on the Movement Area and Precautions to be taken

h) Bird Hazard Reduction

i) Apron Management and Apron Safety

j) Control of Ground Noise

k) Airport Zoning and Obstacle Clearance

l) Aircraft Accidents/Incidents

m) Removal of Disabled Aircraft

n) The Airport Emergency Plan

o) Medical Service

p) Rescue and Fire Fighting Services

q) Security

r) Vehicle Control

s) Incidents Affecting People and Property Outside the Airport Boundary

t) Safety at Air Displays

u) The Provision of Aerodrome Data

(5) Modernization of Office Management

To improve office management procedures, e.g., filing, documentation, etc., IDS proposed that steps should be taken by appointing local experts in this area. The JICA Study Team also advises that by the introduction of computer system in DCA, office management procedures such as filing, documentation, calculation, etc., in particular, process of various data will be done smoothly and correctly.

(6) As IDS Report points out the lack of personnel in DCA, the JICA Study Team also feels actually the lack of personnel in DCA. To solve this issue, it should be cleared the job description for each section, thence DCA should make plan to request the additional personnel to accomplish the job description for each section. The JICA Study Team has made the Recommendation on Operational Improvement, Institutional Requirements and Management roughly. It is expected that the matters which are contained in this Recommendation will be enforced after inspection at a executive committee which will be established in the DCA.

CHAPTER 8 SELECTION OF KEY AIRPORTS AND RELATED FACILITIES FOR MASTER PLANNING

CHAPTER 8 SELECTION OF KEY AIRPORTS AND RELATED FACILITIES FOR MASTER PLANNING

8.1 Airports

As stated in "Evaluation of Existing Airports and Related Facilities" in Chapter 3, Tribhuvan International Airport and New Pokhara Airport should be selected as airports to be developed in the master plan because of their importance and the shortcomings in their existing facilities. In this chapter, key STOL airports to be developed are identified through the comparative study as shown in Table 8.1.1. It mainly focuses on safety factors such as the necessary runway length and condition, pilots' impressions, the role of the airport, and traffic volume.

Jomsom Airport and Simikot Airport, which have relatively short runways should be developed for safety reasons. Similarly, Dolpa Airport should be considered for development in the future. Lukla Airport and Sanfebagar Airport should also be selected since they have high traffic volume which means the runway surface is open to wear and tear.

Jumla is a zonal headquarters to where it is necessary to continue flights since there are no roads there. Therefore, the runway should be surfaced to allow regular flights.

Furthermore, Phaplu Airport, Syangboche Airport and Mugu Airport are recommended by DCA for special emphasis for reasons similar to those mentioned above and also for enhancing tourism. The feasibility study reports for the latter two are reviewed in this study.

Table 8.1.1 Selection of Key Airports for Master Planning

Name of Airport	Runway: Required* Ext. length: Paved (m)	Runway: Required* Ext. length: Firm dry sod (m)	Runway: Possibility of extension	Runway: Soft & slippery when wet	One way operation	Operational status	Role of airport: Basic Human Needs	Role of airport: Tourism	Traffic volume: 1986/87 (x1000)	Traffic volume: 2000 (x1000)	Possibility of paving due to frost	Non road connected	ADB Ext./paving recommendation	Airport recommended by DCA for special emphasis	JICA Study Team recommendation	Remarks
Dolpa	75	130		X soft	one way X	X critical	X		2.9	5.7	X possible	Non-Road X	E ○P		P.O ○	High speed turn off is required
Doti	10	60	X possible	–	X	–	ZH		10.6	11.5	X	–	○E			
Jomsom	110	170	X	X	–	X	X	X	7.9	13.5	△	X	E ○P	○	E.P.O ●	Protection works for river erosion are required
Jumla	0	30	X	–	X	–	ZH X	X	9.2	15.1	△	X	○P	○	P ○	
Lukla	0	0		–	X	X	X	X	14.3	24.2	X	X	○P	○	P.O ○	Additional apron is needed
Phaplu	0	0		–	X	X	X	X	0.8	1.4	X	X	–	○		PC-6 serves
Rolpa	0	40		–	X	–			0.2	0.3	X	–	Close 1992/94			
Rukumkot	0	20	X	–	–	–	X		10.0	18.7	X	X	○E			Drainage works are needed
Sanfebagar	20	60	X	X	X	–	X		14.8	27.1	X	X	Close 1991/93		P.O ○	Protection works for river erosion are required
Simikot	105	160	X	X	X	X	X		2.9	5.4	Diffi-cult	X	E ○P	○	E.P.O ●	Apron should be constructed
Syangboche	–	** 550	X		X	–	X	X	0	8.3	X	X	–	○		DCA has a plan to expand for DHC-6
Mugu	460	550	X	Presently under construction	X	–	X	X	0	2.1	△	X	–	○		DCA has a plan to construct for DHC-6

