Table 3-2-1 *Projection of Generated Commodity Volume*

('000t)

Commodity	Present	1988	2000
Maize	1,085	1,421	2,105
Wheat	582	672	1,015
Coffee	443	626	865
Tea	509	663	999
Cement	905	1,163	1,663
Sugar	514	472	543
Soda	238	595	992
Petroleum	1,753	2,041	2,856
Other	9,842	12,850	25,984
Total	15,877	20,503	37,022

3.2.2 *Modal Share*

Future rail and road transport quantity was projected based on the present figures by commodity and district (Table 3-2-3).

Total freight by district is forecasted in Table 3-2-4.

The results are summarised as follows:

Table 3-2-2 Potential Future Demand

('000t)

	Present	1988	2000
Railway	3,841	5,019	8,466 (5,761)
Road	12,030	15,484	28,552 (31,257)
Total	15,871	20,503	37,018

( ) *shows Demand for Scenario B*

For rail transport, a tremendous investment is necessary in order to develop the transport capacity to more than double that at present (see Part VI). Hence, future demand will be studied according to the next two scripts.

Scenario A: Case in which there are no restrictions on rail transport capacity.

Scenario B: Case in which railway transport capacity can only be increased to 1.5 times that at present.

In Scenario B, transport capacity will reach maximum by 1991. By 2000 the railway will be able to transport only 68% of the potential freight demand. In this case, roads must be increased to handle an additional capacity of 2,705 thousand tonnes by 2000.

Table 3-2-3 Projection of Freight Volume by Rail and Road

('000t)

Commodity \ Year	Present*)			1988			2000		
	Rail	Road	Total	Rail	Road	Total	Rail	Road	Total
Maize	655	1,514	2,169	858	1,984	2,842	1,271	2,937	4,208
Wheat	682	482	1,164	787	557	1,344	1,190	841	2,031
Coffee	509	377	886	719	533	1,252	993	736	1,729
Tea	68	951	1,019	88	1,238	1,326	134	1,866	2,000
Cement	745	1,064	1,809	958	1,368	2,326	1,369	1,956	3,325
Sugar	521	507	1,028	478	466	944	551	536	1,087
Soda, Soda Ash and Soda Products	341	135	476	852	338	1,190	1,421	562	1,983
Petroleum	962	2,543	3,505	1,120	2,962	4,082	1,568	4,145	5,713
Other	3,197	16,486	19,683	4,174	21,526	25,700	7,955	44,012	51,967
Total	7,681	24,059	31,740	10,034	30,972	41,006	16,453	57,591	74,044

*) OD Traffic Volume by KRC Road Traffic Census, March 1983

Table 3-2-4 Future Commodity Prospects: (Generated & Attracted)

(Tonnes/Year)

		PRESENT		1988		2000	
		RAIL	ROAD	RAIL	ROAD	RAIL	ROAD
1	NAIROBI	1780856.	5412180.	2243298.	6417955.	3733705.	11821884.
2	KIAMBU	294105.	919599.	373542.	1105347.	694335.	2130212.
3	KIRINYA	0.	266786.	0.	315502.	0.	584132.
4	MURANG'A	109824.	574075.	140765.	685557.	228097.	1326462.
5	NYANDARU	39127.	165814.	49965.	199251.	84033.	388133.
6	NYERI	84307.	295734.	104405.	352726.	173125.	665665.
7	KILIFI	0.	426716.	0.	509059.	0.	977433.
8	KWALE	0.	497385.	0.	593190.	0.	1152003.
9	LAMU	0.	23389.	0.	26770.	0.	48355.
10	MOMBASA	2144139.	3061622.	2935305.	3634983.	5088818.	6517945.
11	TAI/TAVE	18556.	151966.	22489.	188867.	40512.	364094.
12	TANA RIV	0.	33479.	0.	83411.	0.	382318.
13	EMBU	0.	315402.	0.	365323.	0.	655094.
14	ISIOLO	0.	2323.	0.	2725.	0.	5110.
15	KITUI	0.	169412.	0.	198626.	0.	376606.
16	MACHAKOS	430515.	1096904.	549789.	1361405.	928419.	2522109.
17	MARSABIT	0.	6006.	0.	6987.	0.	12043.
18	MERU	32814.	174033.	40802.	212870.	64471.	399986.
19	GARISSA	0.	108573.	0.	123885.	0.	224860.
20	MANDERA	0.	30591.	0.	36766.	0.	72468.
21	WAJIR	0.	9952.	0.	11235.	0.	19940.
22	KISII	0.	527491.	0.	625404.	0.	1123774.
23	KISUMU	507211.	2567644.	590455.	3384229.	923680.	6171089.
24	SIAYA	0.	120687.	0.	238003.	0.	428845.
25	S.NYANZA	6754.	643770.	8790.	1674255.	16276.	2884379.
26	KAJIADO	205919.	170397.	459590.	202041.	771814.	383360.
27	KERICHO	84872.	555491.	110502.	663391.	178309.	1168938.
28	LAIKIPIA	126921.	95791.	158871.	113324.	254185.	215316.
29	NAKURU	642374.	1402203.	792720.	1679821.	1350927.	3104297.
30	NAROK	0.	290459.	0.	968240.	0.	1608470.
31	TRANS-NZ	166796.	456705.	213909.	543653.	358548.	976830.
32	UASIN-GI	406633.	1146060.	511119.	1371548.	880037.	2551094.
33	BARINGO	0.	30870.	0.	44195.	0.	88150.
34	ELGEYO M	0.	6684.	0.	11759.	0.	23556.
35	NANDI	0.	105023.	0.	126154.	0.	209371.
36	SAMBURU	0.	843.	0.	1014.	0.	2033.
37	TURKANA	0.	40466.	0.	242105.	0.	874837.
38	W.POKOT	0.	35885.	0.	127061.	0.	242309.
39	BUNGOMA	346080.	465501.	405323.	554773.	638678.	1065788.
40	BUSIA	0.	59772.	0.	125532.	0.	240823.
41	KAKAMEGA	24830.	536293.	32311.	626275.	54456.	1148187.
42	INLAND	228791.	1059725.	296221.	1212628.	476624.	1945527.
43	TOTAL	7681424.	24059504.	10038157.	30967616.	16939024.	57103568.
PROVINCE							
1	NAIROBI	1780856.	5412180.	2243298.	6965938.	3733705.	12940938.
2	CENTRAL	527363.	2222008.	668676.	2885359.	1179589.	5576856.
3	COAST	2162695.	4194557.	2957794.	5409312.	5129330.	9962144.
4	EASTERN	463329.	1764080.	590591.	2283764.	992890.	4257857.
5	N. EASTERN	0.	149116.	0.	186562.	0.	347301.
6	NYANZA	513965.	3859592.	599245.	4958495.	939956.	9014353.
7	RIFT VAL	1633515.	4336877.	2246709.	5600186.	3793818.	10296177.
8	WESTERN	370910.	1061566.	435635.	1362035.	693134.	2578619.
9	INLAND	228791.	1059725.	296221.	1316166.	476624.	2129690.
10	TOTAL	7681424.	24059504.	10038157.	30967616.	16939024.	57103568.

3.2.3 Future Road Traffic Demand

(1) Number of Automobiles

The number of passengers transported by car per day in 1983 was 107,000. By 2000, this number will increase to a little less than double that at present – 199,000 per day. As a result, passenger car traffic will rise from 12,000 veh./day in 1983 to 22,000 veh./day in 2000.

On the other hand, freight traffic by car will be 2.37 times that of 1983 by the year 2000: 31,000 t/day in 2000 from 13,000 t/day in 1983.

Table 3-2-5 Forecast of Road Traffic: 1983–2000

	1983	1988	2000
Traffic Volume			
Passengers/day	107,331	129,046 (3.8) 1)	199,110 (3.7) 2)
Freight '000tonnes/year	12,030	15,484 (5.2)	28,552 (5.3)
Vehicle Traffic			
Passenger vehicles/day	11,985	14,413 (3.8)	22,238 (3.7)
Freight vehicles/day	13,136	16,908 (5.2)	31,177 (5.3)

Note: 1) Annual Growth Rate 1983–1988 (%)
2) Annual Growth Rate 1988–2000 (%)

(2) Assigned Traffic on Road

The origin-destination tables on road traffic are computed based on present OD traffic and future trip generation in each zone, and are summarised in Appendix II;

Table II-1 Car OD Table, vehicles/day (1983)

Table II-2 Car OD Table, vehicles/day (2000)
Scenario A: without railway capacity limitations

Table II-3 Car OD Table, vehicles/day (2000)
Scenario B: with railway capacity limitations

Table 3-2-6 Total of Projected Trips Generated and Attracted

(Unit: Average Day)

		PASSENGERS			PASSENGER CARS			FREIGHT CARS		
		1983	1988	2000	1983	1988	2000	1983	1988	2000
1	NAIROBI	40285.	45570.	81055.	4611.	5216.	9277.	4928.	5843.	10763.
2	KIAMBU	6943.	7452.	11113.	923.	991.	1477.	1505.	1809.	3487.
3	KIRINYA	2280.	2448.	3654.	320.	344.	513.	418.	494.	915.
4	MURANG'A	5427.	5826.	8698.	647.	695.	1037.	799.	954.	1846.
5	NYANDARU	1376.	1476.	2202.	147.	157.	235.	236.	284.	553.
6	NYERI	4987.	5353.	7994.	528.	567.	846.	373.	445.	839.
7	KILIFI	8664.	9377.	14272.	761.	824.	1254.	909.	1084.	2082.
8	KWALE	9229.	9990.	15194.	874.	946.	1438.	933.	1112.	2160.
9	LAMU	390.	419.	632.	13.	14.	21.	29.	33.	60.
10	MOMBASA	16875.	18246.	27759.	1706.	1845.	2806.	2292.	2721.	4880.
11	TAI/TAVE	1343.	1524.	2423.	119.	136.	216.	191.	237.	457.
12	TANA RIV	330.	748.	2817.	13.	30.	113.	33.	82.	375.
13	EMBU	4614.	5016.	7655.	474.	515.	787.	456.	528.	947.
14	ISIOLO	99.	108.	165.	20.	21.	33.	27.	31.	59.
15	KITUI	2869.	3120.	4754.	148.	161.	245.	146.	171.	324.
16	MACHAKOS	9934.	10705.	16315.	1283.	1438.	2191.	1392.	1727.	3200.
17	MARSABIT	19.	21.	31.	1.	2.	2.	10.	12.	20.
18	MERU	1090.	1210.	1844.	134.	149.	227.	129.	158.	297.
19	GARISSA	264.	319.	513.	7.	8.	13.	37.	42.	77.
20	MANDERA	9.	10.	16.	3.	3.	5.	18.	22.	43.
21	WAJIR	9.	10.	16.	2.	3.	4.	7.	7.	13.
22	KISII	2656.	2803.	3971.	439.	463.	656.	791.	938.	1685.
23	KISUMU	38494.	45082.	63906.	4168.	4881.	6920.	3638.	4795.	8744.
24	SIAYA	6367.	11430.	16199.	607.	1090.	1545.	241.	476.	857.
25	S.NYANZA	8552.	20031.	28389.	647.	1514.	2146.	936.	2454.	4193.
26	KAJIADO	1301.	1430.	2258.	191.	210.	332.	252.	298.	566.
27	KERICHO	2119.	2329.	3679.	360.	396.	625.	605.	722.	1272.
28	LAIKIPIA	552.	608.	959.	123.	136.	214.	97.	115.	218.
29	NAKURU	5669.	6233.	9843.	968.	1065.	1681.	1397.	1673.	3092.
30	NAROK	478.	1578.	2492.	66.	218.	345.	184.	613.	1018.
31	TRANS-NZ	4960.	5468.	8638.	424.	466.	736.	351.	417.	750.
32	UASIN-GI	7766.	8541.	13482.	923.	1015.	1602.	1059.	1267.	2357.
33	BARINGO	183.	240.	379.	47.	61.	97.	66.	94.	188.
34	ELGEYO M	47.	75.	119.	7.	12.	19.	7.	13.	26.
35	NANDI	1680.	1844.	2912.	146.	160.	253.	90.	108.	179.
36	SAMBURU	67.	73.	116.	13.	14.	22.	16.	19.	39.
37	TURKANA	20.	110.	348.	8.	45.	143.	27.	162.	585.
38	W.POKOT	393.	1312.	2070.	22.	72.	114.	25.	90.	171.
39	BUNGOMA	3971.	4235.	6229.	472.	504.	741.	417.	497.	955.
40	BUSIA	2976.	5403.	7936.	304.	551.	810.	128.	268.	514.
41	KAKAMEGA	9674.	10318.	15176.	1267.	1352.	1988.	841.	982.	1800.
42	INLAND	0.	0.	0.	0.	0.	0.	245.	281.	450.
43	TOTAL	214622.	258091.	398220.	23970.	28825.	44476.	26272.	33815.	62354.

Future car OD traffic is considered to travel on the road requiring the least travelling time.

The assigned freight volume by road for each scenario is shown in Figures 3-2-1 and 3-2-2.

The number of road vehicles for each scenario is shown in Figures 3-2-3 and 3-2-4.

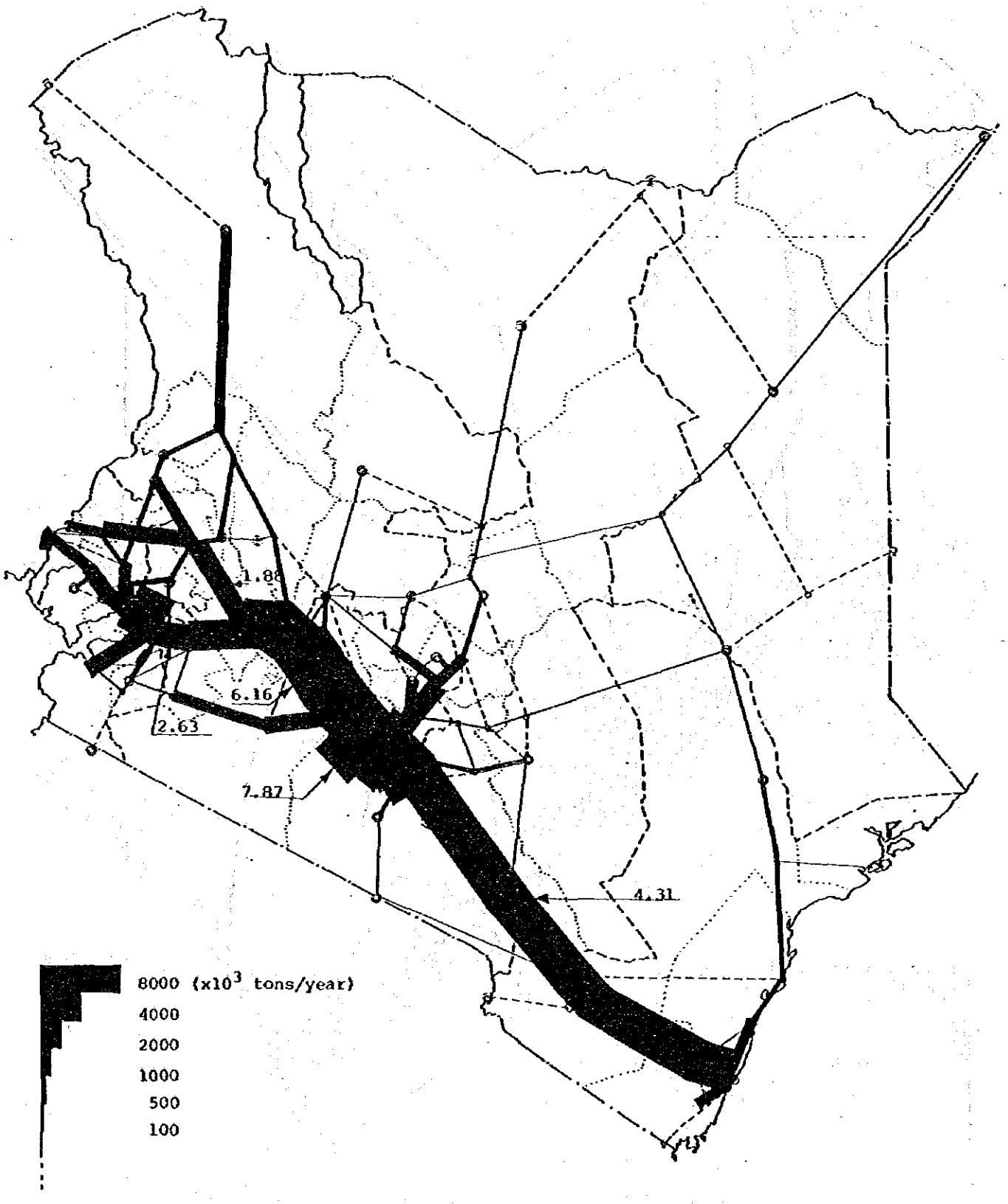


Fig. 3-2-1 Freight Traffic Volume by Road in 2000: Scenario A

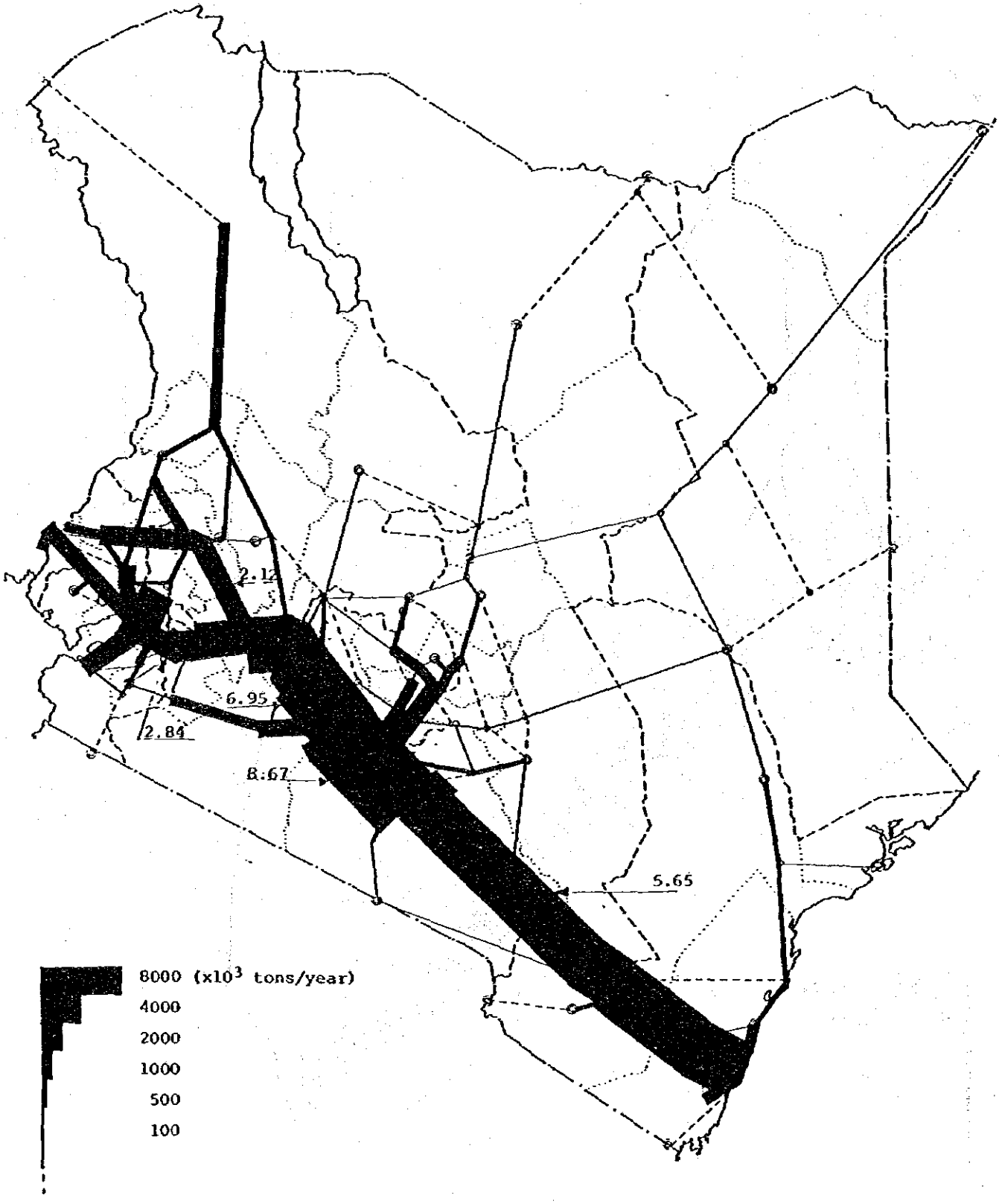


Fig. 3-2-2 Freight Volume by Road in 2000: *Scenario A*

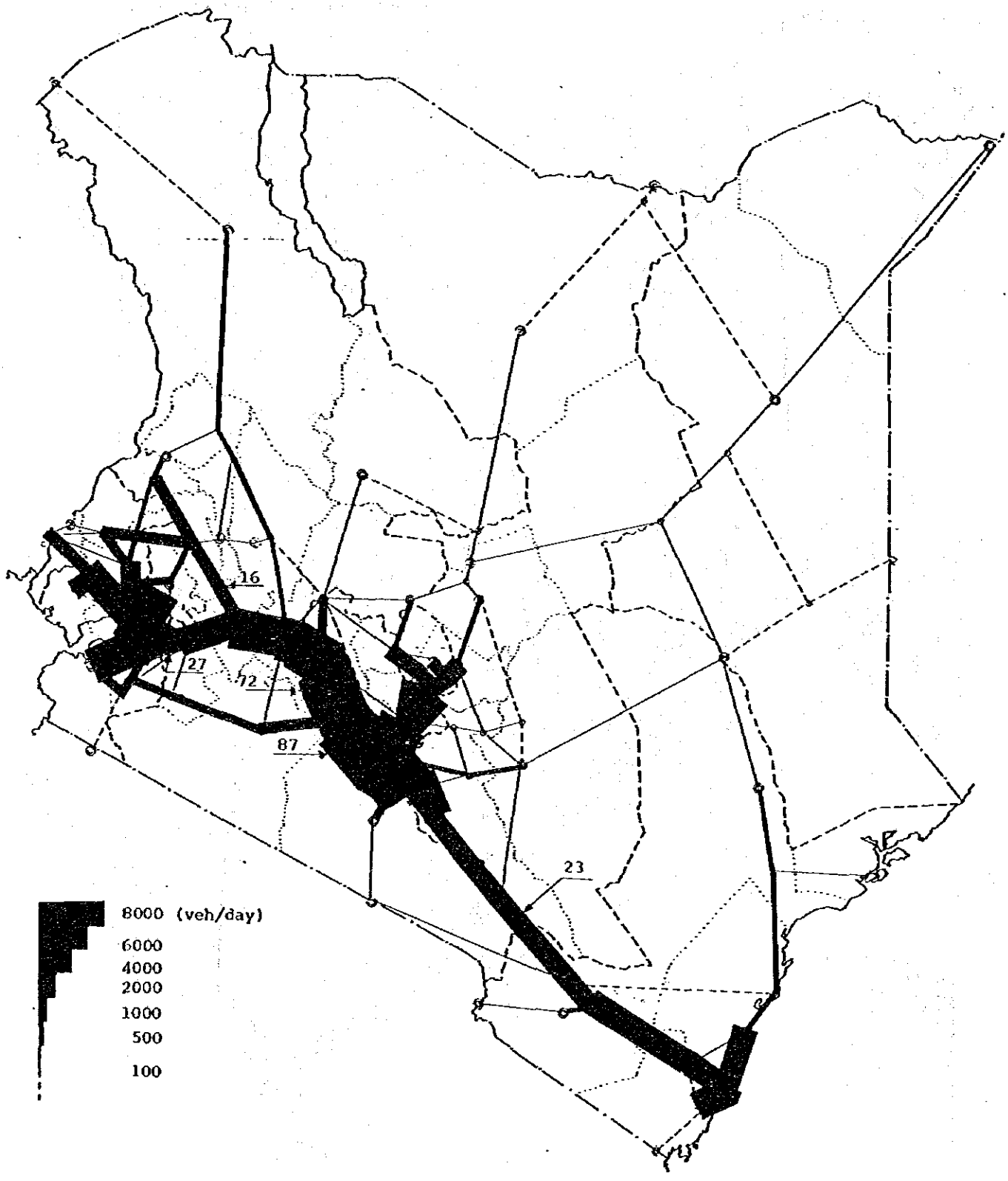


Fig. 3-2-3 Annual Average of Daily Traffic, Vehicles/day in 2000. Scenario B

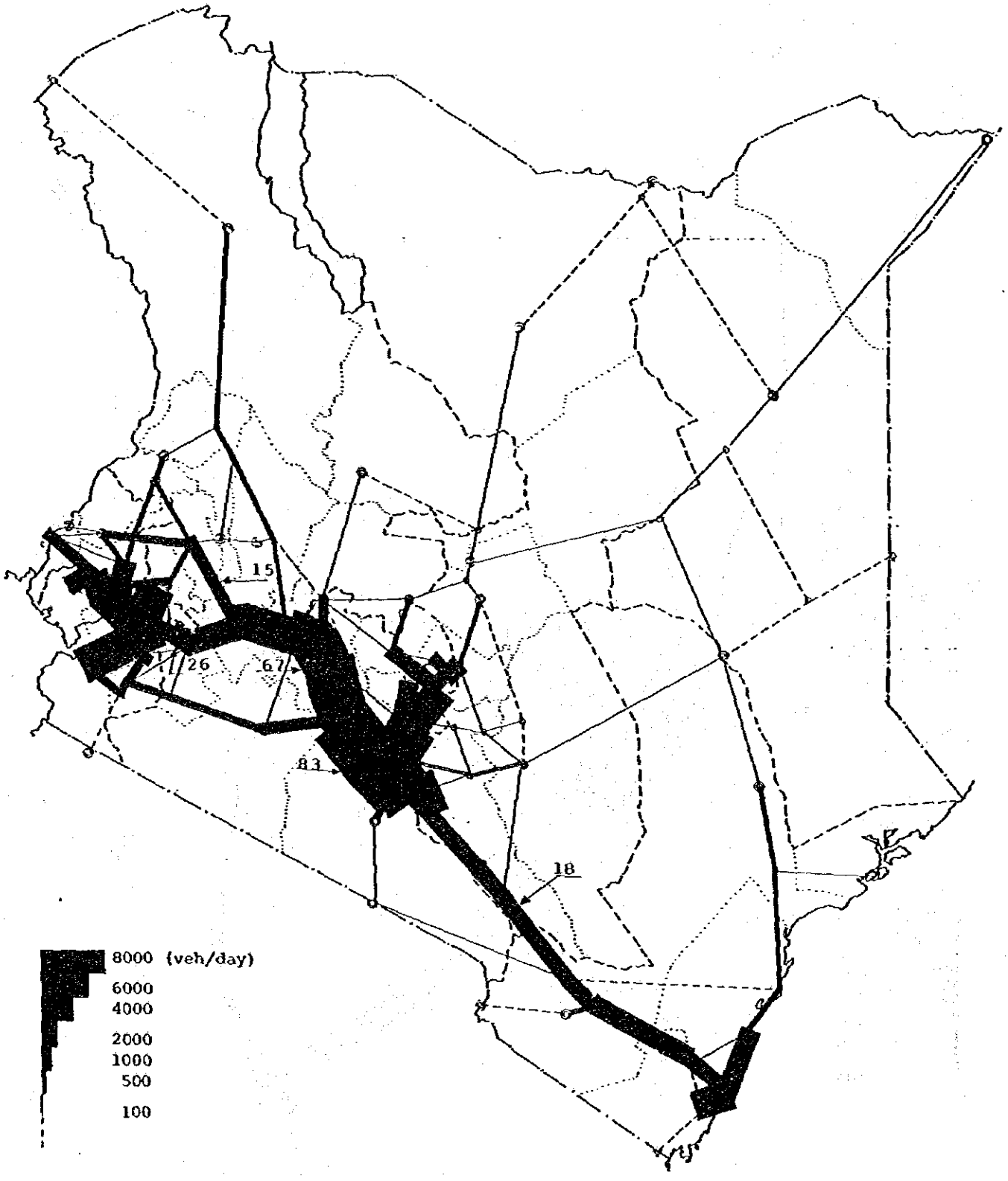


Fig. 3-2-4 Annual Average of Daily Traffic, Vehicles/day in 2000: Scenario B

3.2.4 Future Railway Traffic Demand

(1) Total Traffic

The number of passengers transported by railway was 2,279 passengers per day in 1982; this will increase to 4,963 passengers by 2000. Freight volume transported by railway was 4,473 thousand tonnes per day in 1982 and will increase to 9,857 thousand by 2000.

