II. EXISTING TRANSPORT SYSTEM AND UTILIZATION

1. Environment of Transport System

1-1 General

Pakistan has area of 804 thousand square kilometers and population of 83,782 thousand persons in 1980/81. It extends over the length of about 1,600 kilometers from north to south and 880 kilometers from west to east. Topography is more or less flat except Karakoram Ranges in the north and a series of mountain ranges between Baluchistan and NWFP. The Indus River flows through Punjab and Sind and has formed vast fertile alluvial land, namely, Indus Flood Plain. That desert extends along the border to India and a part of Baluchistan.
The country is land-located except to the south. Climate is dry and hot in general. Average annual precipitation is 200 to 300 mm.

Population increases as rapid as 3.0 percent per year. Any increase in GDP is offset by this rapid population increase in terms of per capital income. As of 1980/81, 28.5 percent of the total population is absorbed in the urban areas which are defined as the settlements with more than 5000 population. Major cities include Karachi (city population being 5103 thousand in 1980/81), Lahore (2922), Faisalabad (1092), Rawalpindi (806), Hyderabad (795), Multan (730), Gujranwala (597), Peshawar (555), Sialkot (296), and Sargodha (294). Except Karachi and Peshawar, all these cities situate in Indus Flood Plain.

The national economy is predominantly agricultural. Major agricultural products include wheat, rice, sugarcane, cotton and livestock products. The agricultural sector accounts for about 30% of GDP and 60% of employment. Industrialization has been gradually taking place. Agro-based industries have been the main component of manufacturing industries, but recent expansion is remarkable in some modern industries such as steel, cement, fertilizers and chemical industries.

However, the national economy suffers from such problems as low domestic saving, deficit in public finance, international balance of payment, unemployment, energy constraint, inadequate physical infrastructures and low level of education.

These problems are inter-related and short-term solution is difficult to be seen. Some of the thrusts in public investment program include

the effective use of irrigation system for expansion of food production and agricultural exports, the expansion/improvement of transport network for industrial development, regional development and natural resource development and the strengthening of education system especially at the elementary level particularly in view of improving very high illiteracy rate at the earliest possible time.

1-2 National Plan

(1) Overall View of National Plan

The Government of Pakistan has consistently placed a great emphasis upon structuring foundations for the socio-economic development of the country. It annually forms an energetic programme aimed for it.

There are at present fifteen sectors that constitute broad infrastructural basis. The Government lays a special weight on them, taking the initiative for their development. They are agriculture, water, power, fuels, industry, minerals, transport and communications (T & C), physical planning and housing, mass media, education, health, population planning, social welfare, manpower, and rural development. The national programme/budget specially geared to them is called Annual Development Programme (ADP).

The Gross National Product of Pakistan for 1980-81 is estimated at 275,132 million rupees. In the same year the estimated amount of 26,137 million rupees was spent under the ADP. The ADP to GNP ratio thus comes to 9.5 percent. The ratio has been consistently around ten percent in the past.

The sectoral shares in the 1980-81 programme are estimated at 12.7% for agriculture, 10.9% for water, 14.7% for power, 17.1% for industry, 19.1% for transport and communications, and 25.5% for the remaining 10 sectors.

The comparative weights among sectors have not changed too much in the past although some differences in sectoral priority have been witnessed with the changes of administration.

As is shown in the above the government among others places exclusive importance to the development of T & C sector.

As regards the financing of ADP for the same year, the estimated equivalent of 42 percent was derived from domestic resources, 41 percent was financed by foreign aid, and the remaining 17 percent was generated through deficit financing. The past four year average of the percentage share of domestic resources stands at 27. Of the remaining 73 percent, 51 percent is accounted for by external resources and 22 percent by deficit financing.

(2) Investment in Transport

Out of 26,137 million rupees under the 1980-81 ADP the estimated 5,004 million rupees were utilized on T & C sector, of which 4,243 million rupees were spent on Transport. The percentage share of Transport Sector in ADP is thus calculated at 16.2 . The share has fluctuated little in the past and the past four year average stands at 16.3%. So, it follows that the equivalent of about 1.6 percent of GNP is yearly invested via normal budgetary route in Transport Sector. There is semi-public sector where the development programme/budget is formed outside ADP.

The amount of Public Sector Development Programme (PSDP)comprising ADP and Non-ADP comes to Rs. 4,538 million for 1980-81. The PSDP to ADP ratio is thus calculated at 1.07. The past four year average of the ratio is 1.09.

Out of 4,243 million rupees on the ADP basis for 1980-81, 1,747 MRs (million rupees) (41%), 407 MRs (10%), 1,100 MRs (26%), 777 MRs (18%) and 212 MRs (5%) were respectively spent on Road, Road Transport, Railway, Port and Airport. The average shares for the respective modes in the past four years are 40% for Road, 7% for Road Transport, 25% for Railway, 24% for Port and 5% for Airport. It is clear from the above that Road and Railway occupy predominant positions.

On the PSDP basis including non-ADP fund, the modal allocations and shares for the same year are as under: 1,747 MRs (39%) for Road, 407 MRs (9%) for Road Transport, 1,100 MRs (24%) for Railway, 1,072 MRs (24%) for Port and 212 MRs (5%) for Airport. The average shares for the respective modes in the past four years are 37% for Road, 6% for Road Transport, 22% for Railway, 27% for Port, 3% for Aviation and 4% for Airport.

If the expenditure under corporate development programme - 729 MRs for Shipping and 756 MRs for Aviation - is added to the PSDP, the respective modal shares for 1980-81 are rewritten as 29% for Road, 7% for Road Transport, 18% for Railway, 18% for Port, 12% for Shipping, 13% for Aviation and 4% for Airport. Viewed in the past four year ranges the respective modal shares in the above order stand at 26%, 5%, 16%, 20%, 7%, 23% and 3%.

2. Existing Transport System and Utilization in General

2-1 Feature of Geographic Terms and Transportation System in Pakistan

The existing transport system of the country as shown in Fig. 2-1-1 is organized centering around the Punjub and Sind Provinces.

The most essential trunk line of the country by railway, road and aviation connects the down country with the up-country.

The roads & railways network was taken over since Independence of the country and there has been scarcely major expansion of the network from then, because it was regarded as accomplished.

However there are many problems in its quality, e.g. the narrow width of the pavement and the weak intensity of that, therefore the annual budget for roads is almost used to the widening or repairing of intensity.

Similarly, as for the railways the tracks and rolling stock is worn out and it is the actual circumstances that most budget is used to the rehabilitation.

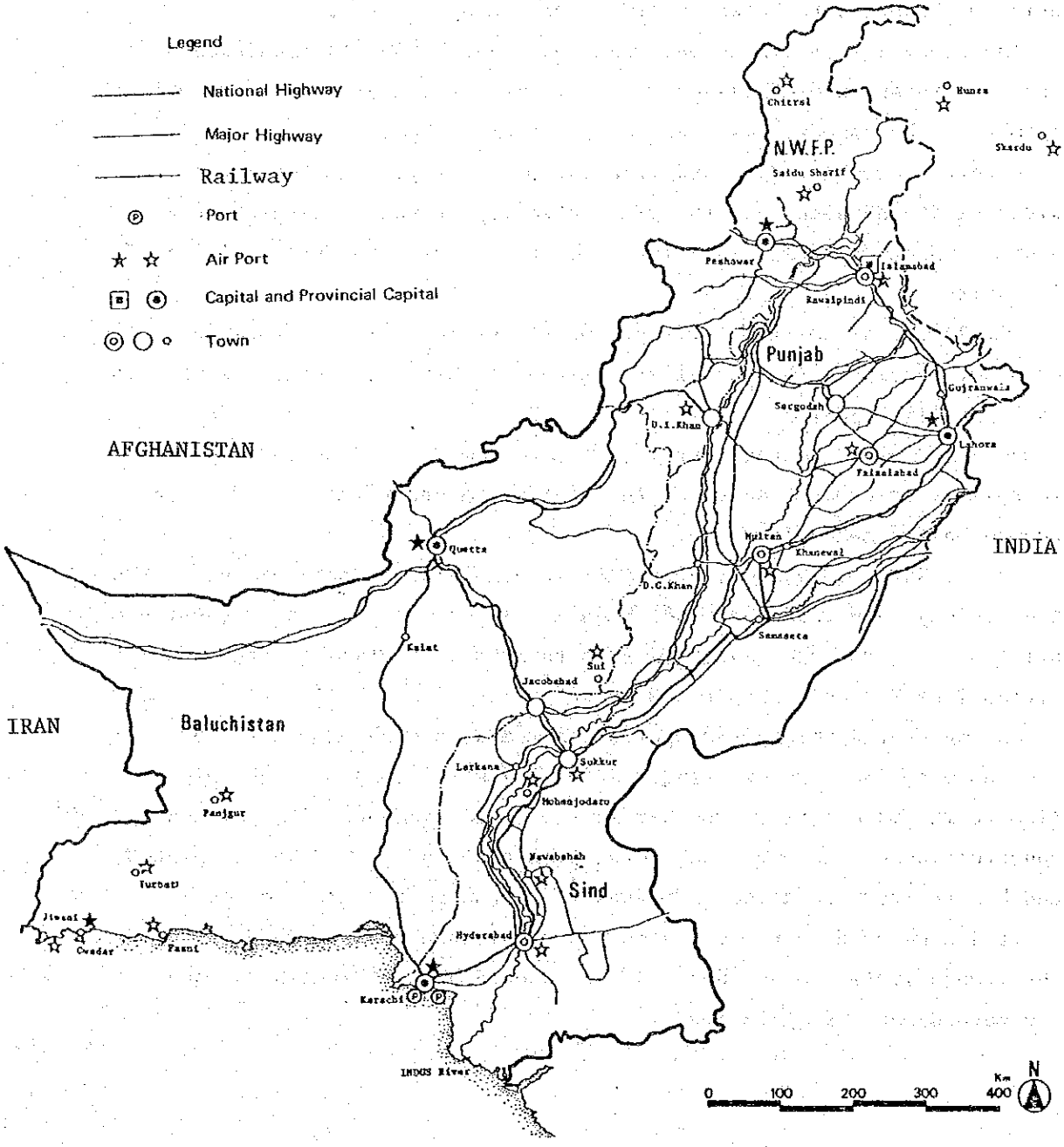
It cannot be neglected that majority of damage to road surface and to railway track are caused by the floods and heavy rains in monsoon season on the naked land.

In the NWFP, Baluchistan Province situating in the mountainous region the railways and roads have not been developed much and as a substitute aviation services are operating from their major cities to the main cities like Karachi, Lahore and so on.

As one of the inland transportation modes, the pipeline for natural gas and petroleum are existing. Natural gas is transported by pipeline to the main cities from Sui in the Baluchistan Province. Recently, construction of the pipeline between Karachi and Multan has completed, and has started operation of transport of the petroleum products.

It can be said that the rivers and canals are not regarded as one of the transportation means because they should be preferentially used for the development of agriculture.

Fig. 2-1-1 Transport Network in Pakistan



2-2 Organization of Transport Administration

The transportation and traffic system in Pakistan consists of mainly four modes, namely railways, roads, ports and airport/aviation. There are three ministries of the Federal government administering and controling these main modes as shown in Fig. 2-2-1. These are Ministry of Railways (MOR) for railways, Ministry of Communication (MOC) for roads, ports and marine transportation and Ministry of Defence (MOD) for airport/aviation. These Ministries and their enforcement organizations make a plan and manage the each transporting organization under the control individually, thus there is no organization to undertake a mutual arrangement among modes from the viewpoint of a whole transportation system.

The Planning and Development Division (PDD) in the Ministry of Finance and Planning (MFP) has performed a mutual arrangement actually at the stage of approving the investment plan offered from each Ministry. National Transport Research Center (NTRC) as an appended organization of PDD is established, which investigates each mode transport problems, however it is not especially authorized to the policy making. The railways department is operated by the Pakistan Railways under the MOR.

As for the road department it is divided to National Highways, provincial roads and local roads and administrated by National Highway Board, Provincial Highway Department and District Council respectively.

As for the road passenger transportation the Road Transport Board of each province except Baluchistan is executing to transport by bus in the cities and inter cities.

As for the inside city transportation in Karachi and the Punjab Province, Transport Corporation is established.

As for the cargo transportation, transport organization under the name of National Logistic Cell (NLC) as a department of Planning and Development Division (PDD) is functioning, which distributes discharge cargoes at Karachi Port and carries out their duties of truck transport to inland and emergency rapairing of roads.

As for the other road transportation it depends on private truck transport and bus transport.

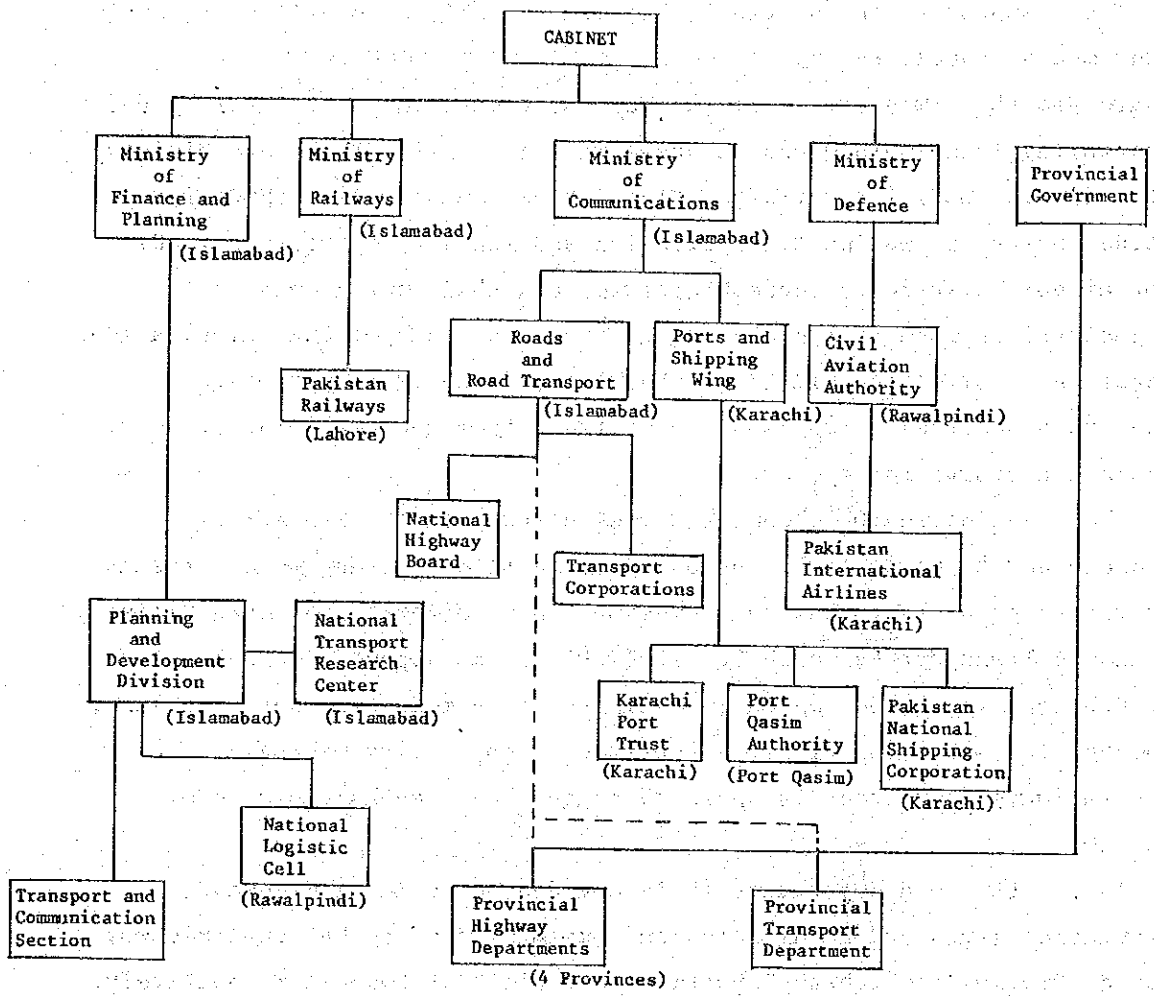


Fig. 2-2-1 Administrative Set-up of the Government of Pakistan for Transport Sector

Port and Shipping Wing (PSW) under the MOC taking charge of ports and marine transportation is at Karachi, which supervises the management of Karachi Port Trust (KPT), Port Qasim Authority (PQA) and a government operated marine transportation corporation, Pakistan National Shipping Corporation (PNSC).

As for the airports and aviation, the Civil Aviation Authority (CAA) under the MOD takes charge of construction and maintenance of airports and aviation aid and administers the government-operated Pakistan International Airlines (PIA) which service covers both international and domestic lines. In addition to these modes, there are inland water ways consisted of the River Indus, its tributaries and the canals, and pipelines of natural gas and petroleum. These are under the control of the Ministry of Water and Power (MWP), the Ministry of Petroleum and Natural Resources (MPNR) and the Ministry of Production (MOP) respectively.

2-3 Trend of Development in Transportation and Traffic Sector

According to the trend of transport from 1971/72 to 1980/81 by the statistics of the traffic volume classified each transport sector (as for the road transport, as the authorized statistics of traffic volume is not existing, it is estimated in the study from the result of the O-D Table in 1980 as a benchmark. In detail refer to Chapter IV), cargo traffic indicates the growth in the rate of 5.7% per annum. In the same period, the actual growth rate of GDP was 5.5%, thus the elasticity value was 1.04. That is to say, the growth of cargo traffic has been increasing as much as the tendency of growth of GDP. On the other hand, as for passenger traffic it showed the growth in the rate of 6.8% per annum exceeding the above GDP growth rate.

In the modal split of inland traffic, the road transport is the greatest sector in both cargo and passenger traffic.

As for the cargo traffic the share of roads and railways was about 50% even in 1971/72. Afterward compared with the high growth in the rate of 9.5% per annum in the road traffic, the growth rate of railway traffic was 0.2% per annum. It shows almost no change in traffic volume itself. Consequently, as against the share of 30% of railways in 1980/81, that of roads showed the big change to about 70%.

As for the passenger traffic, the share of roads and railways in 1971/72 was about 80% and 20% respectively and these shares have not been changed even in 1980/81. In brief, as for the commodities transport the growth of the roads transport is remarkable and as for the passenger transport, both roads and railways showed the similar growth.

Nowadays the passenger transport is regarded as important in the railway transport and consequently the transport capacity for cargo is not increased, thus NLC takes a share in the excess of railway transport.

Besides, the road transport has been increasing because of relative easiness to enter the market, which increased not only in short distance but also in long distance not existing railways.

As a result the share of the railways cargo transport decreased and average trip length of railways become more longer in both passenger and cargo transport.

As for the aviation sector the share is very small compared with

roads and railways, now the share is 1.4% in passenger transport and 0.1% in cargo, although its traffic volume is expanding with the fairly growth rate. Most of the traffic volume is operated in the trunk lines, that is Karachi, Lahore and Rawalpindi (Islambad).

The service covering major cities in NWFP and Baluchistan performs an important role connecting the inconvenient area of traffic to major cities of the National Corridor from the viewpoint of the unity of the nation.

Karachi Port is the only deep one as a international trading port, which treats approx. 15 million tons of commodities in both of export and import in 1980/81.

The major commodities are wheat, cement, fertilizer, rice, cotton, petroleum and petroleum products, which are all indispensable goods to the economy of this country. Port Qasim constructed recently has started handling of iron ore and coal which are raw material for the government-operated Pakistan Steel Mill.

3. Existing Transport System and Utilization by Mode

3-1 Road

(1) Present Highway System in Pakistan

1) There are three main agencies responsible for highways in Pakistan; the Ministry of Communications, Provincial Highway Department and District Councils.

The Rural Development Department and Agency in charge of Social Welfare of the Local Government undertake construction of black-top rural roads, and all the completed roads transfered to the Highway Department for subsequent maintenance.

The Ministry of Communications is the authority responsible for administration of national highways. Within the MOC the National Highway Board is the agency functioning the planning, construction and maintenance of the national highways.

All the functions for the rest of the roads are handled under the Provincial Highway Departments.

Most plannings of the project, appraisals and designs are undertaken by the four Provincial Highway Departments as a whole.

If the cost of individual project is under Rs. 2.5 million, it can be approved within the Provincial Highway Department.

If it is under Rs. 20.0 million, it can be approved by the Provincial Government, and if over that amount, the project has to get an approval from the Federal Government.

In case of Federal Ministries, the approval limit is Rs. 5.0 million. Above this limit, the project has to go to Central Development Working Party (CDWP). However, any project above Rs. 20.0 million has also to be approved by Executive Committee of the National Economic Council (ECNEC).

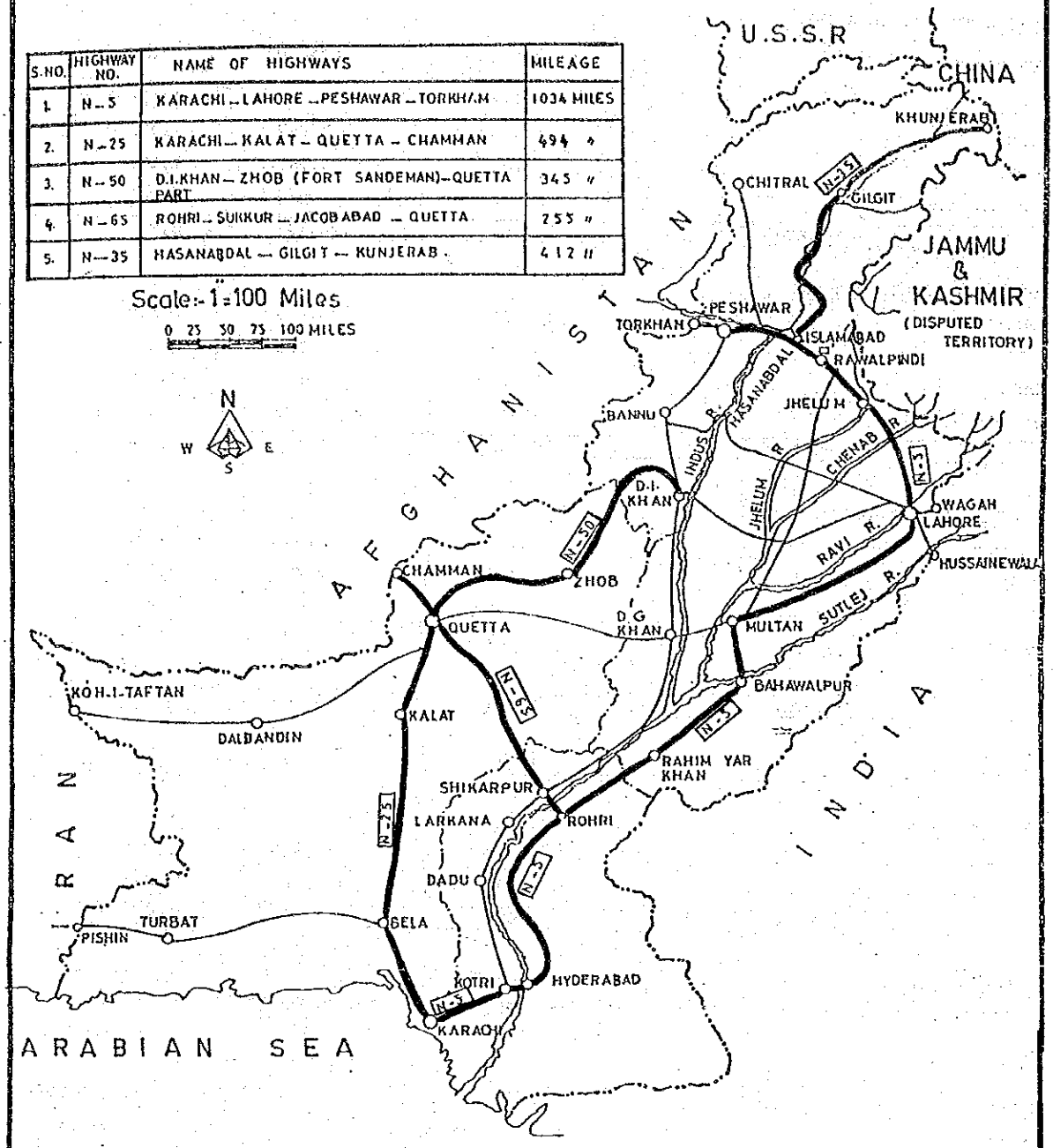
2) Present Road Network

There is no official road classification system in Pakistan, designating the roads as primary, secondary or local roads.

However, five roads with a length of 4,300km were categorized as national highways. These roads are functionally regarded as the most important interprovincial roads from the strategic point of view. Therefore, there are few traffic observed on national highways of N-25, N-35 and N-50 in comparison with N-5 and N-65.

Fig. 3-1-1 National Highway Network

S.NO.	HIGHWAY NO.	NAME OF HIGHWAYS	MILEAGE
1.	N-5	KARACHI-LAHORE-PESHAWAR-TORKHAM	1034 MILES
2.	N-25	KARACHI-KALAT-QUETTA-CHAMMAN	494 "
3.	N-50	D.I.KHAN-ZHOB (FORT SANDEMAN)-QUETTA PART	345 "
4.	N-65	ROHRI-SUKKUR-JACOBABAD-QUETTA	255 "
5.	N-35	HASANABDAL-GILGIT-KUNJERAB	412 "



LEGEND

1. INTERNATIONAL BOUNDARY
2. PROVINCIAL BOUNDARY
3. NATIONAL HIGHWAYS
4. OTHER ROADS
5. HIGHWAY No. N-5
6. RIVERS

Source: Ministry of Communications

Table 3-1-1 Road Kilometerage in Pakistan (1979-80)

PROVINCE	UN-METALLED	METALLED	TOTAL
UNDER HIGHWAY DEPARTMENT:			
PUNJAB	172	11,583	11,755
SIND	1,975	5,997	7,972
NWFP	3,700	3,543	7,243
BALUCHISTAN	8,841	3,019	11,860
SUB-TOTAL:	14,688	24,142	38,830
UNDER DISTRICT COUNCILS:			
PUNJAB	16,823	3,856	20,679
SIND	13,172	193	13,365
NWFP	3,871	178	4,049
BALUCHISTAN	4,596	99	4,695
SUB-TOTAL:	38,462	4,326	42,788
UNDER MUNICIPALITIES:			
PUNJAB	606	3,854	4,460
SIND	304	3,253	3,557
NWFP	78	199	277
BALUCHISTAN	85	299	384
ISLAMABAD	-	560	560
SUB-TOTAL:	1,073	8,165	9,238
UNDER FATA:	1,967	1,956	3,923
AZAD KASHMIR:			
HIGHWAY	960	826	1,786
DISTRICT COUNCILS	693	-	693
SUB-TOTAL:	1,653	826	2,479
NORTHERN AREAS:	2,288	-	2,288
CANAL ROADS			
PUNJAB	112 (35,139)	-	112 (35,139)
SIND	27 (17,647)	-	27 (17,647)
NWFP	187 (2,258)	-	187 (2,258)
BALUCHISTAN	801 (801)	-	801 (801)
SUB-TOTAL:	1,127	-	1,127
OTHERS:	4,000	3,000	7,000
GRAND TOTAL:	65,258	42,415	107,673

Note: Canal Roads - Open to public, ( ) - Total Canal Roads.