* Length is estimated by take off distance, But this length is less than ASD (Accelerate Stop Distance).
**Refer to F/S Report by DCA, 1986

○ : Key airport to be developed
● : Key airport to be developed immediately
△ : Detailed Survey Required
X : Applicable to each item
ZH : Zonal Headquarters

E : Extension
P : Paving
O : Other work

8.2 Nationwide Navaids and Telecommunications Network

All the air navigation systems necessary for airport operation will be included in the airport master plan.

As for other air navigation systems, nationwide telecommunications network and en-route (airway) navigational aids network in Nepal should also be considered.

(1) As discussed in Section 5.6, en-route navigational aids which will commonly be used for terminal navigational aids should be developed in order to compose IFR airways and ensure safety and efficiency of civil air tranport.

(2) As discussed in sub-section 3.3.5, nationwide telecommunications network for international and domestic AFTN and ATS direct speech circuits should be developed in order to improve the difficulties in current communications and expedite air traffic services.

The above considerations should be selected for subsequent study.

CHAPTER 9. REVIEW OF MASTER PLAN OF TRIBHUVAN INTERNATIONAL AIRPORT

CHAPTER 9 REVIEW OF MASTER PLAN OF TRIBHUVAN INTERNATIONAL AIRPORT

9.1 Breakdown of Air Traffic Demand

9.1.1 General

Air traffic demand at TIA estimated in Chapter 2 is broken down as shown in the flow chart in Fig. 9.1.1.