(2) Link Flow

Future OD traffic volume by railway is assigned by railway links, and potential traffic demand on each link by 2000 will be a little more than double that at present. (see Figures 3-2-4, 3-2-5, 3-2-6 and 3-2-7)

Fig. 3-2-4 Present Passenger Traffic by Link: 1982

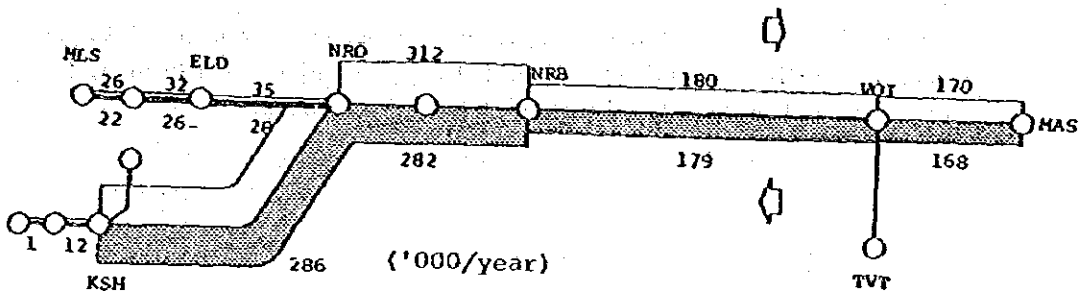
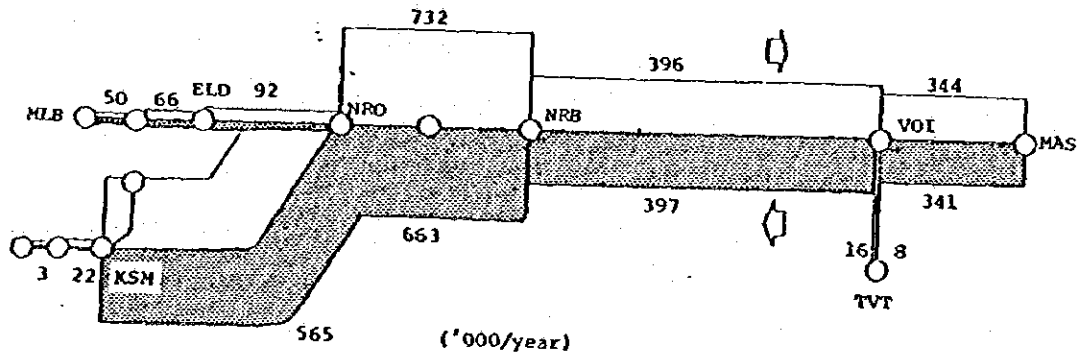
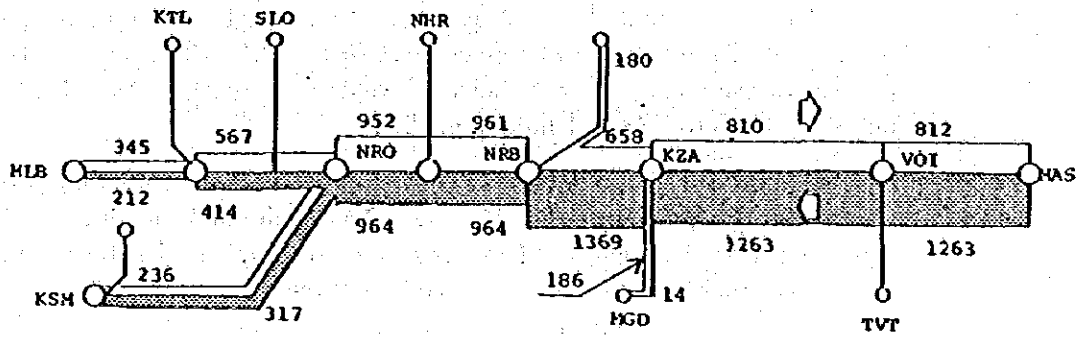


Fig. 3-2-5 Projected Passenger Traffic Link: 2000



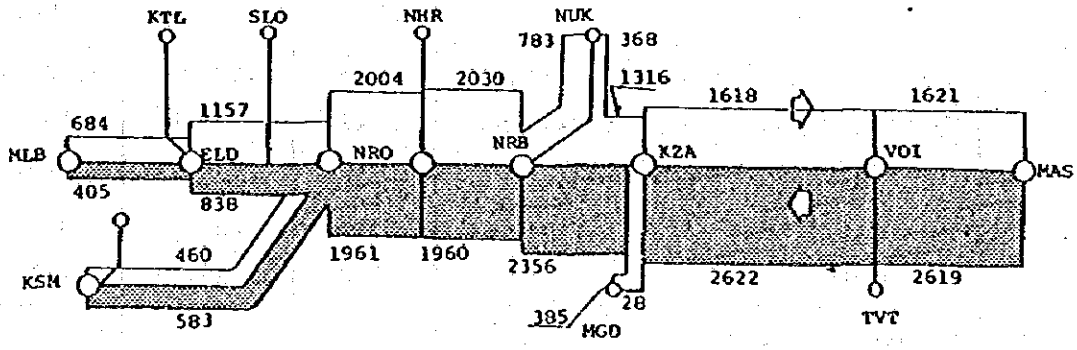
Note: Figures are based on passengers for 12 busy stations tions

Fig. 3-2-6 Present Freight Traffic by Link: 1982



('000 tonnes/year)

Fig. 3-2-7 Projected Freight Traffic by Link: 2000



('000 tonnes/year)

Note: Figures are based on good between 50 stations

4. Oil Transport

4.1 Review of Oil Trade and Consumption

4.1.1 Oil Trade

Table 4.1.1 shows that the total quantity of imported crude oil into Kenya fell by 15% from 3,075,500 tonnes in 1980 to 2,611,100 tonnes in 1981. Because of the large price rise, however, value rose by 31.8% from K£256.6 million in 1980 to K£338.1 million in 1981.

Total imported crude oil quantity has been fairly stable over the long period, i.e., 2,499 thousand tonnes in 1972 and 2,611 thousand tonnes in 1981. It is unlikely that the highest experienced crude oil import of 3,075 thousand tonnes will again be realised due to lack of foreign exchange and increased prices. On the other hand, Kenya exports a substantial amount of petroleum products including petroleum fuels, lubricating oils and lubricating greases. Exported volume of these products was 1,618 thousand tonnes and 1,185 thousand tonnes for the years 1980 and 1981, respectively. Exports have shown a decreasing trend over the long-term as domestic consumption demand has grown.

Payments for imported crude oil have been increasing in terms of their share of GDP, to 11.2% in 1981, while the share of petroleum products exported amounted to just 5.2%.

The major oil consumers in the transport sector are in the order of vehicles, aviation, maritime transport and the railways.

Table 4-1-1 Oil Trade and GDP

		1972	1980	1981
Value	GDP at market price (K£ million)	752.6	2,626.5	3,023.2
	Export of petroleum (K£ million)	19.41	160.88	158.02
	Products & by-products (%)	(2.6)	(6.1)	(5.2)
	Import of crude (K£ million)	14.59	256.58	338.13*
	Petroleum (%)	(1.9)	(9.8)	(11.2)
Quantity	Export of petroleum products & by-products ('000t)	3,358	1,618	1,185
	Import of crude petroleum ('000t)	2,499	3,075	2,611

* Tentative

4.1.2 Petroleum Production and Consumption

Petroleum throughput produced in the Mombasa refinery is not only for domestic use but also for export to neighbouring East African countries such as Uganda, Rwanda and Burundi.

Table 4-1-2 shows the quantity of petroleum produced at the refinery. Crude oil imports which amounted to 3.0 million tonnes in 1980 were reduced to 2.7 million tonnes in 1981 as a result of the lack of foreign currency. The quantity of white oil products including gasoline, kerosene, and jet fuel increases each year while the quantity of black oil products, which include heavy oil and fuel oil decreases, indicating a change in the oil consumption pattern. Because of this change the share of residues to total throughput increased from 10.8% in 1977 to 20% in 1981. It is estimated that about 1.7 million tonnes of petroleum products from the refinery are consumed in Kenya and about 0.5 million tonnes are exported to neighbouring East African countries. The residues produced through the refinery process are transported overseas by ships. Figure 4-1-1 shows this oil traffic flow.

Table 4-1-2 East Africa Oil Refinery Production

('000t)

	1977	1978	1979	1980	1981
Crude Petroleum	2,570.2	2,584.7	2,739.1	3,038.6	2,708.8
L.P.G	19.4	19.3	21.0	24.1	22.3
White oil	1,189.6	1,234.2	1,234.2	1,389.3	1,310.7
Black oil	939.1	827.8	974.2	936.0	715.8
Bitumen	34.0	22.1	36.7	31.0	33.1
Refinery Usage	103.0	122.0	109.6	97.2	87.8
Residues	276.4	366.5	362.5	561.4	542.3
Other	8.6	-5.3	0.9	-0.4	-3.2
Total	2,570.2	2,584.7	2,739.1	3,038.6	2,708.8

Source: "Statistical Abstract, 1982" C.B.S.

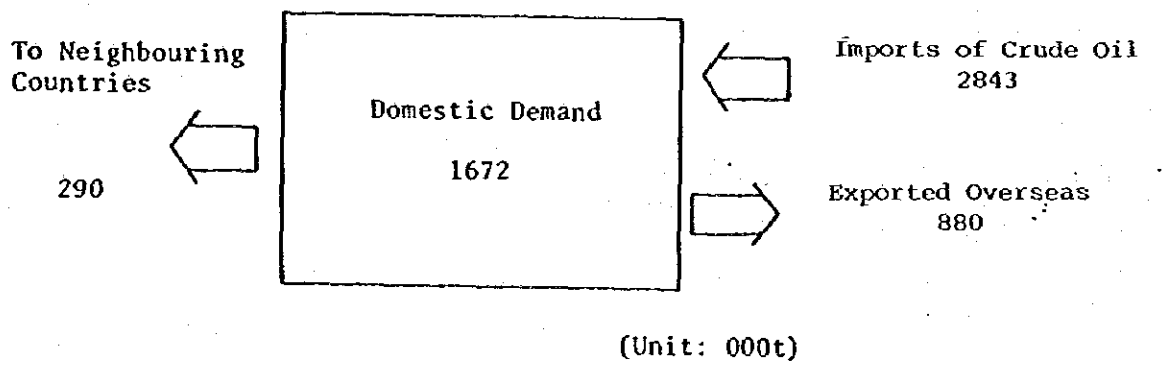


Fig. 4-1-1 Oil Trade Flow: 1981

Table 4-1-3 Petroleum Demand and Sales by Consumer Category '000 tonnes

	1974	1977	1980	1981
Demand				
Motor spirits	225.7	270.5	300.8	298.5
Jet/turbo fuel	238.9	290.0	347.9*	343.5
Light diesel	250.1	311.8	408.5	375.6
Fuel oil	412.0	512.1	462.1	420.4
Other	112.0	120.4	157.1	146.5
Total	1238.7	1504.8	1671.0	1584.5
Refinery usage	114.1	103.0	97.2	87.8
Export of petrol fuels	1588.7	1365.0	1581.8	1169.5
Total Demand	2941.4	2972.8	3350.0	2841.8
Agriculture	-	64.0	69.1	-
Road transport and retail pump outlets	-	428.0	520.8	-
Rail transport	-	89.8	70.7	-
Marine	-	132.4	142.4	-
Aviation	-	324.2	372.1*	-
Power generation	-	124.4	150.7	-
Industrial, commercial and others	-	360.7	497.3	-
Government	-	48.7	92.5	-
Balancing Item	-	67.4	244.6	-
Total	1238.7	1504.8	1671.0	1584.5

* About 87 per cent of total sales to foreign airlines at Kenyan airports

4.2 Petroleum Demand Forecast

4.2.1 Domestic Demand

Domestic oil consumption in future is projected as follows:

Table 4-2-1 Future Domestic Petroleum Demand

('000t)

	1983	1988	1993	2000	Growth %
Residential	82	115	161	259	7
Commercial	113	132	153	188	3
Industrial & Transport	1,508	1,608	1,768	2,097	2
Agriculture	82	105	135	191	5
Total	1,785	1,960	2,217	2,735	2.7

* Notes: Based on Ministry of Energy forecast

4.2.2 *Demand by Neighbouring Countries*

Petroleum products exported to neighbouring countries are shown in Table 4-2-2. The quantity exported fluctuated during 1977 and 1981, making it difficult to project future exports.

Volume of petroleum exported to neighbouring countries was 290 thousand tonnes in 1981. In this study, it is assumed that the growth rate of petroleum products exported will be the same as the population growth in those countries, 3.0% p.a. We thus find that exports will become 357 thousand tonnes in 1988 and 509 thousand tonnes in 2000.

Table 4-2-2 Petroleum Exported to Foreign Countries*

('000t)

1978	1213.5
1979	1036.9
1980	1618.4
1981	1185.8
1982	886.9

* Includes aircraft and ship stores

Source: Economic Survey 1983

Table 4-2-3 Projected Total Petroleum Demand*

('000t)

	1981	1988	2000
Kenya	1672	1960	2735
Neighbouring Countries	290	357	509
Total	1962	2317	3244

* Excludes Residues

4.2.3 Oil Traffic Flow

The oil traffic flow in Kenya is estimated in Figure 4-2-1 based on domestic and transit demands. Table 4-2-4 shows the OD table of oil traffic volume.

Fig. 4-2-1 Oil Traffic Flow

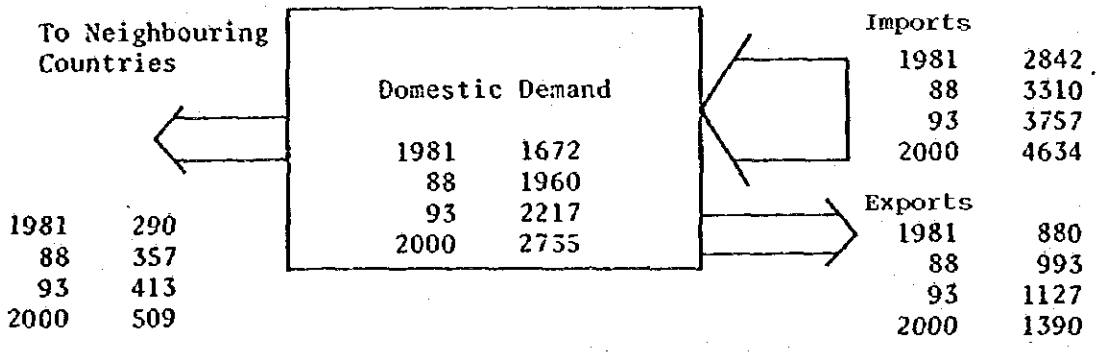


Table 4-2-4 OD Table of Oil Traffic Volume

OD Table in 1981

('000t)

From \ To		Kenya	Foreign		Total
			Inland	Overseas	
Kenya		2,622*)	290	896	3,808
Foreign	Inland	0	-	-	0
	Overseas	2,747	-	-	2,747
Total		5,369	290	896	6,555

*) Pipeline: 1,121 Rail: 478 Road: 1,023

OD Table in 1988

('000t)

From \ To		Kenya	Foreign		Total
			Inland	Overseas	
Kenya		3,074	357	993	4,424
Foreign	Inland	0	-	-	0
	Overseas	3,310	-	-	3,310
Total		6,384	357	993	7,734

OD Table in 2000

('000t)

From \ To		Kenya	Foreign		Total
			Inland	Overseas	
Kenya		4,289	509	1,390	6,188
Foreign	Inland	0	-	-	0
	Overseas	4,634	-	-	4,634
Total		8,923	509	1,390	10,822

5. Ports and Marine Transport

5.1 Present State of Port Cargoes

Along the Kenyan coast of the Indian Ocean there are four ports: Mombasa, Lamu, Kilifi and Shimoni. However, cargoes handled at Lamu, Kilifi and Shimoni are very small in quantity and virtually all are dealt with at Mombasa. Those handled at the Mombasa port are increasing and reached 8,179,000 tonnes in 1981.

Table 5-1-1 Port Cargo Handled in Kenya

('000t)

	Mombasa	Lamu	Kilifi	Shimoni
1978	6,028	10.0	0.2	-
1979	6,006	8.0	0.0	-
1980	7,432	4.7	0.0	0.0
1981	8,179	5.8	0.3	0.0

Source: KPA "Annual Bulletin of Port Statistics 1981"

The cargoes dealt with at Mombasa are not only those which Kenya exports or imports; they include exports from and imports to neighbouring land-locked countries such as Uganda, Rwanda, Burundi and Zaire as well. Table 5-1-2 shows the export and import goods handled at Mombasa and the quantity of transit goods to these neighbouring nations. Transit cargoes in 1981 totaled 354,000 tons, or 4.3% of all the goods that passed the Mombasa port. More than half of the transit cargoes are from or to Uganda, followed by exports from and imports to Rwanda. In 1981, 85% of the transit goods were from and to these two nations. 95% of the transit exports were coffee; the transit imports included a wide variety of goods, mainly industrial products.

Table 5-1-2 Import/Export Traffic at Mombasa Port

(t)

	1977	1978	1979	1980	1981
Exports	2,032	1,802	2,111	2,072	2,750
Kenya	1,780	1,611	1,896	1,912	2.570
Transit Exports	252	191	215	160	180
Uganda	166	114	144	115	132
Burundi	6	-	-	-	-
Rwanda	22	23	47	31	39
Sudan	-	-	-	-	-
Zaire	53	53	24	11	9
Other	5	1	-	3	-
Imports	3,814	4,226	3,900	5,361	5,429
Kenya	3,610	3,610	3,717	5,163	5,255
Transit Imports	204	182	183	198	174
Uganda	103	76	82	112	50
Burundi	1	6	20	17	24
Rwanda	61	82	70	57	80
Sudan	15	4	3	4	8
Zaire	23	7	5	8	8
Other	1	7	3	-	4
Imports/Exports	5,846	6,028	6,011	7,433	8,179
Kenya	5,390	5,655	5,613	7,075	7,825
Transit	456	373	398	358	354
Uganda	269	190	226	227	182
Burundi	7	6	20	17	24
Rwanda	83	105	117	88	119
Sudan	15	4	3	4	8
Zaire	76	60	29	19	17
Other	6	8	3	3	4

Source: "Annual Bulletin of Port Statistics 1981" KPA

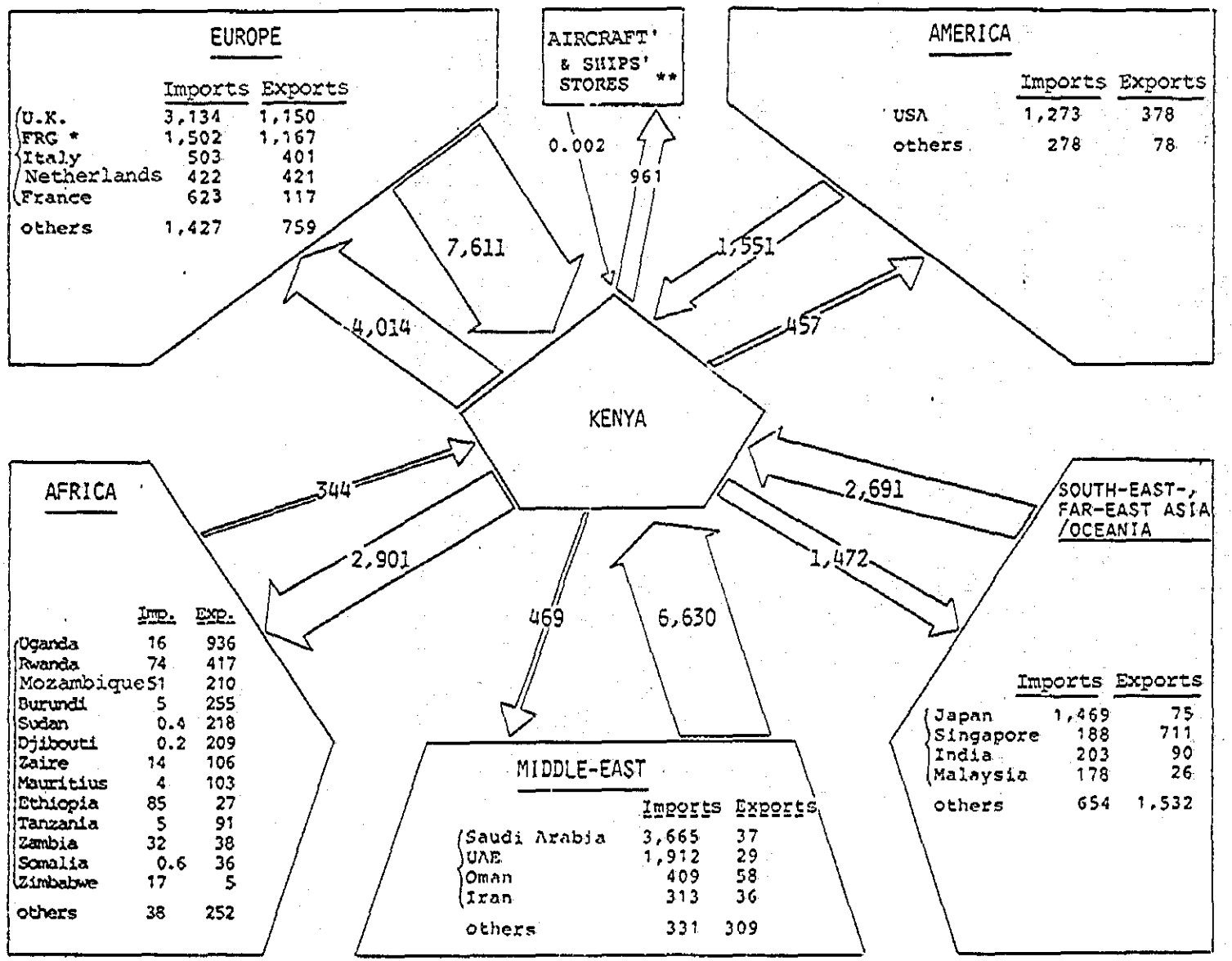
5.2 Present State of Ocean Cargoes

The destination of Kenyan exports and the countries from which imports come are shown in Figure 5-2-1.

Imports: Most of the imports come from Europe; in 1981, 40.1% of Kenyan imports were from there. Principal imports are chemical products and machines. Imports from the Middle East are the second largest, accounting for 35.6% of the nation's total. Virtually all of the goods imported from the Middle East is oil. Imports from Southeast and Far East Asia and from America are not as great, the former accounting for 14.4% and the latter for 8.3%.

Exports: As in the case of imports, Europe is the top purchaser of Kenyan exports; exports to this region in 1981 were 39.1% of Kenya's total. Major export products are coffee, tea, fruit and other farm products. Exports to Southeast and Far East Asia comprise 14.4%; in this case, about half of the exports are oil residues from refineries in Mombasa.

Fig. 5-2-1 Imports/Exports of Kenya, 1981



Unit: KSh million

Note *) Federal Republic of Germany
**) Goods supplied as aircraft or ships' stores

Soruce:
Annual Trade Report, CY 1981
Customs and Excise Dept.
Ministry of Finance,
Republic of Kenya

5.3 Projected Ocean Cargoes

5.3.1 Cargoes Handled at the Port of Mombasa

Ocean cargoes that pass the port of Mombasa can be expressed by the following formula:

$$\left[\begin{array}{l}\text{Total}\\ \text{ocean}\\ \text{cargo}\end{array}\right] = \left[\begin{array}{l}\text{Exports}\\ \text{from and}\\ \text{imports to}\\ \text{Kenya}\end{array}\right] - \left[\begin{array}{l}\text{Exports from}\\ \text{and imports to}\\ \text{Kenya to and}\\ \text{from neighbour-}\\ \text{ing countries}\end{array}\right] + \left[\begin{array}{l}\text{Transit}\\ \text{cargoes}\end{array}\right]$$

A projected estimate of ocean cargoes was made for each of the three cargo categories handled at Mombasa:

Cargoes from and to Kenya: The domestic production and consumption of principal items in the future were estimated, and then their surplus or shortage was assumed to become exports or imports. Estimates for other items were made using anticipated growth rates of their domestic output.

Transit cargoes: Future growth in agricultural, mining and industrial production in Uganda, Rwanda, Burundi, Sudan and Zaire was assumed and the quantity of future transit cargoes was estimated on the basis of this supposition.

Estimation of Kenyan exports to and imports from neighbouring countries was made on the basis of the current pattern of such exports and imports.

Tables 5-3-1 to 5-3-3 show these estimates.

(1) From 1981 to 1988, export and import cargoes handled at Mombasa will continue to increase at an annual average rate of 3.0%, while from 1989 to 2000 the growth rate is expected to be 4.5%.

(2) From 1981 to 1988, the increase rate of imports will be 2.8%, while exports will grow at a rate of 3.3%. From 1989 to 2000 imports are expected to increase at an annual rate of 5.0%, whereas the growth rate of exports will be 3.4%. Import growth will be generated mainly by the need for raw materials for steel plants and other industries expected to grow in the future.

Table 5-3-1 Projection of Cargo Volume at Mombasa Port

('000t)

	1981	1988	2000
Imports (excluding oil)	1,548[1)]	1,915	4,773
Oil	2,746[2)]	3,310	4,634
Imports-Total	4,294	5,225	9,407
Exports (excluding oil)	1,583[3)]	2,110	3,261
Oil	896[3)]	993	1,390
Exports-Total	2,476[3)]	3,103	4,651
Imports and Exports-Total	6,773	8,328	14,058

Note: 1) KPA data less emergency imports of foods
2) Data from "Economic Survey 1982"
3) KPA data

Table 5-3-2 Projected Import Cargo Volume through Ports

('000t)

	Total Kenyan Imports			Imports from Landlocked Countries			Transist Imports			Imports through Kenyan Ports		
	1981	1988	2000	1981	1988	2000	1981	1988	2000	1981	1988	2000
Maize	(382)	-	-	-	-	-	13	-	-	(395)	-	-
Wheat	158	170	361	-	-	-	6	5	4	164	175	365
Coffee	-	-	-	-	-	-	-	-	-	-	-	-
Tea	-	-	-	-	-	-	1	-	-	1	-	-
Cement	-	-	-	-	-	-	7	9	12	7	9	12
Sugar	2	-	-	-	-	-	17	17	17	19	17	17
Soda Ash	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum	2,747	3,310	4,634	-	-	-	-	-	-	2,747	3,310	4,634
Other	1,227	1,545	4,099	10	-	-	130	169	280	1,347	1,714	4,379
Total	4,134	5,035	9,094	10	-	-	174	200	313	4,294	5,255	9,407

* Figures in ( ) denote emergency imports of foods

Table 5-3-3 Projected Export Cargo Volume through Ports

('000t)

	Total Kenyan Exports			Exports to Landlocked Countries			Transit Exports			Exports through Kenyan Ports		
	1981	1988	2000	1981	1988	2000	1981	1988	2000	1981	1988	2000
Maize	1	-	-	-	-	-	-	-	-	1	-	-
Wheat	4	-	-	-	-	-	-	-	-	4	-	-
Coffee	85	117	147	-	-	-	171	253	396	256	370	543
Tea	75	97	14	3	4	6	-	20	43	72	113	181
Cement	668	827	1,000	41	82	100	-	-	-	627	745	900
Sugar	175	97	97	38	-	-	-	-	-	137	97	97
Soda Ash	127	342	570	-	-	-	-	-	-	127	342	570
Petroleum	1,186	1,350	1,899	290	357	509	-	-	-	896	993	1,390
Other	388	479	1,086	38	53	147	9	17	31	359	443	970
Total	2,709	3,309	4,943	410	496	762	180	290	470	2,479	3,108	4,651

5.3.2 Cargoes Handled at the Port of Lamu

Near the port of Lamu are the Bura region and the Lower Tana delta zone where large-scale agricultural development is planned. If these devleopment programs are implemented, the quantity of cargoes generated in the two districts is estimated as shown in Table 5-3-4.