Source: Transport Bulletin (Supplementary No.1) Nov. 1981 NTRC

Table 3-1-2 Length of Road under Highway Department in 1978/1979

Name of Province	Low Type			High Type Black Top by Width										
	Earthen	Shingle	Total Low Type	Up to 12'	12-18	18-24	24-28	28-36	36-44	44-48	Above 48 Divided	Above 48 Undivided	Total High Type	Total
Punjab	116.45	55.79	172.24	7,045.31	1,140.28	3,069.18	160.88	107.77	25.35	7.43	8.41	18.60	11,583.22	11,755.46
Sind	1,898.00	77.25	1,975.25	3,576.95	184.69	1,285.70	734.94	9.01	139.08	5.60	5.66	54.90	5,996.53	7,972.00
NWFP	826.50	2,873.39	3,699.89	2,233.68	412.65	732.53	43.11	96.64	2.00	1.44	20.16	0.86	3,542.77	7,242.66
Baluchistan		8,840.54	8,840.54	1,880.95	1,113.92	24.00							3,018.87	11,859.41
Total:	2,840.95	11,846.97	14,687.92	14,736.89	2,851.54	5,111.41	938.94	213.42	166.43	14.17	34.23	74.36	24,141.39	38,829.53

Length of Road under District Councils in 1980

Punjab	15,866.64	956.64	16,323.28	3,683.08	53.57	17.00		102.00					3,855.65	20,678.93
Sind	12,951.17	221.18	19,172.35	144.57	48.16								192.73	19,365.08
NWFP	2,807.49	1,063.12	3,870.61	144.15	33.66								177.81	4,048.42
Baluchistan	2,171.53	2,420.99	4,592.52	66.95	31.42		0.8						99.17	4,694.69
Total:	33,816.83	4,641.53	38,458.76	4,038.75	166.81	17.00	0.8	102.00					4,326.16	42,784.92

Source : Transport Bulletin (Supplementary No.1) Nov. 1981 NTRC

Most of the major highways have been built as one-lane or two-lane highways. Pavement structural strength on major highways is insufficient to carry a heavy traffic load.

Total length of major roads in Pakistan by type of surface and pavement width is shown in Table 3-1-2.

The present kilometerage is hardly 0.1 per square km of area which is one of the lowest in the world and also lower than many other developing countries. This looks most insignificant when compared with 1.06 km per sq. km in Japan and 1.50 km per sq. km in England.

It is recommended that the road kilometerage per square km of the country can be improved preferably 0.15 by the year 2000.

3) Road Network for National Transport Plan

This paragraph deals with the character and quality of the existing network for National Transport Plan, presenting the results of the inventory carried out by JICA Team. Inventory is prepared based on the basis of information received from the highway authorities concerned.

a) Selection of Road Network for National Transport Plan

Road network for National Transport Plan shown in Fig. 3-1-2 is formulated after discussion with authorities and counterpart concerned, which is basically attributed to the O-D survey conducted by NTRC. Road Network prepared for NTRC O-D survey is shown in Fig. 3-1-3.

In addition, in order to determine the road network for National Transport Plan, the Team studied the networks of Asian Highway Network. Minimum National Highway Linking shown in Fig. 3-1-4 proposed by Masterplan for Highways by Techno-Consult in 1978 and proposed Location Class I & II Highways shown in Fig. 3-1-5 prepared by Government of West Pakistan in 1962 through Masterplan for Highways.

Selected Road length by province is as follows:

	National Highway (Km)	Provincial Highway (Km)
Punjab	1,038	5,528
Sind	719	1,860
NWFP	630	1,333
Baluchistan	1,476	3,322
Total	3,863	12,043

b) Preparation of the Road Inventory

The objective of making a inventory of the Road Network is to obtain useful information on the physical conditions.

The following items were investigated during the field surveys:

- Distance
- Terrain
- Designing Speed
- Cross-Section (ROW, Formation and Pavement)
- Type of Surface
- Surface Condition *
- Pavement Depth
- Sub-grade CBR
- No of Culverts
- Major Structures

* has been graded into following categories.

Good
Fairly Good
Fair
Poor
Very Poor

Fig. 3-1-2 Road Network for National Transport Plan

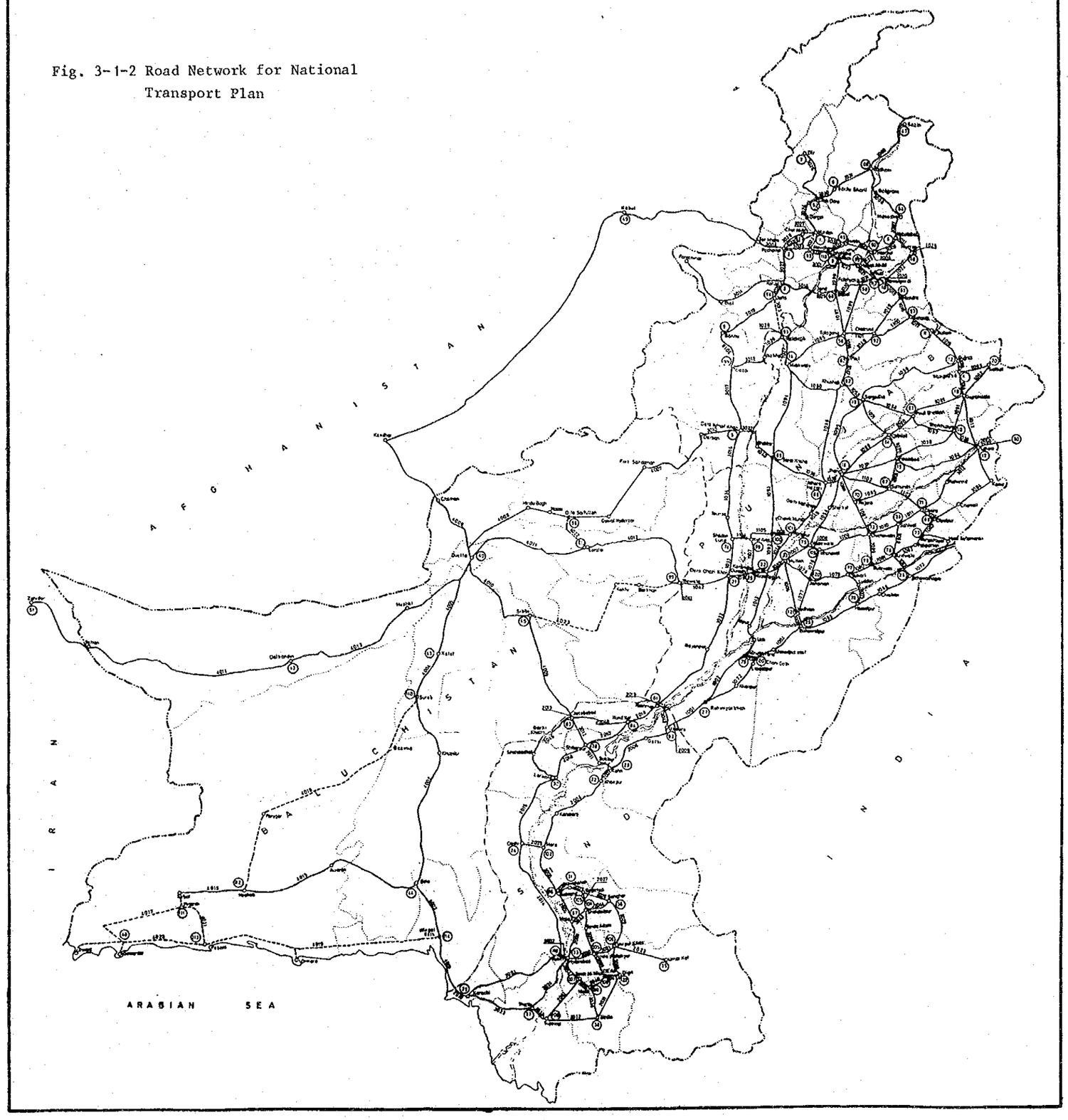
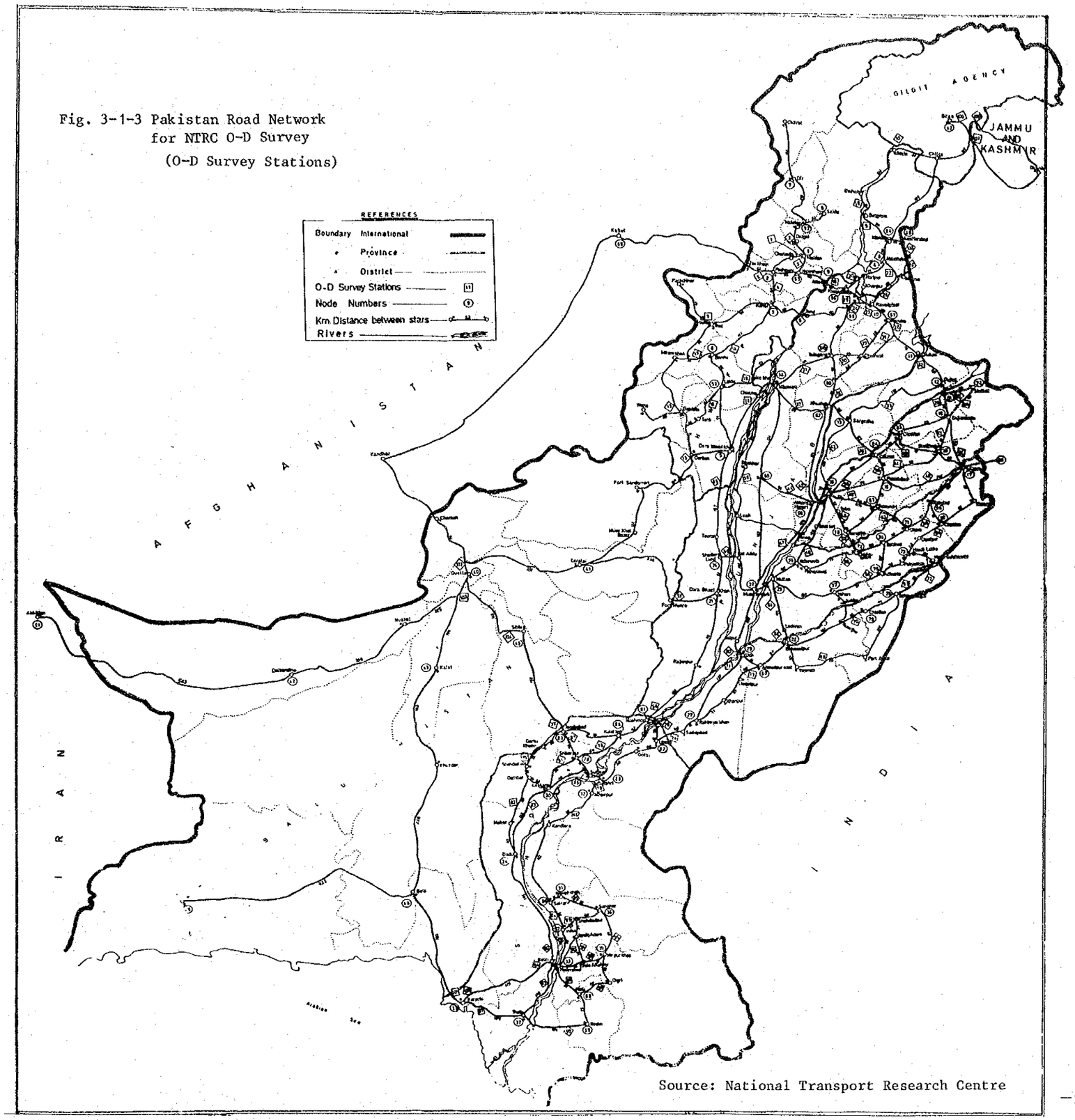
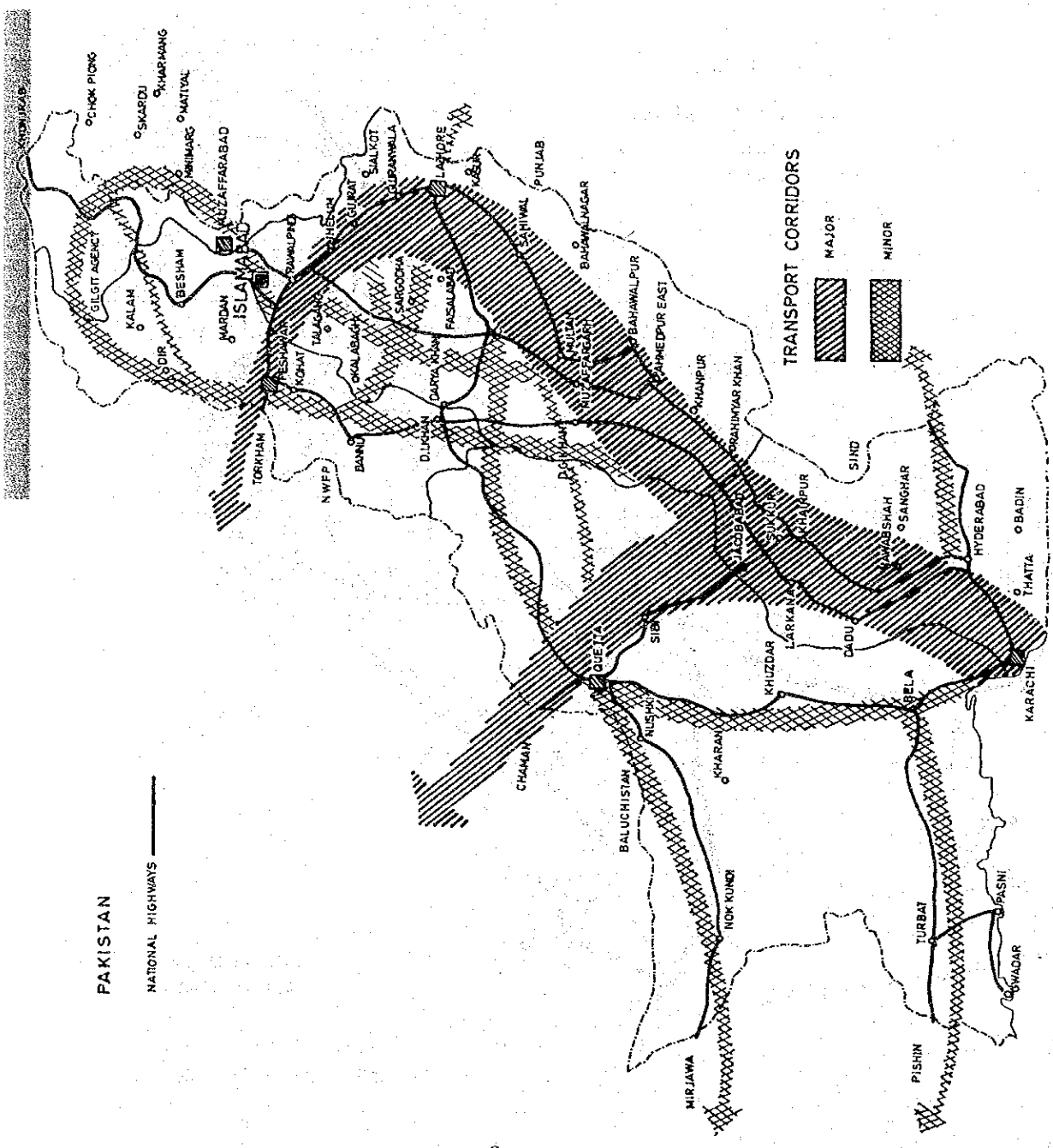


Fig. 3-1-3 Pakistan Road Network
for NTRC O-D Survey
(O-D Survey Stations)



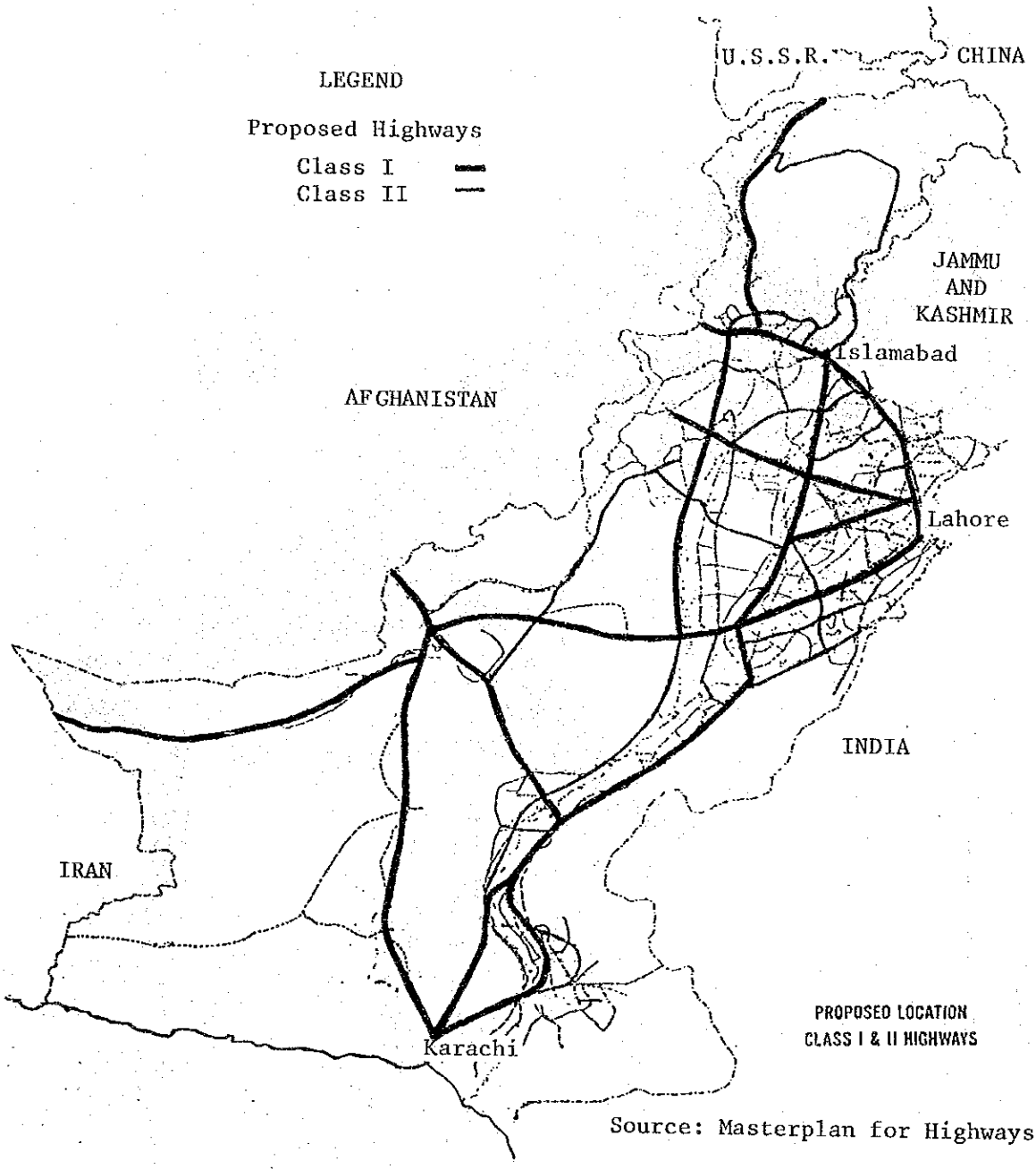
Source: National Transport Research Centre

Fig. 3-1-4 Recommended National Highway Network by Techno-Consult



Source: Masterplan for Highways by Techno-Consult

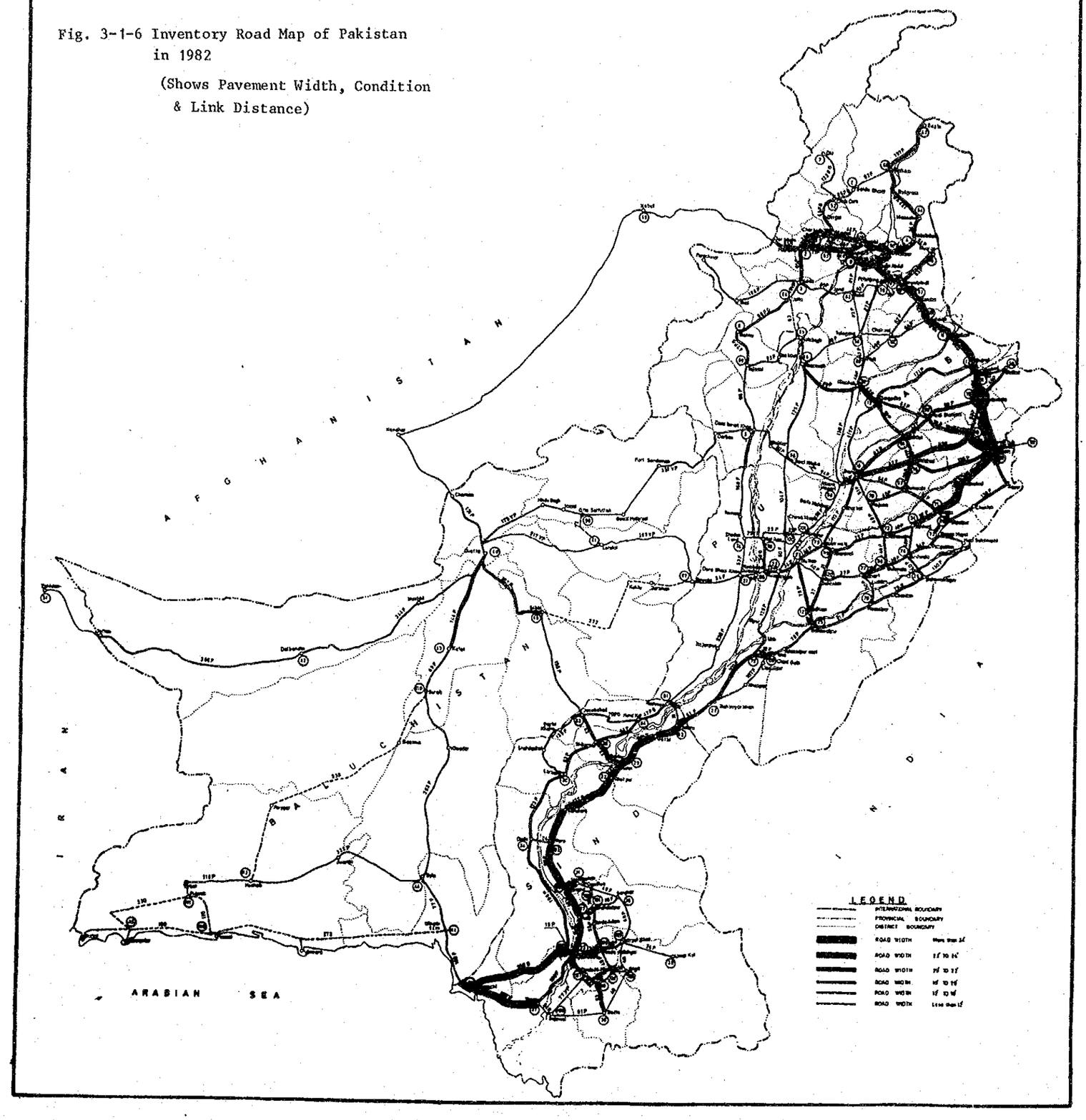
Fig. 3-1-5 Proposed Location of Class I & II Highways



Source: Masterplan for Highways

Fig. 3-1-6 Inventory Road Map of Pakistan
in 1982

(Shows Pavement Width, Condition
& Link Distance)



4) Technical Problems for Highway Planning

Although, a rapid increase in road traffic for the last two decades has exceeded both the traffic capacity and the pavement strength on the road network, Pakistan has an ancient road system which had been initially constructed by over-burnt brick or water bound base on not properly compacted subgrade.

Soil conditions in NWFP and Baluchistan are generally good. On the other hand, subgrade soil in Punjab and Sind are usually poor. Typical subgrade soils in Punjab and Sind have the nature that even a little moisture increase may result in strength loss although they are compacted at the optimum moisture contents close to plastic limit.

Punjab and Sind are subject to annual flooding and high soil salinity. Many roads in Pakistan have suffered from periodic heavy floods in 1973, 1975 and 1976. Floods lead to raising the level of watertable and damage the roads. They also wash away sections of roads and flow of traffic is suspended. In addition, an average holding distance of highway materials is extend to 200 Km.

Highway authorities express that one of the most serious problems is the overloaded vehicles, leading to a rapid deterioration of road and old bridges. It is also said that service lives of most of road structures have been almost terminated.

The problem is further compounded by the fact that insufficient funds are provided for the proper maintenance. Road maintenance by Provincial Highway Department relies on road gangs who carry out routine maintenance, while periodic maintenance is done on an ad-hoc basis as funds and equipment are available.

Structural overloading, together with inadequate maintenance is already causing complete failure on major highways. This will come to result in the loss of whole section of highway system. For example, increasing the axle load from 8 ton to 10 ton doubles the destructive effect.

There are sections under construction on the 3rd Highway Project by IBRD between Lahore and Sahiwal. Road construction progress are far behind the schedule due to the shortage of organized contractors and their inadequate management, and on Rohri section

the contractor gave up construction after finishing a half mile of over-laying.