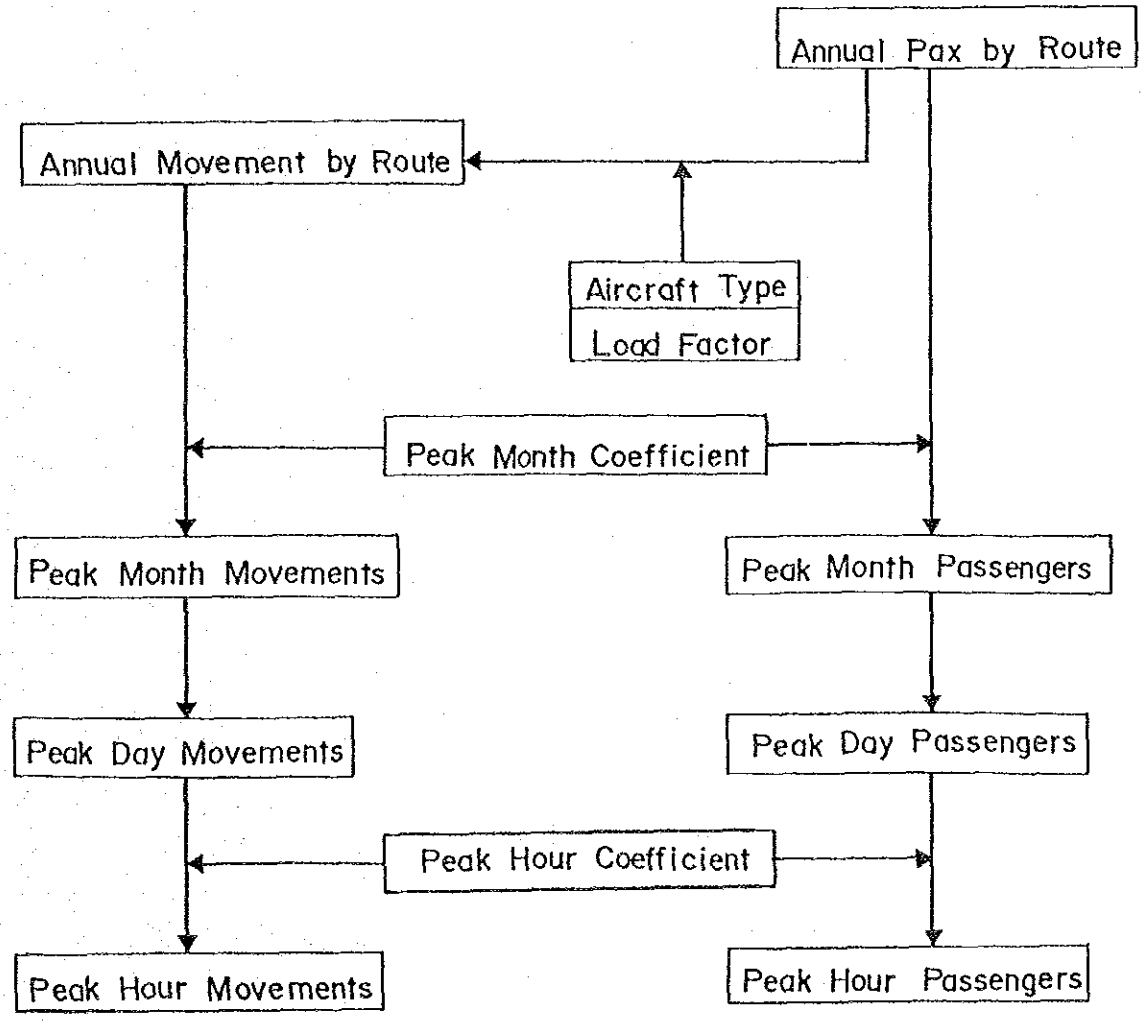


Fig. 9.1.1 Flow Chart for Break Down in Demand Forecast

9.1.2 Aircraft Classification

(1) Aircraft Classification and Seating Capacity

Seating capacity based on aircraft category has been established as shown below, considering the present aircraft types operating at TIA:

a) Domestic

Type of Aircraft	Seating Capacity
DHC-6 Class	20
HS-748 Class	50
B-727 Class	130

b) International

Category	Type of Aircraft	Seating Capacity		
		1990	2000	2010
J	B-747	-	-	500
L	DC-10, A-300	240	280	320
M	A-310, B-767	230	260	280
N	B-757, A-320, MD-80	190	200	220
S	B-727, B-737, DC-9 B-707, F-28	140	140	160

Note: J=Jumbo Jet
L=Large Jet
M=Middle Jet
N=Narrow Body Jet
S=Small Jet

(2) Load Factor

The load factor for the future is set as follows based on the actual load factor of the last few years:

Domestic services	75%
International services	65%

(3) Aircraft Mix

Aircraft mix in the future is estimated as shown below, taking into consideration the introduction of larger aircraft according to the increase of demand.

(Unit=%)

Aircraft Category	Present	1990	1995	2000	2005	2010
J (B-747)	0	0	0	0	5	10
L (DC-10) (A-300)	10	10	12.5	15	15	15
M (A-310) (B-767)	5	5	7.5	10	12.5	15
N (B-757) (A-320) (MD-80)	20	20	22.5	25	27.5	30
S (B-727) (B-737) (DC-9)	65	65	57.5	50	40	30

9.1.3 Peak Air Passengers and Aircraft Movements

(1) Peak Month Coefficient

Peak month coefficients at TIA are projected as follows:

Peak Month Coefficient	Passengers	Aircraft Movements
Domestic	1/8.3	1/ 8.3
International	1/9.2	1/10.3
Domestic and International	1/9.1	1/ 8.9

Note: The above values are based on the actual traffic data of TIA in 1987.

(2) Design Day Coefficient

Design day coefficients for aircraft movements and passengers are basically a product of peak month coefficient and the number of days in a month (1/30.4) as follows:

Design Day Coefficient	Passengers	Aircraft Movements
Domestic	1/250	1/250
International	1/280	1/310
Domestic and International	1/270	1/270

(3) Peak Hour Coefficient

The peak hour coefficient is calculated by the following formulas which were obtained from the actual aircraft traffic data at TIA and airports in foreign countries.