Table 5-3-4 Estimated Cargo Volume in Lamu and Tana River Districts

	1983	1988	1993	2000
Lamu	23,389	26,770	34,249	48,355
Tana River	33,479	83,411	157,298	382,318
Total	56,868	110,181	191,547	430,673

Of these expected future cargoes, those transported from and to Mombasa and Kilifi are considered to represent a potential demand for ocean transport. At present, 88% of the cargoes generated at Lamu demand marine transportation. When this same percentage is used, potential future demand through the port is estimated as:

Potential Demand for Cargoes through the Lamu Port

1988	96,600 tonnes
1993	168,100 tonnes
2000	377,900 tonnes

The potential demand in 2000, 377,900 tonnes, in equivalent to 2.7% of the estimated cargo volume that will pass Mombasa in that year.

6. Air Traffic

6.1 Review of Air Traffic Demand

The total arrival of passengers in Kenya was 408 thousand in 1981 and the proportion of those by air to total arrivals is increasing annually.

	1970	1975	1980	1981
Total Arrivals	472,550	511,380	433,672	408,340
Arrivals by Air	288,417	413,700	411,069	386,540
Passengers carried by KQ	-	-	402,700	411,500

Table 6-1-1 show air passenger movements at the 4 main airports.

Table 6-1-1 Air Passenger Movements in 1981 (arrival and Departure)

Airport	Domestic		International		Total
	Scheduled	Non-scheduled	Scheduled	Charter	
Nairobi	185,000[1)]	-	809,000[1)]	-	994,000[1)]
Mombasa	157,000	-	54,000[1)]	141,000[3)]	352,000[2)]
Malindi	28,900[4)]	36,400[4)]	-	-	65,300
Kisumu	5,000[3)]	5,000	-	-	10,000
Total	375,900	41,400	863,000	141,000	1,421,300

Source: 1) Nairobi Airport Traffic Forecast 1981–1996, (Dec. 1982)
2) Statistical Abstract, C.B.S., 1982
3) Aerodrome Annual Report
4) Malindi Airport Feasibility Study

The air passenger traffic in Kenya can be divided into two categories, international and domestic. About 208 thousand domestic air passengers were carried by Kenya Airways. The past record of air traffic by region is shown in Table 6-1-2.

Table 6-1-2 International Air Passenger Traffic: 1979/1980

('000)

	Northern *	Eastern**	Regional***	Total
Total Market	326,200	54,820	205,090	586,110
KQ share (%)	24.2	48.7	36.1	30.6
KQ Total	78,810	26,682	74,060	179,552

* Europe and North America
** Indian sub-continent, the Fan East and Australia
*** Within Africa

The present market share of Kenya Airways represents about one-third of the volume of total international air passenger traffic into the country. Kenya Airways must expand this share for the following two reasons:

a) the general growth of tourism in Kenya, to assure and increase foreign currency income as a result of such promotion,

b) development of the activity of Kenya Airways itself to improve its financial condition.

The earnings of the tourist industry in 1982 were K£116 million, a relative increase over the 1981 earnings of K£90 million. Furthermore, the value of output by Kenya Airways in 1982 was K£48 million, so that the total value of foreign currency realised from the two sources was K£164 million.

This study has set the following goal for Kenya Airways' expansion of air passenger traffic.

GOAL: The market share of Kenya Airways in international traffic should be 40% in the Northern Area, 50% in the Eastern Area, and 45% in the Regional Area.

6.2 Forecast of Air Traffic Demand

6.2.1 Traffic Forecast for Each Area

International passenger traffic can be divided into 3 distinct market areas:

a) Northern – Europe and North America

b) Eastern – Indian sub-continent, the Far East and Australasia

c) Regional – which comprises countries within Africa

The growth of international scheduled passenger traffic between 1978 and 1981 was slightly more rapid on the average (6%) than domestic traffic growth (5%).

In passenger projections, the following assumptions were made:

a) Political stability in Kenya

b) A slow economy of Europe and North America

c) Stable improvement of the Kenyan economy

d) Changes in airline itineraries with more direct services provided between Mombasa/Malindi and Europe

Assuming these factors, traffic growth is projected in Table 6-2-1. The numerical results of this passenger study are lower than those of the IATA project team referred to in the "Kenya Airways New Development Strategy".

Comparison of Forecasts

	Year	Total International	KQ Total	KQ Share
Forecast by IATA Team	FY 1985/86	902,600	422,700	46.8%
This Report	1985	792,630	290,575	36.7

Table 6-2-1 Passenger Traffic Forecast

Routes	1979/80	1985	1990	1995	2000
Northern					
Total Market	326,200	415,550	517,851	660,924	843,525
KQ Share %	24.2	31.5	40.0	44.7	50.0
KQ Total	78,810	130,742	207,141	295,574	421,763
Eastern					
Total Market	54,820	79,533	111,549	149,278	199,768
KQ Share %	48.7	49.4	50.0	50.0	50.0
KQ Total	26,682	39,259	55,774	74,639	99,884
Regional					
Total Market	205,090	297,547	417,325	558,475	747,366
KQ Share %	36.1	40.5	45.0	52.0	52.0
KQ Total	74,060	120,574	127,796	290,192	388,630
Total Int'l					
Total Market	586,110	792,630	1,046,725	1,368,677	1,790,659
KQ Share %	30.6	36.7	43.0	48.3	50.8
KQ Total	179,552	290,575	450,711	660,405	910,277
Domestic					
Total Market	208,110	274,255	352,073	455,008	588,394
KQ Share %	100.0	100.0	100.0	100.0	100.0
KQ Total	208,110	274,255	352,073	455,008	588,324
Grand Total					
Total Market	794,220	1,066,885	1,398,798	1,823,685	2,378,983
KQ Share %	48.8	52.9	57.3	61.2	63.0
KQ Total	387,662	564,830	802,784	1,115,413	1,498,601

Table 6-2-2 Airport Passengers (Arrivals and Departures)

	1981	1985	1990	1995	2000
NAIROBI					
Domestic Scheduled	185,000	230,415	304,280	397,871	520,540
International Scheduled	809,000	1,007,598	1,330,605	1,739,873	2,275,026
Total	994,000	1,238,013	1,634,885	2,137,744	2,795,566
MOMBASA					
Domestic Scheduled	157,000	187,225	233,316	297,776	380,046
International	195,000	232,541	289,788	369,851	472,034
Total	352,000	419,766	523,104	667,627	852,080
MALINDI					
Domestic Scheduled	(1980) 28,900	36,014	44,880	57,280	73,104
Non-Schedule	(1980) 36,400	45,362	56,528	72,146	92,078
International			(58,000)	(116,000)	(203,000)
Total	(1980) 65,300	81,376	101,408 (159,408)	129,426 (245,426)	165,182 (368,182)
KISUMU					
Domestic Scheduled	5,000	5,803	7,349	9,345	11,926
Total	5,000	5,803	7,349	9,345	11,926
Grand Total					
Domestic Scheduled	375,900	459,457	589,825	762,272	985,616
Charter	36,400	45,362	56,528	72,146	92,078
International	1,004,000	1,240,139	1,620,393	2,109,724	2,747,060
Total	1,416,300	1,744,958	2,266,746 (2,324,746)	2,944,142 (3,060,142)	3,824,754 (4,027,754)

( ): Volume shown in Malindi Airport Feasibility Study.

6.2.2 Traffic Forecast for Each Airport

The air passenger traffic discussed earlier is indicated by airport in Table 6-2-2.

Development of the Malindi Airport by 1990 is necessary so that it can accommodate wide-body jets. Such expansion will allow regional tourist development with an increased number of visitors expected from Europe. The service of wide-body jets at the Malindi Airport will carry 29 thousand passengers per year into the north coast area; it will also be possible to operate one weekly chartered flight.

400 seats x 0.7 x 52 weeks = 14,560 passengers

Table 6-2-3 Number of Visitors to Malindi Area

Year	Foreign Visitors Europe/N. America	Foreign Tourists	
		Beach	Malindi Area
1981	253,300	136,000[1]	43,100[2]
1985	302,100	169,481	51,398
1990	376,400	211,204	64,051
1995	480,400	269,555	81,747
2000	613,100	344,028	104,332

1) Estimated by Bed Occupancy and Average Stay per Person.
2) Malindi Airport Feasibility Study

Future domestic passengers on each air route are shown in Table 6-2-4.

Table 6-2-4 Domestic Passengers by Scheduled Flight

Route	1981	1988	2000
Nairobi – Mombasa	153,002	222,935	396,754
Nairobi – Malindi	23,773	35,130	65,933
Nairobi – Kisumu	5,232	7,269	13,638
Mombasa – Malindi	5,943	8,782	16,483
Total	187,950	266,847	492,808

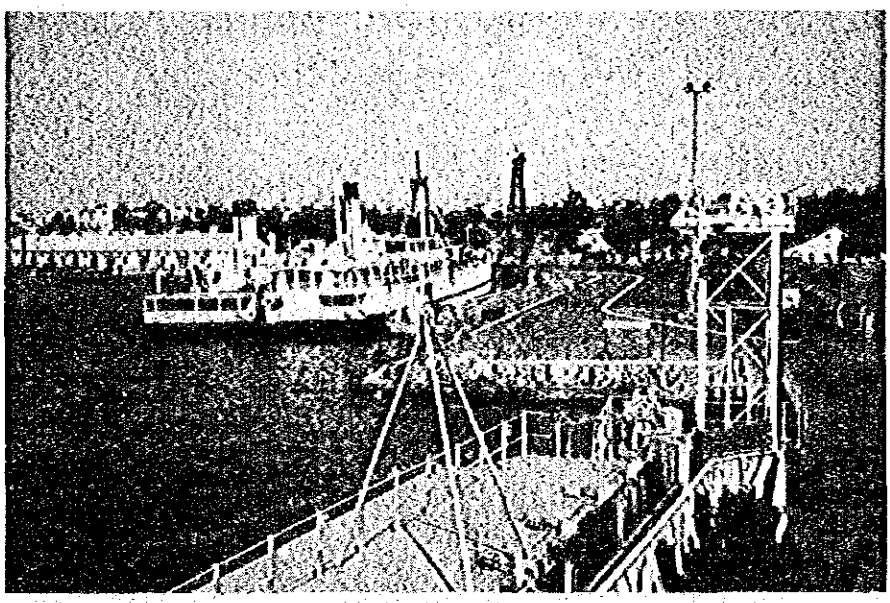
Note: Exclude the non-scheduled traffic

PART V. STRATEGIES FOR TRANSPORT DEVELOPMENT

1. Basic Concept for Comprehensive Transport Planning

2. Strategies for Transport Development

3. Public Development and Investment Expenditure Framework for the Transport Sector



1. Basic Concept of Comprehensive Transport Planning

This section deals with the meaning of a comprehensive transport plan, and the social and economic problems of Kenya. The issues of such a plan are defined in view of these problems and transport strategies to achieve the planned issues are suggested.

1.1 Meaning of a Comprehensive Transport Plan

(1) Meaning of the provision of means of transport

Provision of transport to an area means, for instance, that construction of a new road will allow activationof local activities in that area. In other words, the productivity of the area will be enhanced through:

i. Formation of markets for the area's farm products

ii. Formation of markets for the area's natural resources such as mineral and forest products

iii. Development of new industries

iv. Growth of existing industries.

This will in turn generate new employment opportunities in the area, which will ultimately lead to its activation. Transport means will also contribute to the greater mobility of commodities and people through the:

v. Expansion of trade, and

vi. Encouragement of cultural exchange

(2) Meanin gof the making of a comprehensive transport plan

An overall transport plan aims at offering a combination of different modes of transport. Such a plan has the following two meanings:

i. It can make efficient use of existing transport facilities which are a coordination of different modes.

ii. It can determine how new investment needed to achieve the goal of a plan can be made through a minimum use of resources.

1.2 An Approach to a Comprehensive Transport Plan in Kenya

1.2.1 Transport Planning Issues

(1) Social and Economic Problems and Policies

1) Problems

When considering transport strategies for Kenya, the issues of a transport plan must be defined, and to establish such issues the country's society and economy must be taken into consideration. Some existing problems are:

- A great potential labor force exists but employment opportunities are insufficient.
- Concentration of population in several areas.
- Poverty prevalent in agricultural and forestry areas.
- Stagnant agricultural production due to dry weather and resultant economic inactivity.
- Economic stagnancy caused by rising oil prices and end of the coffee boom.
- Chronic shortage of foreign reserves as a result of the need to import.
- Possibility that the nation's food self-sufficiency may disappear.

2) Background

The above social and economic problems are greatly affected by the following facts. The interrelation of these factors is illustrated in Fig. 1-2-1.

- Very high population growth: The annual average rate of population increase in the past ten years was 3.65%. Because of delayed economic development, insufficient health and sanitary facilities, shortage of water and drainage facilities and lack of employment opportunities, the population concentration in several areas has been accelerated. There exists fear of a food shortage. Pressure of the population growth causes grave problems.

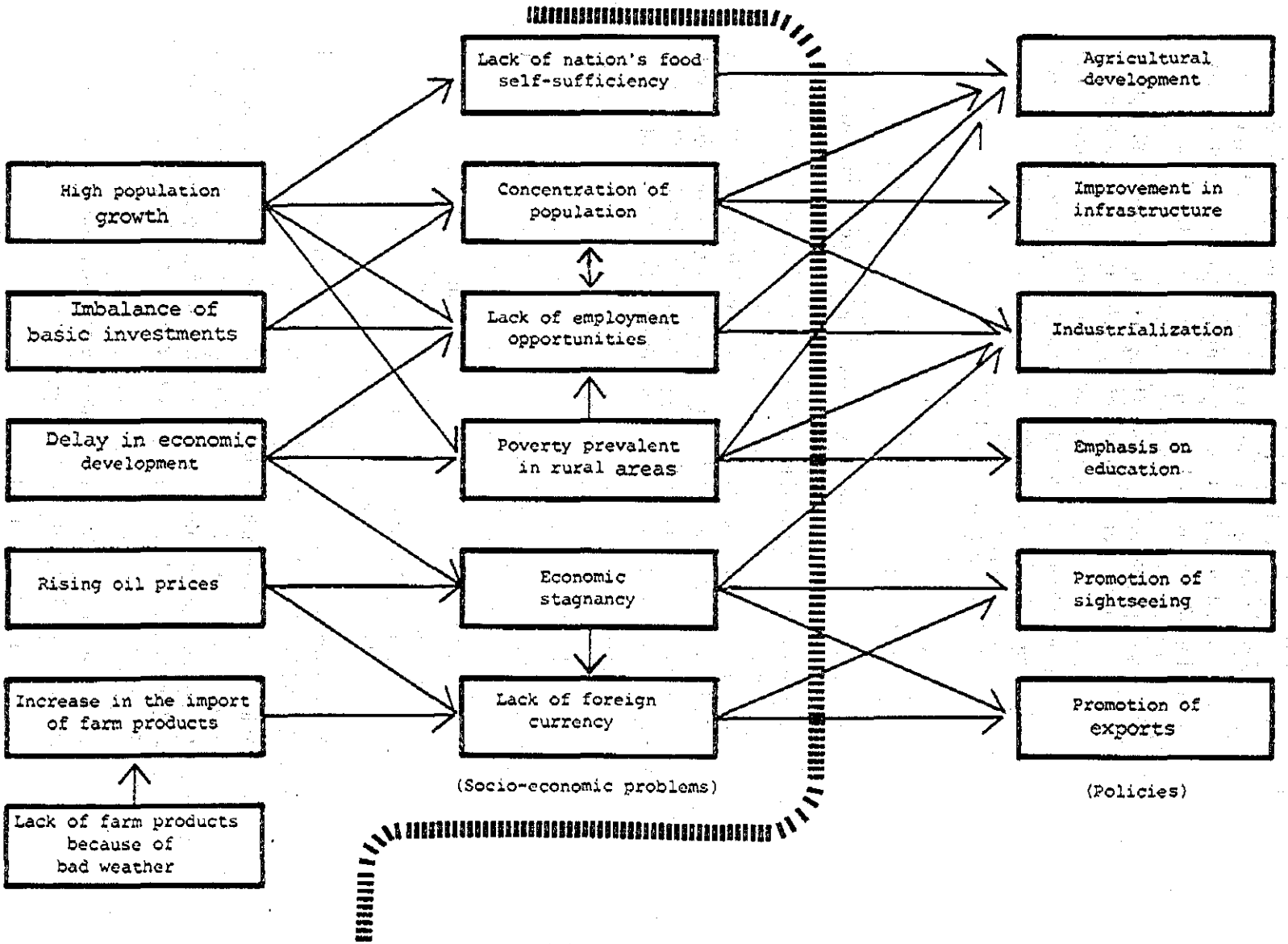


Fig. 1-2-1 Relation between Socio-economic Problems and Policies

- Imbalance of basic investments: In general, investment in health and sanitary facilities, water and sewerage facilities and other infrastructures is insufficient. In addition, investment in these basic facilities has tended to be made mainly in urban areas. As a result, rural areas have suffered a lack of employment opportunities and poverty, which has in turn hastened the population shift to the cities.
- Delayed economic development: Delay in economic development has caused a shortage of employment opportunities, partly accelerated by increasing population, and has led to economic stagnancy. The percentage of those employed in the modern sector to the country's total employees is less than 5% in some provinces:
    - Northeastern: 1.4%
    - Nyanza: 3.1%
    - Eastern: 3.2%
    - Western: 3.2%
- Rising oil prices: Oil price hikes have caused economic inactivity and a shortage in foreign exchange in Kenya and other developing countries where the establishment of economic foundations has been delayed.
- Increase in the import of farm products: Bad (dry) weather in East Africa rom 1979 to 1981 had a grave effect on the agricultural production of this region. As a consequence, Kenya had no alternative but to increase food imports, which resulted in a shortage of foreign exchange.

3) Countermeasures

To deal with these problems, Kenya's Fourth Five-year Development Plan includes the following policies:

- Policy 1: Agricultural development
- Policy 2: Improvement in infrastructure
- Policy 3: Industrialisation
- Policy 4: Emphasis on education

Policy 1 particularly aims at eliminating poverty in rural areas and ensuring human settlement in these areas.

Policy 3 intends to achieve industrialisation on the basis of domestic resources. Modern industries are taken into consideration, but a greater stress is laid on agriculture-based industrialisation. To promote human settlement in rural areas, measures to decentralise industries are also planned.

Apart from these policies for solidifying the domestic economic basis, acquisition of foreign exchange through

- Promotion of sightseeing, and
- Promotion of exports

is important in light of the recent shortage of foreign exchange holdings in Kenya. Figure I-2-1 shows the interrelation of the social and economic issues and policies referred to above.

(2) Issues of a Transport Plan

In this section, we will consider the issues of a transport plan by weighing the problems and their background and Kenya's major policies for countering these problems.

The first three policies referred to above, i.e., agricultural development, industrialisation and improvement of infrastructure, will create employment opportunities and build public facilities in rural areas to achieve

- Balanced development of the country
- Establishment of an economic basis

The principal issues of a transport plan in Kenya will thus be as follows:

- Agriculture and manufacturing industries are two of the country's leading sectors. The ratio of these two to the GDP was 36.0%, 12.7% in 1978, and 33.3%, 13.4% in 1981, respectively.
- In view of Kenya's industrial policies, promotion of agriculture will continue to be important in the years ahead. It will enable the country to use rural resources effectively and to create employment opportunities in these areas.
- Manufacturing industries are also important in consideration of their increasingly greater percentage in the GDP. Priority should be given to modern industries utilising local resources and to agriculturally-based industries.

Thus, in the years to come efforts should be made to promote manufacturing industries and agriculture, because the nation must create employment opportunities to absorb the rapidly increasing work force.

In so doing, however, care should be taken to avoid population concentration in cities and several other areas. To this end, industries should also be located in rural areas to decentralise the population. In short, there is a need to achieve a balanced development of the nation.

In addition to these endeavors to establish a domestic economic foundation while ensuring local decentralisation of the population, consideration should be taken of the securing of foreign exchange holdings.

To acquire foreign currency reserves, tourist resorts should be improved and foreign sightseers invited. The encouragement of exports is also important.

The following are the themes of a transport related plan:

i. To ensure human settlement in rural areas by the development of these areas.

ii. To ensure promotion of industries using local resources.

iii. To ensure settlement of the population in rural areas by the decentralised location of industries.

iv. To promote sightseeing to acquire foreign currency reserves.

v. To promote exports to acquire foreign currency reserves.

Figure 1-2-2 shows the relation among two of the major aims of the Kenyan five-year plan and the five issues mentioned above.

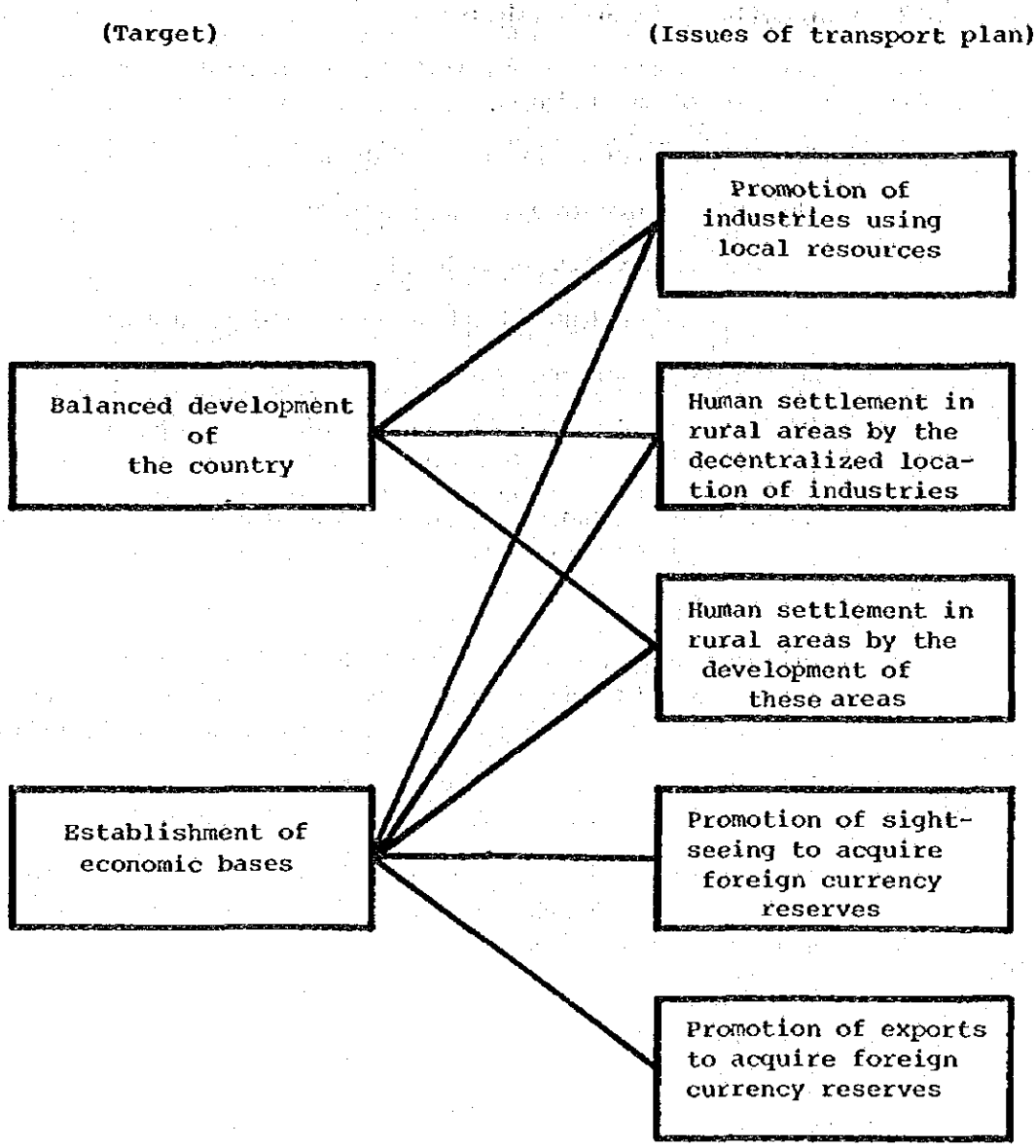


Fig. 1-2-2 Issues of transport plan

1.2.2 Transport Strategies to Meet the Issues

This section discusses transport strategies corresponding to each of the five issues of a transport plan.

(1) Promotion of Industries Using Local Resources

Three types of industries can be considered:

i. modern large-scale, urban-based industries

ii. large-scale agricultural and mineral processing industries

iii. local small-scale industries

Of these, types i and ii are important from the viewpoint of the national economy.

Industries coming under type i are mostly located in

1. Nairobi
2. Mombasa

Industries of type ii include such agricultural types as textile processing, saw-milling and tanning industries, as well as non-agricultural ones such as cement and lime processing and some basic chemical processing industries.

Industries of type ii are mainly located in the east-west belt in the Central and Western Provinces and Nakuru in the Rift Valley Province.

An examination of the location of industries and their concentration has established these growth poles. The following cities are selected as major industrial growth centres:

1. Nairobi
2. Mombasa
3. Kisumu
4. Eldoret
5. Nakuru
6. Thika
7. Kitale

The following are the growth poles of cash crop trading centres and agricultural processing industries:

8. Kakamega
9. Nyeri
10. Embu
11. Meru

Figure 1-2-3 shows the location of these cities.

-- Transport strategies should aim at connecting these growth poles by a trunk network, e.g., by national trunk roads and/or railroad

(2) Human settlement in rural areas by decentralised location of industries

This issue develops agriculturally-based industries and growth poles in those

areas having potential for local resources and agriculture. As a result, employment opportunities will be created in these areas, which will in turn encourage population to settle here. Measures will be taken to enable people to commute to work places in these growth poles. To achieve this, principal towns having a population of at least 10,000 (in the 1979 census) and growth poles will be linked.

Therefore, transport strategies will include:

- Connecting growth poles by a trunk network
- Linking growth poles and principal towns, e.g., with primary roads

Principal towns are, as noted above, those having 10,000 or more residents as of the 1979 census. The purpose of linking these towns with growth poles is to allow people living in the towns easy and convenient access to the growth poles so that they have employment opportunity in the growth pole.

The distribution of principal towns is shown in Fig. 1-2-4.