Because, contractors generally have had more experience in building construction than in highway construction, and apart from locally made rollers, few domestic contractors including NLC hold equipment suitable for modern highway construction.

In addition to above, preconstruction testing for design purposes and effective quality control during construction are insufficient in Pakistan.

Overlay constructed on the section between Nowshera and Khairabad was damaged in few months after opening to traffic due to the above reason.

5) The Current Development Programme and Its On-Going Project

The Fifth Five Year Plan is aimed at the completion of projects already started and for improvement or reconstruction of the existing roads.

The construction of the Indus Super Highway was eliminated from the Plan, because this road has more strategic than economic justificaion. As far as the alignment of Indus Highway is concerned, the section of the road up to Larkana and Shikarpur in Sind, it would traverse relatively undeveloped regions.

It has been decided that limited resources should usefully be spent to duplicate the National Highway N-5 and other congested routes.

Rs. 3,619 million (46.8%) were allocated for national highways out of total amount of Rs. 7,734 million.

The Fifth Five Year Plan does not include farm-to-market roads which are handled under the people's work program.

An Annual Development Program is prepared by each Provincial Government on the following priority basis;

i) Completion of On-going project

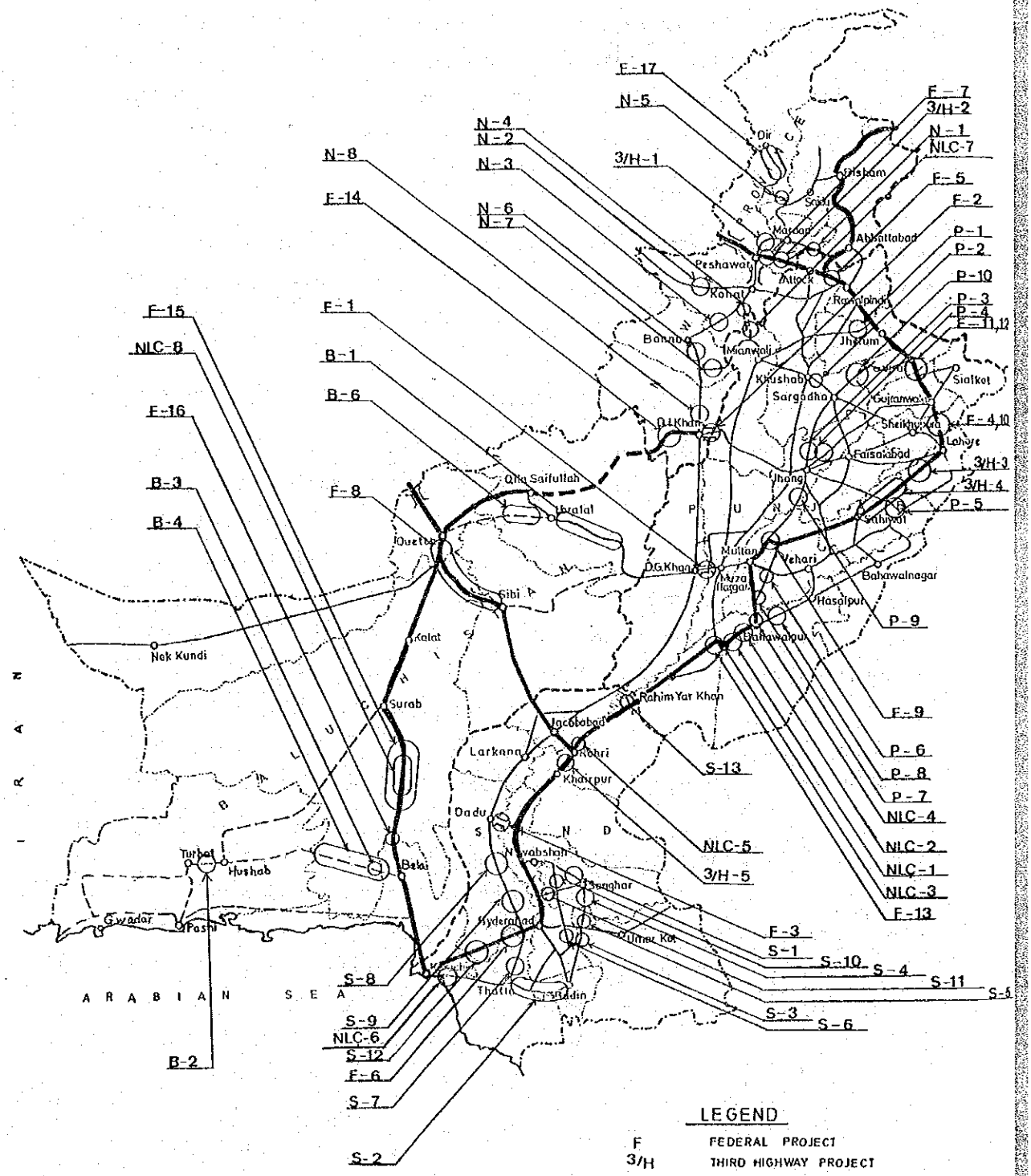
ii) Defense requirements

iii) Demands by the public

These ADP's are incorporated into the Five Year Plan on a yearly basis.

Map of on-going projects with the cost more than Rs. 10 million and located on the Road Network for National Transport Study is shown in Fig. 3-1-7.

Fig. 3-1-7 Location Map of On-going Road Project
(Cost More than Rs. 10 Million)



6) Average Daily Traffic Volume on the Road Network

The Team obtained traffic counts data in 1980/81 for selected links during the field survey from the authorities concerned.

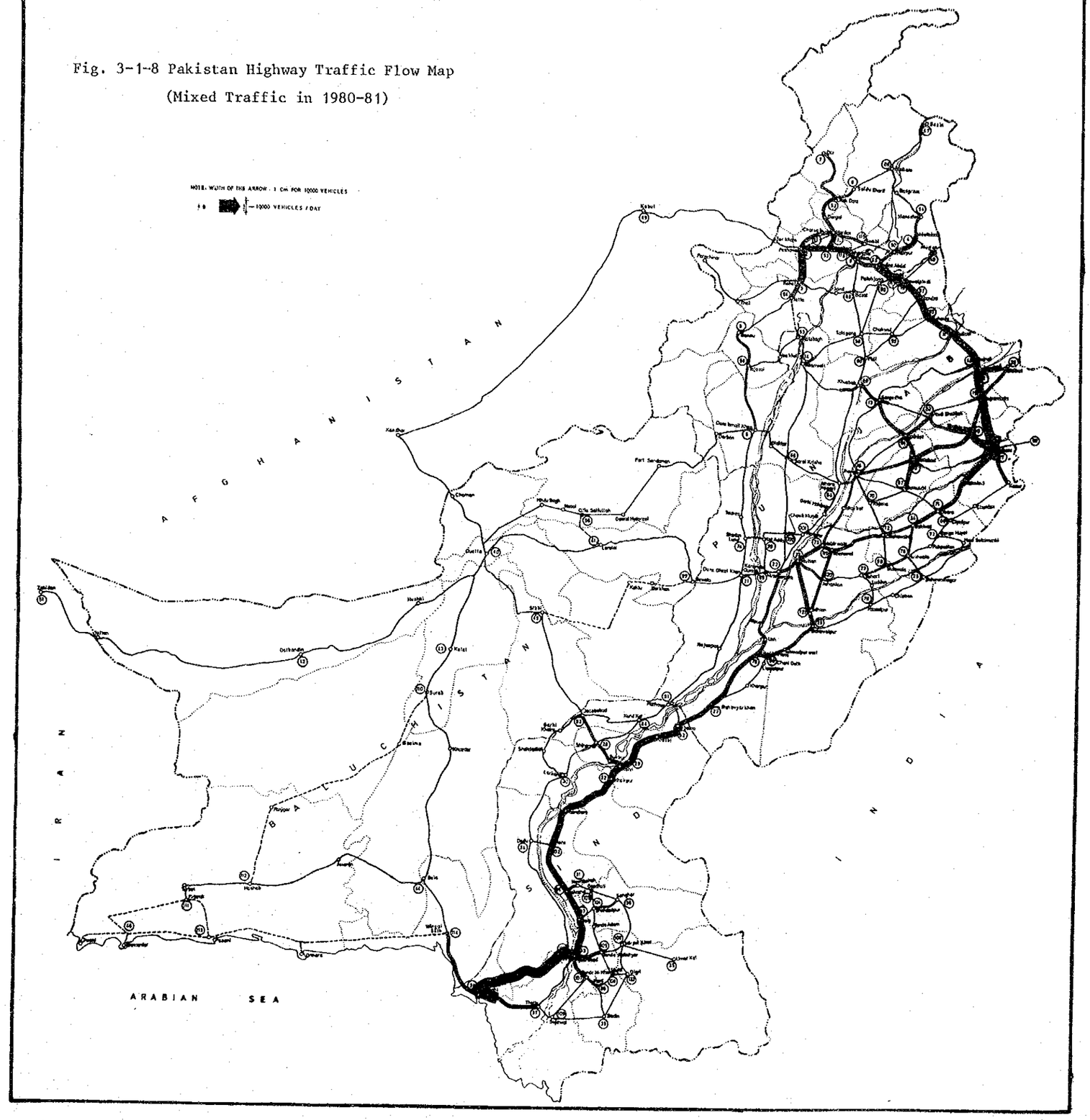
Most reliable data was obtained from Punjab Highway Department because Lahore was the centre for the West Pakistan Highway Department, and traffic counts have been taken as yearly basis and not only in Punjab but also in other provinces.

In addition to above, the Team also obtained traffic counts data from the National Transport Research Center which were taken in conjunction with the NTRC O-D survey in 1980.

Daily Traffic Volumes on the road network are shown in Fig. 3-1-8.

On the main highway, traffic volumes very from about 2,500-5,000 daily traffic in the rural area. About 70% of the traffic volume on major highway is shared by trucks.

Fig. 3-1-8 Pakistan Highway Traffic Flow Map
(Mixed Traffic in 1980-81)



3-2 Road Transport

3-2-1 Organization of Road Transport

(1) Passenger Transport

The passenger road transport in this country is being shared by both the semi-public and the private sectors.

Every transporter in the private sector, either in the form of corporation or individual operator, comes under control of the Transport Authorities in each Provincial Government. The semi-public transport operators for urban transportation come under jurisdiction of the Federal Government and those for the inter-city transport fall into the administration of the Provincial Government.

There are five semi-public corporations, those responsible for the urban transport are Karachi Transport Corporation (KTC) and Punjab Urban Transport Corporation (PUTC) and those for the long haul transport are Punjab Road Transport Board (PRTB), Sind Road Transport Corporation (SRTC) and NWFP Road Transport Board (NWFP RTB).

In addition to those services mentioned above National Logistic Cell (NLC) has started bus services between Karachi and Lahore from January 1982 with ten buses. It is to be noted that there is no bus transport services in the semi-public sector operated in the Province of Baluchistan.

(2) Freight Transport

The road transporters engaged in the freight transportation are to be divided into private and semi-public sectors.

The truck operators of private sector, as is the case of passenger transport, are supposed to be licenced and authorized by the Transport Authority in each province.

In semi-public sector, there is only one body providing the freight road transport, namely National Logistic Cell which was established in 1978, when Pakistan faced with critical shortages of essential commodities, in order to effectively handle and distribute those commodities imported at Karachi Port to the up-countries.

3-2-2 Activity in Road Transport

(1) Traffic Analysis

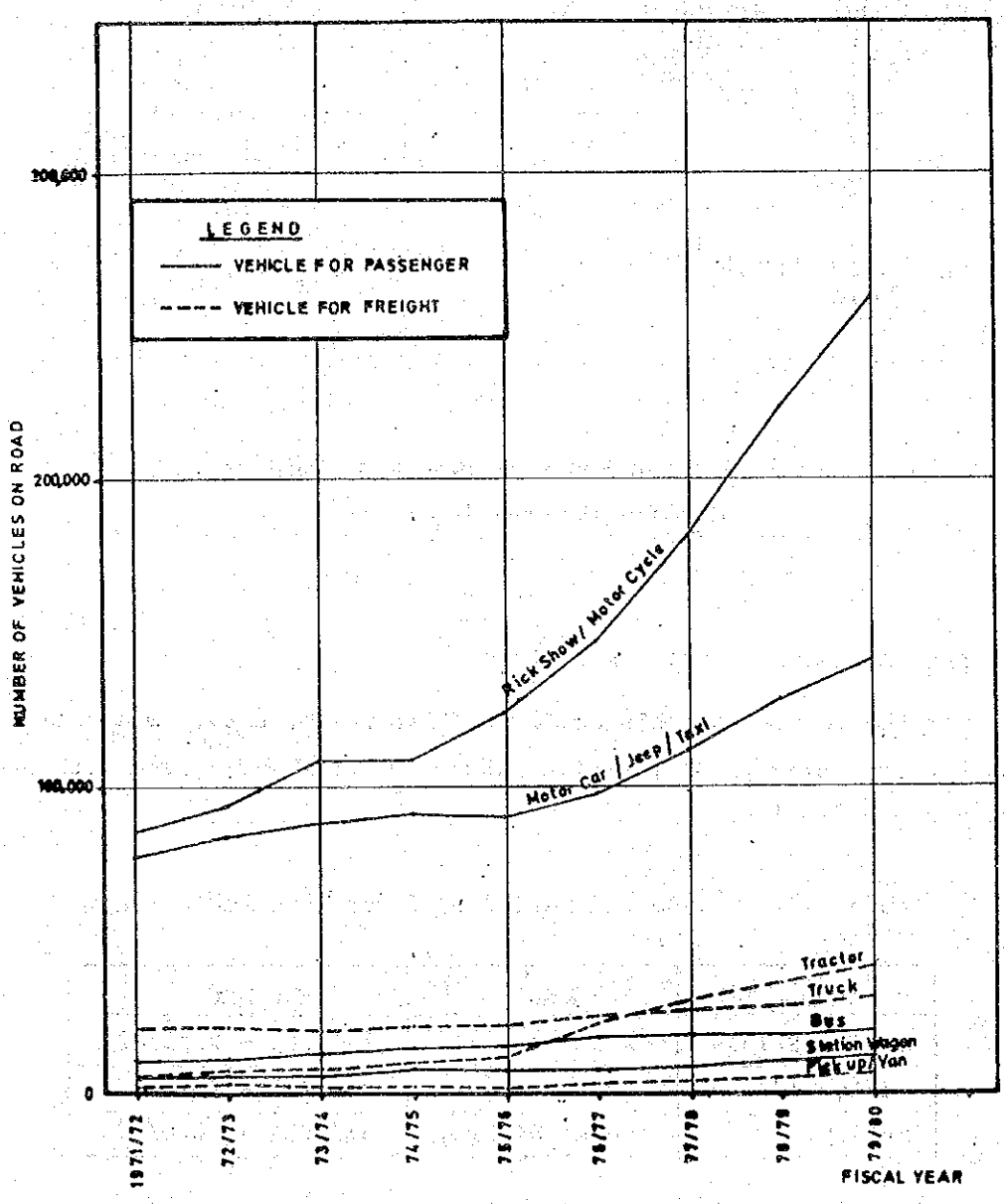
1) Type-wise Motor Vehicles on Road

As is shown in Fig. 3-2-1, number of vehicles on road is increasing year after year. Especially after 1975/76, light vehicles for passenger such as Rickshaws, Motor-cycles, Motor-cars, Jeeps and Taxis which mainly engage in urban transport are increasing quite rapidly almost at an average annual growth rate of 17.1% from 1975/76 to 1979/80.

On the contrary, the increasing ratio of buses is not so high but steady in comparison with the light vehicles. As the result, the number of buses was doubled in 1979/80 from 1971/72.

Number of trucks is increasing at an average annual growth rate of 4.7%, while light commercial vehicles such as pick-up and van are increasing quite rapidly at an average annual growth rate of 13.7% from 1971/72 to 1979/80.

Fig. 3-2-1 Type-wise Motor Vehicles on Road in Pakistan



Source: Transport Bulletin. NTRC, 1980

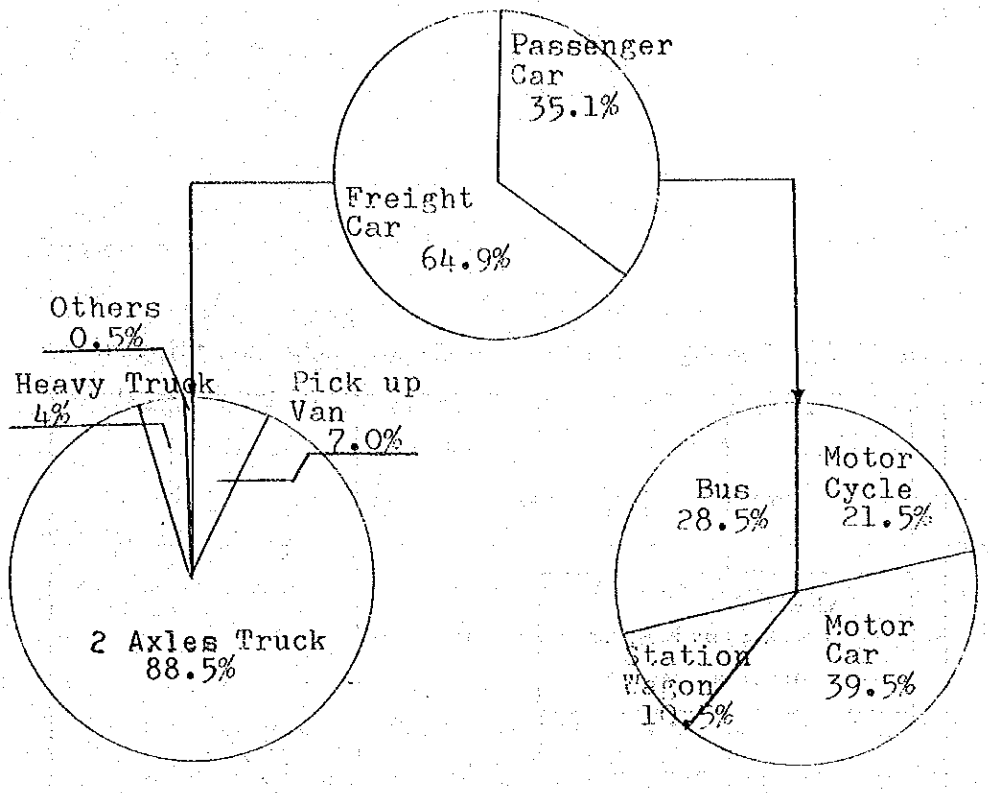


Fig. 3-2-2 Average Share of Type-wise Vehicles of Three Observation Sites

2) Traffic Analysis of Principal Sites

For the purpose of this study, traffic volume survey was done by NTRC at three principle sites shown in Table 3-2-1 from 15th May to 6th June in 1982.

Table 3-2-1 Place and Period of Traffic Volume Survey

Place	Road	Period
Jhelum Bridge	N-5	15/5/82 - 21/5/82
Sadiqabad	N-5	23/5/82 - 29/5/82
Karachi	Super Highway	31/5/82 - 6/6/82

① Share of Type-wise vehicles

It is to be noted that in principal trunk routes, the share of freight car is about 65% and most of those freight cars are occupied by 2 axles truck namely Bedford truck.
(see Fig. 3-2-2)

② Hourly traffic volume variation in a day

Peak ratio and 24 hours traffic volume ratio to day time 12 hours volume are shown in Table 3-2-2.

Table 3-2-2 Peak Ratio and $\frac{\text{24 Hours Traffic Volume}}{\text{12 Hours Traffic Volume}}$

Item/Place	Jhelum Bridge	Sadiqabad	Karachi
Peak ratio (%) (Time)	5.9 (18:00-19:00)	5.9 (17:00-18:00)	5.1
$\frac{\text{24 hours traffic vol.}}{\text{12 hours traffic vol.}}$	1.72	1.68	1.92

Source: Traffic Volume Survey by NTRC in 1982.

The ratio of 24 hours traffic volume to day time 12 hours traffic volume is rather high, because some private trucks are running even in midnight.

③ Daily traffic volume variation in a week

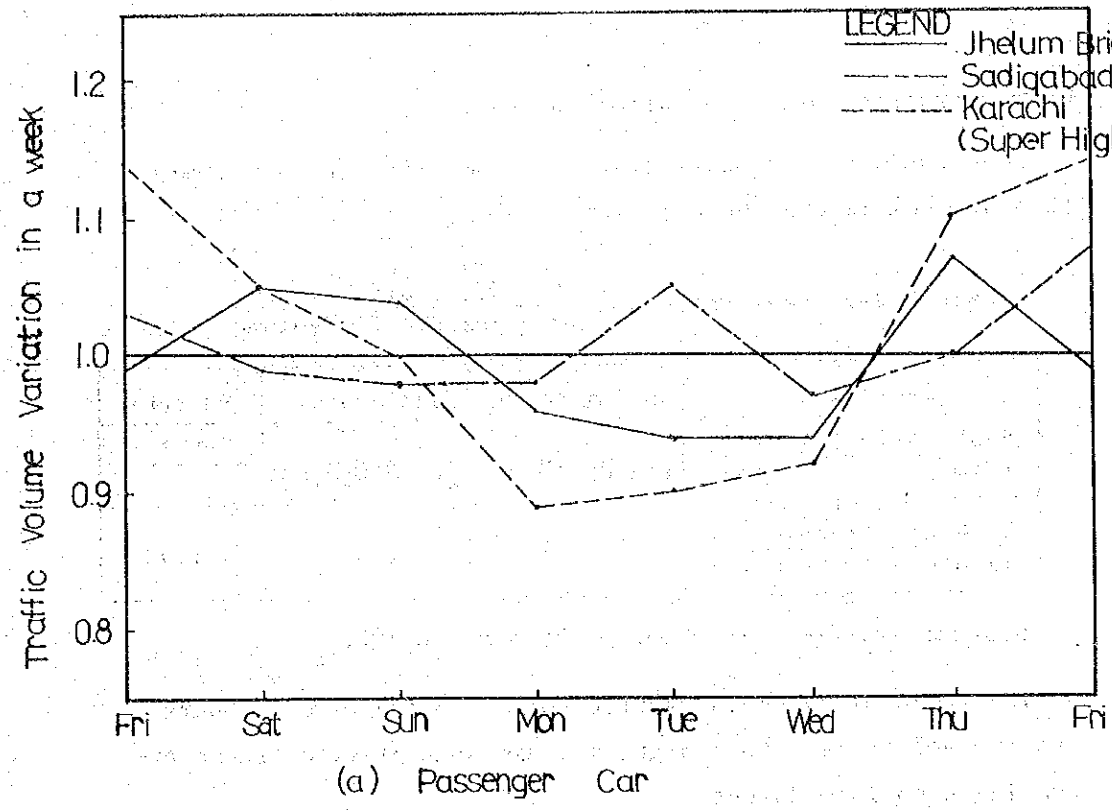
Daily traffic volume variation in a week is shown Fig. 3-2-3. The volume of passenger car is high on Friday while the volume of freight car is low on Friday.

(2) Passenger Transport

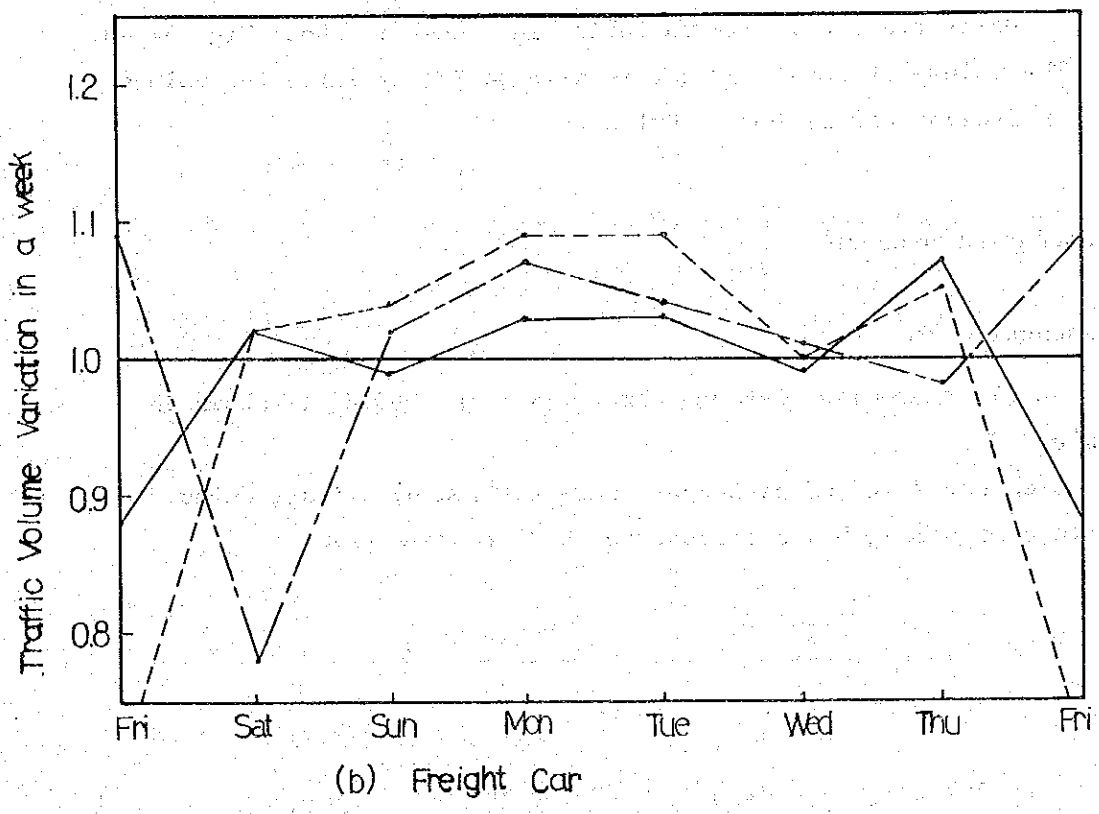
1) Passenger - km

Vehicle type-wise passenger-km carried in 1980/81 is shown in Table 3-2-3.

More than 76.4% of passengers were carried by private buses, while semi-public buses transported 9.7% in this year.