Domestic $Y=2.10/X+0.134$ (X=aircraft movement)
International $Y=1.05/X+0.171$ (X=aircraft movement)

(4) Heavy Direction Ratio

Heavy direction ratio is defined as the ratio of aircraft movement of the heavier direction (arrival or departure) divided by total peak hour movements. It is estimated to be about 0.6 based on the present operation at TIA.

9.1.4 Summary of Air Traffic Demand

Air traffic demand at TIA is summarized as shown in Tables 9.1.1 and 9.1.2.

Table 9.1.1 Summary of Air Traffic Demand (Domestic)

Year	Item / Period	Passenger Embarked/ Disembarked	Cargo (Ton)	Number of Aircraft Movements			
				B-727 Class	HS-748 Class	DHC-6 Class	Total
1995	Annual	280,000	2,200	500	3,930	4,070	8,500
	Peak Month	33,700	–	60	470	490	1,020
	Design Day	1,110	–	2	16	16	34
	Peak Hour	270	–	0.4	3.1	3.1	6.6
	Heavy Direction Peak Hour	160	–	–	–	–	4
2000	Annual	332,900	2,400	640	4,930	4,640	10,210
	Peak Month	46,900	–	100	590	560	1,250
	Design Day	1,330	–	2	20	18	40
	Peak Hour	320	–	0.4	3.7	3.4	7.5
	Heavy Direction Peak Hour	190	–	–	–	–	5
2005	Annual	388,900	2,600	790	5,790	5,290	11,870
	Peak Month	46,900	–	100	700	640	1,440
	Design Day	1,560	–	4	24	22	50
	Peak Hour	370	–	0.7	4.2	3.9	8.8
	Heavy Direction Peak Hour	220	–	–	–	–	5
2010	Annual	443,900	2,900	860	6,790	6,000	13,650
	Peak Month	53,500	–	100	820	720	1,640
	Design Day	1,780	–	4	28	24	56
	Peak Hour	420	–	0.7	4.8	4.1	9.6
	Heavy Direction Peak Hour	250	–	–	–	–	5

Table 9.1.2 Summary of Air Traffic Demand
(International)

Year	Period	Passenger Embarked/ Disembarked	Cargo (Ton)	Number of Aircraft Movements					
				B-747 Class	DC-10 Class	B-767 Class	B-757 Class	B-727 Class	Total
1995	Annual	924,000	45,000	-	1,000	600	1,800	4,600	8,000
	Peak Month	100,000	—	-	100	60	170	450	780
	Design Day	3,300	—	-	4	2	6	14	26
	Peak Hour	700	—	-	0.8	0.4	1.3	3	5.5
	Heavy Direction Peak Hour	400	—	-	—	—	—	—	3.3
2000	Annual	1,234,000	69,000	-	1,500	1,000	2,500	5,100	10,100
	Peak Month	134,000	—	-	150	100	240	500	990
	Design Day	4,410	—	-	4	4	8	16	32
	Peak Hour	900	—	-	0.8	0.8	1.6	3.3	6.5
	Heavy Direction Peak Hour	530	—	-	—	—	—	—	3.9
2005	Annual	1,567,000	100,000	500	1,600	1,300	2,800	4,100	10,300
	Peak Month	170,000	—	50	150	130	270	390	990
	Design Day	5,600	—	2	6	4	10	14	36
	Peak Hour	1,120	—	0.4	1.2	0.8	2	2.8	7.2
	Heavy Direction Peak Hour	670	—	—	—	—	—	—	4.3
2010	Annual	1,946,000	138,000	1,200	1,800	1,800	3,500	3,500	11,800
	Peak Month	212,000	—	120	170	170	340	340	1,140
	Design Day	6,950	—	4	6	6	12	12	40
	Peak Hour	1,370	—	0.8	1.2	1.2	2.4	2.4	8.0
	Heavy Direction Peak Hour	830	—	—	—	—	—	—	4.8