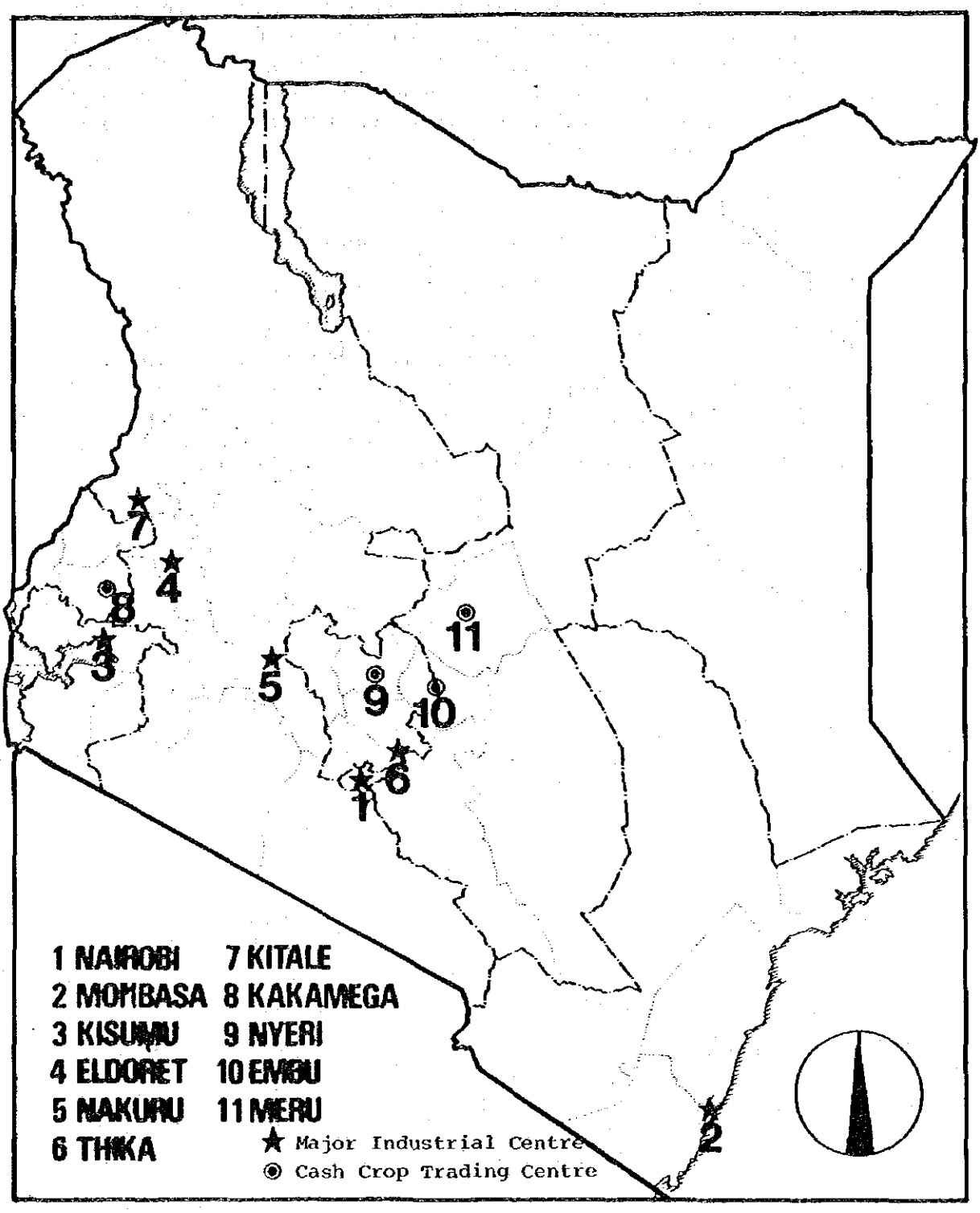


Fig. 1-2-3 Distribution of Growth Poles

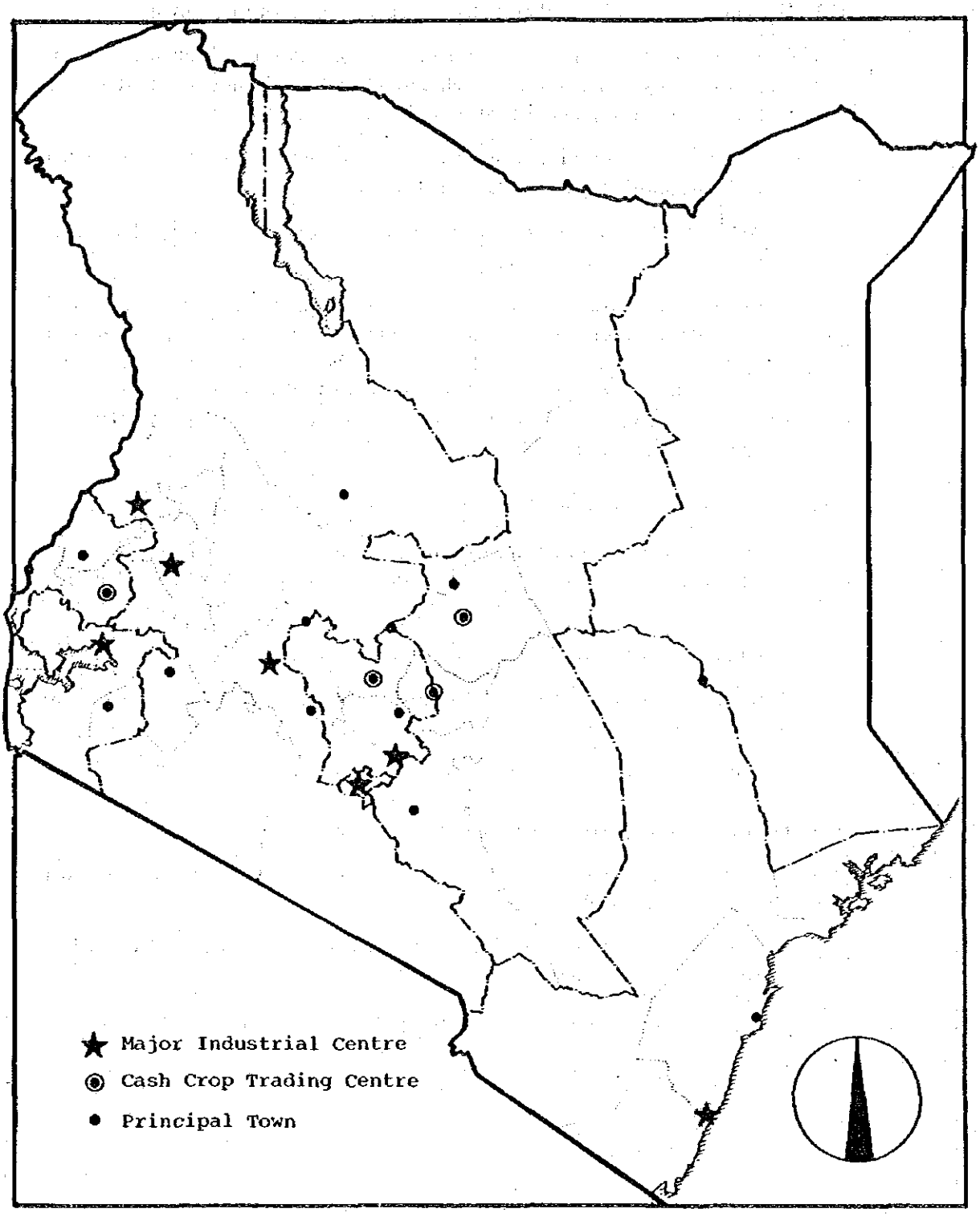


Fig. 1-2-4 Distribution of Principal Towns

(3) Human settlement in rural areas by the development of these areas

Cash crop trading centres are nurtured to promote development of rural areas, especially those having a high agricultural development potential, and to encourage the shipment of farm products to markets. Thus,

- These cash crop trading centres and agricultural value land are connected with one another, e.g., by national trunk roads
- Access to those areas which have a potential for new agricultural development is provided, e.g., by rural roads

These areas are shown in Figs. 1-2-5 and 1-2-6. The total of the farm output of rural areas whose contribution to Kenya's agricultural production is at least 2.0% is expected to reach 85.9% of the country's total production value. Figure 1-2-7 shows the distribution of agriculturally valuable land. Those areas having a high contribution to the nation's farm production and those with agricultural possibility are considered here.

(4) Promotion of sighteseeing to acquire foreign currency reserves

Kenya has many tourist resorts with natural beauty. These sightseeing resources will be used to promote the tourist industry. The transport strategy is:

- To provide access to these tourist resorts

Aerodromes are also important to provide sightseers from abroad access to these resorts.

Figure 1-2-8 shows the distribution of tourist resorts.

(5) Promotion of exports to acquire foreign currency reserves

To increase revenues in foreign currencies, export is encouraged. Transport strategies for this will be:

- Improvement of transport systems to facilitate exports, e.g. by pipeline transport of petroleum
- Measures to respond to containerisation

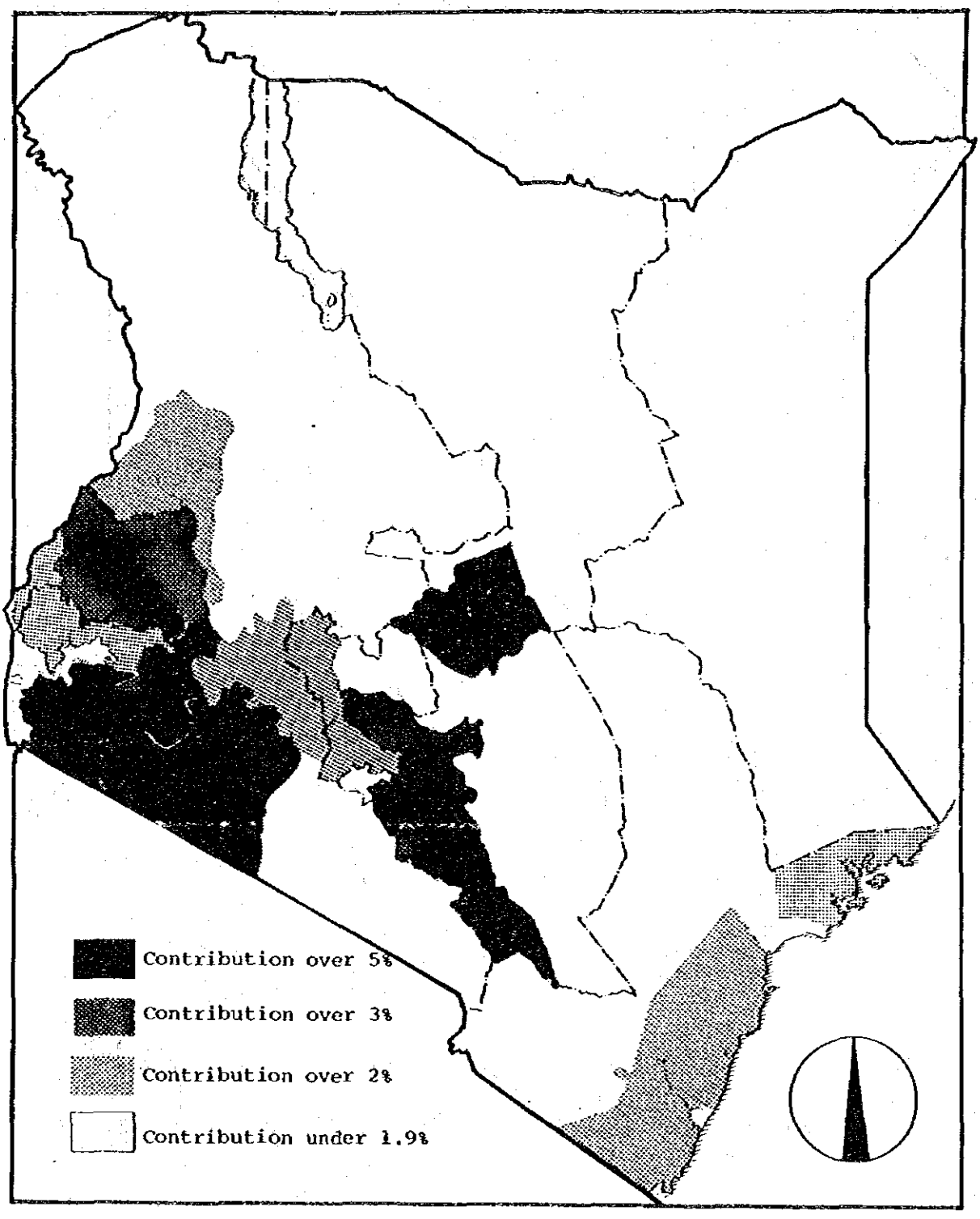


Fig. 1-2-5 High Potential Areas Based on Agricultural Product

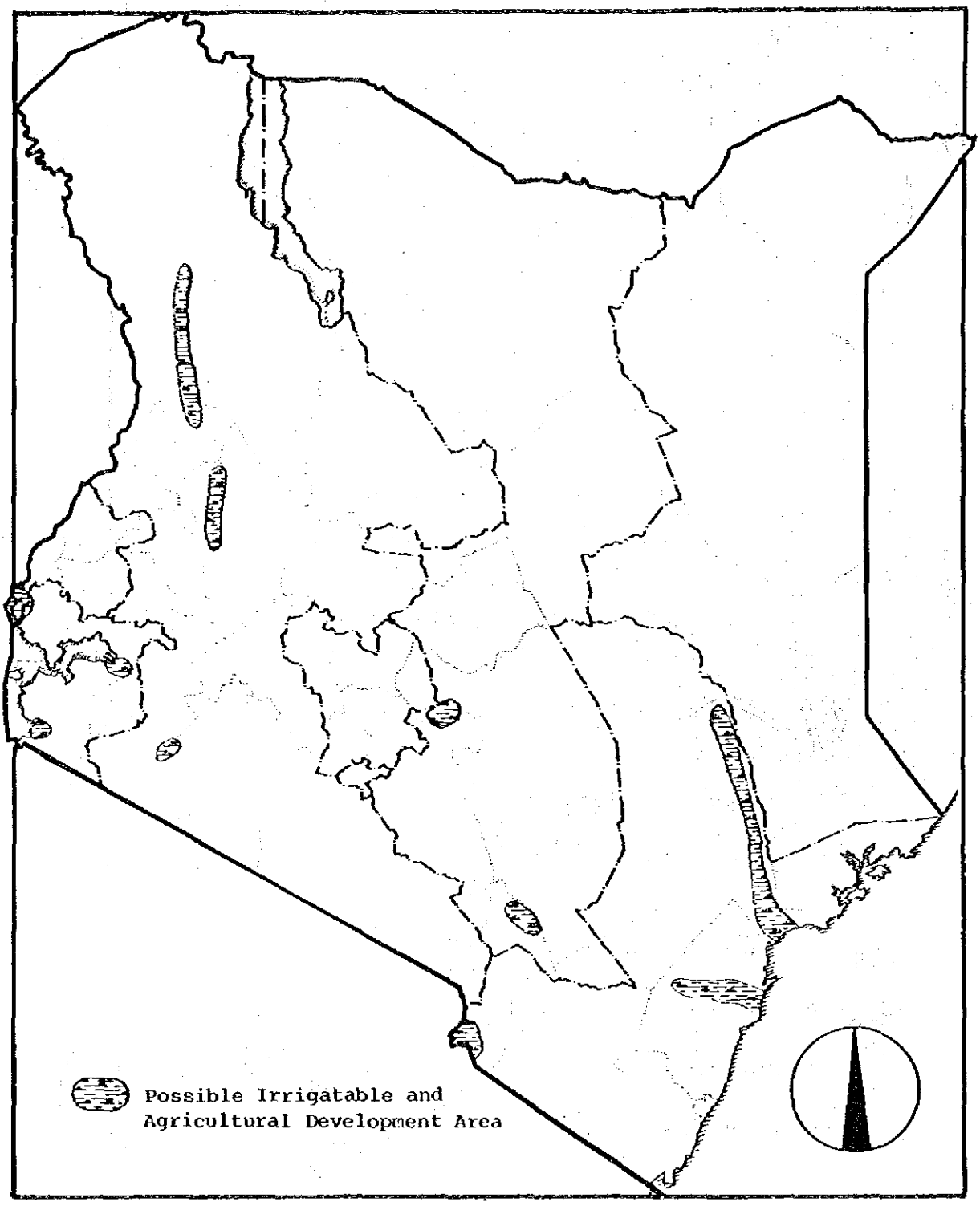


Fig. 1-2-6 Distribution of Agricultural Development Areas

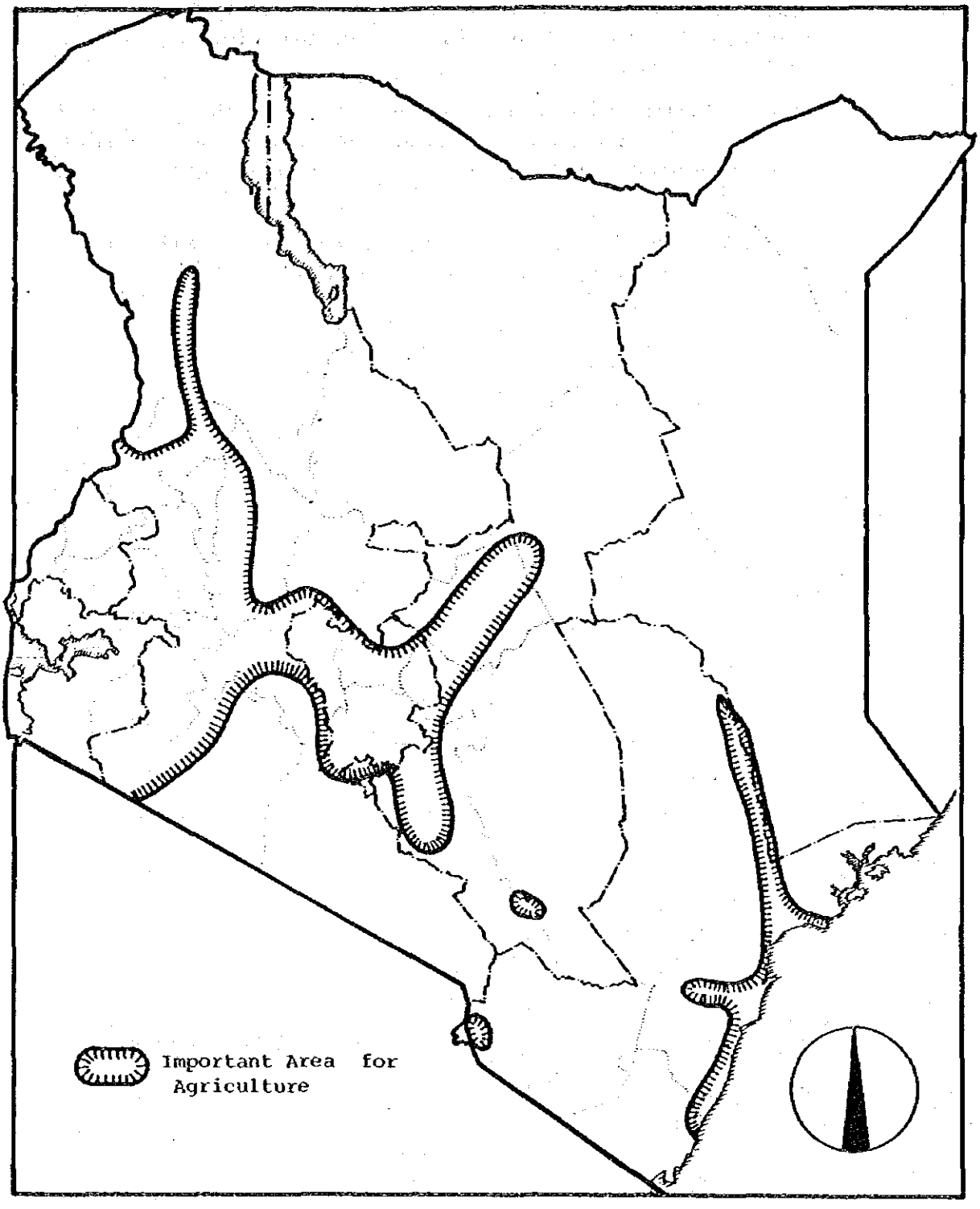


Fig. 1-2-7 Distribution of Important Areas for Agriculture

The former strategy includes improvement of ports, extension of the pipeline and provision of convenient transport routes between cash crop trading centres and port cities.

The latter covers measures to be taken to deal with container cargoes that will come to Kenyan ports as containerisation of marine cargoes expands. These measures are an attempt to adapt Kenyan packing styles to foreign styles.

The relationship between the issues of a transport plan and transport strategies described in this section are summarised in Fig. 1-2-9.

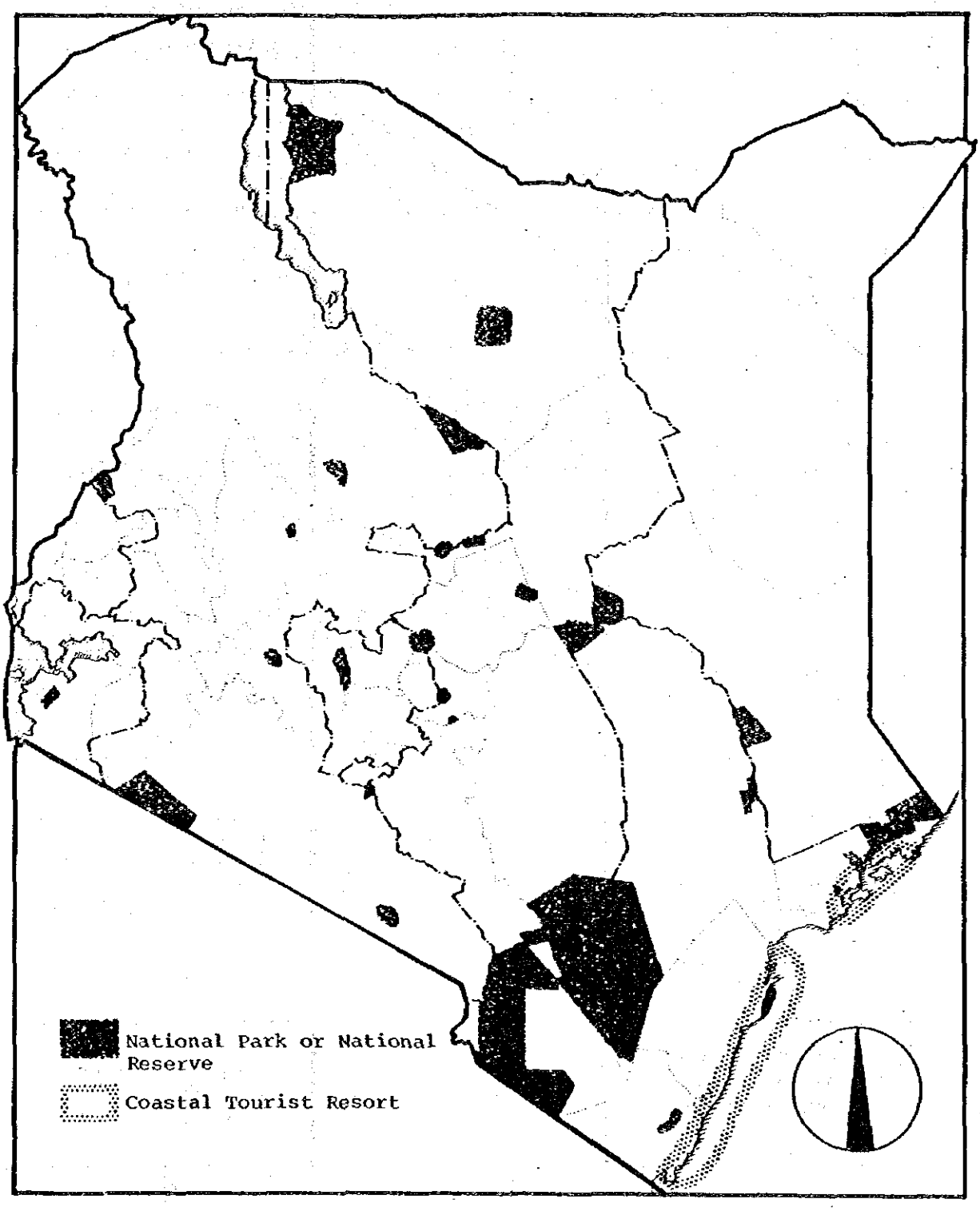


Fig. 1-2-8 Distribution of Tourist Resorts

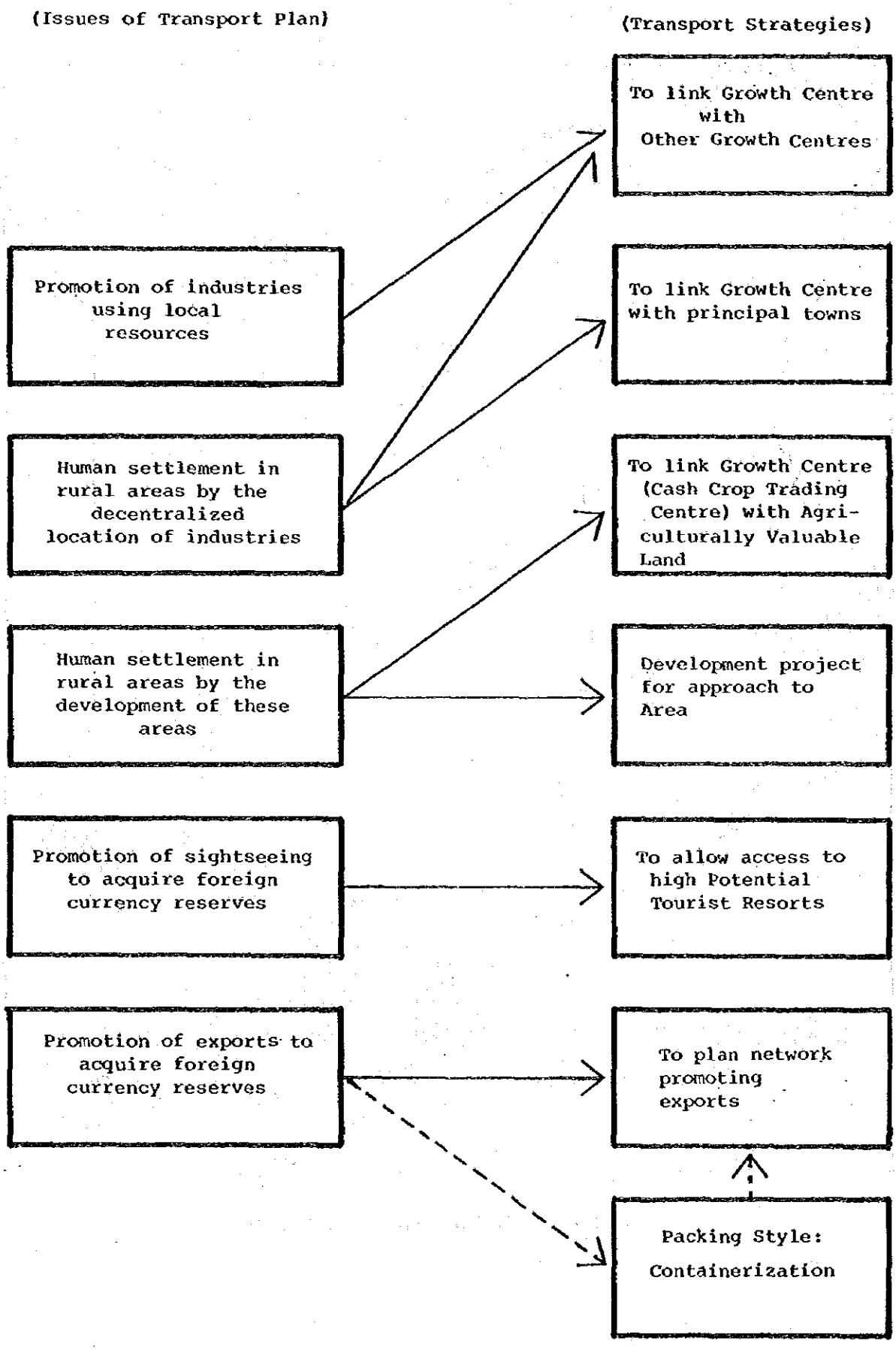


Fig. 1-2-9 Issues of a transport plan and transport strategies

2. Strategies for Transport Development

2.1 Transport Strategies and Transport Network

On the basis of the strategies discussed above, the following steps are planned to improve transport systems:

- Step 1: Link major industrial centres (MICs) with one another
- Step 2: Link MICs and Cash Crop Trading Centres
- Step 3: Connect principal towns with the above networks
- Step 4: Provide access to development areas
- Step 5: Provide access to tourist resorts
- Step 6: Secure land routes to neighbouring countries (Uganda, Sudan, Ethiopia and Somali Republic)

The above networks are also linked to ports (Mombasa, Lamu, etc.) and airports (Nairobi, Mombasa, Kisumu, Malindi, etc.).

- Step 7: Secure ports and airports and access to them

Figures 2-1-1 and 2-1-2 show a plan of transport networks which takes the nation's present condition, that is, its topography and existing traffic routes, fully into consideration.