(a) Passenger Car



(b) Freight Car

Fig.3-2-3 Daily Traffic Volume Variation in a Week

Source: Traffic Volume Survey by NTRC in 1982

Table 3-2-3 Vehicle Type-wise Passenger-km in 1980/81

Category		Passenger Km/year (Million)	Share(%)
(1) Total		36,590	100.0
(2) Motor Car/ Station Wagon		5,064	13.8
(3) Bus		31,526	86.2
Semi-Public Bus	(4) PRTB	2,460	6.7
	(5) SRTC	270	0.7
	(6) NWFP RTB	835	2.3
	(7) Sub Total (4)+(5)+(6)	3,565	9.7
(7) Private Bus (3)-(7)		27,961	76.4

Source: Result of Inter-city Demand Forecast in this study.
(Excluding intra-zonal traffic)
Operational Results of Semi-Public Sector.

2) Fleet Position of Semi-public Sector

Salient problems are seen in case of PRTB and SRTC. Inspite of traffic demand increase, number of vehicles on road is decreasing year by year because of non-procurement of buses and insufficiency of the maintenance.

3) Salient Problems

① Bus services of semi-public sector

Most serious problem in any semi-public sector is non-availability of vehicles, in other words unstable and discountinuous procurement of vehicles. This feature makes it difficult to carry out a stable operation, deliberate recruitment of technical staff and drivers for each corporation.

The main reason seems to be the lackness of definite prospect for the role of semi-public sectors transportation.

So long as private sector pursue the profit oriented free competition rule and provide their services only to lucrative routes, less profitable routes should be covered by semi-public sector from view point of social welfare. For small bus owners there is no room to invest on unprofitable routes. And for the purpose to guarantee a civil minimum services and inspire private sector to improve their own service level through reasonable competition, semi-public sector should play an important role in passenger transport.

② Bus services of private sector

A significant feature of Private Sector in Pakistan is that there is no large scale bus owner. Most of the owners have only one or two buses. This fact sometimes result in the excessive competition on road to acquire passengers on a next station which eventually lead to very high rate of disastrous traffic accidents.

Another feature in this field is that there is no loan financed by government to purchase buses. So when private sector wants to purchase some buses, they cannot help borrowing money from a private financier with expensive interest. And it is said that this makes them discourage from investment.

(3) Freight Transport

1) Freight Ton-km

Freight Ton-km carried in 1980/81 is shown in Table 3-2-4.

National Logistic Cell, including Hired Mechanical Trucks, carry mainly essential commodities, such as wheat, rice, fertilizer, cement, sugar etc. And its share is estimated to be 5.2%.

Table 3-2-4 Freight Ton-km in 1980/81

Category	Ton-km/Year (Million)	Share (%)
(1) Total	18207	100.0
(2) NLC	712	3.9
(3) HMT	232	1.3
(4) Private Sector	(1)-(2) -(3) 17263	94.8

Note: HMT (Hired Mechanical Truck) is the trucks hired by National Logistic Cell from the private sector.

Source: Result of Inter-city Demand Forecast in this study.
Operational Results of National Logistic Cell.

2) Fleet Position of NLC

Fleet position of NLC is shown in Table 3-2-5.

A distinctive feature of NLC fleet is its heavy duty trucks, such as full trailors (Mercedez Benz 22 Tons) and Semi-trailors (Fiat and Hino 20 Tons), while private trucks are mainly composed of Bedford (7-10 Tons).

Table 3-2-5 Fleet Position of National Logistic Cell

May 1982

	Make	Load capacity per veh.	Quantity
a.	Mercedez Benz (Full Trailer)	22.3 Tons	499
b.	Hino (Semi-Trailer)	20.0 Tons	53
c.	Hino Truck	8.5 Tons	50
d.	Hino (Container)	30.5 Tons	28
e.	Fiat (Semi-Trailer)	21.3 Tons	199
f.	Ford Truck	7.0 Tons	98
g.	Dodge Truck	5.0 Tons	66
h.	Saviem Truck	7.3 Tons	229
i.	Hino Bowzer	28000 Listers)	113
j.	Fiat Bowzer	27000 Listers)	
	Total:		1335

Source: Records of Number of Vehicles - Typewise for the Past Four Years (NLC)

3-3 Railway

3-3-1 Present Condition of Transport

(1) Infrastructure

The railway in Pakistan had the revenue service started for the first time in 1861 between Karachi and Kotri. Thereafter, it developed gradually to about 8,000 km in route-kilometerage after the Second World War. Since then, efforts have been exerted for integration of tracks into the broad guage, doubling the tracks, etc., and now modernization of the locomotives, electrification and signals is urgently carried out.

1) Track

Now, the railway has tracks of 8,823 route-km which are classified as below.

Table 3-3-1 Route-km

	(km)
Broad Gauge	7,766
Meter Gauge	446
Narrow Gauge	611
Total	8,823

Source: PR Year Book 80/81

Of these, doubling of the track was made for 1,039 km mainly on the main lines.

Table 3-3-2 Doubled Track

	(km)
Karachi · Lala Musa Section	900
Lala Musa · Peshawar Section	19
Rohri · Quetta Section	37
Other Section	83
Total	1,039

Source: PR Planning Division

Tracks left unattended for many years has come to be improved recently, with renewal of ballast, sleeper and rail. Change of wooden and iron sleepers to concrete sleepers of longer life and 45 kg/m rail to 50 kg/m is in progress.

2) Electrification

Electrification was first made in 1971 between Khanewal and Lahore. This section was comprised of 40 km of doubled track and 245 km of single track, and the electrification was intended to improve the transport capacity of the single track section which was assuming a large volume of transport. In Pakistan which is dependent on foreign countries for oil, electrification in railway is proving effective for release from too much dependence from oil. The electrification project for extension from Khanewal to Samasata approved by ECNEC (Economic Committee of the National Economic Council) still remains unimplemented.

3) Signalling

The Pakistan Railways had the absolute blocking as a criterion not only in the single track but in the doubled track under the principle of safety first. Thus, it was difficult to improve the track capacity even by doubling of the track, so that it was unable to cope with the increasing transport in recent years. Thus, in the district of Karachi assuming the commuter transport, automatic blocking, relay interlocking and CTC were carried out for increasing the transport capacity to meet the transport demand.

Then, with the experience, improvement of the safety devices was made in the double track section between Karachi and Lahore, and now the automatic blocking section extends for 66 km, and the relay interlocked stations number 48.

Concurrently, improvement and development of the telecommunication network for dispatching the rolling stocks and information regarding train operation are in progress.

(2) Rolling Stock

With increasing transport demand, improvement of the hauling capacity was required. Thus, modernization of the locomotives mainly

dependent on oil was carried out, and now DLs and ELs constitute a greater part of the locomotives.

Table 3-3-3 Number of Rolling Stock

Locomotives		960
Steam	457	
Diesel	474	
Electric	29	
Coaches		3,032
Wagons		36,248

Source: PR Year Book 80/81

The steam locomotives are generally of old ages, and those elapsing 45 years, supposed to be the economic life, are counted 300, and their replacement to DL is desired. For DL, re-engining and power-up of about 90 locomotives including those recently scheduled has been carried out. But, there are still 100 locomotives coming to the time of replacement. Consequently, the rate of locomotives suspended from service for periodic inspection, failure, etc. is high at about 15∿16 percent.

(3) Train Operation

Train-kilometerage has continued to increase, although slightly, during the past 10 years.

Table 3-3-4 Train-km

(Million km)

	Passenger	Goods	Total
1970/71	31.5	13.1	44.6
75/76	34.4	13.7	48.1
80/81	36.0	13.0	49.0

Source: PR Year Book 80/81

The number of trains on the trunk lines accounting for the greater part of railway transport is as shown in Table 3-3-5. As seen, it is coming up to the track capacity under the present equipment.

Table 3-3-5 Number of Trains

(One Way)

Section	Passenger		Goods		Total	
	Scheduled	Actual	Scheduled	Actual	Scheduled	Actual
Karachi-Kotri	18	18	24	12	42	30
Kotri-Tando Adam	18	18	22	11	40	29
Tando Adam-Rohri	15	18	22	11	37	29
Rohri-Khanpur	14	15	23	12	37	27
Khanpur-Samasata	14	15	23	12	37	27
Samasata-Khanewal	5	5	16	10	21	15
Khanewal-Sahiwal	13	15	13	6	26	21
Sahiwal-Lahore	15	17	14	7	29	24
Lahore-Lala Musa	16	16	10	4	26	20
Lala Musa-Rawalpindi	17	17	10	6	27	23
Rawalpindi-Peshawar	13	13	10	-	23	13
Rohri-Sibi	5	5	5	3	10	8
Sibi-Kolpur	4	4	13	7	17	11

Source: Time Table & PR Planning Division

According to the statistics of train operation, 85 percent of passenger trains are operated normally, while the operation of goods trains has a considerable difference observed between the scheduled and the actual.

The turn-round time of goods trains increased from about 12 days to 19 days during the past 10 years, although it has decreased to about 15 days recently. During the period, the wagon-km per day increased scarcely.

According to the Sample Survey conducted in February 1982, the actual hours of operation of goods trains far exceeded the scheduled hours.

Table 3-3-6 Freight Train Traveling Time

		Scheduled	Actual
Karachi-Lahore	(Up)	39^h00^m	62^h20^m
-Rawalpindi	(Up)	66^h15^m	151^h40^m
-Peshawar	(Up)	87^h40^m	260^h15^m
-Faisalabad	(Up)	35^h30^m	69^h40^m
-Quetta	(Up)	41^h30^m	122^h25^m

Note: Scheduled Time includes 12 hours at a junction.

(4) Management

PR is comprised of six Regional Headquarters under the Headquarters. The Headquarters is composed of about 40 departments and divisions for management of the respective fields. The Regional Headquarters are located at Karachi, Sukkur, Multan, Lahore, Rawalpindi and Quetta and have full responsibility for management of train operation. The train operation is made with priority given to passenger trains, and in the event of a locomotive failure, the locomotive operation is made primarily for passenger trains, resulting in sacrifice of the goods trains at all times. Thus, for the goods trains, there is no diagram provided for regular operation of locomotives, and the trains, are organized, as required.

At the Headquarters, efforts are made to enhance the operating efficiency of locomotives with the operating condition of trains checked every morning and evening and the movement of locomotives traced. However, the average utility per locomotive per day is falling to about 15 hours.

3-3-2 Fifth 5 Year Plan

(1) General

In the past Five Year Plans up to the Fourth, restoration of the deteriorated was intended mainly. But, in the Fifth Plan, it may be said that along with the restoration heretofore carried out, improvement of the transport infrastructure has been started to cope with the transport demand in the future.

Table 3-3-7 Summary of Railways Programme (1978∿83)

No.	Item	Estimated Expenditure 1970∿78		Fifth Plan Provision 1978∿83		Allocation as % of the Total	Estimated Progress until 1982∿83 (%)
		Total	% of the Total	Total	FEC		
1	2	3	4	5	6	7	8
(i)	Rolling Stock	1,426.004	44.3	2,040.00	1,012.00	30.1	70
(ii)	New Construction	93.769	2.9	112.26	7.00	1.66	0
(iii)	Track Renewal	768.744	23.9	1,963.00	1,206.00	28.98	50
(iv)	Electric Traction	5.147	0.2	160.00	76.00	2.36	0
(v)	Marshalling Yards	220.634	6.8	102.00	42.00	1.51	100
(vi)	Signalling	27.043	0.8	119.00	48.00	1.77	80
(vii)	Telecommunications	17.889	0.6	305.50	152.00	4.52	100
(viii)	Air Brakes and Central Couplers etc.	0.100	-	64.00	25.00	0.95	
(ix)	Workshops	131.087	4.0	253.00	100.25	3.73	100
(x)	Line Capacity and Terminal Facilities	209.581	6.5	324.00	68.00	4.78	45
(xi)	Rehabilitation of Bridges	257.410	8.0	365.60	37.10	5.39	30
(xii)	Research Development Centre	-	-	15.00	-	0.22	
(xiii)	Miscellaneous	63.529	2.0	100.00	68.00	1.48	
(xiv)	Contingency	-	-	850.00	400.00	12.55	
	Total	3,220.937	100.00	6,773.36	3,241.35	100.00	

Source: Fifth Five Year Plan

(2) Progress

The implementation plan of each year for the respective Five Year Plans cannot be said to be satisfactory, and judging from the allotments of

financial resources to the railways up to fiscal 81/82, it is considered to be about 60 percent of the whole plan. The projects of Pipri Yard, Telecommunication and Workshop will be completed. But, the other projects constituting the greater part of the plan will be of a progress rate of 50∿60 percent and will have to be carried forward to a Sixth Plan.

3-4 Port

3-4-1 Present Situation at Karachi and Qasim Ports

(1) Geographical Location

Both ports are located in Southern Pakistan in the Sind Province, facing the Arabian Sea. The Port of Karachi is situated at longitude 66°-58'-38" East and latitude 24°-48'-37" North. The Port of Qasim is situated 42 km South East of Karachi Port at longitude 67°-20' East and latitude 24°-46' North.

These two ports are the only deep sea ports in Pakistan.

Weather: Summer is from April to August. The South West monsoon with high temperatures and humidity is experienced in this season. Winter is from September to March and in this season there is a North East monsoon with favorable temperatures and humidity. There is a strong wind from May to August, and little rain throughout the year. Waves are calm in Winter, and rough in Summer. The location of both ports are shown in Fig. 3-4-1.

(2) Port Operation

The Port of Karachi is operated by the Karachi Port Trust (KPT), as per the KPT Act of 1886.

KPT is a semi-public organization, so it is required that the Federal Government be given prior notice of important port policy decisions.

KPT controls land, sea and facilities in its designated area, with a staff comprised of approximately 14,300 workers.

The Port of Qasim is operated by the Port Qasim Authority (PQA) based on the PQA Act of 1973. It is required that the PQA give the Federal Government prior notice of policy decisions regarding such matters as disposition of estates, budgets, port charges, port credits etc. PQA controls land, sea and facilities in its designated area, with a total staff of approximately 1,400.

(3) Port Facilities

The Port of Karachi consists mainly of an Entrance Channel (3.9 km, -12.2 m), Lower Harbour Channel (3.3 km, -11.3 m), Upper Harbour Channel (3.5km,-10.4m) and berthing facilities known as East and West Wharves, as well as the Juna Bunder Berth which has transit sheds, open storage yards and four oil berths.

The port entrance is protected from open sea by Keamari Groyne and Manora Breakwater.

Besides the above facilities, there are two dry docks, two slipways, and a fishery port at the West Wharf.

The Port of Qasim consists of a 40 km long, -12.4 to -11.3 m depth navigation channel, a set of four 200 m long multi-purpose berths known as "Marginal Wharf", and the 279 m long Iron Ore & Coal Berth which has a causeway and a 3.5 km conveyor belt.

The back up area, a 320 m wide strip stretching behind the quaywall from Marginal Wharf Berth No.1 to 4, and containing two transit sheds, railway lines, and roads, is presently under construction.

Besides these four berths, three additional berths Nos. 5-7 have been planned and are now under construction. These works will be completed by the March of 1983.

(4) Fifth Five Year Plan

Modern development of Karachi Port started with the initiation in 1955 of the First Project, and has continued in 1964 with the Second, then in 1973 and 1974 with the Third and Fourth Projects respectively.

Most work on these projects is almost completed, with the remaining portions to be finished by the end of 1983.

The development plan for Qasim Port was initiated in 1976 under the PQA Phase 1 project. By the end of 1982, the Channel Dredging, IOC Berth

and the 4 berth multi-purpose terminal with necessary back-up functions will be completed. An additional 3 berth multi-purpose terminal and infrastructure are now under construction.

All of phase 1 projects are due to be completed by June 1984.

(5) Port Activities

The volume of cargo handled at Karachi Port in 1980/81 was 14.65 million tonnes.

A breakdown of this total by percentage is as follows: 33% for Import Dry Cargo, 16% for Export Dry Cargo, 42% for Import Liquid Cargo and 9% for Export Liquid Cargo. The total share of Dry and Liquid Cargo are the same.

Average ship waiting time for berthing throughout the year was 1.4 days and the maximum cargo handling record of dry cargo was 21,700 ton/day for a weekday and 16,300 ton/day on a closed holiday.

Qasim Port started full operations on September 1980 at IOC Berth and the total volume of imported cargo through March 1982 was 1.26 million tons, from 51 ships. Commodities were handled to the extent of 0.529 million tons of Coal, 0.708 million tons of iron ore and 0.024 million tons of manganese.

To meet Pakistan Steel's Pig Iron export requirements, interim operation was started on the No.1 berth in November 1981.

So far 6 ships with 0.035 million tonnes of export cargo have been handled.

3-4-2 Problems and Bottlenecks

(1) Karachi Port

The following problems should be remedied:

a) Lack of stock yards for containers and vehicles;

b) Lack of berthing facilities at oil berth;

c) Severe water pollution in the harbour.

In order to deal with the above problems, the following measures have been considered.

a') The area used to store bulk cargo will be re-allocated for the use of containers and vehicles until 1988. Bulk cargo will be treated at Qasim Port.
Also, duration of yard occupancy for vehicles will be decreased as customs clearance is made more efficient.

b') Repair and new construction of oil berth facilities will be commenced.

c') Construction of a plant for the treatment of sewer from the city and acquisition of an oil skimmer ship along with a legal enforcement are considered necessary for water pollution control.

(2) Qasim Port

The following problems should be reminded.

a) Insufficient (sub-capacity) use of Iron Ore and Coal Berth;

b) Insufficient (sub-capacity) use of existing marginal wharves;

c) Current contract basis for maintenance dredging of approach channel.

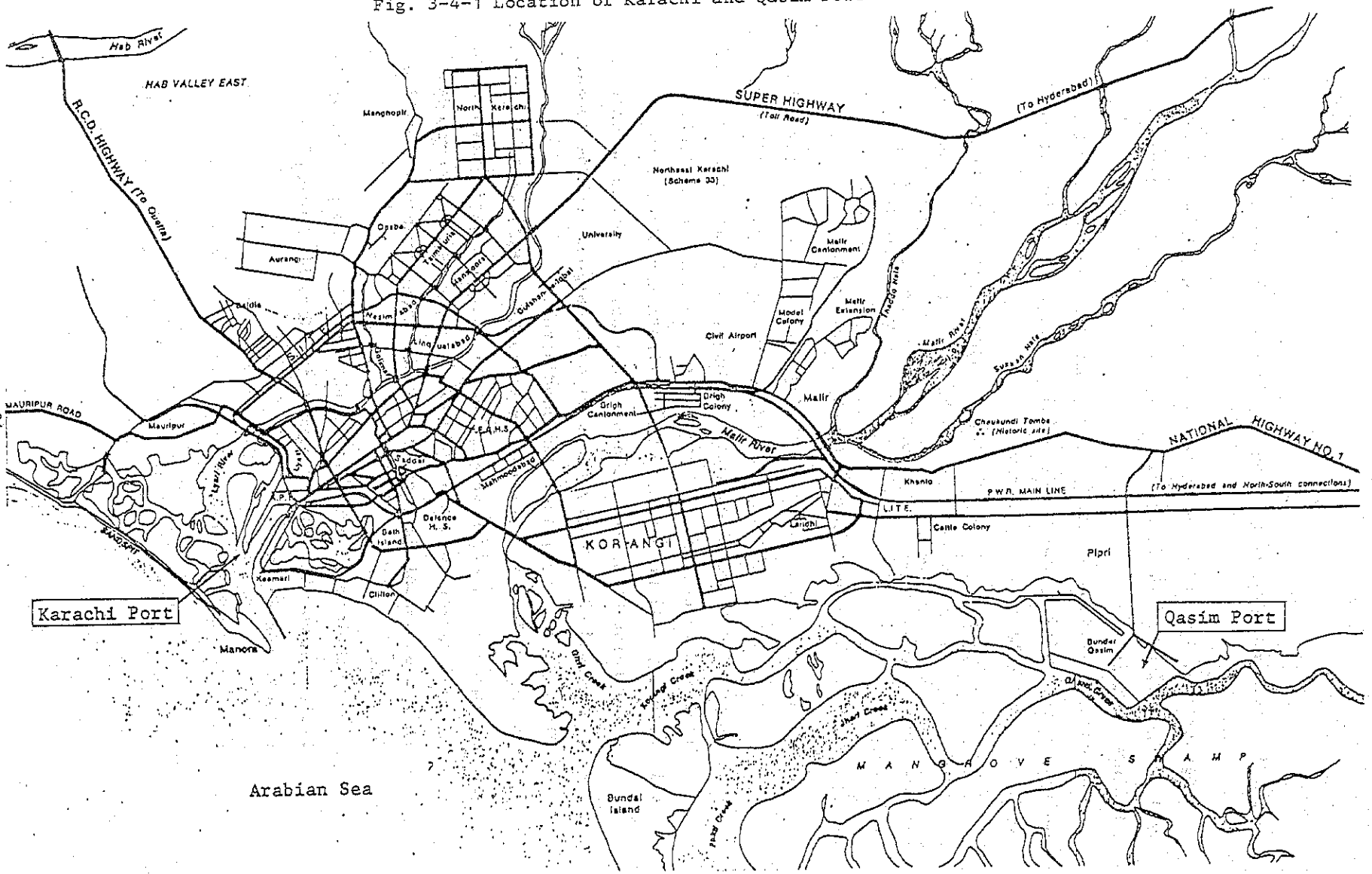
In order to deal with the above problems, the following have been considered.

a') An increase in production at Pakistan Steel, up to the original production target, would provide the Iron Ore & Coal Berth with ample cargo.

b') Better conditions for ships, in terms of reduced port charges and improved infrastructure, would attract more of these carriers to the marginal wharves.

c') Acquisition of a trailing hopper suction dredger is recommended for self maintenance dredging of channel and turning basin for the following three reasons:
First, the mobilization and overhead costs will be reduced;
Second, with its own equipment, Pakistan can upgrade its dredging technique;
Third, possession of own equipment makes possible prompt dredging when emergency conditions arise due to weather.

Fig. 3-4-1 Location of Karachi and Qasim Port



3-5 Shipping

3-5-1 Strategy for Shipping in the Fifth Plan (1978-83)

The strategy for shipping of the Fifth Plan has been geared to expanding a fleet of Pakistan-flag vessels especially for modernization of liner vessels.

The main objectives and targets of this strategy were to build 21 multi-purpose ships to carry 40% of liner cargo as indicated in the UN Code of Conduct Liner Conference.

This ambitious plan for expanding national fleet was expected to contribute to the improvement of the balance of payment, table transport of the nation's trade goods and to the developments of shipping industries.

The strategy for the Fifth Plan was as follows:

i. To increase the operational efficiency of general cargo between a minimum of 4.8 tons/DWT and desirable target of 5.2 tons/DWT.

ii. Ships of over 20 years will be replaced by new ships preferably of standard designs to build up a more efficient fleet.

iii. Priority will be given to rehabilitate the Liner Service. Older ships being replaced on Liner Service would be used as tramps and would carry the semi-bulk cargoes such as cement, rice, wheat, fertilizer and phosphates.

iv. The dry bulk cargo for the proposed Steel Mill would be initially carried in chartered vessels until the Port Qasim reaches the optimal operation and 75,000 DWT vessels can be accommodated when a permanent national fleet for these transports will be acquired.

v. Local manufacture of ships to the extent of 50 percent of the sister ships will be arranged KSEW (Karachi Shipyard and Engineering Works).

3-5-2 Fleet Modernization Programme

Fifth Plan Investment Programme of Shipping is as follows.

(Million Rs.)

	No.	DWT	Cost
General Cargo Ships	21	315,000	2,500
Passenger/RO RO Ships	3	15,000	250
Total	24	330,000	2,750

Through a study conducted by JICA, order for construction of 19 multi-purpose ships were placed to various countries obtaining very soft credit conditions from respective governments.

i. Denmark

One ship

Price: DKB 125 millions

Term : Danish Government credit for 35 years including 10 years grace period.

Interest: Nil

ii. Japan

Six Ships

Unit Price: Yen 2,600 millions

Terms: Credit for 30 years with grace period of 10 years.

Interest: 3.5 %

iii. U.K.

Three Ships

Unit Price: £7,174,000

Terms: British Govt Grant:
CECGO Guaranteed Bank loan for £983,600 repayable over 7 years.

Interest: 7.5% for Bank loan

iv. Poland

Eight ships were ordered but five ships were cancelled due to economic and political problems in Poland.
Finally three ships were delivered with total price of US$24.52 millions.

v. KSEW, Pakistan

One Ship

Price: Rs. 138,600,000

Terms: Rs. 47,013,000 to be paid in cash during construction
Rs. 91,578,000 to be paid for supply of material against OECF credit from Japan.

All ships ordered in Denmark, Japan, UK and three ships out of 8 ships ordered in Poland have already been delivered except one ship ordered in KSEW which is expected to be ready for delivery in first half of 1983.

PNSC Fleet Position in 1983

AGE	NUMBER	TYPE	DWT	REMARKS
Under 5 years	14	multi-purpose cargo vessels.	254,676	New constructions being used on Liner/Container Service.
5 to 15 years	5	general cargo vessels.	72,857	Being used on liner service.
15 to 20 years	17	general cargo vessels.	210,890	Being used on Liner/Tramp Service. (to be scrapped during 6th Plan period.)
Over 20 years	7	6 general cargo vessels.	86,538	Tramp operations (to be scrapped immediately).
		1 passenger vessel.		
TOTAL:	43		624,961	

These new multi-purpose ships are of combination design for both conventional cargo and containers with the capacity of maximum 400 TEU (one ship 750 TEU), and can be used as semi-container.

In addition to PNSC fleet, Pan-Islamic Steamship has 5 vessels of 50,587 tons which include 2 passenger vessels.

PNSC are now operating on the following routes in liner trade.

Pakistan - UK, Continent
Pakistan - Far East - Japan
Pakistan - USA, Canada

Pakistan - North Continent/Middle East of Gulf

Pakistan - Africa

Pakistan - Black Sea

Pakistan - Makran Coast

From January 1982, a regular container service between Karachi and UK/Continent has been introduced by employing three newly built multi-purpose semi-container vessels in order to meet shipper's requirements and the growing competition.