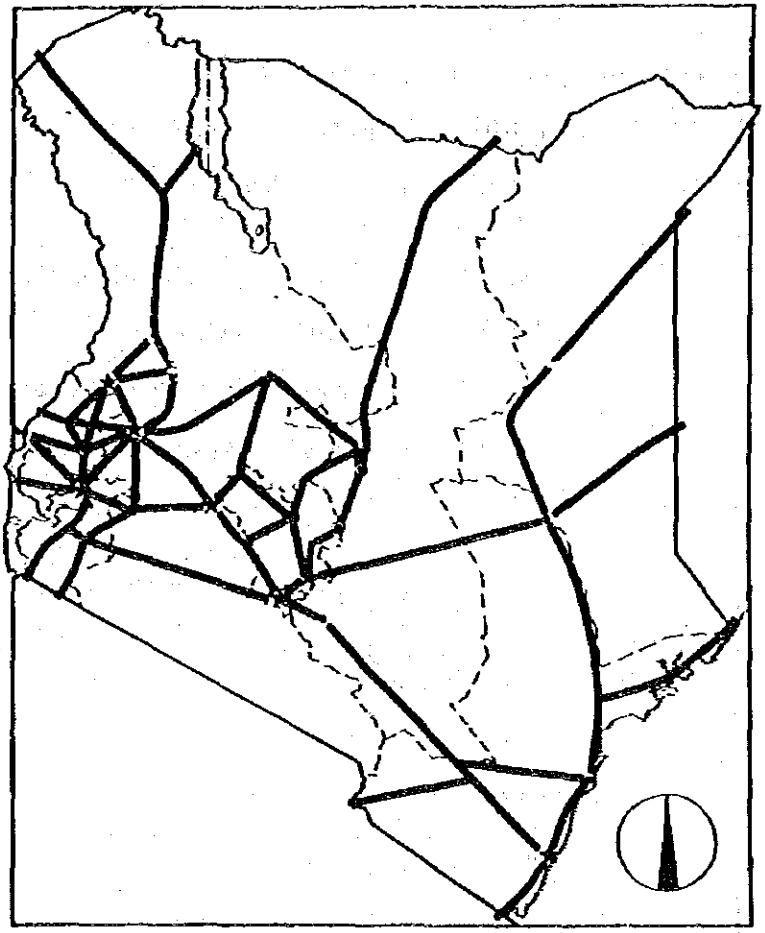


Fig. 2-1-1 Conceptural Design of Transport Network

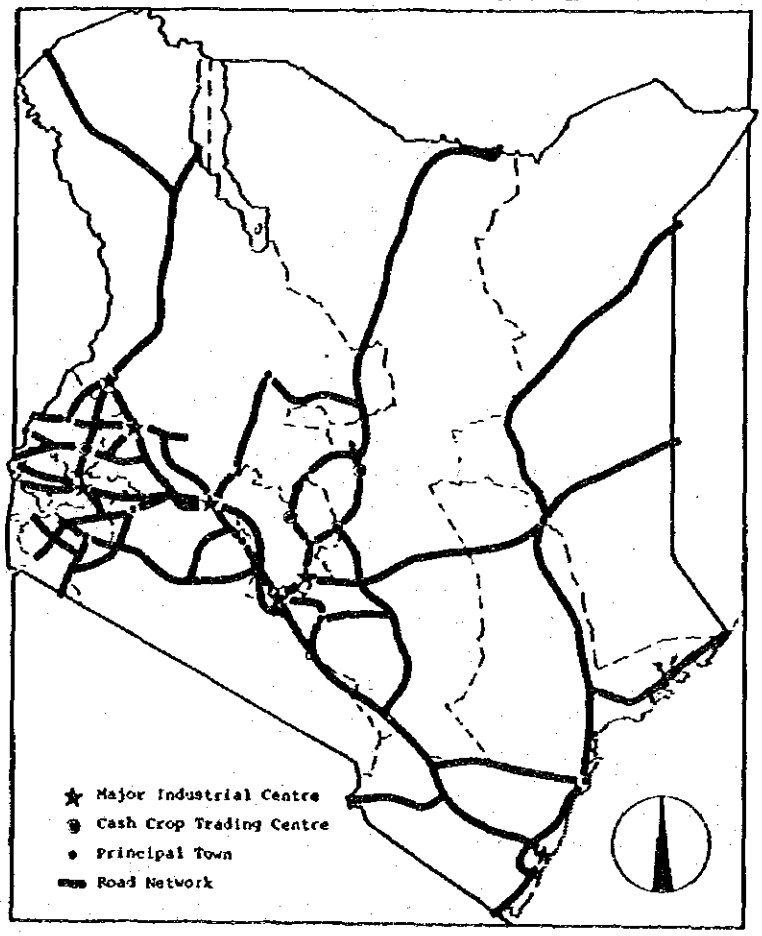


Fig. 2-1-2 Transport Network Pattern

2.2 Means of Development

2.2.1 Transport Networks and Modal Split

This section discusses the modes of transport which should be adopted to give shape to the plan outlined in the previous section.

The following points require special attention in considering the relation between a transport network and transport modes:

i. Efficient energy use and reduced oil consumption.

ii. Maximum use of existing transport facilities through optimal coordination of modal split while avoiding duplication of investment.

iii. Provision of transport services which assure punctual and reliable means of transport at reasonable cost.

In view of these factors, the following principles were adopted in the plan for a nationwide transport system in Kenya:

i. The future modal split should be determined in accordance with the characteristics and relative costs of transport of the commodities involved. For example:

   1. Transport on the Mombasa-Nairobi-Eldoret route:
      - railways or roads

   2. Transport of oil from Nairobi western areas to neighbouring countries:
      - pipeline or roads

   3. Transport from South Nyanza to the corridor:
      - inland waterway and railways or roads

ii. Consideration should be given to the interchangeability of modes so that the total cost of transport may be minimised. For example:

   1. Inland transport in response to containerisation:
      - Railroads or roads
      - Mode interchanging facilities (from one mode to another mode)

   2. Transport from South Nyanza to the corridor:
      - Mode interchanging facilities between inland waterway and railroads

iii. Existing facilities should be checked, any bottlenecks removed, their efficiency improved and their full use ensured.

iv. Limited resources in the public sector should be recognised and funds introduced from the private sector. For example:

   1. Efficient utilisation of the funds of parastatals

v. To ensure acquisition of foreign currencies, those facilities which provide contacts with foreign countries should be improved. For example:

1. Ports
2. Aerodromes
3. Marine transport

vi. Development of priority areas should be encouraged. For example:

1. Roads in potentially irrigatable areas
2. Roads or railways in other agriculture development areas

The distribution of existing facilities is shown in Figs. 2-2-1, 2-2-2 and 2-2-3.

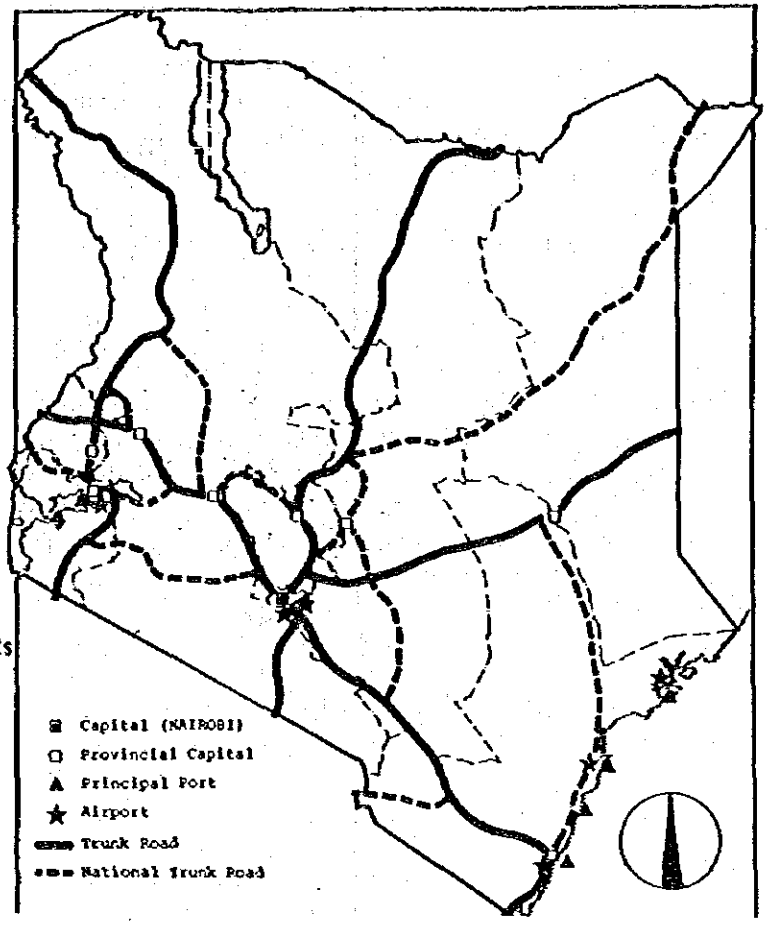


Fig. 2-2-1 Present Road Network and Distribution of Ports and Airports

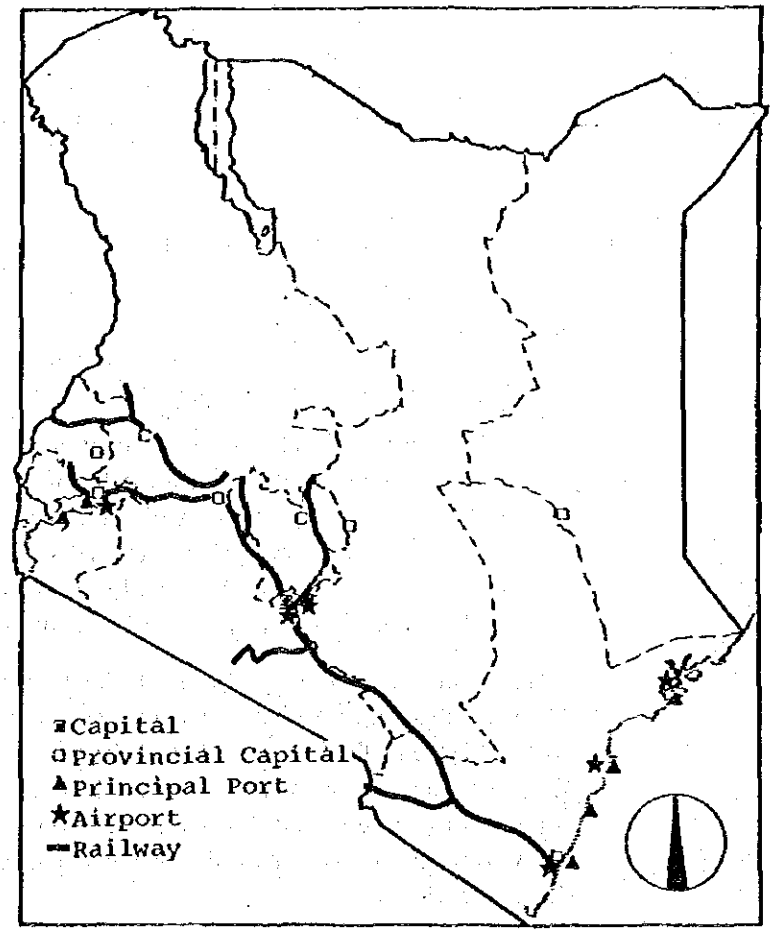


Fig. 2-2-2 Present Status of Railroad Network

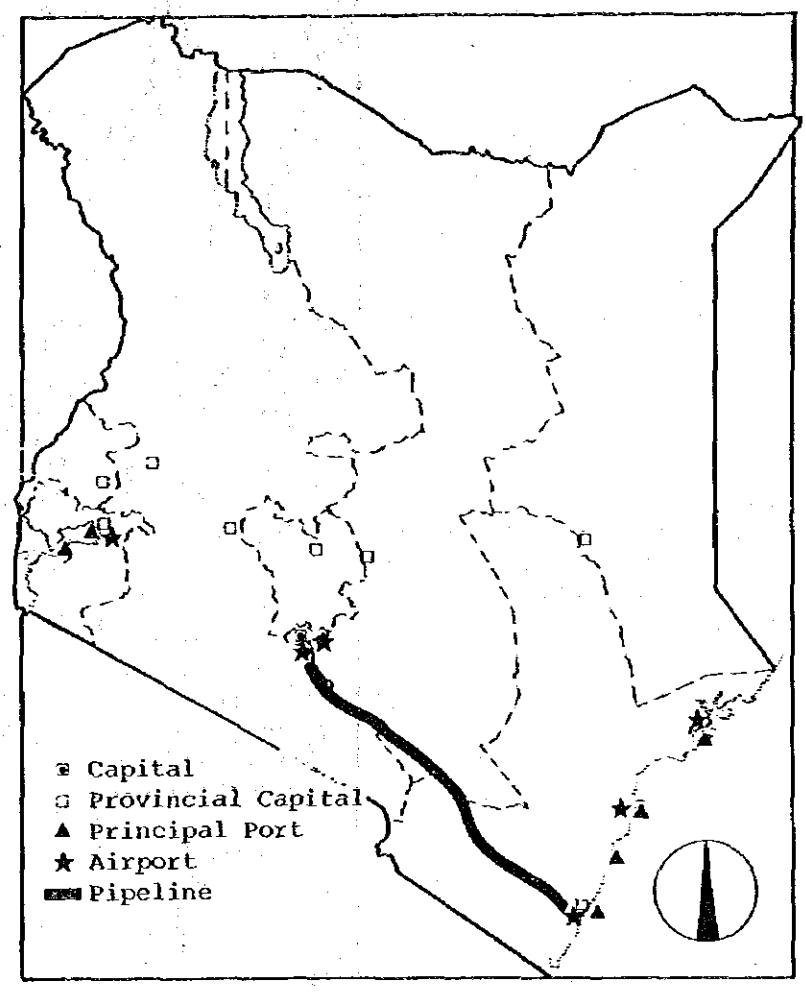


Fig. 2-2-3 Present Status of Pipeline Network

2.2.2 *Restrictions on the Improvement of Transport Facilities*

When considering a plan for improving transport facilities, financial restrictions must be recognised.

At present, the transport business in Kenya is handled by parastatals.

- Railways: Kenya Railways Corporation (KRC)
- Inland waterway: Kenya Railways Corporation (KRC)
- Ports: Kenya Ports Authority (KPA) and Kenya Cargo Handling Services Limited (KCHS)
- Airlines: Kenya Airways Limited (KQ)
- Pipeline: Kenya Pipeline Company (KPC)

"Report and Recommendations of the Working Party" (July 1982) points out the following problems of parastatals and other Government enterprises which engage in transport related projects:

Many of the management problems of parastatals and other Government enterprises can be traced directly to their relationships and responsibilities to the Government. The Working Party classifies the following problems in these categories:

i. Political considerations occasionally override merit and experience in the appointment of board members and chief executives, and their management and personnel decisions in turn are often politically motivated to the detriment of parastatal efficiency. As a result, conflicts among senior personnel occur more frequently over political matters than over issues of substance and the latter are often given only secondary attention.

ii. Managers must perceive, interpret and anticipate changes in Government policies although in their forward planning they are often dependent on information from the Government which may be difficult to obtain. Information on Government decisions in such vital matters as prices of basic commodities and rates of interest on borrowed funds or on funds lent to certain activities such as agricultural credit are absolutely necessary for effective forward budgeting.

iii. Parastatals often receive instructions from various sources within the Government, including parent ministries, the Inspectorate of Statutory Boards, the Parastatal Advisory Committee and the Treasury, which hamper effective management and efficient operation. In certain cases, such instructions often conflict because the sources have not cleared with each other before issuing them.

iv. Some Government policies may establish pricing, lending and hiring parameters for management which make profitable operations impossible and losses inevitable.

v. Once in a loss situation, parastatals may seek covering finance from the Government without preparing strategies for recovery, unlike a private sector enterprise in difficulties whose bankers will require a promising recovery plan.

In light of these factors, the following policies are determined to improve transport facilities:

i. Parastatal projects

- To ensure parastatal efficiency is essential.
- Thus, those projects which stress the efficiency of parastatals and increase the profitability of these businesses should be given top priority.

ii. Projects other than those of parastatals (roads, aerodromes and civil aviation)

- Projects required to secure safety
- Projects meeting great future traffic demands
- Projects which will play a leading role in the promotion of various developmental projects.

3. Public Development and Investment Expenditure Framework for the Transport Sector

3.1 Development and Investment Expenditure Framework for the Public Sector

(1) Gross Fixed Capital Formation in the Public Sector

The proportion of gross fixed capital in GDP at market price was 23.8% in 1979, 23.6% in 1980, and 23.9% in 1981, demonstrating a stable level. A detailed presentation by type of assets is indicated in Table 3-1-1.

Examining gross fixed capital formation by sector, the share of the public sector was 46.0% in 1979, 45.2% in 1980, and 44.5% in 1981, signifying a small downward trend. However, 1982 provisional data revealed that the share of the public sector had enlarged to 47.3%, reflecting an estimated 10% drop in gross fixed capital formation in the private sector.

Considering these findings, we have assumed that gross fixed capital for the public sector in the future will change proportionate to GDP in the following manner:

1) The proportion of gross fixed capital formation in GDP is expected to stay at 23.8%.

2) The share of gross fixed capital formation for the public sector is predicted to remain at around 42% in the future, returning to the past trends with the recovery of the economy.

Gross fixed capital formation for the public sector is thus expected to constitute 10% of GDP.

Table 3-1-1 Gross Fixed Capital Formation by Type of Asset, 1979–1982

(K£ million)

	Current Prices			
	1979	1980	1981	1982*
Dwellings:				
Private				
Traditional	39.65	43.64	50.52	54.18
Modern	36.78	34.94	42.77	40.38
Subtotal	76.43	78.58	93.29	94.56
Public	16.66	27.28	26.26	27.48
Total	93.08	105.86	119.55	122.40
Non-Residential Buildings:				
Private	27.68	32.03	43.81	28.86
Public	41.63	57.32	58.00	70.15
Total	69.35	89.34	101.81	99.01
Other Construction Works:				
Private	8.19	11.46	11.38	10.54
Public	76.48	102.93	127.32	133.25
Total	84.67	114.39	138.70	143.79
Land Improvement and Plantation Development:				
Private	7.20	8.21	7.88	6.96
Public	1.65	2.16	1.75	2.60
Total	8.85	10.37	9.63	9.56
Transport Equipment:				
Private	50. 0	61.26	63.02	59.64
Public	63.44	43.91	39.17	27.22
Total	114.34	105.17	102.19	86.86
Machinery and Other Equipment:				
Private	119.74	151.51	183.54	160.65
Public	48.84	47.97	69.96	65.82
Total	168.58	199.48	253.50	226.47
Breeding Stock and Dairy Cattle:				
Private	+1.57	-2.07	+0.03	-0.78
Total:				
Traditional Dwellings	39.65	43.64	50.52	54.18
Other	252.06	297.33	352.43	306.25
Total Private	291.70	340.97	402.95	360.43
Total Public	248.74	281.56	322.46	326.53
Total Private and Public	540.45	622.53	725.41	686.96

Note: *Provisional
Source: Economic Survey, 1983

(2) Financing of Gross Fixed Capital Formation

The situation for procurement of funds necessary for gross fixed capital formation is the same as that in most developing countries. Domestic savings are insufficient and, as indicated in Table 3-1-2, foreign funds had to be relied on at the rate of 39.1% in 1979, 44.4% in 1980, 40.4% in 1981, and 39.9% (provisional) in 1982 – about 40% on the average.

Table 3-1-2 Financing of Capital Formation, 1979–1982

(K£ million)

	1979	1980	1981	1982*
Gross Capital Formation:				
Gross Fixed Capital Formation	540.45	622.53	725.41	686.96
Changes in Stocks	-24.20	166.66	133.40	77.03
Total	516.25	789.19	858.81	763.99
Financing:				
Grants from Abroad	15.40	21.90	20.70	25.50
Net Borrowing from Abroad	186.30	328.70	326.20	279.60
Domestic Saving	314.55	438.59	511.91	458.89
Total	516.25	789.19	858.81	761.99

*: Provisional
Source: Economic Survey 1983

On the other hand, the influx of funds from advanced countries which compensate for the lack of capital has slowed down rapidly, according to the World Development Report published by World Bank on July 24, 1983. In the 1970's, the real growth rate per year of government and private capital combined was approximately 10%, while a growth rate of only 3.6% is predicted from 1982 to 1995.

For this reason, the domestic savings rate must be raised gradually from now on as the economy grows in order to reduce the dependence on foreign funds.

Utilising the future economic framework presented earlier, the 40% rate of dependence on foreign funds at present is bound to decrease to 34% by the year 2000 if the real growth rate of these funds remains at 3.6% as stated in the World Bank Report. Therefore, the domestic savings rate must increase 1.4% above the present level by the year 2000. With the rise in per capita income, such an increase is expected to be possible.

Table 3-1-3 Financing of Current Deficits for All Developing Countries, 1982--1995

	Billions of Current Dollars		Annual Percentage Growth		
	1982[1]	1995	1970-1980	1980-1982	1982-1985
Current account balance[2]	-118.2	-276.2	17.2	41.7	6.7
Net capital flows	85.2	294.2	20.4	2.2	10.0
Official development assistance	23.9	81.2	17.9	-1.0	9.9
Official nonconcessional loans	11.0	42.0	24.5	5.6	10.9
Private loans	35.0	109.6	22.3	-0.4	9.2
Private direct investment	15.3	61.4	18.6	12.5	11.3
Use of reserves and other capital[3]	33.0	-18.0	*	*	*
Memorandum items:					
Debt outstanding	548.0	1,996.8	19.9	13.7	10.5
Official	199.0	809.8	16.5	12.5	11.4
Private	349.0	1,187.0	22.3	14.3	9.9
Resource gap as percentage of GNP	3.7	1.6	n.a.	n.a.	n.a.
Current account deficit as percentage of GNP	5.0	2.7	*	*	*
Net capital flow as percentage of GNP	3.6	2.9	*	*	*
Debt service as percentage of GNP	4.7	3.5	*	*	*
Debt service as percentage of exports	20.7	12.0	*	*	*
Interest payments as percentage of GNP	2.1	1.5	*	*	*
Deflator[4]	95.7	213.8	10.3	-1.6	6.4

Note: n.a.: Not applicable
*: Not available
1): Estimated
2): Excludes official transfers. These figures differ from the current ccount given in Table 2-11, which include official rtansfers.
3): Short-term borrowing
4): US dollar GDP deflator for industrial countries

Source: World Development Report 1983, World Bank

(3) Public Development and Investment Expenditure

The outlook for development and investment expenditure in the public sector from the standpoint of government expenditure is examined.

The capital expenditure of the Government can be classified roughly into development expenditure and investment expenditure. Investment expenditure is composed of the purchase of equities and loans to enterprises.

Table 3-1-4 illustrates the changes in capital expenditure in the past ten years in relation to GDP. The proportion of Government capital expenditure in GDP has been increasing slightly, but with the financial crisis in the 1980's, the tendency toward restraint can be seen today. As a measure to solve the problem, a report was submitted to the President in July 1982 by the Working Party.

Basic understanding underlying the recommendations of the report are:

1) The potential for raising additional revenue and levels of borrowing, either external or internal, is unlikely;

2) Arbitrary across-the-board imposition of restrictions and curtailment on expenditure may seriously distort the favourable pattern of development.

Principal guidelines recommended by the Working Party include:

1) Modifications of the composition of revenue through cost sharing and local revenue sources, and the composition of expenditures through reductions in commercial investments and increases in self-help contributions to projects;

2) Efficient management of the way in which revenue, credit and expenditures are used to achieve increased productivity in Government services.

Therefore, the recommendable level of Government finance is delineated as below:

1) Tax and non-tax revenue will be maintained as a proportion of GDP. (Currently this amounts to 25.6% of GDP at market price)

2) Appropriations-in-Aid will rise over the forward budget period as a proportion of GDP reflecting growing reliance on cost sharing to finance Government services;

3) Current revenues will therefore rise as a proportion of GDP, but should decline in subsequent years;

4) Recurrent expenditure should rise with GDP remaining proportionately constant, but recurrent expenditures of Ministries will rise less rapidly;

5) The current surplus will improve;

6) Development spending will fall slightly in real terms and as a proportion of GDP;

7) The major reduction in development spending will affect investments;

8) Hence, while project spending will decline somewhat as a proportion of GDP, it will remain essentially constant in real terms.

The important outcome of the above measures will be that total expenditure of Government will decline as a proportion of GDP.

Table 3-1-4 GDP and Public Expenditures 1972–1981

Year	GDP at Market Price (K£ million)	Capital Expenditure (K£ million)					
		Development		Investment		Total	
			As % of GDP		As % of GDP		As % of GDP
1972	715.5	44.8	6.3	17.0	2.4	61.8	8.6
1973	838.6	48.2	5.7	18.2	2.2	66.4	7.9
1974	1,029.5	62.9	6.0	32.2	3.1	94.2	9.2
1975	1,192.3	74.3	6.2	52.1	4.4	126.4	10.6
1976	1,471.6	86.0	5.8	38.7	2.6	124.7	8.5
1977	1,899.8	115.2	6.1	75.1	4.0	190.3	10.0
1978	2,058.2	146.5	7.1	76.0	3.7	222.5	10.8
1979	2,271.9	171.9	7.6	63.0	2.8	234.9	10.3
1980	2,632.5	205.2	7.8	81.8	3.1	287.0	10.9
1981	3,038.6	217.2	7.1	81.6	2.7	298.8	9.8

*) Provisional

We have therefore assumed that the capital expenditure of the Government will henceforth remain at the level of 10% of GDP.

As mentioned earlier, we have concluded that gross fixed capital formation in the public sector will also stay at 10% of GDP. Although a few differences exist between the two concepts, gross fixed capital formation and capital expenditure, both concepts utilise approximately the same framework.

3.2 Public Development and Investment Budget Framework for the Transport Sector

(1) The Share of the Transport Sector (in Kenya) in Public Development and Investment Expenditure

In the past Five-year Plans, the transport sector's proportion of the public development and investment allocation has, as pointed out in Table 3-2-1, had a downward slope since the 1970's; the most recent figure shows it at 21.5%.

Among countries with a range of per capita GDP of $500 to $1,500 in 1980, the average proportion for the transport/communication sector, based on data of the public development and investment plans available for twelve countries (ref. Table 3-2-2), was calculated:

Countries with $500 – $1,000 per capital GDP:	20.6%
Countries with $1,000 – $1,500 per capital GDP:	19.0%

Table 3-2-1 Share of the Transport Sector in Kenya

Development Plan	Share of the Transport Sector in Public Development and Investment Allocation
First Plan	29.4%
Second Plan	36.9%
Third Plan	26.5%
Fourth Plan	21.5%

Table 3-2-2 Share of Transport/Communication Sector in Development Countries

Country	Per Capita GDP (1980)	Share of Transport/Communication Sector in Public Development Expenditure
Liberia	$530	24.1%
Zambia	$560	20.3
Egypt	$580	22.7
El Salvador	$660	18.7
Peru	$930	17.3
Jamaica	$1,040	18.5
Guatemala	$1,080	15.6
Ivory Coast	$1,150	22.3
Paraguay	$1,300	24.7
Jordan	$1,420	21.5
Turkey	$1,470	19.1

Table 3-2-3 Lending to Borrowers by Sector

(Annual Average of Fiscal Years) (US$ millions)

Region / Sector	Eastern Africa		Western Africa		World Total	
	1973-77	1978-82	1973-77	1978-82	1973-77	1978-82
Transport	88.6 (18.3%)	124.5 (17.2%)	108.2 (31.4%)	179.6 (23.5%)	971.1 (17.8%)	1,427.5 (12.9%)
Communication	20.4 (4.2%)	35.6 (4.9%)	12.8 (3.7%)	38.0 (5.0%)	151.8 (2.8%)	413.6 (3.7%)
Agriculture and Rural Development	144.0 (29.8%)	207.7 (28.8%)	149.6 (40.5%)	261.2 (34.2%)	1,537.2 (28.1%)	3,097.7 (28.1%)
Development Finance Companies	30.0 (6.2%)	48.2 (6.7%)	7.2 (2.1%)	37.7 (4.9%)	512.4 (9.4%)	922.4 (8.4%)
Education	43.9 (9.1%)	68.3 (9.5%)	28.4 (8.2%)	29.0 (3.8%)	251.8 (4.6%)	509.9 (4.6%)
Energy	66.1 (13.7%)	56.0 (7.8%)	12.3 (3.6%)	85.5 (11.2%)	766.8 (14.6%)	2,228.9 (20.2%)
Industry	29.1 (6.0%)	29.5 (4:1%)	0.1 (0.0%)	28.6 (3.7%)	445.0 (8.1%)	782.9 (7.1%)
Nonproject	27.0 (5.6%)	159.8 (22.1%)	- -	105.0 (13.7%)	326.4 (6.0%)	979.6 (8.9%)
Population, Health and Nutrition	2.4 (0.5%)	23.0 (3.2%)	- -	- -	30.4 (0.6%)	167.5 (1.5%)
Small Scale Enterprise	0.8 (0.2%)	7.6 (1.1%)	13.7 (4.0%)	15.9 (20.8%)	71.6 (1.3%)	236.2 (2.1%)
Technical Assistance	2.3 (0.5%)	17.2 (2.4%)	2.5 (0.7%)	21.3 (2.8%)	14.9 (0.3%)	71.5 (0.6%)
Tourism	3.4 (0.7%)	14.0 (1.9%)	5.5 (1.6%)	14.2 (1.9%)	41.4 (0.8%)	112.0 (1.0%)
Urbanization	9.5 (2.0%)	35.3 (4.9%)	8.8 (2.6%)	24.8 (3.2%)	96.0 (1.8%)	419.2 (3.8%)
Water Supply and Sewerage	16.4 (3.4%)	27.4 (3.8%)	5.8 (1.7%)	60.0 (7.8%)	246.6 (4.5%)	725.5 (6.6%)
Total	$483.9	$722.0	$345.0	$764.5	$5,463.4	$11,042.0

Source: World Bank Annual Report, 1982

As can be seen, there is a clear tendency that the share of the transport/communication decreases as per capita GDP rises. When the share of the transport sector in countries with $500–$1,000 per capita GDP level is examined using data which classify the transport and communication sectors separately, the level is 17.1%. Therefore, since the per capita GDP of Kenya was $420/person as of 1980, it is possible that the future share of the transport sector will approach 17%.

Also, the trends in aid by IBRD and IDA for development are studied by category in Table 3-2-3 and the following tendency can be detected on a worldwide perspective.

1) A decline in the share of the transport sector (17.8% to 12.9%)

2) An increase in the share of the energy sector (14.0% to 20.2%)

As a region, Eastern Africa is second after Western Africa in the size of its share to the transport sector. During the past five years, the share has been 17.2%.

Upon examination of the various categories of loan contracts of the Africa Development Bank (AfDB), the transport sector accounted for 23.6% of the total sum between 1967 and 1981.

In addition, the transport/communication sector has a 21.2% share in the recent data of the European Development Fund (EDF).

Moreover, transport accounted for 23.9% of the total sum during 1966–1981, according to the sector-based agreement situation for direct loans of Japan.

Taking into account the variation in the share of transport sector described above, we have assumed two different cases in the level of share of the transport sector in public development and investment expenditure. The first case is a downward trend continuing the recent development at 18%, and the second case maintains the average level of the past ten years at 24%.

Table 3-2-4 shows the public development and investment framework for the transport sector classified by time period and by case, based on GDP forecasted for a future economic framework. The framework was set at K£332 million for Case 1 and K£442 million for Case 2 during the period of 1984–1988. Both frameworks are considered desirable guidelines for selecting projects, since it is recommendable for actual Government spending to be closer to the levels in Case 1 from the viewpoint of public finance.

The investment framework shown in Table 3-2-4 should be considered as a flexible quideline because the economic and financial feasibility of investment projects are more important factors than budget guidelines.

Table 3-2-4 Public Development and Investment Framework for Transport Sector

(K£ million at 1981 prices)

Period	GDP at Market Price	Case 1			Case 2		
		Development Expenditure[1]	Investment Expenditure[2]	Total	Development Expenditure[1]	Investment Expenditure[2]	Total
1984-1988	18,505	240	93	333[3]	319	125	444[3]
1989-1993	23,689	307	119	426	410	159	569
1994-2000	44,424	576	224	800	768	298	1,066
1984-2000	86,618	1,123	436	1,559	1,497	582	2,079

Note: 1) Development expenditure for roads, aerodomes and civil aviation.
2) Investment expenditure for Kenya Railways Corporation, Kenya Ports Authority, Kenya Airways, Kenya Pipeline Company and other public transport companies. The values in this column not include the self-financing portion.
3) According to the Fifth Development Plan for the period 1984 to 1988, Forward Development and Investment Budget Allocation Ceiling for the transport sector is estimated at K£ 278 million at 1981 prices.

According to the Fifth Development Plan published recently, the budgetary allocation ceiling for public development and investment is set at lower than our framework.

In order to improve the recent fiscal situation of the Kenyan economy, the share of public development/investment allocation in GDP at market prices has been reduced since 1982 as shown in Figure 3-2-1. The share during the Fifth Plan is set 7.4%.

The share of the transport sector in the public development/investment allocation is estimated as approximately 20% based upon the Fifth Development Plan. Therefore, the public development/investment allocation ceiling for the transport sector is K£276 million at 1981 prices during the period 1984–1988. The Fifth Development Plan also mentions that investments in parastatals should have a diminishing share of the budget releasing a growing share for the financing of Ministry projects.

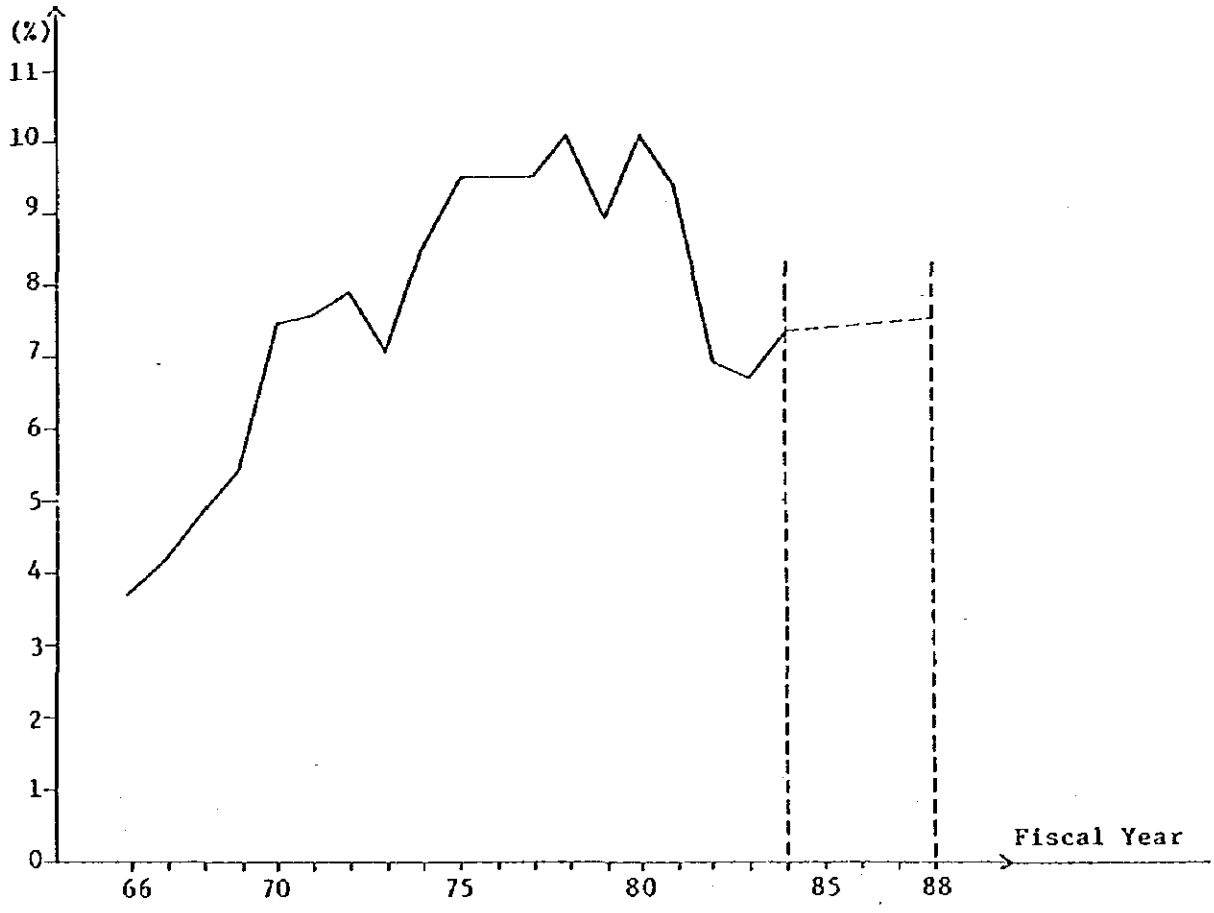


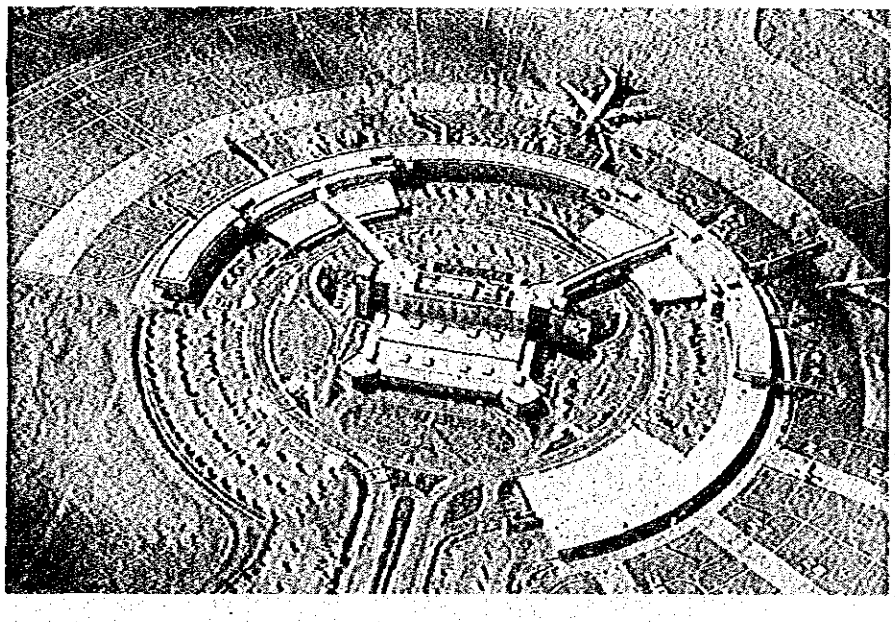
Fig. 3-2-1 Public Development and Investment A as % of GDP at Market Price

PART VI. SHORRT AND LONG—TERM TRANSPORT PLAN

1 . Development Policy and Strategy

2 . Summary of Draft Development Plan

3 . Budgetary Demand and Finance



1. Development Policy and Strategy

1.1 General

The objectives of the comprehensive transport plan are to determine:

1) the means to realise maximum utilisation of the existing transport infrastructure;

2) the investment necessary for various modes to meet future transport demand.

The policy instruments available for use in the determination of transport planning include:

1) required capital investment in the transport sector and its allocation to individual modes

2) timing, size and scale of development projects over the transport network

3) operational improvements of transport infrastructure, facilities and human resources

4) intermodal coordination such as tariff and tax adjustments

5) regulations and legal provisions for effective administration

Transport planning has to be coordinated with national economic and public finance objectives. Consideration should be given to the following domestic constraints:

1) limited foreign exchange income, and

2) funds available for transport sector investment.

Each transport means (railway, road, aircraft and pipeline, etc.) employs technology unique to its mode. This technology comprises speed, capacity, equipment cost, energy consumption, construction cost and operating cost. It is essential to consider the characteristics of the technology employed for each mode in formulating a strategic transport plan.

1.2 Role of Transport and Development Strategies

The following strategies should be adopted after existing transport facilities have been studied on the basis of the transport demand forecast.

(1) Nearly all of the transport demand in Kenya will be generated in the national corridor from Mombasa to Western Kenya through Nairobi. The capacity of this corridor should be continuously improved in the future. For this purpose, the following policy decisions should be made.

1) To improve and expand roads along the corridor and to build bypass roads

2) To increase the capacity of the existing railway network

3) To extend the pipeline to West Kenya

4) To increase the cargo handling capacity of the Mombasa port.

(2) Mombasa, Nairobi, Kisumu, Eldoret and Nakuru are important as transport terminals; therefore, the intermodal connections of maritime shipping, ports, railways and roads of these cities must be coordinated and developed to cope with increases in containerisation. The following policy decisons are particularly important.

1) To build container yards and berths for the Mombasa port

2) To build container inland terminals

3) To improve rolling stock for containers

4) To study the long-term purchase of a full-container ship.

(3) Foreign funds are a source of growth for the national economy, and procurement of foreign currency is one of the most important national policies. For this reason, the following decisions need be made for the transport sector.

1) To expand international aviation transport for tourists by Kenya Airways

2) To improve Malindi and other aerodromes to develop tourism.

3) To maintain a national flag carrier and participate in the management of international cargo transport.

(4) To support the development of a high yielding agricultural area and industries in Mombasa, investment in transport should be made on a priority basis.

1) To improve the roads connecting agricultural development areas and major towns

2) To develop a new Lamu port

3) To improve port facilities for the development of South Mainland of Mombasa, and roads and railways for freight transport in port regions.

1.3 Development Strategy for each Mode

1.3.1 Railway

The railway investment plan was decided in accordance with the following strategies.

(1) The most important task is to utilise the capacity of the existing railways, and fundamental improvements are given priority.

(2) Next, capacity should be increased to meet increases in the demand. By 1990, a transportation capacity 1.5 times that at present should be available.

(3) In the long-term perspective, KRC should be prepared to respond to innovations in railway technology.

In particular, container transportation should be expanded from its early stage, and an electrification plan should be studied.

1.3.2 Roads

The investment plans for the road network were formulated on the basis of the following strategies.

(1) Completion of projects under construction and early commencement of others scheduled to begin as well as projects to which financing has already been committed.

(2) Roads linking major townships shall be converted into trunk roads (A and B) and upgraded.

(3) Roads for which increases in transport demand can be expected shall be improved on a priority basis.

(4) At least one primary road shall be built in each agricultural development area.

(5) Roads along the national corridor for which increases in transport demand can be expected shall be improved in a planned way. Those sections of Routes A104, A109, and B1 with large transport demand should especially be expanded to four-lane (dual-lane) roads.

(6) A ring road to bypass Nairobi should be built.

A shortage of trucks to carry increasing cargo volumes is foreseen for the future. Therefore, a plan to increase the number of freight cars should be established.

1.3.3 Ports

The investment plan for the port sector was formulated in accordance with the following strategies.

(1) Improve and expand container yards, container berths, and inland container depots to meet demand increases for containerised cargo.

(2) Develop South Mainland as an industrial area.

(3) Improve and expand roads and railways to connect the existing Mombasa port to South Mainland to support industrial development in the Mombasa area.

(4) Improve and expand grain and cement terminals to meet increased demand.

(5) Develop the New Lamu port to support agricultural development in the Lamu hinterland.

(6) Improve and expand a free port zone to strengthen the functions of the Mombasa port as an international trade port and to expand employment opportunities in the long term.

The port investment priority is based on the cargo handling demand and rate of industrial development.

1.3.4 Maritime Transport

The investment plan for maritime transport was drafted in accordance with the following strategies under the assumption that realisation of international maritime cargo transportation by a national flag carrier is important as a national policy of Kenya.

(1) For maritime shipping 1 tanker between the Middle East and Kenya and 3 multi-purpose ships on the European sea route should be adopted.

(2) An analysis of the profitability of maritime transportation in the region shows that the venture will pay off in the long term. Initial investment purchases of used ships would be appropriate.

(3) In the medium or long term, maritime shipping services using container ships should be studied to meet increases in the demand for containerised shipping.

1.3.5 *Inland Water Transport*

The effective utilisation of existing ships is the largest task.

(1) The wagon ferry (M.V. Uhuru) should be allocated for cargo transport service in the Victoria Lake coastal areas.

Cargo transport service between Homa Bay and Kisumu is particularly important.

(2) The engine power of the existing passenger and tugboats should be increased for greater speed.

1.3.6 Airports/Civil Aviation

The investment plan for airports and civil aviation was based on the following strategies.

(1) Airports and air routes in Kenya are important in the network of international aviation routes; therefore they should be improved and expanded with the installation of:

1) International air route navigational aid equipment

2) JKIA and MIA international airport facilities to bring them up to an international level.

(2) Both Malindi and Kusumu airports should be upgraded to handle jets, to increase employment opportunities and foreign exchange income. Scheduled domestic flights between tourist areas should be started.

(3) In the long range, to promote aviation among the Kenyan people, local airports should be built and improved in concentrated population areas and in major cities in remote areas.

(4) Air traffic control facilities should be replaed when their useful life has expired, and facilities and equipment meeting the requirements of ICAO and other organisations should be installed to ensure safety.

(5) KQ's share of the international transport in Kenya should be increased. In particular, its portion of the northern and regional routes should be increased to 40 and 45%, respectively, by 1990.

For this purpose, tourism promotion should be carried out on a large scale, and aircraft needed for this should be purchased.

1.3.7 Pipeline

The existing pipeline connecting Nairobi and Mombasa has a capacity sufficient to meet transportation demand until 2000, and no new investment should be made at this time.

The extension of the pipeline to West Kenya should be undertaken at the first opportunity using the route from Nairobi to the border through Kimusu. Such an extension is predicted to be an investment yielding high economic returns.

2. Summary of Draft Development Plan

Based on the candidate projects by transport mode in Part VI and development policy and strategy compiled in Chapter 1, draft development plans are summarised as follows. These are recapitulated from the viewpoint of investment required for short, medium and long range. Project lists and necessary funds are shown in the tables indicated.

2.1 Railways

Table 2-1-1.

2.2 Roads

Table 2-2-1.

2.3 Ports

Table 2-3-1.

2.4 Maritime Transport

Table 2-4-1.

2.5 Inland Waterway Transport

Table 2-5-1.

2.6 Civil Aviation

Table 2-6-1, airport facilities; Table 2-6-2, air navigation facilities.

2.7 National Airline

Table 2-7-1.

2.8 Pipeline

Table 2-8-1.

2.9 Total Modes

Total funds required for all modes are summarised in Table 2-9-1.

Table 2-1-1 Project List and Necessary Funds (Railways): Domestic and Foreign Currency

(Kb million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1.	Standardisation	1985-1994	2.75	2.00	4.75	3.45	2.50	5.95	0.7	0.5	1.2	6.90	5.00	11.9
2.	Coupling Device	1984-1986	5.00	6.80	11.80	-	-	-	-	-	-	5.00	6.80	11.8
	Improvement of Track and Signalling System													
3.	(1) PCC Ties	1987-1993	4.60	7.20	11.80	15.40	24.05	39.45	-	-	-	20.00	31.25	51.25
4.	(2) Electric Token System	1992-1998	-	-	-	0.49	3.46	3.95	1.61	11.54	13.15	2.10	15.00	17.10
5.	Rationalisation of Existing System	1984-1990	3.57	15.23	18.80	1.43	6.07	7.50	-	-	-	5.00	21.30	26.30
6.	Expanding Transport Capacity	1996-2000	-	-	-	-	-	-	50.00	290.80	340.80	50.00	290.80	340.80
7.	Mombasa Port Railway Construction	1984-1986	(1.60)	(2.50)	(4.10)	(1.60)	(2.50)	(4.10)	-	-	-	(3.20)	(5.00)	(8.20)
8.	Container Terminal (1)	1989-1990	-	-	-	(3.30)	(6.00)	(9.30)	-	-	-	(3.30)	(6.00)	(9.30)
9.	Container Terminal (2)	1994-1997	-	-	-	-	-	-	(3.30)	(6.00)	(9.30)	(3.30)	(6.00)	(9.30)
10.	Electrification PH. 1	1991-1992	-	-	-	12.50	25.00	37.50	-	-	-	12.50	25.00	37.50
11.	Electrification PH. 2	1994-2000	-	-	-	-	-	-	40.00	85.00	125.00	40.00	85.00	125.00
	Total		(25.80) 24.20	(25.45) 22.95	(51.25) 47.15	(51.70) 46.80	(56.05) 47.55	(107.75) 94.35	(73.80) 70.50	(415.65) 409.65	(489.45) 480.15	(151.30) 141.50	(497.15) 480.15	(648.45) 621.65

Table 2-2-1 Project List and Necessary Funds (Roads): Domestic and Foreign Currency

(K£ million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
	Trunk (A) Domestic 35% Foreign 65%	1984-2000	33	61	94	42	78	120	84	156	240	159	295	454
	Trunk (B) Domestic 65% Foreign 35%	1984-2000	33	18	51	48	26	74	79	43	122	160	87	247
	Primary (C) Domestic 90% Foreign 10%	1984-2000	28	3	31	29	3	32	19	174	193	76	180	256
	Sub Total		94	82	176	119	107	226	182	373	555	395	562	957
	Other Road Development Project[a] Domestic 70% Foreign 30%	1984-2000	75	31	106	74	32	106	130	56	186	279	119	398
	Total		169	113	282	193	139	332	312	429	741	674	681	1,355

Table 2-3-1 Project List and Necessary Funds (Ports): Domestic and Foreign Currency

(K£ million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1	Mombasa Port Container Berth (1st Phase)	1985-1987	5.05	15.20	20.25							5.05	15.20	20.25
2	" (2nd Phase)	1993-1995				1.70	5.05	6.75	3.35	10.15	13.50	5.05	15.20	20.25
3	Mombasa Port Container Yard (1st Phase)	1985-1987	1.75	5.30	7.05							1.75	5.30	7 05
4	" (2nd Phase)	1990-1992				1.75	5.30	7.05				1.75	5.30	7.05
5	Inland Container Depot (Nairobi)	1988-1990	0.50	1.45	1.95	1.00	2.965	3.95				1.50	4.40	5.90
6	" (Eldoret)	1988-1990	0.60	1.85	2.45	1.25	3.70	4.95				1.85	5.55	7.40
7	" (Kisumu)	1993-1995				0.60	1.85	2.45	1.25	3.70	4.95	1.85	5.55	7.40
8	" (Nakuru)	1998-2000							1.25	3.70	4.95	1.85	5.55	7.40
9	Mombasa Port South Mainland Development (1st Phase)	1985-1987	25.65	77.00	102.65							25.65	77.00	102.65
10	" (2nd Phase)	1989-1991				15.45	46.45	61.90				15.45	46.45	61.90
11	" (3rd Phase)	1994-1998							11.55	34.70	46.25	11.55	34.70	46.25
12	Mombasa Port Railway and Road Connection to South Mainland (1st Phase)	1984-1986	(4.30)	(13.15)	(17.45)							(4.30)	(13.15)	(17.45)
13	" (2nd Phase)	1994-1995							(0.75)	(2.20)	(2.95)	(0.75)	(2.20)	(2.95)

(Continued)

(K£ million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
14	Mombasa Port Development Bulk Terminal (1st Phase)	1984-1985	1.25	3.80	5.05							1.25	3.80	5.05
15	" (2nd Phase)	1990-1992				2.05	6.15	8.20				2.05	6.15	8.20
16	Lamu Port New Port Development (1st Phase)	1986-1988	1.80	5.55	7.35							1.80	5.55	7.35
17	" (2nd Phase)	1991-1993				8.55	25.65	34.20				8.55	25.65	34.20
18	" (3rd Phase)	1996-1997	(0.85)	(2.50)	(3.35)				1.80	5.55	7.35	1.80	5.55	7.35
19	Roads in Lamu Port	1986-1988	(0.85)	(2.50)	(3.35)							(0.85)	(2.50)	(3.35)
	Total		36.60 (5.15)	110.2 (15.65)	146.80 (20.80)	32.35	97.05	129.40	19.40 (0.75)	60.05 (2.20)	79.45 (2.95)	88.35 (5.90)	267.30 (17.85)	355.65 (23.75)

Table 2-4-1 Project List and Necessary Funds (Maritime Transport): Domestic and Foreign Currency

(Kb million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1	Purchase of Second-hand Tanker (1 vessel)	1985	-	6.30	6.30							-	6.30	6.30
2	Purchase of Second-hand Multi-purpose Vessels (3 vessels)	1985	-	17.05	17.05							-	17.05	17.05
3	Capital Fund to Establish National Shipping Line	1984	2.50	-	2.50							2.50	-	2.50
4	Building of Full-Container Vessel (1 vessel)	1989-1990				-	22.75	22.75				-	22.75	22.75
	Total		2.50	23.35	25.85	-	22.75	22.75				2.50	46.10	48.60

Table 2-5-1 Project List and Necessary Funds (Inland Waterway Transport): Domestic and Foreign Currency

(Kb million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1	Reinforcement of Passenger Boats	1984	-	-	-							-	-	-
2	Reinforcement of Rugboats	1984	0.30	-	0.30							0.30	-	0.30
3	Reinforcement of Lighter	1984	0.12	-	0.12							0.12	-	0.12
4	Revival of Wagon Ferry	1985-1986	3.80	-	3.80							3.80	-	3.80
5	New Passenger Boat	1985-1988	-	4.93	4.93							-	4.93	4.93
	Total		4.22	4.93	9.15							4.22	4.93	9.15

Table 2-6-1 Project List and Necessary Funds (Airports): Domestic and Foreign Currency

(K£ million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1.	JKIA (Nairobi)	1984-2000	2.36	4.40	6.76	3.96	7.53	11.49	9.75	22.75	32.50	16.07	34.68	50.75
2.	MIA (Mombasa)	"	1.10	2.53	3.63	1.13	2.53	3.66	4.50	10.50	15.00	6.73	15.56	22.29
3.	Malindi	"	4.46	5.81	10.27	1.12	1.46	2.58	2.25	5.25	7.50	7.83	12.52	20.35
4.	Kisumu	"	1.76	2.47	4.23	0.71	2.54	3.25	1.50	3.50	5.00	3.97	8.51	12.48
5.	Wilson	"	0.51	1.53	2.04	0.78	1.00	1.78	2.50	5.00	7.50	3.79	7.53	11.32
6.	Local Airports	"	8.39	9.53	17.92	10.08	11.44	21.52	10.00	8.50	18.50	28.47	29.47	57.94
	Total		18.59	26.27	44.85	17.78	26.50	44.28	30.50	55.50	86.00	66.86	108.27	175.13

Table 2-6-2 Project List and Necessary Funds (Air Navigation): Domestic and Foreign Currency

(K$ million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1	Navigation Aids System Development (1st Stage)	1984-1988	0.86	4.63	5.49							0.86	4.63	5.49
2	" (2nd Stage)	1989-1993				0.94	6.25	7.19				0.94	6.25	7.19
3	" (3rd Stage)	1994-1998							0.86	7.04	7.90	0.86	7.04	7.90
4	ATS System Development (1st Stage)	1984-1988	0.62	6.39	7.01							0.62	6.39	7.01
5	Telecommunication System Development (1st & 2nd Stage)	1987-1988	0.35	2.54	2.89							0.35	2.54	2.89
		1988-1990				0.49	2.86	3.35				0.49	2.86	3.35
	(3rd Stage)								0.56	3.04	3.60	0.56	3.04	3.60
6	ATS System Development (2nd Stage)	1989-1993				0.49	7.80	8.29				0.49	7.80	8.29
7	" (3rd Stage)	1994-2000							1.55	13.08	14.63	1.55	13.08	14.63
8														
9	Development of School of Aviation (1st Stage)	1984-1985	0.16	1.37	1.53							0.16	1.37	1.53
10	" (2nd Stage)	1989-1990				0.36	1.76	2.12				0.36	1.76	2.12
11	" (3rd Stage)	1994-1995							0.71	3.52	4.23	0.71	3.52	4.23
12	MET System Development													
	" 1st Stage	1984-1986	0.29	3.16	3.45							0.29	3.16	3.45
	" 2nd Stage	1989-1991				0.40	4.35	4.75				0.40	4.35	4.75
	" 3rd Stage	1994-1996							0.46	4.56	5.02	0.46	4.56	5.02
	Total		2.28	18.09	20.37	2.68	23.02	25.70	4.14	31.24	35.38	9.10	72.35	81.45

Table 2-7-1 Project List and Necessary Funds (National Airline): Domestic and Foreign Currency

(Kb million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1	Purchase of Aircraft (Used DC-10)	1983/1984		11.5	11.5								11.5	11.5
2	" (Used DC-9-30)	1983/1984		3.0	3.0								3.0	3.0
3	" (Used DC-10)	1985/1986		12.5	12.5								12.5	12.5
4	" (Used DC-10)	1987/1988		13.5	13.5								13.5	13.5
5	" (Used DC-9-30)	1987/1988		3.0	3.0								3.0	3.0
6	" (Used DC-10)	1991/1992					13.5	13.5					13.5	13.5
7	" (Used DC-9-30)	1992/1993					3.0	3.0					3.0	3.0
8	" (Used DC-10)	1994/1995								13.5	13.5		13.5	13.5
9	" (Used DC-9-30)	1996/1997								3.0	3.0		3.0	3.0
10	" (Used DC-10)	1998/1999								13.5	13.5		13.5	13.5
11	" (Used DC-9-80 x 3)	1999/2000								22.5	22.5		22.5	22.5
12	Sale of Aircraft (DC-9-30 x 5)	1994-2000								-15.0	-15.0		-15.0	-15.0
13	Const. of Hangar	1989/1990				2.6	11.9	14.5				2.6	11.9	14.5
14	Purchase of small Aircraft	1984/1985		2.5	2.5		2.5	2.5					5.0	5.0
	Total			46.0	46.0	2.6	30.9	33.5		37.5	37.5	2.6	114.4	117.0

Table 2-8-1 Project List and Necessary Funds (Pipeline): Domestic and Foreign Currency

(Kb million at 1983 price)

No.	Project	Period	Short Range (1984 - 1988)			Medium Range (1989 - 1993)			Long Range (1994 - 2000)			Total (1984 - 2000)		
			Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1	Extension to West Kenya	1984-1987	28	51	79	-	-	-	-	-	-	28	51	79
	Total		28	51	79	-	-	-	-	-	-	28	51	79

Table 2-9-1 Total Funds Required for All Modes

(K£ million at 1983 price)

Mode			Public Sector			Sub Total	Quasi-Public Sector (Parastatals, etc.)						Sub Total	Total
			Road	Airport	Air Control		Railway	Port	Maritime Transport	Inland Waterway Transport	National Air line	Pipeline		
1984 - 1988	Required Funds	D	169	19	2	190	26	37	3	4	0	28	98	288
		F	113	26	18	157	25	110	23	5	46	51	260	417
		Total	282	45	20	347	51	147	26	9	46	79	358	705
1989 - 1993	Required Funds	D	194	18	3	215	48	32	0	-	3	-	83	298
		F	139	26	23	188	50	97	23	-	31	-	201	389
		Total	333	44	26	403	98	129	23	-	34	-	284	687
1994 - 2000	Required Funds	D	312	31	4	347	70	20	-	-	0	-	90	437
		F	428	55	31	514	410	59	-	-	38	-	507	1,017
		Total	740	86	35	861	480	79	-	-	38	-	597	1,458
1984 - 2000	Required Funds	D	675	67	9	751	145	89	3	4	3	28	272	1,023
		F	680	108	72	860	484	267	46	5	114	51	967	1,827
		Total	1,355	175	81	1,611	629	356	49	9	117	79	1,239	2,850

Note: D: Domestic Currency
F: Foreign Currency

3. Budgetary Demand and Financing

3.1 Budgetary Demand

A variety of projects to fill the gap between demand and supply have been included in the long-range transport demand forecast for the year 2000. The current status of social capital stocks in the transport sector, transport policies and strategies, and the criteria for the various modes were fully taken into consideration during the selection process.