3-5-3 Change of the Strategy

(1) Acquisition of Tanker for Crude Oil

Although the Fifth Plan did not provide for acquisition of any tanker for transportation of liquid bulk, the Government decided to carry crude oil by national flag due to the reason of national security.

The National Tanker Company (NTC) was formed in June 1981 as joint venture of PNSC and the state Petroleum Refining and Petro-Chemical Corp.

With a loan from the Islamic Development Bank, NTC has bought one second hand tanker of 89,000 DWT at a cost of £12.9 millions.

NTC will carry half of the nation's needs, the other half being carried by China Ocean Shipping Company (COSCO) under a yearly chartering arrangement.

(2) Denationalization Pan-Islamic Steamship Co.

In the Fifth Plan there was a provision for acquisition of three RO-RO/Passenger ferrie's for the service between Karachi and the Gulf. The Government decided to allocate these ships to Pan-Islamic Steamship Company which was denationalized on Sept. 1980 in view of the foreign investment.

3-5-4 Other On-Going Projects

(1) Bulk Carrier for Steel Mill

The Fifth Plan provides the policy for Bulk Carrier for Steel Mill as follows:

"The dry bulk cargo for the Steel Mill would be initially carried in chartered vessels until the Port Qasim reaches the optimum operation and 75,000 DWT vessels can be accommodated when a permanent national fleet for these transports will be acquired".

Comprehensive transportation plan in accordance with the Steel Mill's production schedule has been studied as to number and size of bulk carrier together with a type of contract.

In order to carry 3.3 million tons of dry bulk cargo (2,030,000 tons of Iron Ore and 1,360,000 tons of coal), 7 bulk carriers of 53,000 DWT or 5 bulk carriers of 75,000 DWT are estimated as required tonnage.

(2) Passenger Ferry

According to PNSC's information, Passenger Ferries have been allocated to Pan-Islamic Steamship Co. as on-going project.

3-6 Airport

3-6-1 Airport and Network of Air Routes

In Pakistan, there are 22 civil airports existing and administered by the Department of Civil Aviation (DCA) including joint use airports that are used by civil and military aircraft.

The current location of civil airports and the air routes are shown in Fig. 3-6-1.

3-6-2 Organization and Function of Department of Civil Aviation

The Organization of Department of Civil Aviation is shown in Fig. 3-6-2.

Fig. 3-6-1 The Current Location of Civil Airports and the Air Routes

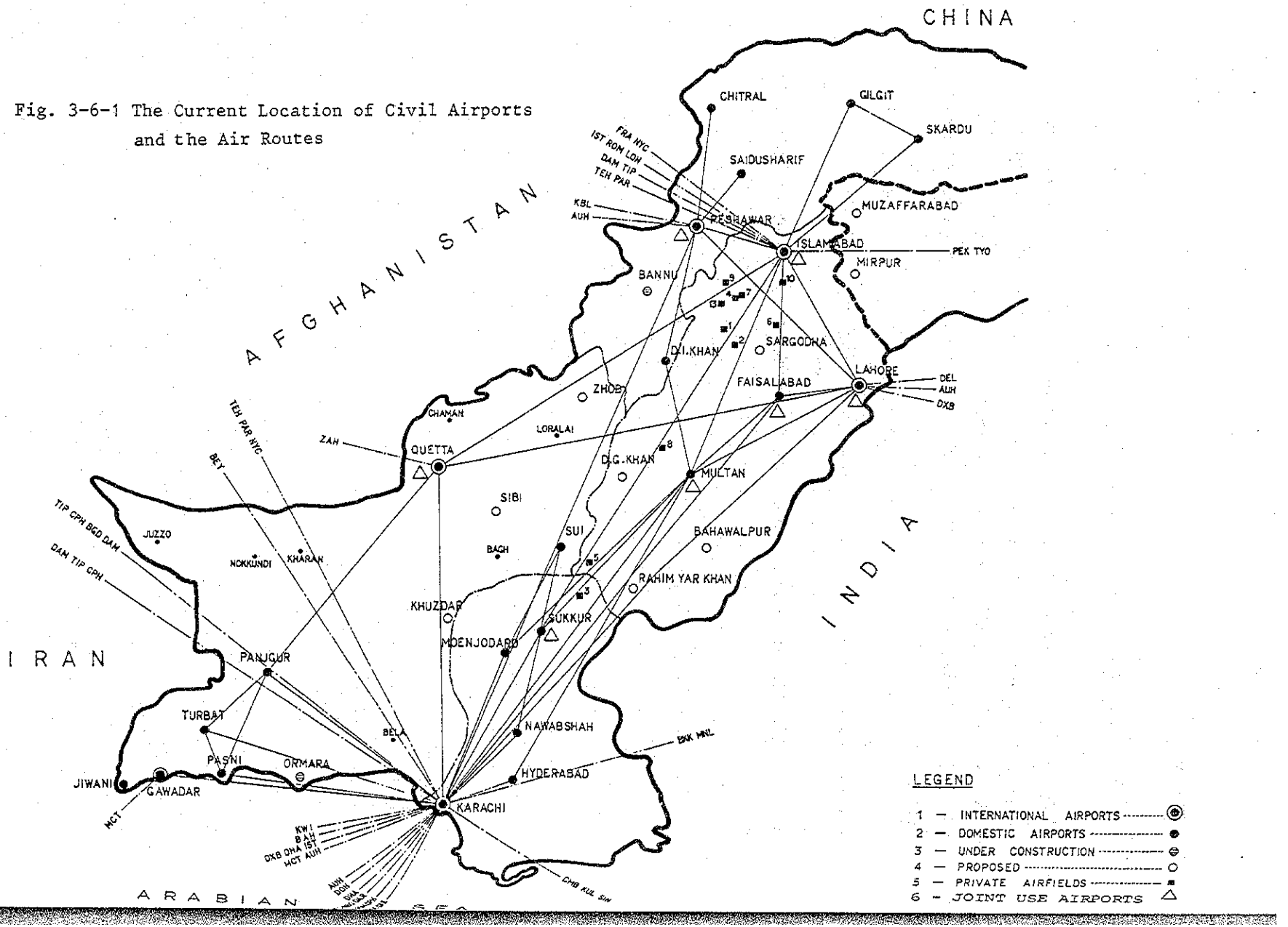
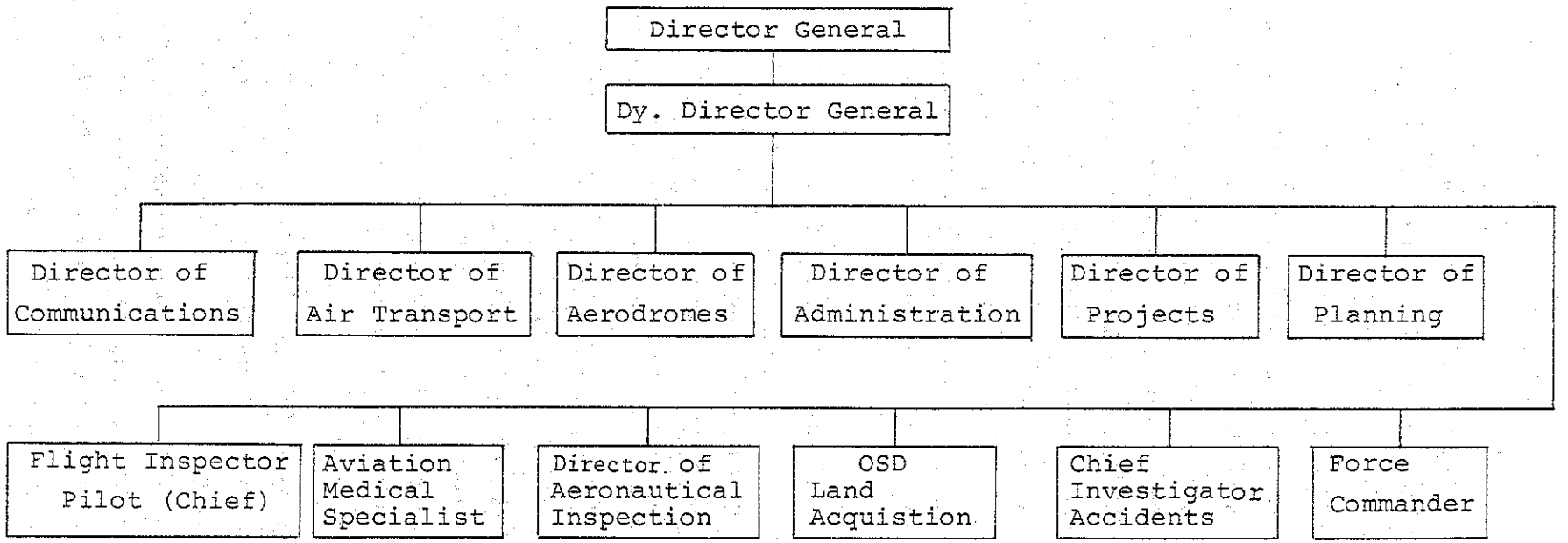


Fig. 3-6-2 Chart of the Organization of the Department of Civil Aviation



3-6-3 Civil Aviation Rules

The rules regarding civil aviation are provided in Part II of the Extraordinary Issue of The Gazette of Pakistan, published on January 20, 1979.

These rules are divided into 19 parts:

I. Preliminary, II. Administration and Organization, III. Registration and Marking of Aircraft, IV. Air-worthiness Requirements, V. Licences and Ratings of Operating Crew, VI. Flying Schools and Training Organizations, VII. Personal Log Books and Navigation Logs, VIII. Radio Systems for Use In, or In Connection with Aircraft, IX. Aerodomes and Facilities and Services, X. Conditions of Flight, XI. Rules of the Air, XII. Signals for the Control of Air Traffic, XIII. Air Service Operations, XIV. (Not available) XV. Refusal to Grant, and Suspension and Cancellation of Licences and Certificates, XVI. Accident Inquiry, XVII. Penal Provisions and Prosecutions, XVIII. Evidence, XIX. Miscellaneous.

Particularly the authority for administration of civil aviation is provided in Part II - Administration and Organizations, 4 (1) to 6. The provisions in 4 (1) are stated as follows:

> 4 (1) The Director-General shall, subject to the directions of the Federal Government, be charged with the administration of these rules, and shall exercise and perform all the powers and functions conferred on the Director-General by these rules.

In Pakistan, the Director-General of Department of Civil Aviation has the authority to perform the administration of civil aviation.

Moreover, the Director-General has to maintain close coordination with the Pakistan Air Force in matters of common interest to both, civil aviation and the military air force.

> The Federal Government may establish, provide, maintain and operate aerodome and air route and airway facilities. - Part IX, Section 1, 86 (1). Aerodomes and air routes and airway facilities established or provided in pursuance of these rules shall be under the control and management of the Director-General who may determine, subject to these rules, the conditions of the use thereof. - 86 (2).

3-6-4 The Preparation for Conversion to Civil Aviation Authority

The volume of passenger traffic has created a pressure on the existing facilities at the airports. The lounges have become over-crowded, visitor concourses are jampacked, car parks have over flowed, parking lays do not meet the requirements, safety and security facilities have been put under heavy strain. DCA has some problems that should be solved immediately, such as smoothing of procedures for:

(i) Induction of adequate manpower with sufficient motivation that cannot be provided by a Government orgnization.

(ii) Purchase of equipment and stores, which are constantly experiencing technological changes, for which simple and quick procedures are required.

As a result, the presentation regarding the conversion of the Department of Civil Aviation into an Authority was set before the Government.

(1) Function

The Authority has been planned in consonance with the above aims and also with a view to obtain maximum coordination between PIA and Civil Aviation Authorities, while safeguarding the interests of the Government of Pakistan.

PIA and Civil Aviation Authority will be on a coordinated basis keeping the infrastructure facilities in phase with the expansion of PIA operations. The basic function of the Authority is indicated below.

(2) Activities of Civil Aviation Authority

1) Services

① Provide air traffic control, communication and navigational services

② Provide crash fire, search, and rescue services

③ Calibration of navigational aids

④ Provide aeronautical information services

⑤ Provide security for prevention of unlawful seizure of aircraft and interference with civil aviation facilities

⑥ Training of civil aviation personnel
⑦ Accident investigation
⑧ Participation in world aviation activities
⑨ Assist Government in negotiation of bilateral agreements on aviation matters
⑩ Maintenance and operation of airfields/aerodomes

2) Regulations

① Registration, inspection and certification of aircraft
② Licensing of pilots, flight engineers, navigators and aircraft maintenance engineers
③ Licensing of air transport operation & general aviation and issue of operating permits to foreign air carriers
④ Licensing of air traffic controllers, flight operation officers and flight service personnel
⑤ Inspection and approval of aircraft maintenance/overhaul workshops
⑥ Licensing of airfields not owned by the Government

3) Development

① Preparation & Processing of 5 Year Plans and Annual Development Programmes
② Planning & continuation of infrastructure facilities as per ICAO recommendations.

The Federal Cabinet meeting held on Feb. 11, 1982 has already passed the decision to convert the Civil Aviation into the Civil Aviation Department of Authority (CAA).

Following this the Ministry of Defense started to prepare conversion plans for the creation of CAA.

3-6-5 Airport Development Agency (ADA)

ADA provides a full range of services on all phases of construction projects from initial planning, to completion of the airport facilities. These functions include construction, engineering, procurement, project management and other essential support services.

Actually, ADA acts as an adviser and also executes projects for the Department of Civil Aviation, PIA and other departments for the development of airports, terminals, and other allied facilities.

The ADA undertakes the actual construction of airfields roads, pavements and all types of building activities.

Moreover, the ADA carries out the maintenance of all civil airports in Pakistan.

3-6-6 Provisions Regarding Civil Aviation in the 5th Plan

The budget for total investment in civil aviation during the 5th Plan period, 1978-83, amounted to Rs. 1,350 million originally.

Afterwards, this amount was revised upward to Rs. 2,187 million. However, after Rs. 469.479 million were invested in the first 3 years of the Plan, 1978-81, it was estimated that only Rs. 561.346 million could be provided for the remaining 2 years of the Plan, 1981-1983.

As a result, the total amount became Rs. 1,030.825 million due to the shortage of funds.

(1) The 5th Plan Objectives

Main objectives of the Civil Aviation programmes are:

1) Consolidation of existing infrastructure with expansion of capacity wherever absolutely necessary.
2) Providing top priority to passenger safety and operation by providing telecommunication and navigational facilities to fill in the gaps.
3) To provide ground safety measures covering fire fighting and rescue services.
4) Build new airports only at Khuzdar and Panjgur in Baluchistan where operation has become risky and improvement is required urgently by way of black topping the runway.
5) To develop interim terminal facilities at Lahore where conjestion has already reached a critical stage.
6) Construction of new International Air Terminal at Karachi which is fully warranted to be undertaken as a commercial project.

7) To expand training and engineering facilities and initiate research in the field of civil aviation in the country.

Details of the Civil Aviation programmes amounting to Rs. 1,350 million for the above are shown in Table 3-6-1.

Table 3-6-1 Civil Aviation Plan 1978-83

(Rs. Million)

	Name of Project	Allocation
1	Air Terminal at Lahore Airport	97.8
2	Extension of Existing Airports Terminal Facilities	222.1
3	Communications	84.8
4	Navigation and Airport Ground-facilities	294.0
5	Improvement of Existing Runways and Aprons	251.6
6	Fire Fighting and Service at Important Airports	111.1
7	Security Measures	104.5
8	Training Facilities	58.5
9	Proper Runway at Khuzdar and Panjgur	36.5
10	New Airports On-going (Saidu Sharif and Ormara)	32.5
11	General Miscellaneous	56.4
	Total	1,349.8

(2) List of On-going Projects

List of on-going projects which seem to be carried over to the 6th Plan are summarised and shown in the Master Plan Alternatives.

3-7 Aviation

3-7-1 Provision in the 5th Plan Regarding the PIA Fleet

(1) To carry the projected traffic, a programme amounting to Rs. 8,410.3 million will be initiated to augment the 1977/8 fleet of 4 DC-10s, 2 Boeing-747s, 7 Boeing-707s, 5 Boeing 720-Bs and 8 Fokker-27s by 11 wide-bodied aircrafts and 5 short haul jet aircrafts along with the augmentation of supporting ground facilities and training.

On all major domestic routes the Fokker-27s will be replaced by an all jet fleet of short suitable for haul and medium and Fokker 27s will be operated on secondary routes only.

(2) The fleet position with the successful implementation of the above acquisition through the plan period would have been as follows:

Type of Aircraft	1978 - 79	1979 - 80	1980 - 81	1981 - 82	1982 - 83
Boeing 747	3	4	5	6	7
DC-10-30	4	4	4	4	4
A-300	-	3	4	5	6
Boeing 707	7	7	7	7	7
Boeing 720B/ Short Haul Jets	5	5	5	5	5
Fokker-27	8	8	8	8	8
Total	27	31	33	35	37

However this fleet acquisition plan of PIA has not been implemented completely. Actually, the fleet position through the 5th Plan period is as follows:

Type of Aircraft	1978 - 79	1979 - 80	1981 - 82	1982 - 83
Boeing 747	2	4	4	4
DC-10-30	4	4	3	3
A-300	-	3	4	4
Boeing 707	10	6	6	6
Boeing 720B/ Short Haul Jets	6	6	6	3
Fokker-27	9	9	8	9
Total	31	32	31	29

Note: The above figures include leased aircraft.

The 5th aircraft acquisition plan has not been implemented as per the original scheme proposed in 1983.

3-7-2 PIA Policy in the 5th and 6th Plans

(1) Policies in the 5th Plan

1) Expansion during the first half of the plan period.
2) Consolidation in the second half of the plan period.
3) Induction of new technology and more fuel efficient aircraft.
4) Planning and initiation of the phasing out of the narrow-body (B-707B) aircraft.
5) Cost control and improvements in yield, seat factor and utilization of fleet during the second half of the plan period.

Fifth Plan (1978-83) of PIA

Project	Estimated Cost		Estimated Expenditure upto June 1978	5th Plan (1978-83) Allocation
	Total	FEC		
I. Fleet				
1. 11Wide-bodied Aircrafts	5,915.0	5,915.0	-	-
2. 5 Short Haul Twin Jets	697.0	697.0	-	-
3. Functional Equipment & Spares	1,798.3	1,357.1	-	-
Sub-total (Fleet)	8,410.3	7,969.1	-	-
II. Ground Facilities				
1. Wide-bodied Aircraft Hangers Supporting Work-shops and facilities	217.3	114.4	113.3	104.0
2. Computerised Reservation	87.1	31.0	10.5	76.6
3. Ground Workshops and Flight Equipment	284.4	188.5	76.3	200.0
4. Other Infrastructure Projects	150.1	38.0	27.9	34.0
Sub-total (Ground Facilities)	738.9	371.9	228.0	414.6
III. Terminals				
1. New Cargo Terminal Building at Karachi Airport	57.0	29.5	17.0	40.0
2. PIA Town Terminal Complex at Karachi	40.0	5.0	1.0	39.0
3. New Cargo Terminal Building at Lahore Airport	3.4	0.5	-	3.4

Project	Estimated Cost		Estimated Expenditure upto June 1978	5th Plan (1978-83) Allocation
	Total	FEC		
4. New Cargo Terminal Building at Islamabad Airport	3.4	0.5	0.4	3.00
Sub-Total (Terminal)	103.8	35.5	18.4	85.40
Grand Total	9,258.0	8,376.5	246.4	500.00

(2) Policies in the 6th Plan

1) Further consolidation of the route network and traffic during the first half of the plan period.
2) Moderate growth during the second half of the plan period.
3) Induction of the Twin Jet aircraft and expansion of the A-300-B4 aircraft fleet.
4) Completion of the phasing out of the Boeing 707 and Boeing 720B aircraft.
5) Continuous emphasis on cost control, improvement of yield, higher utilization of fleet and load factors during the 6th Plan.
6) Improvement in liquidity position to generate funds for financing purchase of new aircraft.

3-8 Others

3-8-1 Inland Water Transportation

Pakistan has the largest canal network which mainly lies in the provinces of Punjab and Sind. The total length of the canal network is now approximately 62,820 km, and the main source of the canals are from the tributaries of the Indus River. The canal network consists of main canal, branch canal, distributaries, minors and water courses. The province-wise distribution of canals is; Punjab 38,660 km, Sind 19,610 km, NWFP 2,990 km and Baluchistan 1,560 km. Therefore, there seems to be a huge potential in the form of a network of rivers and canals for transportation.

Some studies/reconnaissance were carried out to make the Indus River navigable and to make sure feasibility of utilizing existing canals for transportation. According to the studies, as for costs, transportation costs by Inland Water Way will be less than that by others. For example, this mode consumes the least amount of energy for each ton-kilometer, so the increase in costs of energy will make Inland Water Transportation more economical comparing with other modes. However, the canal network has not hardly been utilized for transport.

3-8-2 Pipeline for POL Transport

The pipeline dealing in this section is confined to that for the transport of POL, which at present is running from Karachi to Multan with the distance of 869 km and diameter of 16 inches (approximately 40 cm) having the transport capacity of about 4 million tons per year. At present this pipeline is transporting mainly the high speed diesel oil, kerosene and other POL products with the volume of about 2 million tons a year from Karachi to Multan.

The POL products which are being transported to Multan are distributed from the Multan Terminal to the major consumption areas in Punjab and NWFP by railway and road transportations.

According to the demand forecast of the consumption of POL products, it is estimated to increase with the average compound growth rate of about 5 per cent per annum, and if this assumption is to be granted, there would be no need for another pipeline up to the end of the 6th Plan period.

There exists another short distance pipeline running from Meyal to Attock Refinery with distance of about 50 km and the diameter of 8 inches (about 20 cm).

It is to be noted that with regard to the determination of the need for another pipeline, the vital importance shall be the study specially intended for this purpose including the need for the additional oil refinery.

III. MACRO AND REGIONAL ECONOMIC FRAMEWORK

III. MACRO AND REGIONAL ECONOMIC FRAMEWORK

1. Projection

1-1 Overall Frame

A set of macro economic targets at both the national and regional (province/district) levels have been established as a basis for projecting traffic demands and the financial capacity for transport development, and as a yardstick for setting various target values necessary in transport planning. The targets include Gross Domestic Products by sector, production quantity of selected commodities both at the national and regional levels, quantity and value of imports/exports, and urban/rural population both at the national and regional levels. Reference periods are 1961/62 to 1980/81, in principle, for the analysis of past trends and 1980/81 to 1999/2000 for projection, with interim target years set at 1982/83 and 1987/88 for the sake of maintaining consistency with the period of the Sixth Five Year Plan.

Sectional classification is agriculture, mining, manufacturing and services. The selected commodities are wheat, rice, sugarcane and cotton in agriculture. In 1980/81, four these crops account for 84 percent of the total agricultural production in quantity and 50 percent in value. The rest of agricultural sector is classified into other crops, livestock, fishery and forest. In mining, those selected are coal, crude oil, sulphur/phosphate and iron ore while the rest is categorized into "other minerals"*. Four these minerals account for 15 percent of the total mining production in quantity and 58 percent in value excluding natural gas. In manufacturing, those selected are edible oil and fats, sugar, cigarettes, cotton textile (yarn and cloth), fertilizers, cement, iron and steel and transport equipment while the rest is categorized into "other products". Eight these products

* In spite of relatively small proportion of these minerals in terms of production quantity, they have been selected because of their significant inter-regional movement. Other heavy minerals such as limestone and gypsum are mostly consumed or processed within the vicinity of mining area before being transported.

account for 70 percent of the total manufacturing production in quantity (estimate) and 52 percent in value. As for trade, those selected as major import commodities are wheat, coal, crude oil and petroleum products, sulphur/phosphate, iron ore, edible oil and fats, sugar, fertilizers, cement and iron and steel. Similary, major export commodities include wheat, rice, cotton molasses, petroleum, cement, and iron and steel. The rest is categorized into other import/export commodities. In import, the selected commodities account for 82 percent of the total in quantity and 51 percent in value while, in export, 79 percent and 45 percent, respectively. It should be noted that some commodities imported at present will turn to be exported in future.

For the projection at the regional level, commodities of reference have been limited to those which have significance in inter-regional cargo traffic. Availability of data at the district level is another consideration. Commodities thus selected are wheat, rice, sugarcane, cotton, edible oil and fats, sugar, cement, fertilizer, iron and steel, coal, and crude oil and petroleum. They are estimated to account for 69 percent of the total production quantity of agriculture, mining and manufacturing as of 1980/81. In addition to projecting production quantity of these commodities, it has been attempted to project total manufacturing production in value term.

Reference area comprises of 61 districts and seven agencies in the federally administered tribal areas. The seven agencies are grouped into five. Peshawar, Kohat, Bannu and D.I. Khan Districts include the tribal areas adjoining them, respectively. Islamabad District (Federal Capital Area) is included in Rawalpindi District.

Alternative projections were undertaken for a high case assuming rapid economic growth and urbanization, and a low case assuming moderate economic growth and urbanization. The results of the alternative projections have been discussed in the team.

It was then a common observation of the team members that during the Sixth Five Year Plan period, the national economy will be able to grow rapidly at a rate as high as nearly the rate projected under the high case in view especially of on-going industrialization policies and the latest performance of economic development. With regard to the post Sixth Five Year Plan period, the observation was that it seems rather unrealistic to expect the national economy to keep growing at such a high rate for more than a decade as projected under the high

case partly because even a drastically reinforced transport system can hardly accommodate a sky-rocketing increase in the traffic demands consequent upon the high case projection. Hence, it did not deem unreasonable to presume in general that a high economic growth expected during the Sixth Five-Year Plan period may calm down to a moderate level while, for the whole period toward the year 2000, the national economy will maintain the growth at an average rate higher than ever experienced in the long term.

Although, methodology adopted in the initial projection was basically relevant to the purpose of projection, it was necessary to make some modification and elaboration of projection model in view of these observations. The major points of the modification/elaboration are:

(1) To prepare and screen/combine several alternative models of industrial capital stock and its utilization from the viewpoints of their fitness to the past trend, implication to the overall growth performance and consistency with on-going policies to materialize the growth potential of this sector;
(2) To incorporate in the Model the production targets of on-going/proposed mining projects and the expected increase of production capacities upon completion of on-going/proposed industrial projects;
(3) To examine the relationships in production between sugarcane and sugar, and between cotton and cotton textile;
(4) To include in the model imports/exports to be projected as differences between production and the domestic consumption which are estimated based on the projected results of GDP and GDP per capita;
(5) To analyze the selected key-functions which may be responsible for the aggregate growth rate of economy to a considerable extent by comparing alternative functions in terms of regression coefficients and consequent rates of increase; and
(6) To project gross domestic fixed capital formation and compare the projected results with past experience in terms of incremental capital output ratio, in an effort to examine the reasonability of projection.