The transport facilities are not presently adequate to cope with the future social and economic devevelopment of Kenya. Therefore, it is important to invest positively in the sector until 2000, at least to a level commensurate with the country's development. Fiscal income may not be sufficient during the Fifth 5-year Development Plan; however, investment in the transport sector will become even more important in the development of the country's social economy in the future.

Required Funds by Each Mode: Capital Expenditure

(K£ million at 1983 price)

	1984 - 88	1989 - 93	1994 - 2000	Total
Public Sector				
Roads	282	333	740	1,355
Airports	45	44	86	175
Air Control	20	26	35	81
Sub-Total	347	403	861	1,611
Quasi-Public Sector				
Railways	51	98	480	629
Ports	147	129	79	356
Maritime Transport	26	23	-	49
Inland Waterway Transport	9	-	-	9
National Airline	46	34	38	117
Pipeline	79	-	-	79
Sub-Total	358	284	597	1,239
Total	705	687	1,458	2,850

3.2 Financial Target

Probable capital investment to the transport sector can be estimated from a projection of the Kenyan economy and the Government budget. The target amount of this capital investment could take different forms such as:

Case 1: A conservative target considering the recent share of investment for the transport sector

Case 2: An aggressive target considering the recovery of investment for the transport sector based on the share of the past ten years.

The budgetary demands and targets for the two cases are summarized in the table below. Since demands exceed the target, it may be necessary for the transport sector to look into the possibility of providing its own finding sources and also to politically adjust the priority set on each project.

Budgetary Target of Transport Sector

(K£ million of 1983 price)

Period		Transport Sector Expenditures		
		Development	Investment*	Total**
1984 - 88		254	99	353
1989 - 93	Case 1	388	152	540
	Case 2	521	203	724
1994 - 2000	Case 1	732	286	1,018
	Case 2	975	381	1,356

*) Foreign exchange portion only; amounts are largely dependent on the foreign aid for each project, self-financing, etc.

**) Estimated Figure based on "Fifth Development Plan"

Note: Development expenditures: Roads, airports, and air-navigation
Investment expenditure: Railway, KPA, KQ and Kenya Pipeline Company

3.3 Recommendation for Management

3.3.1 Principle

The transport sector should be managed in a sound financial condition. Some principles to maintain such a condition are as follows:

(1) recovery of financial balance (balance between revenue and expenditure) with each transport mode,

(2) full cost recovery by tariff and tax,

(3) cost saving and efficient operation.

To achieve the above principle, the following policies should be investigated and undertaken.

3.3.2 Financial Policy

(1) Tax

The possibility of increasing the petroleum consumption tax should be investigated. It is also important to increase the tax for vehicle registration, and/or to investigate the possibility of introducing a weight tax upon heavy lorries and trucks. Such income could be earmarked for a road maintenance fund.

An airport landing fee and passenger's tax may provide an effective financial source for airports and air control development. A study will be required to investigate an appropriate tax level. Roads and airports should investigate the possibility of introducing a special purpose account system and subsidy system. Kenya Airways should take especially prompt action to purchase aircraft under an appropriate subsidy system.

(2) Tariff

It may be necessary for Kenya Railways to increase its tariff by 1.5 times every three years in order to cope with the current inflation condition.

The Kenya Port Authority and Kenya Pipeline Company maintain a favourable financial balance. These companies can implement their development projects following the established priority using their own and foreign funds.

(3) Operation

Kenya Railways should increase its transport capacity by 1.5 times that at present by the year 1990 by improving existing line capacity. This improvement should be made without increasing the number of employees.

Ports should promote containerisation and reduce the number of employees by half by the year 2000. Such a policy is important to increase productivity.

KQ needs to improve its reservation and information system by introducing computers.

3.3.3 Regulation and Organisation

(1) Regulations

Matatu, passenger transport, should have regulations controlling its operating routes, frequency, etc.

The rights and duty of the registered owner and operator of each aerodrome should be clarified.

(2) Organisation

A committee should be organised to assure cooperation among railways, ports and roads for the containerisation projects.

Sales promotion, especially in foreign countries, is very important for tourism. KQ and the Ministry of Tourism should work together on this activity.

3.3.4 Training and Study

(1) Training

A training school is needed for aerodrome operation and air traffic service personnel.

(2) Study

It is desirable that a standardised nationwide survey on aircraft movement and passenger OD be taken every year.

A road traffic census including an OD traffic survey should be performed every 3 or 5 years. Training of staff and introduction of computer systems to analyse the data is important.

APPENDIX

Appendix I. Observed and Computed Road Traffic Volume

Fig. I-1 Observed Road Traffic Volume: Vehicles/day. Results of a 60 point Census (1982) and OD Survey (1983)

Fig. I-2 Computed Road Traffic Volume: Vehicles/day. Results of Traffic Assignment by the Shortest Travel Time Method

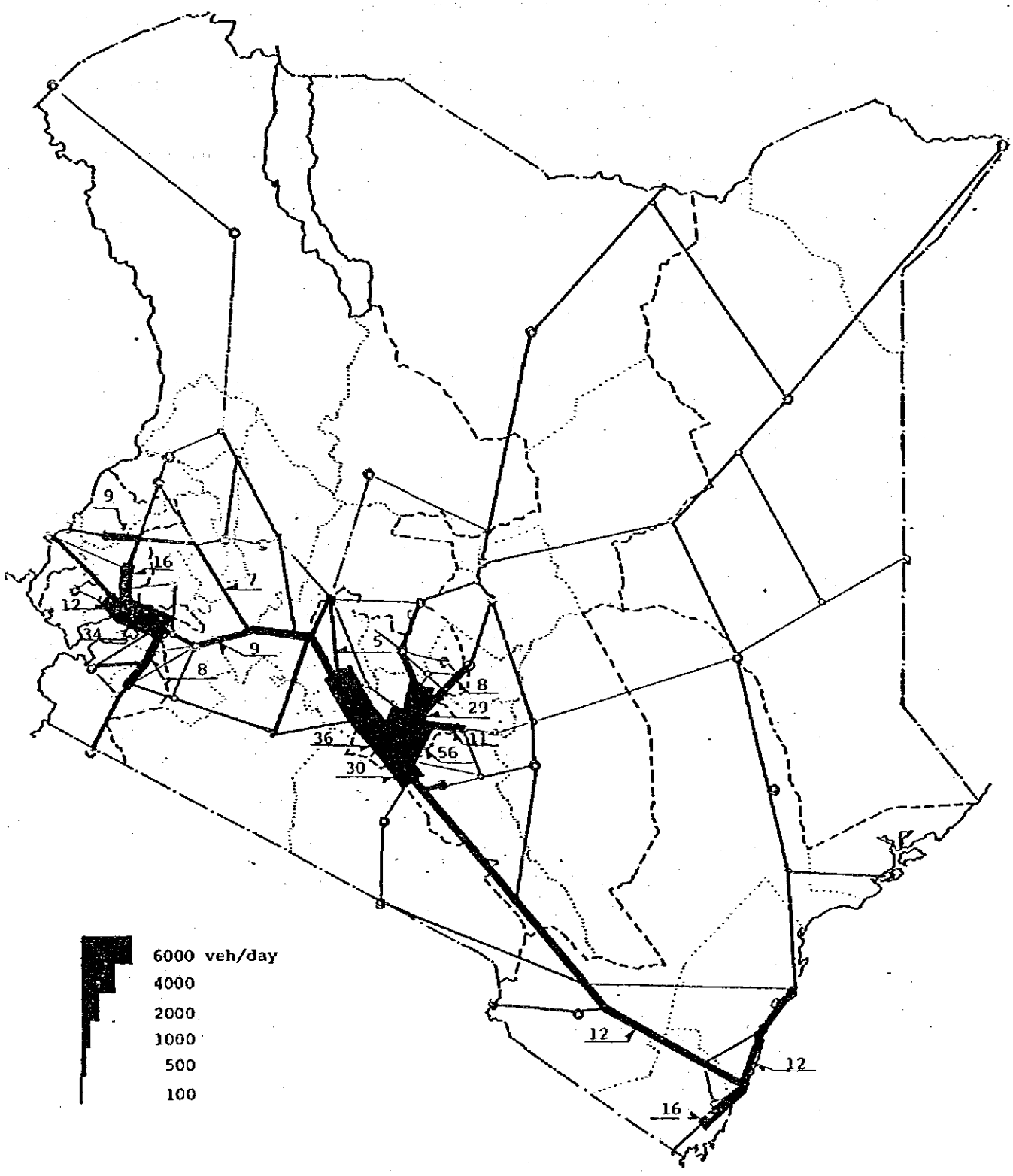


Fig. I-1 Observed Road Traffic Volume:
Vehicles/day Results of 60 point Census (1982) and OD Survey

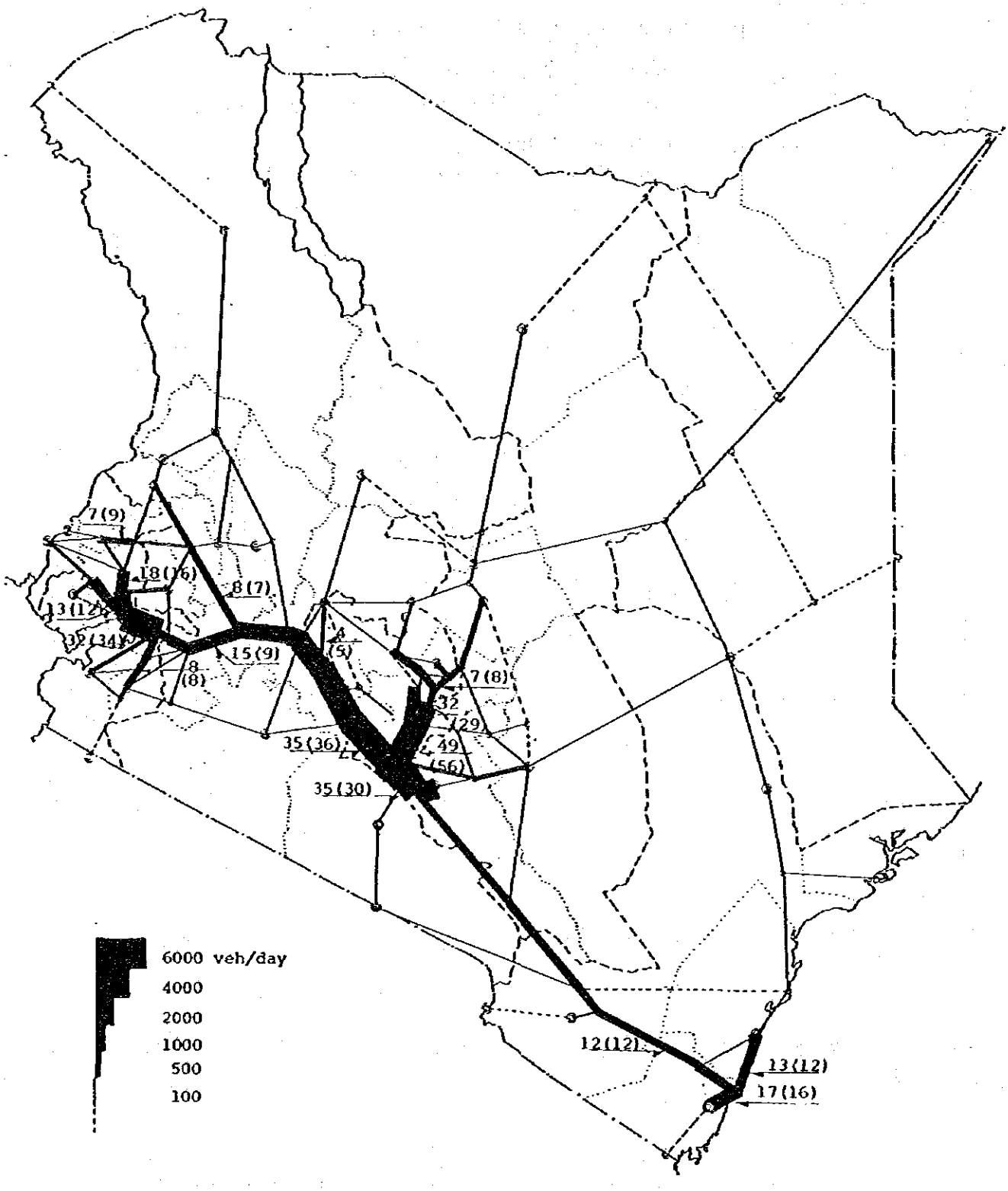


Fig. I-2 Computed Road Traffic Volume:
Vehicles/day Results of Traffic Assignment by the Shortest Travel Time Method

Appendix II. OD Table

Table II-1 Car OD Table, Vehicles/day (1983)

Table II-2 Car OD Table, Vehicles/day (2000)
Scenario A: Without limitation on railway capacity

Table II-3 Car OD Table, Vehicles/day (2000)
Scenario B: With limitation on railway capacity

Table II-1 Car Table, Vehicles/day (1983)

		1	2	3	4	5	6	7	8	9	10
1	NAIROBI	33.	334.	99.	398.	240.	375.	12.	10.	2.	205.
2	KIAMBU	308.	354.	19.	226.	13.	25.	1.	1.	0.	7.
3	KIRINYA	105.	25.	50.	5.	0.	3.	1.	1.	0.	2.
4	MURANG'A	341.	195.	4.	102.	4.	6.	0.	1.	0.	5.
5	NYANDARU	90.	5.	0.	2.	0.	1.	1.	0.	0.	0.
6	NYERI	324.	25.	1.	4.	1.	3.	0.	0.	0.	5.
7	KILIFI	19.	2.	0.	0.	0.	0.	179.	57.	6.	518.
8	KWALE	6.	0.	0.	0.	0.	0.	31.	37.	0.	770.
9	LAMU	1.	0.	0.	0.	0.	0.	5.	1.	0.	11.
10	MOMBASA	254.	11.	1.	1.	0.	1.	600.	826.	15.	78.
11	TAI/TAVE	11.	1.	0.	0.	0.	0.	9.	5.	0.	115.
12	TANA RIV	3.	0.	1.	0.	0.	0.	7.	1.	0.	10.
13	EMBU	209.	18.	186.	8.	1.	38.	0.	0.	0.	2.
14	ISIOLO	16.	0.	1.	0.	0.	0.	1.	0.	0.	1.
15	KITUI	106.	18.	1.	2.	3.	0.	0.	0.	0.	7.
16	MACHAKOS	1092.	142.	1.	9.	3.	2.	2.	0.	1.	13.
17	MARSABIT	3.	0.	0.	0.	1.	0.	0.	0.	0.	0.
18	MERU	77.	7.	7.	1.	0.	3.	1.	0.	0.	5.
19	GARISSA	8.	3.	0.	0.	0.	1.	1.	0.	0.	3.
20	MANDERA	12.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	4.	0.	0.	0.	0.	0.	0.	0.	0.	1.
22	KISII	24.	0.	0.	0.	0.	0.	1.	0.	0.	1.
23	KISUMU	215.	3.	0.	2.	1.	3.	0.	4.	0.	13.
24	SIAYA	11.	0.	0.	0.	0.	4.	0.	1.	0.	3.
25	S.NYANZA	16.	0.	0.	0.	0.	2.	0.	1.	0.	0.
26	KAJIADO	148.	5.	0.	3.	5.	5.	0.	3.	0.	10.
27	KERICHO	43.	1.	0.	0.	1.	1.	0.	1.	0.	11.
28	LAIKIPIA	79.	2.	1.	1.	0.	0.	0.	0.	0.	2.
29	NAKURU	471.	29.	2.	6.	2.	3.	1.	0.	0.	9.
30	NAROK	112.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	TRANS-NZ	37.	2.	0.	0.	0.	0.	0.	0.	0.	6.
32	UASIN-GI	47.	1.	0.	0.	0.	1.	0.	1.	0.	6.
33	BARINGO	38.	2.	0.	0.	0.	0.	0.	0.	0.	2.
34	ELGEYO M	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
35	NANDI	9.	0.	0.	0.	1.	0.	0.	0.	0.	4.
36	SAMBURU	4.	1.	0.	0.	0.	0.	3.	0.	0.	0.
37	TURKANA	8.	0.	0.	0.	0.	0.	1.	0.	0.	5.
38	W.POKOT	10.	0.	0.	0.	1.	0.	0.	0.	0.	0.
39	BUNGOMA	22.	0.	0.	1.	0.	0.	0.	0.	0.	0.
40	BUSIA	18.	0.	0.	0.	0.	0.	0.	0.	0.	2.
41	KAKAMEGA	30.	0.	0.	0.	0.	1.	0.	0.	0.	3.
42	NON KENYA	70.	0.	0.	0.	0.	0.	0.	0.	0.	36.
43	TOTAL	4434.	1185.	373.	771.	276.	478.	857.	949.	24.	1872.

Table II-1 (Continued)

		11	12	13	14	15	16	17	18	19	20
1	NAIROBI	19.	3.	178.	19.	110.	1165.	6.	116.	14.	7.
2	KIAMBU	0.	1.	20.	0.	19.	157.	1.	11.	1.	0.
3	KIRINYA	0.	0.	162.	0.	0.	0.	0.	7.	0.	0.
4	MURANG'A	0.	0.	7.	0.	1.	3.	0.	2.	0.	0.
5	NYANDARU	0.	1.	1.	0.	0.	1.	0.	0.	0.	0.
6	NYERI	0.	0.	43.	0.	0.	4.	0.	1.	0.	0.
7	KILIFI	11.	7.	0.	1.	1.	3.	0.	0.	0.	0.
8	KWALE	5.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	129.	13.	3.	1.	16.	12.	0.	4.	11.	0.
11	TAI/TAVE	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	0.	9.	2.	0.	4.	1.	6.	0.	0.
14	ISIOLO	0.	0.	1.	0.	1.	2.	0.	0.	0.	0.
15	KITUI	0.	0.	1.	0.	0.	0.	0.	1.	0.	0.
16	MACHAKOS	0.	1.	4.	0.	0.	5.	0.	1.	1.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	1.	0.	0.	0.	0.	1.	0.	0.
19	GARISSA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	MANDERA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
23	KISUMU	2.	0.	3.	0.	0.	0.	0.	2.	0.	0.
24	SIAYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	S.NYANZA	0.	0.	0.	0.	0.	1.	0.	0.	1.	0.
26	KAJIADO	0.	0.	0.	0.	0.	4.	0.	0.	0.	0.
27	KERICHO	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.
28	LAIKIPIA	0.	0.	3.	0.	0.	2.	0.	0.	0.	0.
29	NAKURU	0.	0.	3.	0.	0.	10.	0.	0.	0.	1.
30	NAROK	0.	0.	0.	0.	0.	4.	0.	3.	0.	0.
31	TRANS-NZ	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.
32	UASIN-GI	0.	0.	0.	0.	0.	3.	0.	1.	0.	0.
33	BARINGO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
34	ELGEYO M	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
35	NANDI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
36	SAMBURU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38	W.POKOT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
39	BUNGOMA	2.	0.	1.	0.	0.	0.	0.	0.	0.	0.
40	BUSIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
41	KAKAMEGA	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
42		0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
43	TOTAL	169.	24.	440.	24.	148.	1384.	8.	157.	27.	8.

Table II-1 (Continued)

		21	22	23	24	25	26	27	28	29	30
1	NAIROBI	3.	24.	161.	9.	22.	160.	53.	104.	778.	108.
2	KIAMBU	0.	0.	8.	0.	1.	13.	0.	4.	44.	2.
3	KIRINYA	0.	0.	2.	0.	0.	1.	0.	0.	2.	0.
4	MURANG'A	0.	0.	0.	0.	0.	1.	0.	1.	3.	0.
5	NYANDARU	0.	0.	1.	0.	0.	0.	1.	1.	0.	0.
6	NYERI	0.	0.	3.	0.	0.	0.	1.	0.	0.	0.
7	KILIFI	0.	1.	1.	0.	1.	1.	0.	0.	1.	0.
8	KWALE	0.	0.	3.	0.	3.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	0.	5.	13.	0.	0.	20.	6.	2.	8.	0.
11	TAI/TAVE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	1.	0.	0.	1.	0.	0.	3.	2.	0.
14	ISIOLO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	KITUI	0.	0.	2.	0.	0.	0.	0.	0.	2.	0.
16	MACHAKOS	0.	0.	2.	0.	0.	2.	1.	0.	7.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	0.	0.	0.	0.	0.	1.	1.	3.
19	GARISSA	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.
20	MANDERA	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	0.	33.	381.	3.	149.	0.	0.	0.	9.	1.
23	KISUMU	0.	376.	1154.	390.	576.	7.	160.	1.	83.	2.
24	SIAYA	0.	3.	378.	4.	4.	0.	4.	1.	9.	0.
25	S.NYANZA	0.	141.	506.	3.	35.	1.	13.	0.	4.	1.
26	KAJIADO	0.	0.	10.	0.	0.	5.	0.	4.	15.	1.
27	KERICHO	0.	1.	175.	1.	8.	0.	8.	1.	224.	0.
28	LAIKIPIA	0.	0.	1.	0.	0.	0.	0.	0.	2.	0.
29	NAKURU	0.	11.	63.	3.	6.	5.	208.	3.	8.	1.
30	NAROK	0.	1.	5.	0.	0.	2.	1.	0.	1.	0.
31	TRANS-NZ	0.	5.	64.	1.	10.	0.	2.	0.	15.	0.
32	UASIN-GI	0.	2.	113.	1.	3.	2.	2.	1.	102.	3.
33	BARINGO	0.	1.	6.	0.	1.	0.	2.	0.	1.	0.
34	ELGEYO M	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.
35	NANDI	0.	0.	80.	4.	0.	2.	0.	0.	26.	0.
36	SAMBURU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	0.	3.	0.	0.	0.	0.	0.	3.	0.
38	W.POKOT	0.	0.	6.	0.	2.	0.	0.	0.	0.	0.
39	BUNGOMA	0.	2.	45.	0.	2.	0.	2.	0.	4.	0.
40	BUSIA	0.	0.	147.	0.	1.	0.	3.	0.	7.	0.
41	KAKAMEGA	2.	7.	523.	2.	7.	0.	7.	0.	9.	0.
42		0.	0.	9.	0.	0.	0.	0.	0.	1.	0.
43	TOTAL	5.	614.	3866.	421.	832.	223.	472.	127.	1372.	122.

Table II-1 (Continued)

		31	32	33	34	35	36	37	38	39	40
1	NAIROBI	49.	92.	22.	1.	5.	17.	6.	5.	24.	21.
2	KIAMBU	2.	2.	0.	0.	0.	0.	0.	2.	0.	0.
3	KIRINYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	MURANG'A	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	NYANDARU	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
6	NYERI	2.	2.	0.	0.	0.	0.	1.	0.	0.	0.
7	KILIFI	0.	1.	0.	0.	0.	2.	0.	0.	1.	0.
8	KWALE	0.	2.	0.	0.	0.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	2.	7.	2.	0.	4.	1.	0.	0.	6.	2.
11	TAI/TAVE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	ISIOLO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	KITUI	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
16	MACHAKOS	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
19	GARISSA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	MANDERA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	5.	4.	0.	0.	0.	0.	0.	0.	0.	0.
23	KISUMU	51.	148.	1.	2.	53.	0.	4.	6.	56.	150.
24	SIAYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
25	S.NYANZA	5.	3.	0.	0.	0.	0.	0.	0.	2.	3.
26	KAJIADO	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
27	KERICHO	2.	4.	1.	0.	2.	0.	0.	0.	5.	1.
28	LAIKIPIA	0.	1.	0.	0.	0.	0.	0.	0.	2.	0.
29	NAKURU	15.	92.	1.	0.	17.	0.	0.	1.	1.	4.
30	NAROK	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	TRANS-NZ	1.	224.	1.	0.	1.	0.	0.	1.	5.	0.
32	UASIN-GI	202.	204.	10.	5.	4.	0.	2.	11.	172.	23.
33	BARINGO	1.	13.	3.	0.	0.	0.	0.	0.	0.	0.
34	ELGEYO M	1.	1.	0.	0.	0.	0.	0.	1.	0.	0.
35	NANDI	2.	1.	0.	0.	0.	0.	0.	0.	2.	2.
36	SAMBURU	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
38	W.POKOT	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.
39	BUNGOMA	1.	179.	0.	0.	0.	0.	0.	0.	26.	6.
40	BUSIA	0.	21.	0.	0.	0.	0.	0.	0.	4.	2.
41	KAKAMEGA	38.	30.	1.	2.	7.	0.	0.	0.	139.	4.
42		0.	5.	0.	0.	0.	0.	0.	0.	2.	1.
43	TOTAL	378.	1042.	42.	9.	92.	20.	13.	26.	447.	219.

Table II-1 (Continued)

		41	42	43
1	NAIROBI	30.	58.	5097.
2	KIAMBU	2.	0.	1243.
3	KIRINYA	0.	0.	366.
4	MURANG'A	0.	0.	675.
5	NYANDARU	0.	0.	107.
6	NYERI	2.	0.	423.
7	KILIFI	0.	0.	813.
8	KWALE	1.	0.	857.
9	LAMU	0	0.	18.
10	MOMBASA	2.	67.	2122.
11	TAI/TAVE	0.	0.	141.
12	TANA RIV	0.	0.	22.
13	EMBU	0.	0.	490.
14	ISIOLO	0.	0.	23.
15	KITUI	2.	0.	146.
16	MACHAKOS	0.	0.	1291.
17	MARSABIT	0.	0.	4.
18	MERU	0.	0.	107.
19	GARISSA	0.	0.	17.
20	MANDERA	0.	0.	13.
21	WAJIR	0.	0.	5.
22	KISII	6.	0.	616.
23	KISUMU	465.	5.	3938.
24	SIAYA	4.	0.	428.
25	S.NYANZA	10.	2.	751.
26	KAJIADO	1.	0.	220.
27	KERICHO	1.	0.	492.
28	LAIKIPIA	0.	0.	93.
29	NAKURU	14.	1.	991.
30	NAROK	0.	0.	128.
31	TRANS-NZ	21.	0.	397.
32	UASIN-GI	16.	3.	940.
33	BARINGO	0.	0.	71.
34	ELGEYO M	2.	0.	5.
35	NANDI	11.	0.	143.
36	SAMBURU	0.	0.	8.
37	TURKANA	0.	0.	22.
38	W.POKOT	0.	0.	21.
39	BUNGOMA	153	0.	443.
40	BUSIA	8.	0.	212.
41	KAKAMEGA	272.	0.	1085.
42		0.	0.	124.
43	TOTAL	1023.	136.	25107.

Table II-2 Car OD Table, Vehicles/day (2000)
Scenario A: Without Imitation on Railway Capacity

		1	2	3	4	5	6	7	8	9	10
1	NAIROBI	77.	680.	200.	765.	490.	697.	24.	21.	4.	356.
2	KIAMBU	623.	722.	39.	464.	30.	46.	1.	2.	0.	13.
3	KIRINYA	213.	51.	105.	9.	0.	7.	3.	2.	0.	4.
4	MURANG'A	646.	401.	10.	221.	9.	14.	0.	2.	0.	9.
5	NYANDARU	150.	9.	0.	5.	0.	2.	2.	0.	0.	0.
6	NYERI	592.	49.	2.	8.	2.	4.	0.	0.	0.	10.
7	KILIFI	41.	3.	0.	0.	0.	0.	381.	124.	13.	909.
8	KWALE	15.	0.	0.	0.	0.	0.	66.	94.	0.	1485.
9	LAMU	2.	0.	0.	0.	0.	0.	11.	2.	0.	20.
10	MOMBASA	467.	21.	2.	3.	0.	3.	1082.	1595.	26.	120.
11	TAI/TAVE	26.	2.	0.	0.	0.	0.	24.	11.	0.	238.
12	TANA RIV	30.	0.	9.	0.	0.	0.	83.	12.	0.	97.
13	EMBU	403.	39.	330.	14.	1.	71.	0.	0.	0.	4.
14	ISIOLO	31.	0.	1.	0.	0.	0.	2.	0.	0.	2.
15	KITUI	201.	42.	1.	3.	8.	0.	0.	0.	0.	11.
16	MACHAKOS	2178.	278.	2.	21.	8.	4.	5.	0.	3.	27.
17	MARSABIT	6.	0.	0.	0.	1.	0.	0.	0.	0.	0.
18	MERU	140.	15.	15.	1.	0.	5.	2.	0.	0.	9.
19	GARISSA	16.	5.	0.	0.	0.	1.	2.	0.	0.	5.
20	MANDERA	29.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	7.	0.	0.	0.	0.	0.	0.	0.	0.	2.
22	KISII	37.	0.	0.	0.	0.	0.	1.	0.	0.	1.
23	KISUMU	363.	5.	0.	4.	3.	3.	0.	7.	0.	17.
24	SIAYA	39.	0.	0.	0.	0.	10.	0.	3.	0.	9.
25	S.NYANZA	74.	0.	0.	0.	0.	6.	0.	2.	0.	1.
26	KAJIADO	311.	10.	0.	7.	5.	6.	0.	6.	0.	18.
27	KERICHO	88.	1.	0.	0.	2.	2.	0.	1.	0.	19.
28	LAIKIPIA	153.	3.	2.	1.	0.	0.	0.	0.	0.	3.
29	NAKURU	933.	63.	2.	11.	3.	7.	2.	0.	0.	17.
30	NAROK	600.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	TRANS-NZ	74.	4.	0.	0.	0.	0.	0.	0.	0.	10.
32	UASIN-GI	97.	2.	0.	0.	0.	3.	0.	1.	0.	9.
33	BARINGO	93.	4.	0.	0.	0.	0.	0.	0.	0.	4.
34	ELGEYO M	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
35	NANDI	19.	0.	0.	0.	2.	0.	0.	0.	0.	5.
36	SAMBURU	8.	1.	0.	0.	0.	0.	6.	0.	0.	0.
37	TURKANA	172.	0.	0.	0.	0.	0.	21.	0.	0.	88.
38	W.POKOT	56.	0.	0.	0.	9.	0.	0.	0.	0.	0.
39	BUNGOMA	42.	0.	0.	1.	0.	0.	0.	0.	0.	0.
40	BUSIA	68.	0.	0.	0.	0.	0.	0.	0.	0.	6.
41	KAKAMEGA	62.	0.	0.	0.	0.	2.	0.	0.	0.	5.
42		115.	0.	0.	0.	0.	0.	1.	0.	0.	63.
43	TOTAL	9297.	2411.	720.	1537.	574.	890.	1718.	1886.	46.	3596.

Table II-2 (Continued)

		11	12	13	14	15	16	17	18	19	20
1	NAIROBI	43.	34.	349.	36.	213.	2340.	13.	222.	26.	16.
2	KIAMBU	0.	9.	37.	0.	40.	317.	2.	23.	2.	0.
3	KIRINYA	0.	0.	294.	0.	0.	0.	0.	15.	0.	0.
4	MURANG'A	0.	0.	13.	0.	3.	6.	0.	5.	0.	0.
5	NYANDARU	0.	5.	2.	0.	0.	2.	0.	0.	0.	0.
6	NYERI	0.	0.	76.	0.	0.	7.	0.	2.	0.	0.
7	KILIFI	29.	76.	0.	2.	3.	9.	0.	0.	0.	0.
8	KWALE	12.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	269.	127.	5.	3.	29.	26.	0.	9.	21.	0.
11	TAI/TAVE	4.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	0.	15.	5.	0.	8.	1.	9.	0.	0.
14	ISIOLO	0.	0.	3.	0.	2.	5.	0.	0.	0.	0.
15	KITUI	0.	0.	2.	0.	0.	0.	0.	1.	0.	0.
16	MACHAKOS	0.	4.	8.	0.	0.	13.	0.	1.	3.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	1.	0.	0.	0.	0.	2.	0.	0.
19	GARISSA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	MANDERA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
23	KISUMU	3.	0.	4.	0.	0.	0.	0.	4.	0.	0.
24	SIAYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	S.NYANZA	0.	0.	0.	0.	0.	4.	0.	0.	4.	0.
26	KAJIADO	0.	0.	0.	0.	0.	9.	0.	0.	0.	0.
27	KERICHO	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.
28	LAIKIPIA	0.	0.	5.	0.	0.	4.	0.	0.	0.	0.
29	NAKURU	0.	0.	6.	0.	0.	23.	0.	0.	0.	3.
30	NAROK	0.	0.	0.	0.	0.	26.	0.	19.	0.	0.
31	TRANS-NZ	0.	0.	0.	0.	0.	4.	0.	0.	0.	0.
32	UASIN-GI	0.	0.	0.	0.	0.	7.	0.	2.	0.	0.
33	BARINGO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
34	ELGEYO M	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
35	NANDI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
36	SAMBURU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38	W.POKOT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
39	BUNGOMA	5.	0.	1.	0.	0.	0.	0.	0.	0.	0.
40	BUSIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
41	KAKAMEGA	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.
42		0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
43	TOTAL	366.	255.	823.	45.	291.	2817.	15.	312.	56.	18.

Table II-2 (Continued)

		21	22	23	24	25	26	27	28	29	30
1	NAIROBI	6.	41.	300.	35.	104.	320.	111.	237.	1561.	587.
2	KIAMBU	0.	0.	15.	0.	4.	24.	0.	9.	96.	14.
3	KIRINYA	0.	0.	3.	0.	0.	2.	0.	0.	2.	0.
4	MURANG'A	0.	0.	0.	0.	0.	2.	0.	2.	8.	0.
5	NYANDARU	0.	0.	1.	0.	0.	0.	3.	2.	0.	0.
6	NYERI	0.	0.	6.	0.	0.	0.	1.	0.	0.	0.
7	KILIFI	0.	2.	1.	0.	4.	3.	0.	0.	3.	0.
8	KWALE	0.	0.	7.	0.	17.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	0.	9.	22.	0.	0.	42.	11.	3.	16.	0.
11	TAI/TAVE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	1.	0.	0.	4.	0.	0.	5.	3.	0.
14	ISIOLO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	KITUI	0.	0.	3.	0.	0.	0.	0.	0.	3.	0.
16	MACHAKOS	0.	0.	3.	0.	0.	5.	2.	0.	13.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	0.	0.	0.	0.	0.	2.	2.	18.
19	GARISSA	0.	0.	0.	0.	3.	0.	0.	0.	1.	0.
20	MANDERA	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	0.	43.	535.	6.	510.	0.	0.	0.	14.	2.
23	KISUMU	0.	530.	1634.	1068.	2107.	8.	260.	1.	153.	10.
24	SIAYA	0.	7.	1024.	23.	25.	0.	14.	3.	50.	0.
25	S.NYANZA	0.	491.	1882.	22.	320.	3.	53.	0.	15.	16.
26	KAJIADO	0.	0.	16.	0.	0.	10.	0.	8.	30.	4.
27	KERICHO	0.	2.	314.	5.	59.	0.	15.	3.	441.	0.
28	LAIKIPIA	0.	0.	2.	0.	0.	0.	0.	0.	2.	0.
29	NAKURU	0.	18.	114.	9.	27.	12.	417.	7.	16.	3.
30	NAROK	0.	2.	24.	0.	0.	15.	4.	0.	5.	0.
31	TRANS-NZ	0.	9.	95.	3.	59.	0.	3.	0.	27.	0.
32	UASIN-GI	0.	4.	174.	3.	12.	3.	4.	3.	178.	14.
33	BARINGO	0.	3.	15.	0.	6.	0.	6.	0.	2.	0.
34	ELGEYO M	0.	0.	0.	0.	2.	0.	0.	0.	3.	0.
35	NANDI	0.	0.	132.	14.	0.	4.	0.	0.	49.	0.
36	SAMBURU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	0.	76.	0.	0.	0.	0.	0.	75.	0.
38	W.POKOT	0.	0.	24.	0.	19.	0.	0.	0.	0.	0.
39	BUNGOMA	0.	2.	69.	0.	5.	0.	3.	0.	9.	0.
40	BUSIA	0.	0.	409.	0.	7.	0.	10.	0.	27.	0.
41	KAKAMEGA	3.	10.	833.	9.	31.	0.	13.	0.	18.	0.
42		0.	0.	5.	0.	0.	0.	0.	0.	2.	0.
43	TOTAL	9.	1174.	7737.	1197.	3347.	455.	951.	253.	2782.	668.

Table II-2 (Continued)

		31	32	33	34	35	36	37	38	39	40
1	NAIROBI	108.	202.	61.	3.	12.	37.	102.	31.	53.	85.
2	KIAMBU	5.	3.	0.	0.	0.	0.	0.	12.	0.	0.
3	KIRINYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	MURANG'A	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	NYANDARU	0.	0.	0.	0.	0.	0.	32.	0.	0.	0.
6	NYERI	4.	2.	0.	0.	0.	0.	50.	0.	0.	0.
7	KILIFI	0.	2.	0.	0.	0.	2.	0.	0.	3.	0.
8	KWALE	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	3.	13.	4.	0.	8.	3.	0.	0.	13.	6.
11	TAI/TAVE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	ISIOLO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	KITUI	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
16	MACHAKOS	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.
19	GARISSA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	MANDERA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	6.	7.	0.	0.	0.	0.	0.	0.	0.	0.
23	KISUMU	78.	228.	4.	3.	85.	0.	70.	26.	82.	407.
24	SIAYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.
25	S.NYANZA	20.	11.	0.	0.	0.	0.	0.	0.	10.	20.
26	KAJIADO	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.
27	KERICHO	4.	0.	3.	0.	4.	0.	0.	0.	10.	2.
28	LAIKIPIA	0.	2.	0.	0.	0.	0.	0.	0.	5.	0.
29	NAKURU	32.	182.	1.	0.	36.	0.	0.	9.	2.	17.
30	NAROK	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	TRANS-NZ	1.	436.	2.	0.	1.	0.	0.	5.	11.	0.
32	UASIN-GI	386.	399.	22.	16.	7.	0.	56.	71.	326.	76.
33	BARINGO	2.	52.	9.	0.	0.	0.	0.	0.	0.	0.
34	ELGEYO M	2.	1.	0.	0.	0.	0.	0.	5.	0.	0.
35	NANDI	4.	2.	0.	0.	0.	0.	0.	0.	3.	7.
36	SAMBURU	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	26.	0.	0.	0.	0.	0.	0.	0.	0.
38	W.POKOT	0.	18.	0.	0.	0.	0.	0.	0.	0.	0.
39	BUNGOMA	1.	550.	0.	0.	0.	0.	0.	0.	51.	18.
40	BUSIA	0.	72.	0.	0.	0.	0.	0.	0.	13.	13.
41	KAKAMEGA	67.	60.	3.	4.	15.	0.	0.	0.	275.	12.
42		0.	11.	0.	0.	0.	0.	0.	0.	0.	0.
43	TOTAL	724.	2076.	110.	27.	169.	43.	271.	160.	857.	670.

Table II-2 (Continued)

		41	42	43
1	NAIROBI	66.	102.	10743.
2	KIAMBU	5.	0.	2557.
3	KIRINYA	0.	0.	708.
4	MURANG'A	0.	0.	1351.
5	NYANDARU	0.	0.	215.
6	NYERI	2.	0.	799.
7	KILIFI	0.	0.	1611.
8	KWALE	2.	0.	1702.
9	LAMU	0.	0.	35.
10	MOMBASA	4.	123.	4090.
11	TAI/TAVE	0.	0.	305.
12	TANA RIV	0.	0.	232.
13	EMBU	0.	0.	912.
14	ISIOLO	0.	0.	46.
15	KITUI	3.	0.	280.
16	MACHAKOS	0.	1.	2579.
17	MARSABIT	0.	0.	7.
18	MERU	0.	0.	213.
19	GARISSA	0.	0.	34.
20	MANDERA	0.	0.	30.
21	WAJIR	0.	0.	9.
22	KISII	7.	0.	1170.
23	KISUMU	732.	8.	7948.
24	SIAYA	15.	0.	1206.
25	S.NYANZA	41.	8.	2999.
26	KAJIADO	1.	1.	444.
27	KERICHO	2.	0.	969.
28	LAIKIPIA	0.	0.	180.
29	NAKURU	26.	3.	1998.
30	NAROK	0.	0.	695.
31	TRANS-NZ	40.	0.	764.
32	UASIN-GI	30.	5.	1890.
33	BARINGO	0.	0.	175.
34	ELGEYO M	4.	0.	16.
35	NANDI	21.	0.	264.
36	SAMBURU	0.	0.	18.
37	TURKANA	0.	0.	457.
38	W.POKOT	0.	0.	125.
39	BUNGOMA	283.	0.	842.
40	BUSIA	29.	0.	655.
41	KAKAMEGA	527.	0.	1951.
42		0.	0.	199.
43	TOTAL	1842.	250.	53424.

Table II-3 Car OD Table, Vehicles/day (2000)
Scenario B: With Imitation on Railway Capacity

		1	2	3	4	5	6	7	8	9	10
1	NAIROBI	78.	702.	202.	775.	514.	719.	22.	20.	4.	459.
2	KIAMBU	645.	783.	41.	490.	33.	50.	1.	1.	0.	19.
3	KIRINYA	214.	53.	105.	9.	0.	7.	2.	1.	0.	5.
4	MURANG'A	654.	425.	10.	228.	9.	15.	0.	2.	0.	12.
5	NYANDARU	157.	10.	0.	5.	0.	2.	2.	0.	0.	0.
6	NYERI	613.	54.	2.	8.	2.	4.	0.	0.	0.	15.
7	KILIFI	38.	3.	0.	0.	0.	0.	304.	99.	10.	1044.
8	KWALE	15.	0.	0.	0.	0.	0.	54.	63.	0.	1544.
9	LAMU	2.	0.	0.	0.	0.	0.	8.	1.	0.	24.
10	MOMBASA	617.	31.	2.	5.	0.	5.	1207.	1662.	50.	195.
11	TAI/TAVE	23.	2.	0.	0.	0.	0.	17.	9.	0.	260.
12	TANA RIV	27.	0.	8.	0.	0.	0.	67.	8.	0.	121.
13	EMBU	401.	40.	326.	14.	2.	73.	0.	0.	0.	5.
14	ISIOLO	30.	0.	1.	0.	0.	0.	2.	0.	0.	3.
15	KITUI	197.	43.	1.	3.	8.	0.	0.	0.	0.	15.
16	MACHAKOS	2298.	307.	2.	24.	9.	4.	4.	0.	3.	42.
17	MARSABIT	6.	0.	0.	0.	1.	0.	0.	0.	0.	0.
18	MERU	141.	16.	15.	1.	0.	5.	1.	0.	0.	13.
19	GARISSA	15.	5.	0.	0.	0.	1.	1.	0.	0.	5.
20	MANDERA	29.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	7.	0.	0.	0.	0.	0.	0.	0.	0.	2.
22	KISII	37.	0.	0.	0.	0.	0.	1.	0.	0.	2.
23	KISUMU	373.	6.	0.	4.	3.	3.	0.	6.	0.	20.
24	SIAYA	38.	0.	0.	0.	0.	10.	0.	2.	0.	9.
25	S.NYANZA	74.	0.	0.	0.	0.	6.	0.	2.	0.	1.
26	KAJIADO	422.	15.	0.	11.	5.	6.	0.	6.	0.	34.
27	KERICHO	87.	2.	0.	0.	2.	2.	0.	1.	0.	27.
28	LAIKIPIA	174.	4.	2.	1.	0.	0.	0.	0.	0.	3.
29	NAKURU	1004.	73.	2.	11.	3.	8.	2.	0.	0.	26.
30	NAROK	591.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	TRANS-NZ	76.	4.	0.	0.	0.	0.	0.	0.	0.	15.
32	UASIN-GI	99.	2.	0.	0.	0.	3.	0.	1.	0.	12.
33	BARINGO	93.	4.	0.	0.	0.	0.	0.	0.	0.	4.
34	ELGEYO M	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
35	NANDI	19.	0.	0.	0.	2.	0.	0.	0.	0.	7.
36	SAMBURU	8.	1.	0.	0.	0.	0.	5.	0.	0.	0.
37	TURKANA	161.	0.	0.	0.	0.	0.	15.	0.	0.	106.
38	W.POKOT	56.	0.	0.	0.	9.	0.	0.	0.	0.	0.
39	BUNGOMA	46.	0.	0.	1.	0.	0.	0.	0.	0.	0.
40	BUSIA	67.	0.	0.	0.	0.	0.	0.	0.	0.	9.
41	KAKAMEGA	62.	0.	0.	0.	0.	2.	0.	0.	0.	6.
42		109.	0.	0.	0.	0.	0.	1.	0.	0.	85.
43	TOTAL	9803.	2583.	720.	1590.	602.	924.	1718.	1886.	46.	4150.

Table II-3 (Continued)

		11	12	13	14	15	16	17	18	19	20
1	NAIROBI	40.	30.	348.	35.	207.	2475.	13.	225.	23.	16.
2	KIAMBU	0.	8.	38.	0.	40.	350.	2.	25.	2.	0.
3	KIRINYA	0.	0.	289.	0.	0.	0.	0.	15.	0.	0.
4	MURANG'A	0.	0.	13.	0.	2.	7.	0.	5.	0.	0.
5	NYANDARU	0.	5.	2.	0.	0.	3.	0.	0.	0.	0.
6	NYERI	0.	0.	78.	0.	0.	8.	0.	2.	0.	0.
7	KILIFI	21.	60.	0.	2.	3.	9.	0.	0.	0.	0.
8	KWALE	9.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	296.	147.	8.	4.	37.	41.	0.	13.	26.	0.
11	TAI/TAVE	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	0.	14.	5.	0.	8.	1.	8.	0.	0.
14	ISIOLO	0.	0.	3.	0.	2.	5.	0.	0.	0.	0.
15	KITUI	0.	0.	2.	0.	0.	0.	0.	1.	0.	0.
16	MACHAKOS	0.	4.	9.	0.	0.	14.	0.	1.	2.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	1.	0.	0.	0.	0.	2.	0.	0.
19	GARISSA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	MANDERA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
23	KISUMU	3.	0.	4.	0.	0.	0.	0.	4.	0.	0.
24	SIAYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	S.NYANZA	0.	0.	0.	0.	0.	4.	0.	0.	3.	0.
26	KAJIADO	0.	0.	0.	0.	0.	15.	0.	0.	0.	0.
27	KERICHO	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.
28	LAIKIPIA	0.	0.	6.	0.	0.	5.	0.	0.	0.	0.
29	NAKURU	0.	0.	6.	0.	0.	28.	0.	0.	0.	3.
30	NAROK	0.	0.	0.	0.	0.	27.	0.	19.	0.	0.
31	TRANS-NZ	0.	0.	0.	0.	0.	5.	0.	0.	0.	0.
32	UASIN-GI	0.	0.	0.	0.	0.	7.	0.	2.	0.	0.
33	BARINGO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
34	ELGEYO M	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
35	NANDI	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
36	SAMBURU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38	W.POKOT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
39	BUNGOMA	4.	0.	1.	0.	0.	0.	0.	0.	0.	0.
40	BUSIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
41	KAKAMEGA	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.
42		0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
43	TOTAL	375.	255.	823.	45.	291.	3018.	15.	321.	56.	18.

Table II-3 (Continued)

		21	22	23	24	25	26	27	28	29	30
1	NAIROBI	6.	41.	308.	34.	104.	417.	110.	242.	1689.	586.
2	KIAMBU	0.	0.	16.	0.	4.	32.	0.	13.	111.	15.
3	KIRINYA	0.	0.	3.	0.	0.	3.	0.	0.	2.	0.
4	MURANG'A	0.	0.	0.	0.	0.	4.	0.	3.	9.	0.
5	NYANDARU	0.	0.	2.	0.	0.	0.	3.	2.	0.	0.
6	NYERI	0.	0.	7.	0.	0.	0.	1.	0.	0.	0.
7	KILIFI	0.	1.	1.	0.	4.	4.	0.	0.	2.	0.
8	KWALE	0.	0.	5.	0.	12.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	0.	13.	30.	0.	0.	88.	16.	4.	25.	0.
11	TAI/TAVE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	1.	0.	0.	4.	0.	0.	6.	3.	0.
14	ISIOLO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	KITUI	0.	0.	3.	0.	0.	0.	0.	0.	4.	0.
16	MACHAKOS	0.	0.	3.	0.	0.	9.	2.	0.	14.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	0.	0.	0.	0.	0.	2.	2.	18.
19	GARISSA	0.	0.	0.	0.	3.	0.	0.	0.	1.	0.
20	MANDERA	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	0.	42.	549.	6.	495.	0.	0.	0.	16.	2.
23	KISUMU	0.	542.	1735.	1072.	2202.	8.	265.	1.	150.	10.
24	SIAYA	0.	7.	1026.	22.	25.	0.	14.	3.	31.	0.
25	S.NYANZA	0.	476.	1913.	22.	310.	3.	50.	0.	16.	15.
26	KAJIADO	0.	0.	22.	0.	0.	21.	0.	12.	45.	4.
27	KERICHO	0.	2.	315.	5.	57.	0.	15.	4.	465.	0.
28	LAIKIPIA	0.	0.	2.	0.	0.	0.	0.	0.	2.	0.
29	NAKURU	0.	19.	128.	9.	29.	21.	442.	9.	19.	3.
30	NAROK	0.	2.	24.	0.	0.	23.	4.	0.	5.	0.
31	TRANS-NZ	0.	10.	98.	3.	40.	0.	3.	0.	50.	0.
32	UASIN-GI	0.	4.	179.	3.	13.	3.	4.	4.	196.	15.
33	BARINGO	0.	3.	15.	0.	5.	0.	6.	0.	2.	0.
34	ELGEYO M	0.	0.	0.	0.	2.	0.	0.	0.	3.	0.
35	NANDI	0.	0.	131.	13.	0.	6.	0.	0.	50.	0.
36	SAMBURU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	0.	73.	0.	0.	0.	0.	0.	17.	0.
38	W.POKOT	0.	0.	24.	0.	19.	0.	0.	0.	0.	0.
39	BUNGOMA	0.	2.	76.	0.	5.	0.	4.	0.	11.	0.
40	BUSIA	0.	0.	408.	0.	7.	0.	9.	0.	29.	0.
41	KAKAMEGA	3.	10.	839.	8.	30.	0.	13.	0.	20.	0.
42		0.	0.	4.	0.	0.	0.	0.	0.	3.	0.
43	TOTAL	9.	1174.	7940.	1197.	3351.	640.	902.	306.	3054.	668.

Table II-3 (Continued)

		31	32	33	34	35	36	37	38	39	40
1	NAIROBI	113.	207.	60.	3.	12.	36.	102.	31.	57.	84.
2	KIAMBU	5.	3.	0.	0.	0.	0.	0.	12.	0.	0.
3	KIRINYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	MURANG'A	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	NYANDARU	0.	0.	0.	0.	0.	0.	52.	0.	0.	0.
6	NyERI	5.	2.	0.	0.	0.	0.	50.	0.	0.	0.
7	KILIFI	0.	2.	0.	0.	0.	2.	0.	0.	3.	0.
8	KWALE	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.
9	LAMU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	MOMBASA	4.	18.	6.	0.	8.	4.	0.	0.	20.	9.
11	TAI/TAVE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
12	TANA RIV	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	EMBU	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	ISIOLO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	KITUI	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
16	MACHAKOS	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.
17	MARSABIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	MERU	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.
19	GARISSA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	MANDERA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	WAJIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	KISII	7.	2.	0.	0.	0.	0.	0.	0.	0.	0.
23	KISUMU	82.	234.	4.	3.	84.	0.	70.	26.	89.	407.
24	SIAYA	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.
25	S.NYANZA	20.	11.	0.	0.	0.	0.	0.	0.	10.	20.
26	KAJIADO	0.	0.	0.	0.	3.	0.	0.	0.	0.	0.
27	KERICHO	4.	8.	3.	0.	4.	0.	0.	0.	11.	2.
28	LAIKIPIA	0.	2.	0.	0.	0.	0.	0.	0.	8.	0.
29	NAKURU	36.	199.	1.	0.	36.	0.	0.	10.	3.	18.
30	NAROK	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	TRANS-NZ	1.	462.	2.	0.	1.	0.	0.	5.	12.	0.
32	UASIN-GI	411.	429.	22.	16.	7.	0.	36.	71.	364.	76.
33	BARINGO	2.	33.	9.	0.	0.	0.	0.	0.	0.	0.
34	ELGEYO M	2.	1.	0.	0.	0.	0.	0.	5.	0.	0.
35	NANDI	4.	2.	0.	0.	0.	0.	0.	0.	3.	6.
36	SAMBURU	0.	3.	0.	0.	0.	0.	0.	0.	0.	0.
37	TURKANA	0.	25.	0.	0.	0.	0.	0.	0.	0.	0.
38	W.POKOT	0.	18.	0.	0.	0.	0.	0.	0.	0.	0.
39	BUNGOMA	1.	394.	0.	0.	0.	0.	0.	0.	63.	18.
40	BUSIA	0.	72.	0.	0.	0.	0.	0.	0.	14.	11.
41	KAKAMEGA	68.	61.	3.	4.	13.	0.	0.	0.	294.	12.
42		0.	11.	0.	0.	0.	0.	0.	0.	0.	0.
43	TOTAL	766.	2210.	110.	27.	169.	43.	271.	160.	952.	670.

Table II-3 (Continued)

		41	42	43
1	NAIROBI	65.	91.	11305.
2	KIAMBU	6.	0.	2744.
3	KIRINYA	0.	0.	708.
4	MURANG'A	0.	0.	1398.
5	NYANDARU	0.	0.	225.
6	NYERI	2.	0.	835.
7	KILIFI	0.	0.	1612.
8	KWALE	1.	0.	1707.
9	LAMU	0.	0.	35.
10	MOMBASA	6.	156.	4732.
11	TAI/TAVE	0.	0.	313.
12	TANA RIV	0.	0.	232.
13	EMBU	0.	0.	912.
14	ISIOLO	0.	0.	46.
15	KITUI	3.	0.	280.
16	MACHAKOS	0.	1.	2754.
17	MARSABIT	0.	0.	7.
18	MERU	0.	0.	220.
19	GARISSA	0.	0.	34.
20	MANDERA	0.	0.	30.
21	WAJIR	0.	0.	9.
22	KISII	7.	0.	1170.
23	KISUMU	742.	7.	8162.
24	SIAYA	14.	0.	1207.
25	S.NYANZA	40.	7.	3004.
26	KAJIADO	1.	1.	623.
27	KERICHO	2.	0.	999.
28	LAIKIPIA	0.	0.	209.
29	NAKURU	27.	2.	2177.
30	NAROK	0.	0.	695.
31	TRANS-NZ	41.	0.	809.
32	UASIN-GI	30.	5.	2013.
33	BARINGO	0.	0.	175.
34	ELGEYO M	4.	0.	16.
35	NANDI	21.	0.	264.
36	SAMBURU	0.	0.	18.
37	TURKANA	0.	0.	457.
38	W.POKOT	0.	0.	125.
39	BUNGOMA	302.	0.	929.
40	BUSIA	28.	0.	655.
41	KAKAMEGA	513.	0.	1963.
42		0.	0.	215.
43	TOTAL	1856.	270.	56023.