The regional projection has been completed accordingly, but different methods had to be used for different indicators/items. These are summarized under Chapter 2,3.

The overall frame of projection is illustrated in the Fig. 1-1-1.

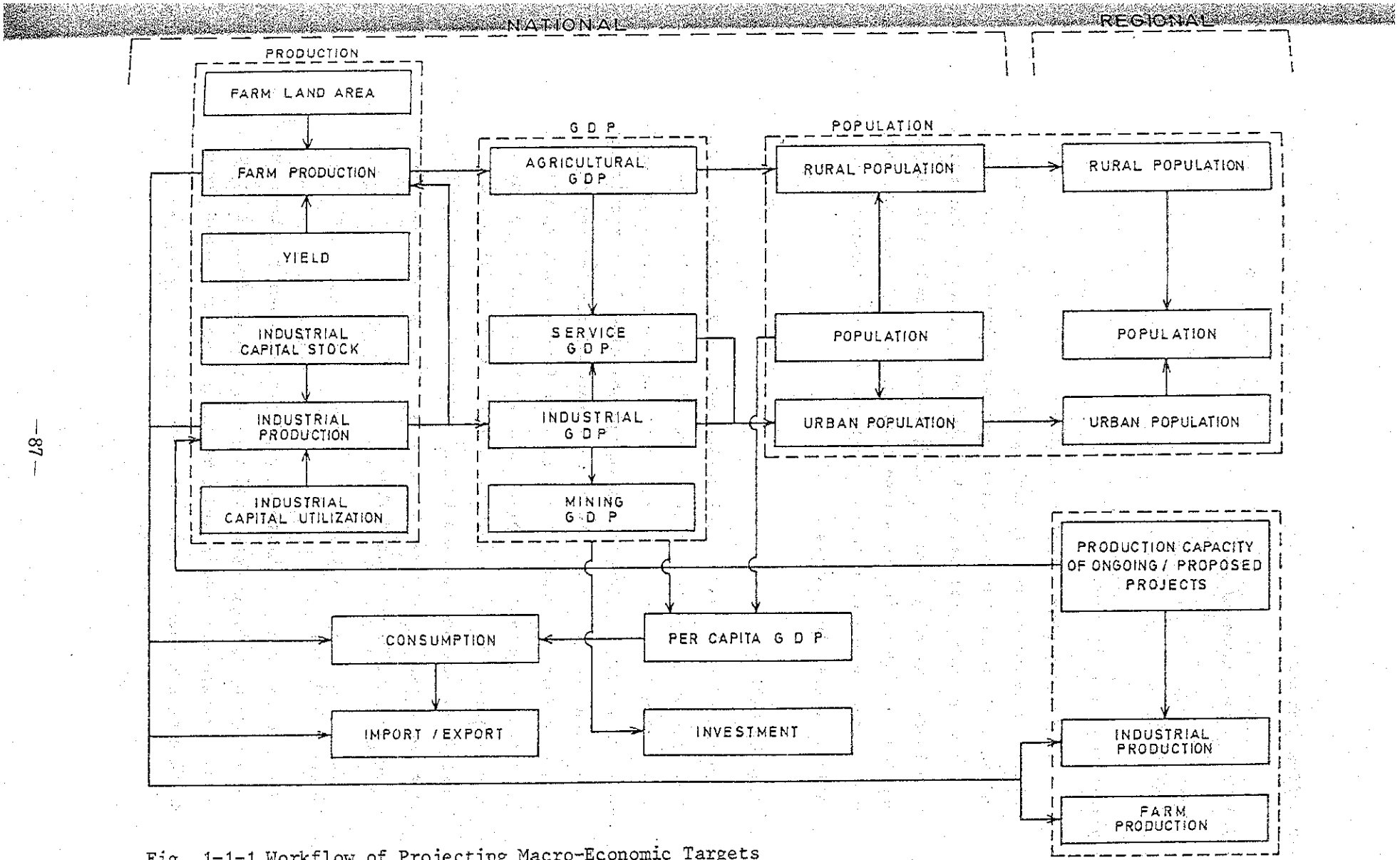


Fig. 1-1-1 Workflow of Projecting Macro-Economic Targets

1-2 National Economy

1-2-1 Method and Assumptions

(1) Production

1) Farm Land Area by Crop

Past trend suggests that expansion of farm lands will reach a saturation point in some future. It is also widely understood that the agriculture in Pakistan will grow based mainly on the yield increase and diversification of crops rather than the expansion of farm lands. Keeping these in mind, logistic function has been applied to project the farm land area in future. The total area thus projected has been further brokendown into crop-wise area on the basis of regression analysis.

2) Yield by Crop

In the past 20 years, yields fluctuate in a considerably wide range due to change in climatic conditions though long term trends were upward in general. In future yields are expected to increase more constantly in view of the stated policies for agricultural development to give emphasis on crop intensification and to reinforce rural infrastructures so that farm production will be less dependent on weather. Keeping these in mind, yields in future have been projected by using logistic functions, in which maximum possible yields are assumed to be attained in the year 2000 if yields keep increasing at average rates of increase in the past years when production indicated upward trend.

3) Production Output

For major crops, quantity of production output has been obtained simply by multiplying farm land area by yield. For the other farm crops, livestock, fishery and forest, production outputs have been derived from projected sectional GDP.

4) Industrial Capital Stock

The amount of industrial capital stock showed a fairly rapid increase during the 1960's and the beginning of the 1970's, and a rather moderate increase during the 1970's although it started to increase fast again during the end of the 1970's. A number of economic reports have pointed out that capital is the most crucial factor to determine the level of future growth of economy, industries in particular. While energy and manpower constraints are also crucial, the country is said to be suffering the most from the shortage of capital. Capital stock is projected, therefore, for two cases; Case-I assuming a rapid rate of the capital increase as experienced actually before the beginning of the 1970's.

5) Industrial Production Output by Major Sector

Based on the projected capital stock, industrial production output have been estimated using a regression model. Category-wise industrial production output is derived through extrapolating past changes in production output of respective industrial cateogries within the limit of the total production output. The production outputs have been converted into weight term based on the relationship between production output and estimated weight of products in the past.

(2) GDP

1) Agricultural GDP

GDP of major crops has been first estimated based on the projected output of major crop production. The total agricultural GDP has been derived through a model of the regression between major crops and total agriculture in terms of GDP. In the model, exponential function has been employed taking into account the expected increase in nonmajor crop production under the agricultural policy toward crop diversification and the rising income which will demand sharp increase in the production of minor crops, livestock, fish and forest products.

2) Industrial GDP

Production output of manufacturing industries is converted into GDP term. As for mining industries, past relationship between manufacturing GDP and mining GDP is used as the basis of projection.

(3) Population

1) Total Population

Having reviewed various long-term population projections attempted in a number of economic reports, this projections adopts average figures between the results of simple regression and the results of a World Bank projections, in which fast decline in fertility rate is assumed as a target of population planning (fertility rate to decline from 4.8 to 2.5 during the period 1985 to 2000).

2) Urban/Rural Population

Total population has been broken down into urban and rural population by linking urban population with industrial and service GDP and rural population with agricultural GDP.

(4) Trade

Fig. 1-2-1 shows workflow of projecting exports and imports in value terms at 1980-81 constant prices. Model and assumptions for trade projection are as follows:

1) Quantity by Commodity

Projected quantities by commodity are derived from "Port traffic projection" which is explained in IV.

2) Unit Value by Commodity

The unit value of selected commodities are assumed that figures in 1980-81 will remain constant.

In view of expected diversification of commodities in favour of goods of higher value added, unit value of other commodities of exports and imports is assumed by using the following formula:

log UNEX = 2.4619 + 0.25284 log T r=0.7790

log UNIM = 2.1799 + 0.20034 log T r=0.6435

where

UNEX: Unit value of other commodities of export

UNIM: Unit value of other commodities of import

T: Time trend (1971-72 = 1,...,1980-81 = 10)

3) Conversion to Export and Import GDP in Expenditure Accounts

Projected value of export and import is converted to export and import GDP in expenditure accounts using the following formula:

EXGDP = 337.7 + 1.20908 EXV r=0.9843

IMGDP = 1714 + 1.12757 IMV r=0.9925

where

EXGDP: Export GDP in expenditure accounts

IMGDP: Import GDP in expenditure accounts

EXV: Export in value terms

IMV: Import in value terms

4) Net Factor Income from Abroad

Net factor income from abroad is projected by using the following formula on the basis of relation to surplus of the nation on current account which is defined as the difference between export GDP and import GDP.

NIA = 4643 - 0.79847 (EXGDP-IMGDP) r=0.8537

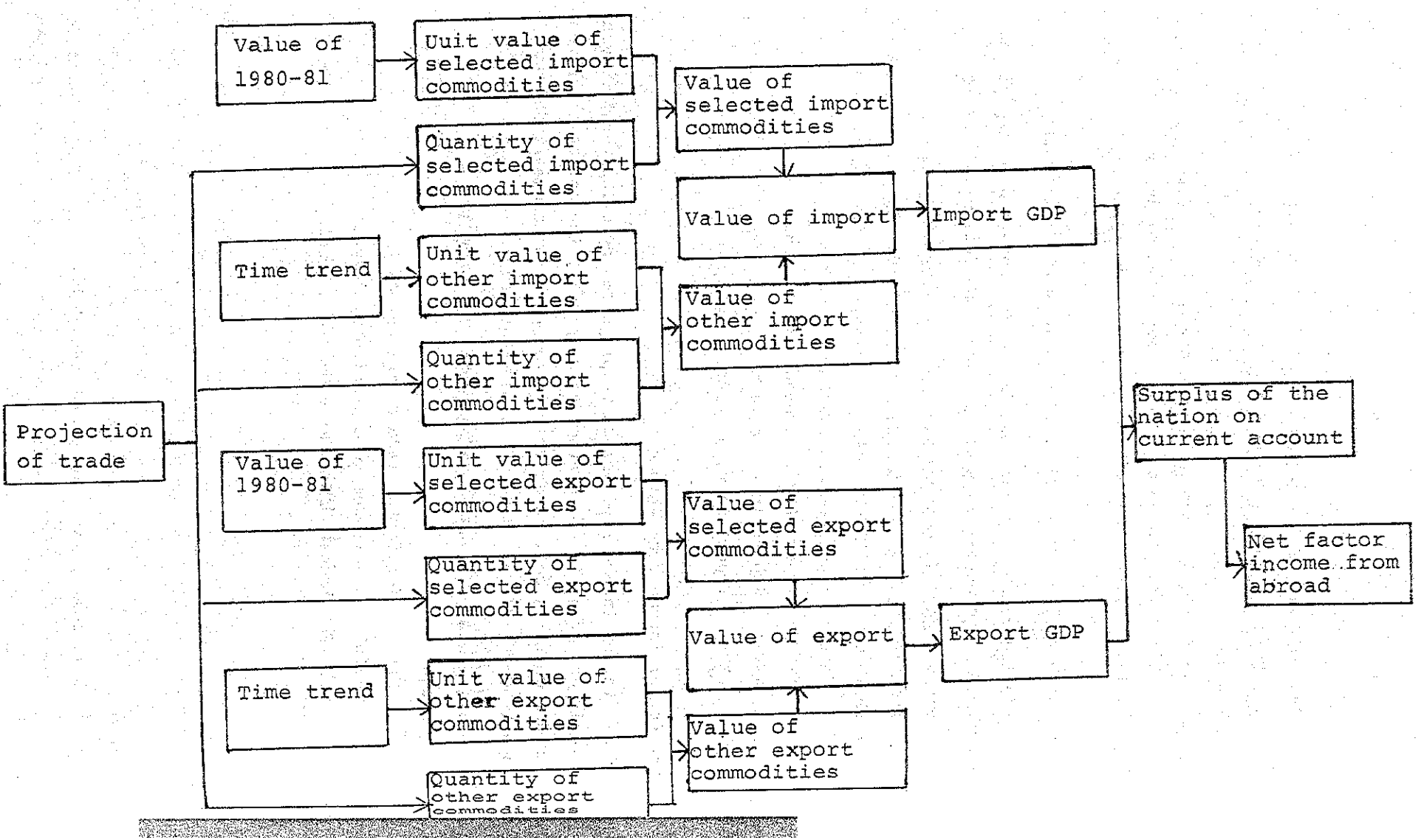
where

NIA: Net factor income from abroad

EXGDP: Export GDP in expenditure accounts

IMGDP: Import GDP in expenditure accounts

Fig. 1-2-1 Workflow of Projecting Imports and Exports



1-2-2 The Results

GDP growth rate is estimated at 7.2 percent for the period 1982-83 to 1987-88 (6.8 percent for the period 1980-81 to 1987-88 taking into account the recent growth achievements) and 6.5 percent for the period 1987-88 to 1999-2000 (See Fig. 1-2-2). Per capita GDP will grow from Rs. 2972 or US$297 in 1980-81 to Rs. 6223 or US$622 to 1999-2000. Toward the year 1999-2000, proportion of agricultural GDP will decline from 30.0 to 21.8 percent while proportions of manufacturing GDP and service GDP will increase from 16.9 to 20.8 percent and from 51.9 to 56.0 percent, respectively. (See Fig. 1-2-3). GDP with respect of major commodities is shown in Table 1-2-1. Ratio or import value to GDP is estimated to decline from 21.5 percent at present to 14.2. percent in the year 1999-2000 while ratio of export value to GDP is estimated to increase from 11.8 percent at present to 12.4 percent in the year 1999-2000 (See Table 1-2-1).

Table 1-2-2 shows the results of imports and exports projections in quantity and value terms. The ratio of imports value to GDP is expected to decline from 21.5 percent in 1980-81 to 18.9 percent in 1987-88, 15.8 percent in 1999-2000 while the ratio of exports value to GDP is expected to keep the level of 11 percent upto the year 1999-2000. As a result, import/export ratio will be steady down from 1.83 in 1980-81 to 1.58 in 1987-88, 1.37 in 1999-2000.

The results of external transaction account projection are summarised as shown in Table 1-2-3. The ratio of net factor income from abroad to GDP is expected to decline from 10.48 percent in 1980-81 to 6.94 percent in 1987-88, 3.81 percent in 1999-2000.

Quantities of production, import and export are shown in Figs. 1-2-4 and 1-2-5. Future investment requirements for the unit increase in GDP will be considerably less than experienced during the mid-1970's when heavy public investments were made for economic development although investment amount will have to increase at the rate of 7.1 percent on average toward the year 1999-2000 (See Table 1-2-4).

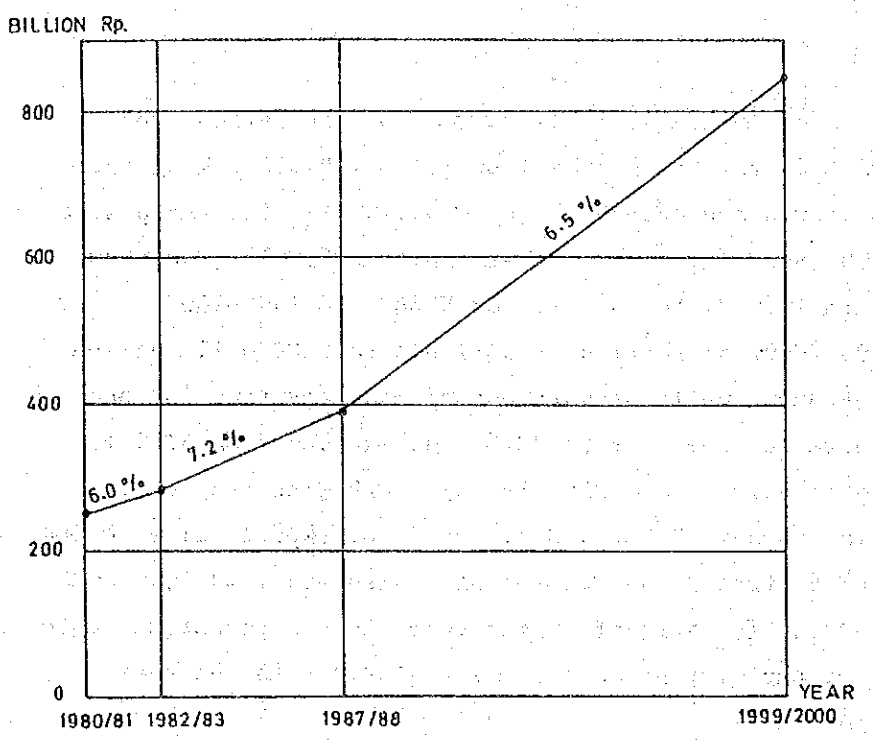


Fig. 1-2-2 Gross Domestic Products

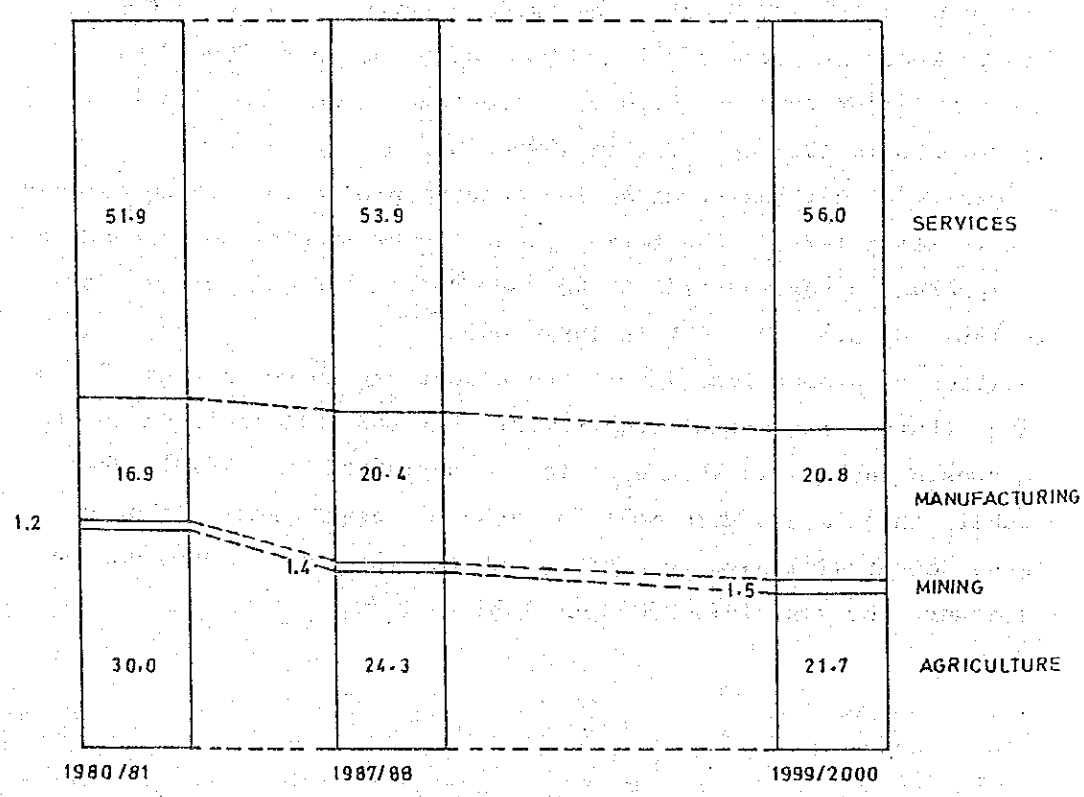


Fig. 1-2-3 Sector-Mix of GDP

Table 1-2-1 Summary of GDP Projection

1980/81 Constant Prices

	Gross Domestic Products (Million Rs.)				Average annual rate of growth %		
	1980-81	1982-83	1987-88	1999-2000	1980-81 to 1987-88	1982-83 to 1987-88	1987-88 to 1999-2000
Total	249038	279830	395794	844847	6.8	7.2	6.5
Agriculture	74625	77174	96280	183046	3.7	4.5	5.6
Wheat	17512	18066	22574	36462	3.7	4.6	4.1
Rice	6365	7506	9287	14414	5.5	4.4	3.7
Sugarcane	6218	5573	6332	7574	0.3	2.6	1.5
Cotton	7398	7403	9036	12070	2.9	4.1	2.4
Minor crops	12274	13498	18238	48323	5.8	6.2	8.5
Livestock	22867	23559	29844	64193	3.9	4.8	6.6
Fishery	1444	1569	1933	3254	4.3	4.3	4.4
Forestry	547	610	803	1611	5.6	5.7	6.0
Mining	2865	3332	5692	13019	10.3	11.3	7.1
Manufacturing	42006	48168	80637	176134	9.8	10.9	6.7
Edible oil & fats	3194	3486	6425	15956	10.5	13.0	7.9
Sugar	4953	5305	9958	25098	10.5	13.4	8.0
Cigarettes	2335	2662	4462	10157	9.7	10.9	7.1
Cotton spinning & weaving	5911	6647	10312	21592	8.3	9.2	6.4
Fertilizers	786	918	1572	3868	10.4	11.4	7.8
Cement	1174	1896	4796	9959	22.3	20.4	6.3
Iron & steel industries	1006	1132	3419	8455	19.1	24.7	7.8
Transport equipment	2472	2690	4922	12150	10.3	12.8	7.8
Other industries	20175	23432	34771	68899	8.1	8.2	5.9
Services	129542	151156	213185	472648	7.4	7.1	6.9
Transport storage and communication	18712	21144	31051	75347	7.5	8.0	7.7
Other services	110830	130012	182134	397301	7.4	7.0	6.7

Note: (1) The real production capacity of Steel Mill may decrease due to the delay of production schedule.

(2) The growth rate of small-scale industry was estimated roughly due to the lack of data.

Table 1-2-2 Projection of Imports and Exports

	1980-81		1982-83		1987-88		1999-2000	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Imports	10918	53544	11515	56139	17227	74731	29168	133871
Cement	444	494	142	158	-	-	-	-
Coal	161	140	504	438	1360	1183	1360	1183
Iron ore	244	93	754	287	2030	773	2030	773
Fertilizers	1294	3573	1228	3391	1193	3294	2059	5685
Phosphate rock	191	195	299	305	278	284	779	795
Sugar	74	500	63	426	-	-	-	-
Wheat	308	639	347	720	527	1094	-	-
Iron & steel	442	1937	536	2349	-	-	-	-
Crude oil	5598	15302	6264	17120	8533	23321	18146	49593
Edible oil	608	3419	632	3554	685	3852	636	3576
Other commodities	1959	27252	2004	27391	2621	40930	4158	72266
Exports	3618	29279	3799	29907	7398	47178	15521	97472
Cement	-	-	-	-	1468	1633	2208	2458
Cotton	315	5067	185	2976	334	5373	492	7914
Rice	1257	5660	1259	5669	1593	7173	2998	13500
Wheat	-	-	-	-	-	-	643	1334
Fertilizers	21	17	-	-	-	-	282	779
Sugar	-	-	-	-	94	635	266	1797
Iron & steel	-	-	-	-	630	2761	1735	7603
Petroleum products	994	2171	1222	2669	1825	3986	4436	9688
Molasses	265	288	302	328	406	441	577	627
Other commodities	766	16076	831	18265	1049	25176	1884	51772
Import/GDP		21.5		20.1		18.9		15.8
Export/GDP		11.8		10.7		11.9		11.5
Import/Export		1.83		1.88		1.58		1.37

Note: (1) Quantity = 1000 tonnes

(2) Value = Million RS. at 1980/81 constant prices

Table 1-2-3 Projection of Net Factor Income from Abroad

(Million Rs.,1980-81 constant prices)

Year	Foreign Expenditure GDP				Net Factor Income	Ratio of NIA to GDP
	Import	Export	Import	Export		
1980-81	53544	29279	62176	35311	26094	10.48
1982-83	56139	29907	65015	36498	27413	9.80
1987-88	74731	47178	85978	57380	27478	6.94
1999-2000	133871	97472	152663	118189	32169	3.81

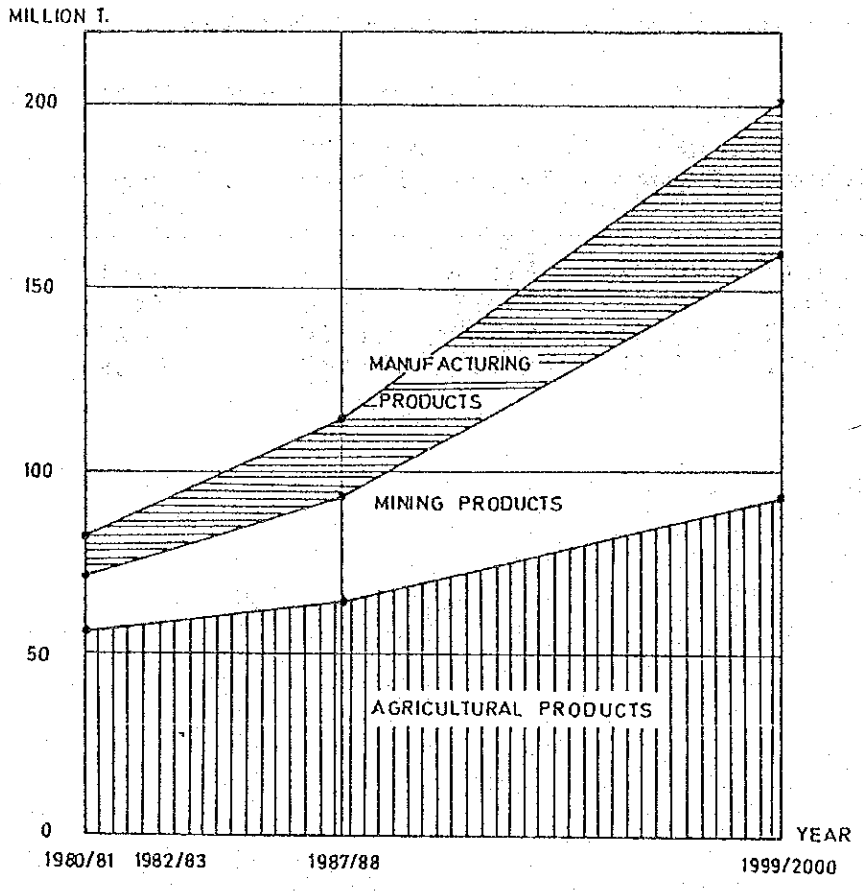


Fig. 1-2-4 Estimated Quantity of Production

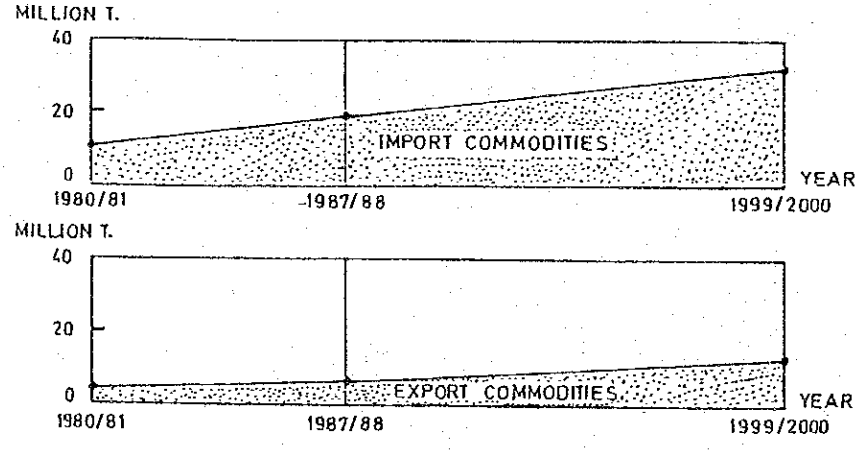


Fig. 1-2-5 Quantity of Imports/Exports

Table 1-2-4 Projection of Investments

(Million Rs.)

	Total	Agricul-ture	Mining & Manufac-turing	Services
1973-74 to 1977-78	183025	20401	39829	122895
1978-79 to 1982-83	224865	20008	55774	149083
1983-84 to 1987-88	314041	21207	84286	214000
1988-89 to 1999-2000	1374888	124075	320811	921094
ICOR:				
1973-74 to 1977-78	4.05	2.93	6.41	3.80
1978-79 to 1982-83	3.24	1.63	3.56	3.60
1983-84 to 1987-88	2.71	1.09	2.38	3.39
1988-89 to 1999-2000	3.06	1.44	3.14	3.57

Notes: (1) Agricultural investment covers agriculture in private sector, and Indus basin and rural work programme in public sector.

(2) Mining investment covers mining & quarrying, manufacturing large-scale and small-scale, both in private and public sectors.

(3) Service investment covers the rest, including construction, electricity and gas, transport and communication, banking insurance & other financial institutions, ownership of dwellings and services in private sector, and railway, post office, telegraph & telephone department, banking insurance and other financial institutions, electricity and gas, other autonomous and semi-autonomous organizations and general government in public sector.

1-3 Regional Economy

1-3-1 Method and Assumptions

(1) General

The purpose of this projection is to project population and production by district within the framework of national economy.

The results of projection of these economic indicator by district are passed on Microscopic Traffic Demand Forecasting to be used by generation and attraction in OD traffic.

1) Reference Area

According to "Housing and Population Censuses of Pakistan 1980-1981", the area in Pakistan area grouped as follows:

Punjab ..... 21 Districts and 1 Federal Capital Area (Islamabad)
Sind ..... 13 Districts
NWFP ..... 11 Districts, 1 Protected Area, 7 Agencies and 4 Tribal Area adjoining District
Baluchistan .. 15 Districts and 1 Agency

In this regional economy study, Bajaur and Mohmand Agency in NWFP are grouped, Orekuzai Agency in NWFP is included in Peshawar District, 4 Tribal Areas are included in each adjoining district and Federal Capital Area is included in Rawalpindi District. Thus, reference area in this regional economy study comprises of:

Punjab ..... 21 Districts
Sind ..... 13 Districts
NWFP ..... 17 Districts (including 1 Protected Area and 5 Agencies)
Baluchistan .. 16 Districts (including 1 Agency)
Total ..... 67 Districts

2) Reference Periods

Reference past periods for the regional economy projection are mainly from 1971-72 to 1980-81 due to the limited data.

(2) Population

Reference population at the regional level are urban, rural and total.

The method of regional population projection is shown in Fig. 1-3-1. For each province and district, urban/rural population is firstly assumed to grow at constant increment between 1972 and 1981 census, and projected figures are adjusted against the national total which is already projected in the national economy projection.

(3) Production

For the projection at the regional level, commodities of reference have been limited to those which have significance in inter-regional cargo traffic. Commodities thus selected are wheat, rice, sugarcane, cotton, edible oil, sugar, cement, fertilizer, iron & steel, coal, crude oil and petroleum products. They are estimated to account for 69 percent of the total production quantity of agriculture, mining and manufacturing as of 1980-81. In addition to projecting production quantity of these commodities, it has been attempted to project total manufacturing production in value term.

For these commodities, the method of regional projections are illustrated in the Fig. 1-3-2.

Fig. 1-3-1 Chart Showing the Method of Regional Population Projection

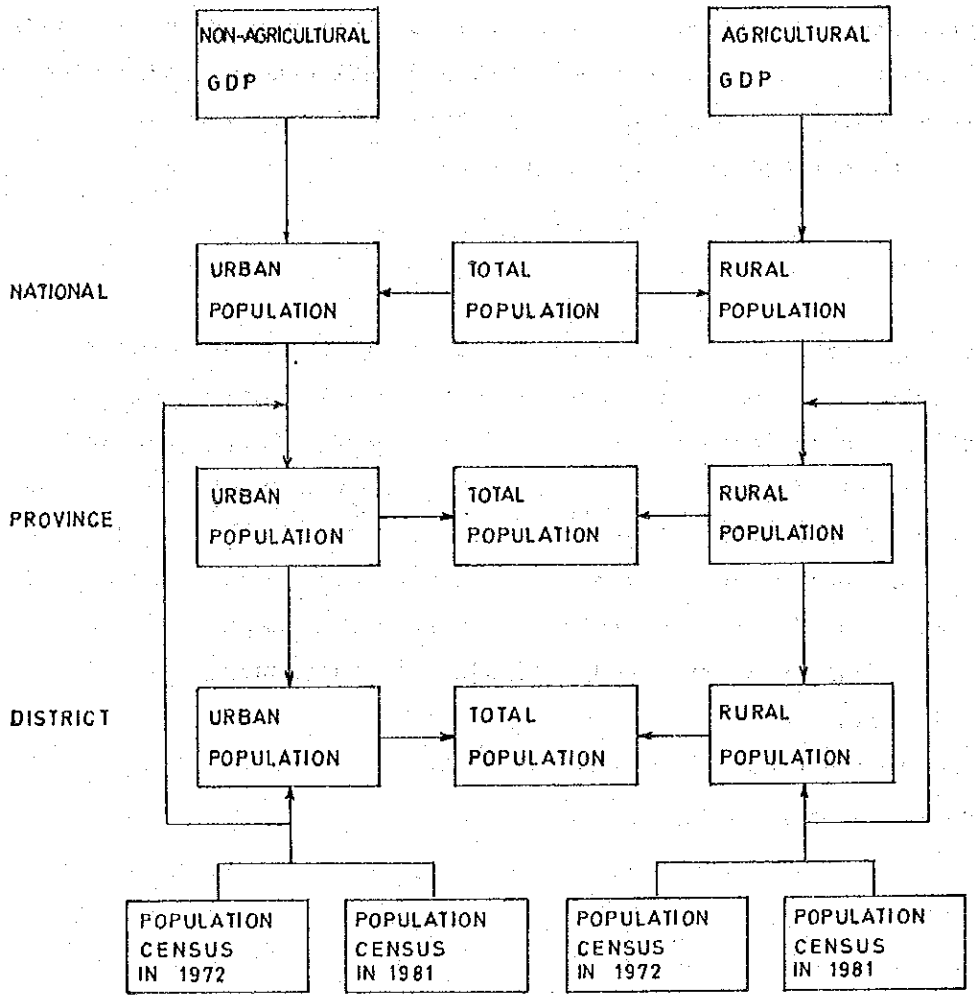
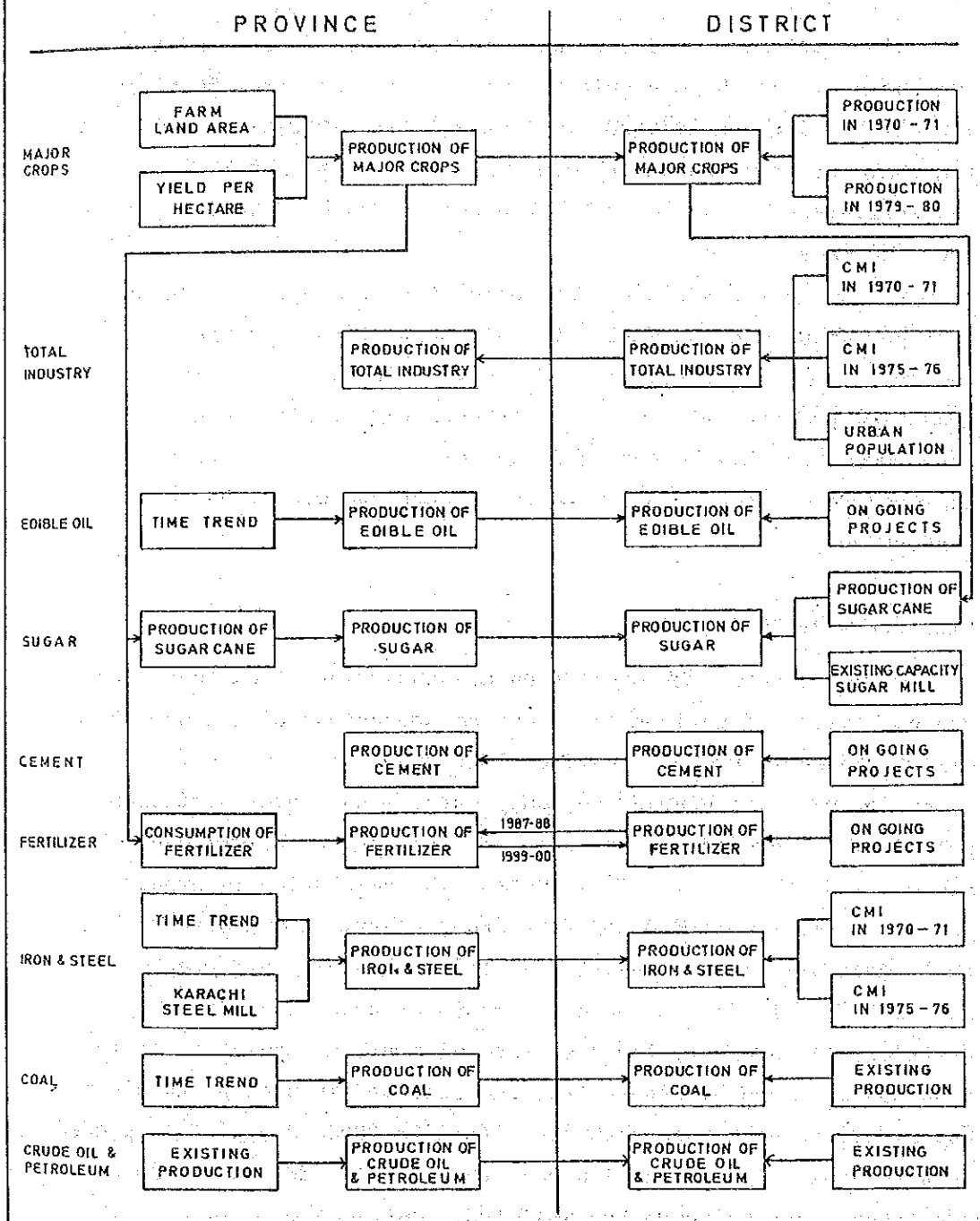


Fig. 1-3-2 Chart Showing the Method of Regional Economic Projection



Note: All provincial production are adjusted against the national total.

1-3-2 The Results

(1) Population

1) Province-wise Population

Table 1-3-1 shows the province-wise projection of population. The share of Punjab in population will be decline from 56.6% in 1980-81 to 55.1% in 1999-2000. Instead, from 1980-81 to 1999-2000 the share of Sind and Baluchistan will be up 1.5% and 1.6% respectively. As for NWFP, the share will be down 1.5 point over the same period.

Upto the year 1999-2000 urban population will grow at the rate of 4.5% per annum and the ratio of urban population in Pakistan will be up from 28.5% in 1980-81 to 34.3% in 1999-2000. Sind is the most urbanized province with 43.3% in 1980-81 and it will reach 48.6% in 1999-2000. In Punjab, NWFP and Baluchistan, the ratio is expected to be 34.8%, 15.9% and 16.7% upto the year 1999-2000, respectively.

2) District-wise Population

Fig. 1-3-3 shows the projection of population of national corridor. The population of national corridor as percentage of national total will increase from 48.7% in 1980-81 to 49.9% in 1999-2000.

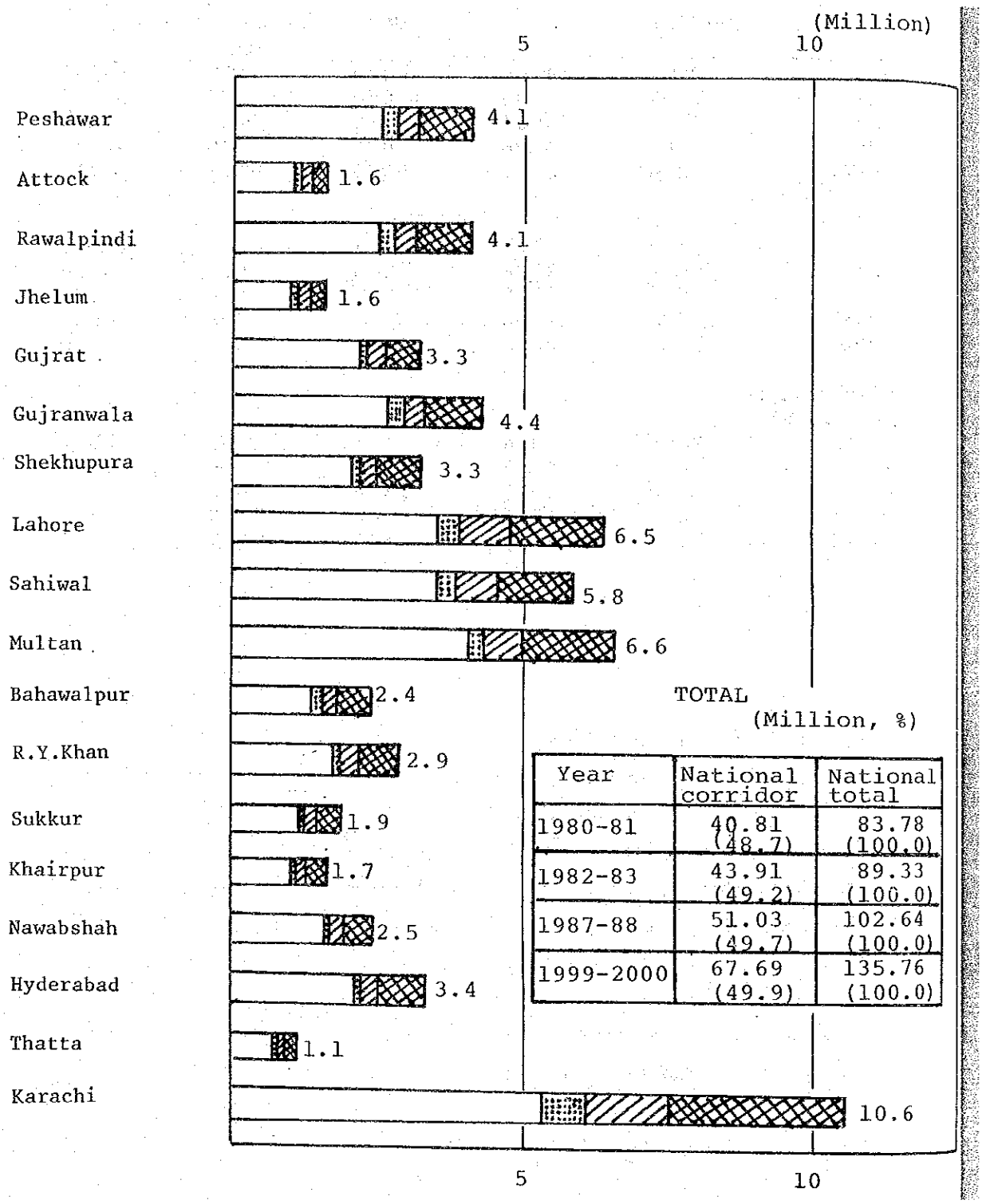
As for district population, only Karachi have over 5 million population at present in Pakistan and followed by Faisalabad, Multan, Sahiwal and Lahore. In 1999-2000 Karachi population is expected to be over 10 million and above four other districts are also expected to be over 5 million respectively, and the results are graphed in Fig. 1-3-4. Fig. 1-3-5 shows the ratio of urban population by district. At present, the districts with urban population of more than 80% are Karachi and Lahore, and followed by Quetta, Rawalpindi and Hyderabad with more than 40%. In 1999-2000, Quetta is expected to have urban population with more than 80% in addition to Karachi and Lahore, and followed by Rawalpindi, Gujranwala, Gwadar, Hyderabad and Faisalabad with more than 40%.

Table 1-3-1 Province-wise Projection of Population

(1000Persons)

	Punjab	Sind	NWFP	Baluchi-stan	Pakistan
1972-73	37845	14156	10879	2429	65309
1980-81	47451	18966	13060	4305	83782
1982-83	50367	20554	13619	4786	89327
1987-88	57361	24198	15075	6000	102635
1999-2000	74813	32747	19079	9116	135756
Share (%)					
1972-73	57.9	21.7	16.7	3.7	100.0
1980-81	56.6	22.6	15.6	5.1	100.0
1982-83	56.4	23.0	15.2	5.4	100.0
1987-1988	55.9	23.6	14.7	5.8	100.0
1999-2000	55.1	24.1	14.1	6.7	100.0
Ratio of urban population(%)					
1972-73	24.5	40.4	11.1	16.5	25.4
1980-81	28.1	43.3	12.6	15.6	28.5
1982-83	30.0	45.2	13.6	16.0	30.2
1987-88	32.7	47.6	15.0	16.4	32.7
1999-2000	34.8	48.6	15.9	16.7	34.3

Fig. 1-3-3 Projection of Population of National Corridor



Year	National corridor	National total
1980-81	40.81 (48.7)	83.78 (100.0)
1982-83	43.91 (49.2)	89.33 (100.0)
1987-88	51.03 (49.7)	102.64 (100.0)
1999-2000	67.69 (49.9)	135.76 (100.0)

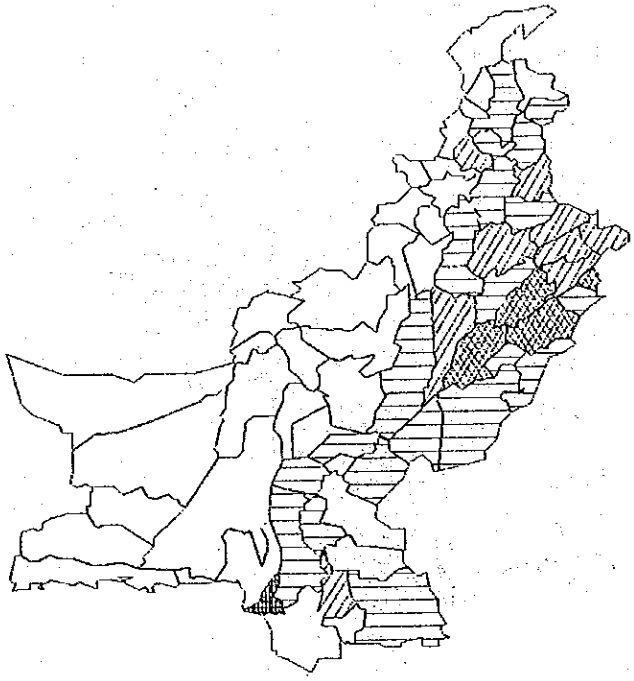
Note :

Population in 1999-2000

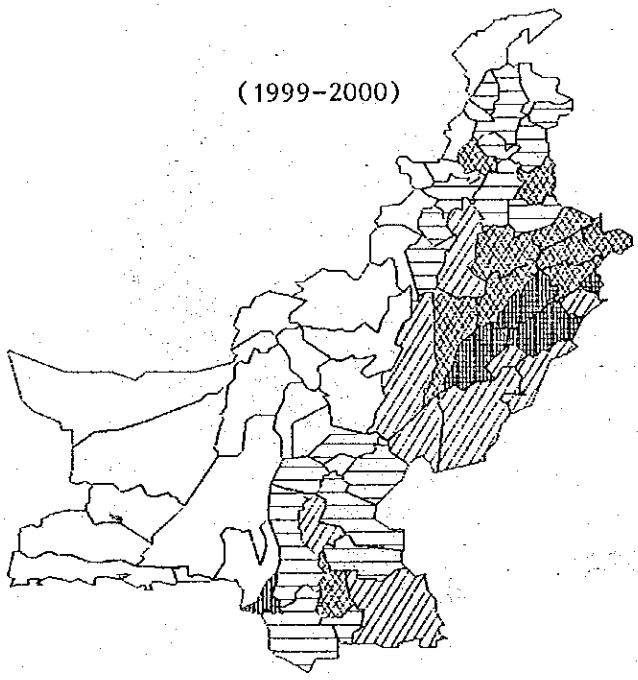
1980 -81 1982 -83 1987 -88 1999 -2000

Fig. 1-3-4 Distribution of Population

(1980-81)



(1999-2000)



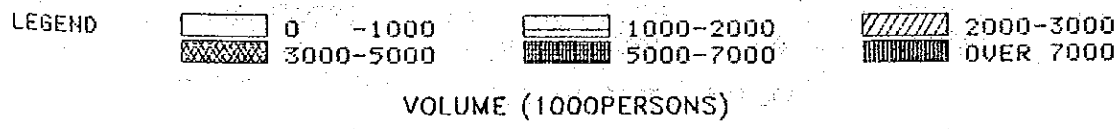
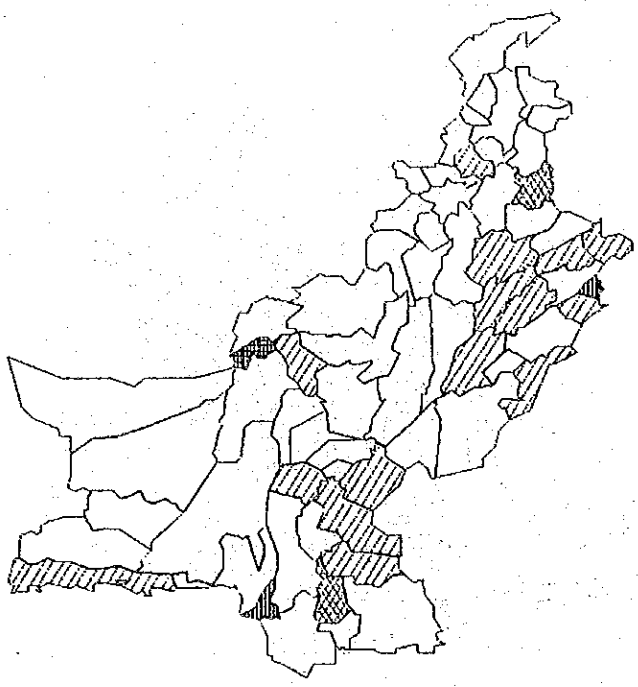
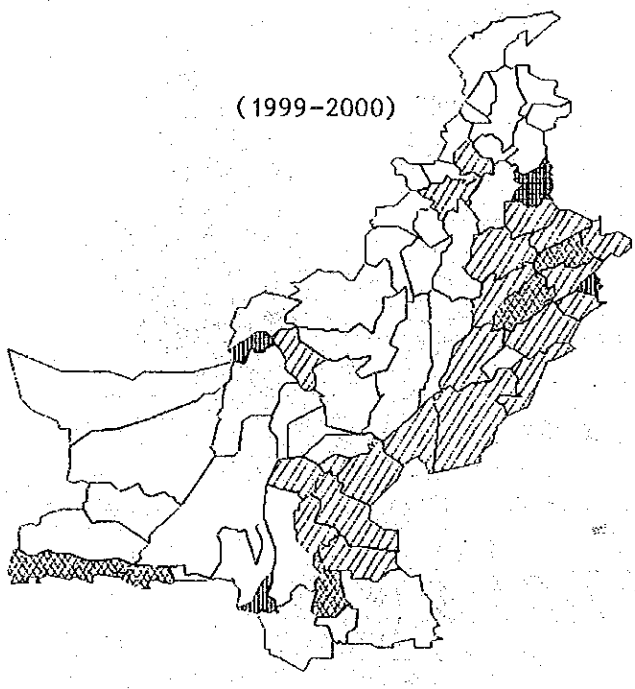


Fig. 1-3-5 Ratio of Urban Population

(1980-81)



(1999-2000)



LEGEND 0 - 20 20 - 40 40 - 60 60 - 80 OVER 80

VOLUME (PERCENTAGE)

An attempt has been made to compare the results of JICA Study projection with other existing projections of population in the cities with more than two million population at present (Karachi and Lahore). After reviewing papers/interview records of Karachi Development Authority, Lahore Development Authority, Demographic Section of PDD, ICAO Study and the World Bank, the following projections have been found available:

(Million persons)

Projection by:	In the year 2000	
	Karachi	Lahore
JICA Study Team 1)	10.16	5.80
KDA/LDA 2)	9.95	6.94
World Bank 3)	16.64	8.08
ICAO Report 4)	8.00	4.98

Note: 1) Urban population in Karachi/Lahore District
2) Population in Karachi/Lahore Metropolitan Area which is under the jurisdiction of KDA/LDA. Information has been obtained by the Team on its visits to KDA/LDA.
3) Population in Karachi/Lahore city
4) LONG RANGE PERSPECTIVE DEVELOPMENT PLAN FOR CIVIL AVIATION IN PAKISTAN (Interim Report)

Comparison of these four projections reveals that projection by JICA Study Team falls in the middle among other three projections but closer to the projection by KDA at the difference of 2.1%, and that projection by JICA Study Team for Lahore also falls in the middle of four projections.

(2) Production

1) Agriculture

a) Province-wise Production

The projected production of major crops by province is shown in Table 1-3-2. In the production projections it is assumed that

the share of inter-province production after 1982-83 will be constant because of past production which showed fluctuations due to the weather conditions.

About 70% of the production in major crops excluding rice is expected in Punjab. As for rice production, it is expected that half is in Punjab and another half is in Sind. In NWFP and Baluchistan, the share of major crops production is very few excluding wheat and sugarcane production in NWFP.

b) District-wise Production

The distribution of major crops production are graphed in Fig. 1-3-6 to Fig. 1-3-9.

For each crop, major places of production are as follows:

Wheat (over 0.9 million tonnes)

1980-81 ..... Sahiwal

1999-2000 ..... Sahiwal, Multan, Faisalabad, Sialkot, R.Y. Khan, Nawabshah, Jhang, Gujrat, Shekhupura

Rice (over 0.3 million tonnes)

1980-81 ..... Jacobabad, Larkana, Gujranwala

1999-2000 ..... Jacobabad, Larkana, Gujranwala, Badin, Shekhupura , Shikarpur, Sahiwal, Dadu

Sugarcane (over 2 million tonnes)

1980-81 ..... Faisalabad, Sahiwal, Peshawar

1999-2000 ..... Faisalabad, Sahiwal, Peshawar, R.Y. Khan, Multan, Bahawalnagar, Muzaffargarh, Jhang.

Cotton (over 0.1 million tonnes)

1980-81 ..... Multan

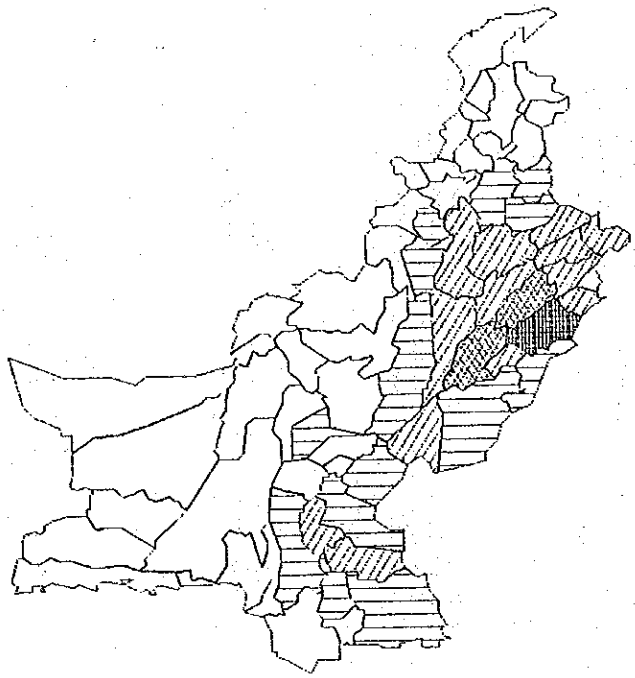
1999-2000 ..... R.Y. Khan, Multan, Bahawalpur

Table 1-3-2 Province-wise Projection of Major Crops Production

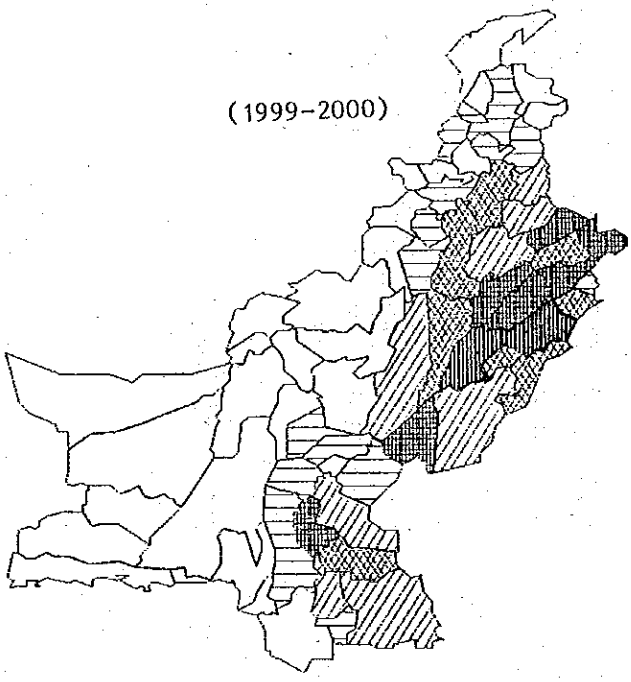
	Punjab	Sind	NWFP	Baluchistan	Pakistan
		Production (1000Tonnes)			
Wheat					
1971-72	5291	1081	440	79	6890
1980-81	8300	1949	815	239	11302
1982-83	8749	1891	904	200	11744
1987-88	10953	2368	1127	252	14700
1999-2000	17739	3825	1824	409	23807
Rice					
1971-72	992	1168	59	43	2262
1980-81	1362	1550	105	103	3120
1982-83	1687	1700	111	68	3566
1987-88	2083	2100	137	84	4404
1999-2000	3224	3250	213	130	6817
Sugarcane					
1971-72	13775	2785	3402	-	19963
1980-81	23733	5007	3598	-	32359
1982-83	20291	4229	3860	-	28380
1987-88	23439	4899	4466	-	32804
1999-2000	27899	5831	5316	-	39045
Cotton					
1971-72	529	178	1	-	707
1980-81	474	239	1	-	714
1982-83	448	212	1	-	661
1987-88	578	273	1	-	852
1999-2000	763	361	1	-	1125
		Share (%)			
Wheat					
1972-81	74.6	16.3	7.6	1.5	100.0
1983-2000	74.5	16.1	7.7	1.7	100.0
Rice					
1972-81	47.5	47.5	3.1	1.9	100.0
1983-2000	47.3	47.7	3.1	1.9	100.0
Sugarcane					
1972-81	71.3	14.9	13.8	-	100.0
1983-2000	71.5	14.9	13.6	-	100.0
Cotton					
1972-81	68.2	31.7	0.1	-	100.0
1983-2000	67.8	32.0	0.1	-	100.0

Fig. 1-3-6 Distribution of Wheat Production

(1980-81)



(1999-2000)



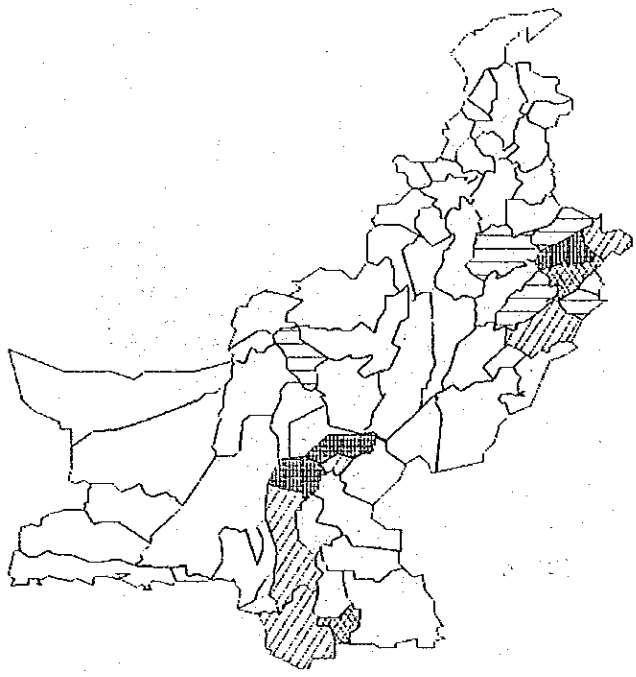
LEGEND

UNDER 100
100 - 300
300 - 600
600 - 900
900 -1200
OVER 1200

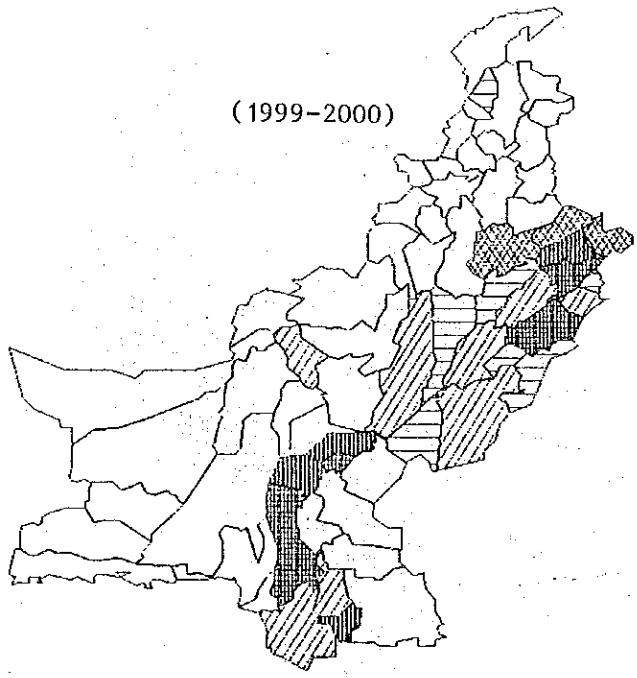
PRODUCTION (1000TON)

Fig. 1-3-7 Distribution of Rice Production

(1980-81)



(1999-2000)



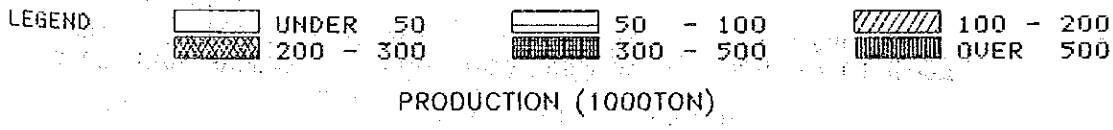
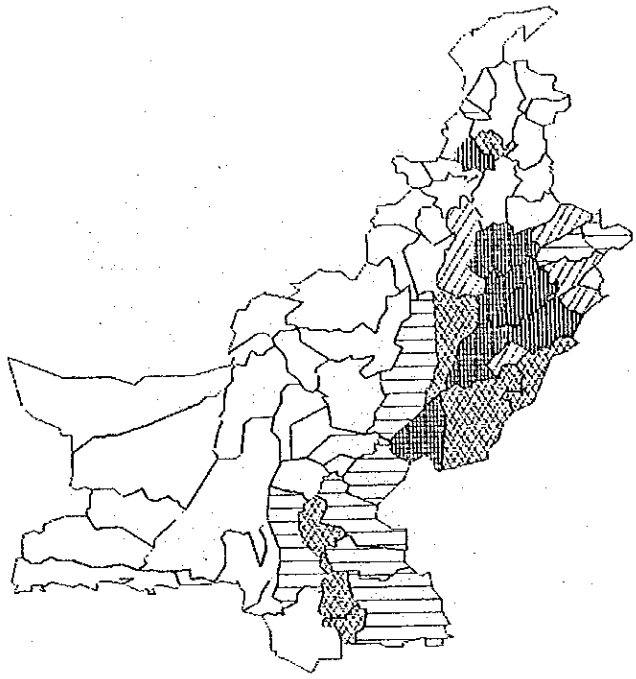
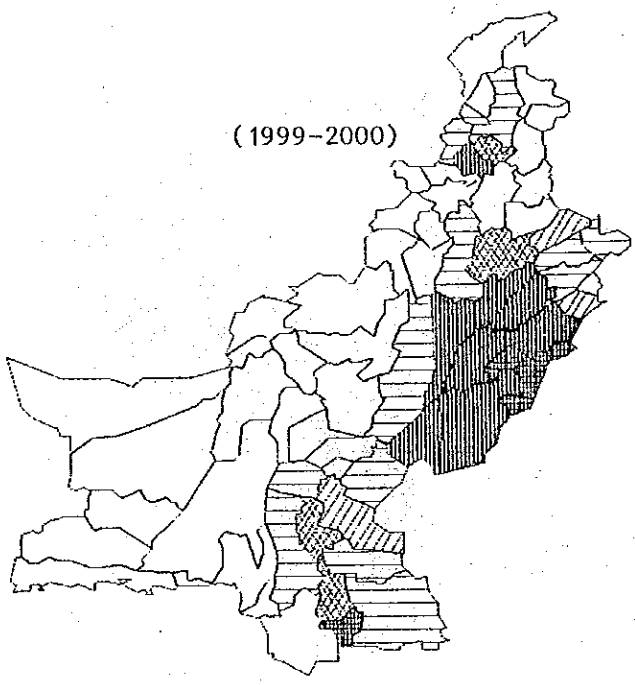


Fig. 1-3-8 Distribution of Sugarcane Production
(1980-81)



(1999-2000)



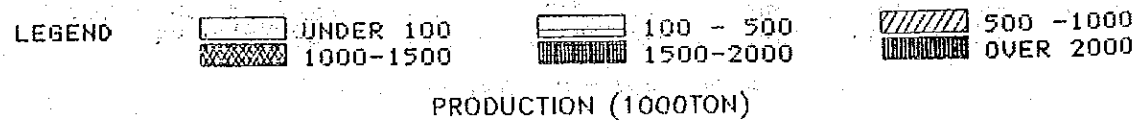
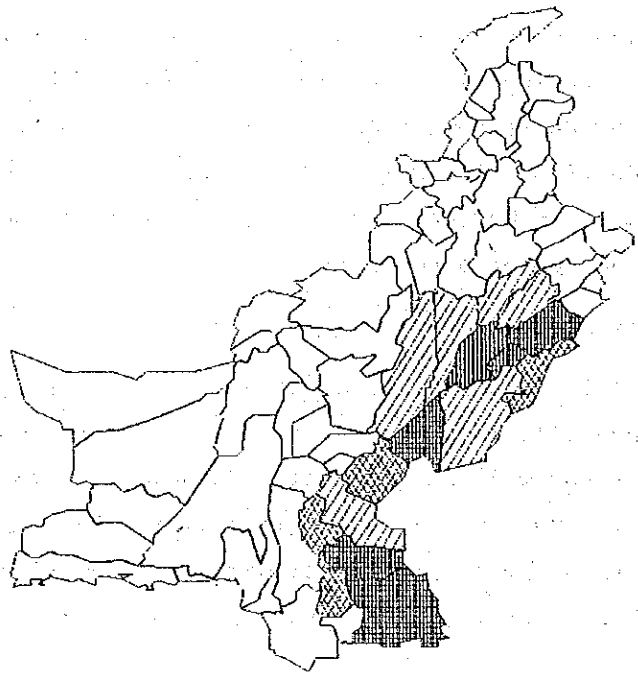
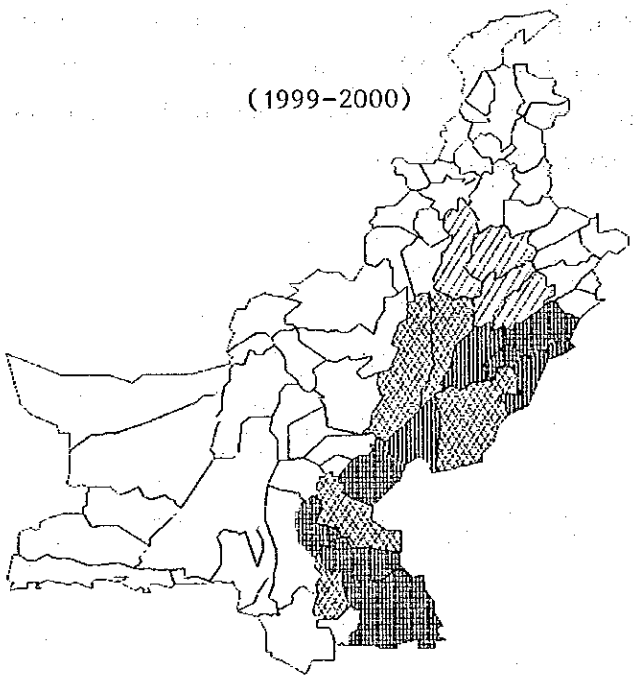


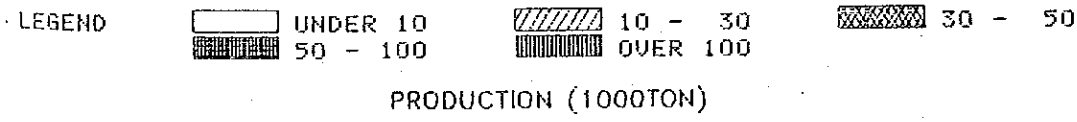
Fig. 1-3-9 Distribution of Cotton Production

(1980-81)



(1999-2000)





2) Manufacturing

a) Province-wise Production

Table 1-3-3 shows inter-province distribution of industrial production by commodity. Increased shares of NWFP are remarkable in sugar, cement and fertilizers production. In iron & steel production, Sind will be in an outstanding position until 1987-88 because of Karachi Steel Mill but relative position of Punjab will be enhanced thereafter.

b) District-wise Production

As for total industrial production in value terms, while no drastic change will take place inter-province, the share of national corridor will be gradually enhanced from 78.6% in 1980-81 to 79.7% in 1999-2000 as shown in Fig. 1-3-10.

The results of projection of industrial production in quantity terms by selected district are shown in Table 1-3-4.

3) Coal, Crude Oil and Petroleum Products

The projection of regional production of these items has been done based on existing distribution of its production which is obtained from Ministry of Petroleum & Natural Resources, and the results are shown in Table 1-3-5.

Table 1-3-3 Summary Projection of Industrial Production

Industry	Year	PAKISTAN	Share(%)			
			Punjab	Sind	NWFP	Baluchi-stan
All industry (Million Rp)	1970-71	47424	45.61	46.33	7.81	0.25
	1980-81	64708	42.15	49.87	7.80	0.18
	1982-83	72143	42.76	49.35	7.48	0.42
	1987-88	107256	42.85	49.50	6.74	0.91
	1999-2000	220800	42.98	49.56	6.19	1.27
Edible oil (1000t)	1972-73	182	52.24	35.82	11.94	-
	1980-81	505	57.62	29.31	11.29	1.78
	1982-83	551	57.71	29.22	11.25	1.81
	1987-88	979	59.86	29.01	8.38	2.76
	1999-2000	2364	61.29	26.86	7.91	3.93
Sugar (1000t)	1971-72	375	41.74	31.09	27.17	-
	1980-81	851	48.00	39.56	12.44	-
	1982-83	897	47.94	39.58	12.49	-
	1987-88	1481	39.70	40.72	19.58	-
	1999-2000	3366	38.44	40.31	21.27	-
Cement (1000t)	1972-73	2876	35.94	59.07	4.99	-
	1980-81	3538	37.68	52.91	9.41	-
	1982-83	4545	34.74	52.54	12.74	-
	1987-88	7810	29.77	37.31	20.14	12.77
	1999-2000	13178	29.77	37.31	20.14	12.77
Fertilizer (1000t)	1971-72	601	70.97	29.03	-	-
	1980-81	1605	65.19	34.81	-	-
	1982-83	1940	61.96	33.09	4.95	-
	1987-88	3016	70.09	26.36	3.55	-
	1999-2000	6869	68.64	24.79	5.39	1.18
Iron & steel (1000t)	1975-76	231	61.04	30.30	8.66	-
	1980-81	495	69.09	26.87	4.04	-
	1982-83	599	69.12	26.88	4.01	-
	1987-88	2392	27.26	71.74	1.00	-
	1999-2000	6051	49.99	49.02	0.99	-

Fig. 1-3-10 Projection of Industrial Production of National Corridor

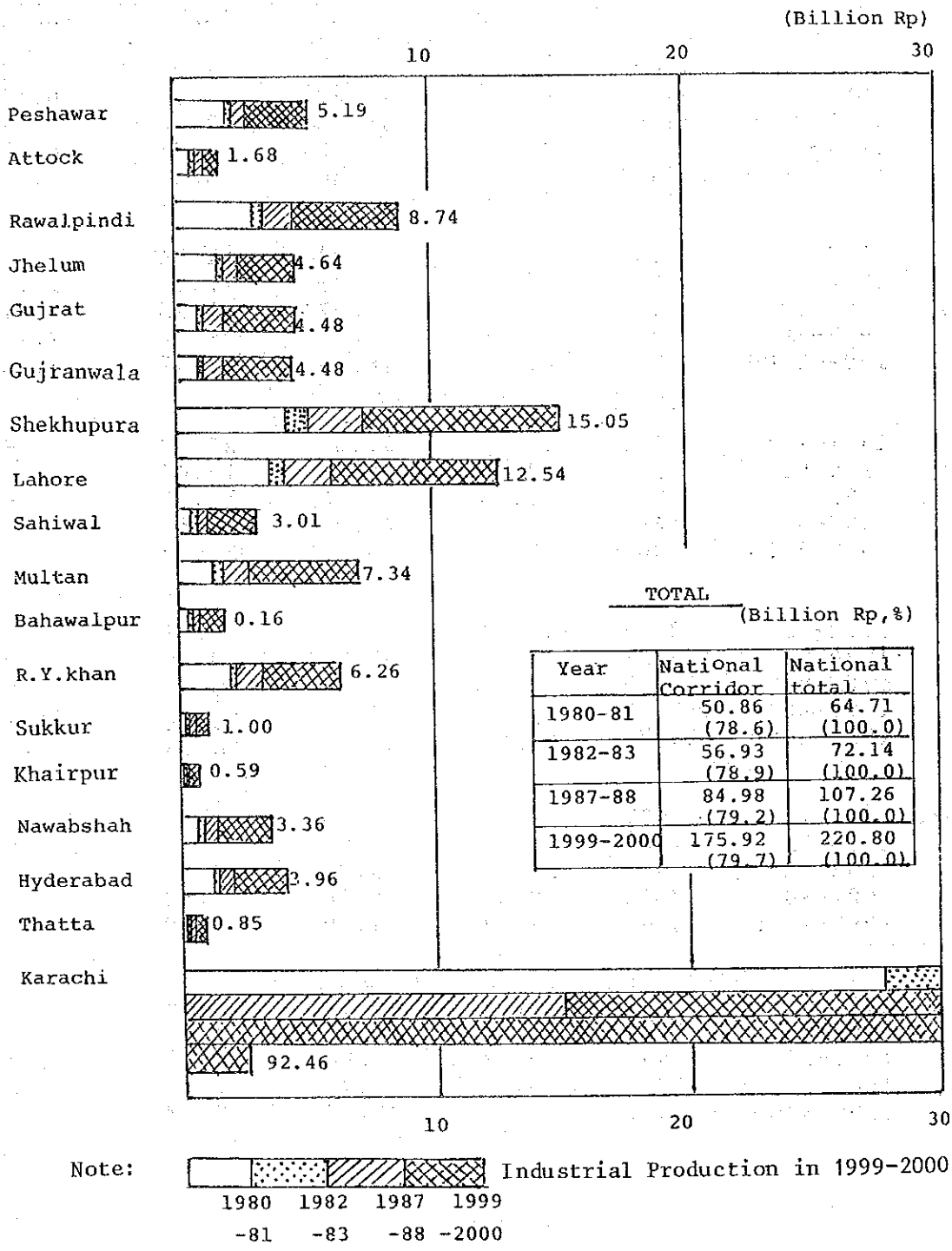


Table 1-3-4 Projection of Industrial Production by Selected District

(1000 tonnes)

	Edible oil	Sugar	Cement	Ferti-lizers	Iron & steel	Total
Karachi						
1980-81	110	-	670	-	130	910
1982-83	120	-	670	-	160	950
1987-88	190	-	920	-	1670	2780
1999-2000	420	-	1560	-	2890	4870
Faisalabad						
1980-81	100	100	-	70	-	270
1982-83	110	110	-	80	-	300
1987-88	190	110	-	100	-	400
1999-2000	460	200	-	220	10	890
Multan						
1980-81	60	-	-	640	-	700
1982-83	60	-	-	730	-	790
1987-88	100	40	-	920	-	1060
1999-2000	250	100	-	2050	-	2400
Lahore						
1980-81	20	-	-	-	230	250
1982-83	20	-	-	-	280	300
1987-88	30	-	-	-	440	470
1999-2000	80	-	-	-	2050	2130
Peshawar						
1980-81	30	50	-	-	20	100
1982-83	30	50	-	-	20	100
1987-88	30	180	990	-	20	1220
1999-2000	60	460	1670	-	60	2250
Sargodha						
1980-81	-	40	-	-	-	40
1982-83	-	40	-	-	-	40
1987-88	-	40	-	-	-	40
1999-2000	-	70	-	-	-	70
Rawalpindi						
1980-81	20	-	440	-	-	460
1982-83	20	-	440	-	-	460
1987-88	50	-	690	-	10	750
1999-2000	120	-	1170	-	20	1310
Hyderabad						
1980-81	30	60	960	-	-	1050
1982-83	30	60	960	-	-	1050
1987-88	50	120	960	-	50	1180
1999-2000	100	280	1620	-	80	2080

Note: The districts which have population more than 2 million and urban population more than 20% in 1980-81 are selected.

Table 1-3-5 Projection of Selected Mining and Energy Production by District

(1000Tonnes)

	1980-81	1982-83	1987-88	1999-2000
Coal				
Pakistan	1720	2506	6419	14457
Punjab	470	685	2146	4761
Mianwali	470	685	2146	4761
Sind	206	300	1142	3074
Dadu	168	245	931	2505
Thatta	38	56	211	569
NWFP	42	61	184	529
Peshawar	42	61	184	529
Baluchistan	1002	1460	2947	6093
Pishin	407	593	1196	2474
Loralai	156	228	460	951
Kalat	331	482	973	2011
Sibi	108	158	318	658
Crude oil				
Pakistan	532	619	1057	2417
Punjab	532	619	1057	2417
Attock	455	529	904	2067
Rawalpindi	9	10	17	39
Jhelum	69	80	136	312
Petroleum products				
Pakistan	4259	4688	6234	12499
Punjab	493	573	970	2211
Attock	493	573	970	2211
Sind	3766	4115	5264	10288
Karachi	3766	4115	5264	10288